



CP6940

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▶ CP6940 - CLI Reference Manual

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Kontron S&T AG

Lise-Meitner-Straße 3-5
86156 Augsburg
Germany
www.kontron.com

Revision History

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1.04	Added configuration options in „File Integrity Commands“ chapter	2023-08-22
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About this Book

This document describes command-line interface (CLI) commands you use to view and configure FASTPATH software. You can access the CLI by using a direct connection to the serial port or by using telnet or SSH over a remote network connection.

This document is for system administrators who configure and operate systems using FASTPATH software. It provides an understanding of the configuration options of the FASTPATH software.

This document assumes that the reader has a basic knowledge of Ethernet and networking concepts.

Please note, FASTPATH 8.x SW versions and higher are only running on boards, equipped with extended memory.

How to Use this Document

Chapter 1, "Using the Command-Line Interface" on page 15 details the procedure to quickly become acquainted with the FASTPATH software.

NOTICE

Please note, the suite of features supported by the FASTPATH packages are not available on all the platforms to which FASTPATH has been ported.

Symbols

The following symbols may be used in this manual.

▲ DANGER

Note: DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

▲ WARNING

Note: WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

▲ CAUTION

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NOTICE

Note: NOTICE indicates a property damage message.



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Please refer also to the „High.Voltage Safety Instructions“ portion below in this section.



ESD Sensitive Device!

This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.



HOT Surface!

Do NOT touch! Allow to cool before servicing.



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This symbol also indicates detail information about the specific product configuration.



This symbol precedes helpful hints and tips for daily use.

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Special Handling and Unpacking Instruction



ESD Sensitive Device!

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Kontron follows the DEEE/WEEE directive

You are encouraged to return our products for proper disposal.

The Waste Electrical and Electronic Equipment (WEEE) Directive aims to:

Reduce waste arising from electrical and electronic equipment (EEE)

Make producers of EEE responsible for the environmental impact of their products, especially when the product become waste

Encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE

Improve the environmental performance of all those involved during the lifecycle of EEE.

1/ Using the Command-Line Interface

The command-line interface (CLI) is a text-based way to manage and monitor the system. You can access the CLI by using a direct serial connection or by using a remote logical connection with telnet or SSH.

This chapter describes the CLI syntax, conventions, and modes.

1.1 Command Syntax

A command is one or more words that might be followed by one or more parameters. Parameters can be required or optional values.

Some commands, such as `show network` or `clear vlan`, do not require parameters. Other commands, such as `network parms`, require that you supply a value after the command. You must type the parameter values in a specific order, and optional parameters follow required parameters. The following example describes the command syntax for the `network parms ipaddr netmask [gateway]` command.

- `network parms` is the command name.
- `ipaddr` and `netmask` are parameters and represent required values that you must enter after you type the command keywords.
- `[gateway]` is an optional parameter, so you are not required to enter a value in place of the parameter.

The CLI Command Reference lists each command by the command name and provides a brief description of the command. Each command reference also contains the following information:

- Format shows the command keywords and the required and optional parameters.
- Mode identifies the command mode you must be in to access the command.
- Default shows the default value, if any, of a configurable setting on the device.

The `show` commands also contain a description of the information that the command shows.

1.2 Command Conventions

The parameters for a command might include mandatory values, optional values, or keyword choices. Parameters are order-dependent. The following table describes the conventions this document uses to distinguish between value types.

Table 1: Parameter Conventions

Symbol	Example	Description
[] square brackets <i>italic font in a parameter.</i>	[value] value or [value]	Indicates an optional parameter. Indicates a variable value. You must replace the italicized text and brackets with an appropriate value, which might be a name or number.
{ } curly braces	{choice1 choice2}	Indicates that you must select a parameter from the list of choices.
Vertical bars	choice1 choice2	Separates the mutually exclusive choices.
[{ }] Braces within square brackets	[{choice1 choice2}]	Indicates a choice within an optional element.

1.3 Common Parameter Values

Parameter values might be names (strings) or numbers. To use spaces as part of a name parameter, enclose the name value in double quotation marks. For example, the expression "System Name with Spaces" forces the system to accept the spaces. Empty strings ("") are not valid user-defined strings. The following table describes common parameter values and value formatting.

Table 2: Parameter Descriptions

Parameter	Description
ipaddr	<p>This parameter is a valid IP address. You can enter the IP address in the following formats:</p> <ul style="list-style-type: none"> a (32 bits) a.b (8.24 bits) a.b.c (8.8.16 bits) a.b.c.d (8.8.8.8) <p>In addition to these formats, the CLI accepts decimal, hexadecimal and octal formats through the following input formats (where n is any valid hexadecimal, octal or decimal number):</p> <ul style="list-style-type: none"> 0xn (CLI assumes hexadecimal format.) 0n (CLI assumes octal format with leading zeros.) n (CLI assumes decimal format.)
ipv6-address	<p>FE80:0000:0000:0000:020F:24FF:FE8F:DBCB, or FE80:0:0:0:20F:24FF:FE8F:DBCB, or FE80::20F24FF:FE8F:DBCB, or FE80:0:0:0:20F:24FF:128:141:49:32</p> <p>For additional information, refer to RFC 3513.</p>
Interface or <i>slot/port</i>	Valid slot and port number separated by a forward slash. For example, 0/1 represents slot number 0 and port number 1.
Logical Interface	Represents a logical slot and port number. This is applicable in the case of a port-channel (LAG). You can use the logical slot/port to configure the port-channel.
Character strings	Use double quotation marks to identify character strings, for example, "System Name with Spaces". An empty string ("") is not valid.

1.4 slot/port Naming Convention

FASTPATH software references physical entities such as cards and ports by using a *slot/port* naming convention. The FASTPATH software also uses this convention to identify certain logical entities, such as Port-Channel interfaces.

The slot number has two uses. In the case of physical ports, it identifies the card containing the ports. In the case of logical and CPU ports it also identifies the type of interface or port.

Table 3: Type of Slots

Slot Type	Description
Physical slot numbers	Physical slot numbers begin with zero, and are allocated up to the maximum number of physical slots.
Logical slot numbers	Logical slots immediately follow physical slots and identify port-channel (LAG) or router interfaces. The value of logical slot numbers depend on the type of logical interface and can vary from platform to platform.
CPU slot numbers	The CPU slots immediately follow the logical slots.

The port identifies the specific physical port or logical interface being managed on a given slot.

Table 4: Type of Ports

Port Type	Description
Physical Ports	The physical ports for each slot are numbered sequentially starting from one/ For example, port 1 on slot 0 (an internal port) for a stand alone (nonstacked) switch is 1/0/1, port 2 is 1/0/2, port 3 is 1/0/3, and so on.
Logical Interfaces	Port-channel or Link Aggregation Group (LAG) interfaces are logical interfaces that are only used for bridging functions. VLAN routing interfaces are only used for routing functions. Loopback interfaces are logical interfaces that are always up. Tunnel interfaces are logical point-to-point links that carry encapsulated packets.
CPU ports	CPU ports are handled by the driver as one or more physical entities located on physical slots.

NOTICE

In the CLI, loopback and tunnel interfaces do not use the slot/port format. To specify a loopback interface, you use the loopback ID. To specify a tunnel interface, use the tunnel ID.

1.5 Using the No Form of a Command

The `no` keyword is a specific form of an existing command and does not represent a new or distinct command. Almost every configuration command has a `no` form. In general, use the `no` form to reverse the action of a command or reset a value back to the default. For example, the `no shutdown` configuration command reverses the shutdown of an interface. Use the command without the keyword `no` to reenable a disabled feature or to enable a feature that is disabled by default. Only the configuration commands are available in the `no` form.

1.6 Executing Show Commands

All show commands can be issued from any configuration mode (Global Configuration, Interface Configuration, VLAN Database, etc.). The show commands provide information about system and feature-specific configuration, status, and statistics. Previously, show commands could be issued only in User EXEC or Privileged EXEC modes.

1.7 CLI Output Filtering

Many CLI `show` commands include considerable content to display to the user. This can make output confusing and cumbersome to parse through to find the information of desired importance. The CLI Output Filtering feature allows the user, when executing CLI `show display` commands, to optionally specify arguments to filter the CLI output to display only desired information. The result is to simplify the display and make it easier for the user to find the information the user is interested in.

The main functions of the CLI Output Filtering feature are:

- Pagination Control
- Supports enabling/disabling paginated output for all `show` CLI commands. When disabled, output is displayed in its entirety. When enabled, output is displayed page-by-page such that content does not scroll off the terminal screen until the user presses a key to continue. `--More--` or `(q)uit` is displayed at the end of each page.
- When pagination is enabled, press the return key to advance a single line, press `q` or `Q` to stop pagination, or press any other key to advance a whole page. These keys are not configurable.

NOTICE

Although some FASTPATH show commands already support pagination, the implementation is unique per command and not generic to all commands.

- Output Filtering. "Grep"-like control for modifying the displayed output to only show the user-desired content.
- Filter displayed output to only include lines containing a specified string match.
- Filter displayed output to exclude lines containing a specified string match.
- Filter displayed output to only include lines including and following a specified string match.
- Filter displayed output to only include a specified section of the content (for example, "interface 0/1") with a configurable end-of-section delimiter.
- String matching should be case insensitive.
- Pagination, when enabled, also applies to filtered output.

Example: The following shows an example of the extensions made to the CLI `show` commands for the Output Filtering feature.

(Routing) #show running-config ?

```
<cr>          Press enter to execute the command.
|            Output filter options.
<scriptname> Script file name for writing active configuration.
all          Show all the running configuration on the switch.
interface    Display the running configuration for specified interface on the switch.
```

(Routing) #show running-config | ?

```
begin        Begin with the line that matches
exclude      Exclude lines that matches
include      Include lines that matches
section      Display portion of lines
```

1.8 FASTPATH Modules

FASTPATH software consists of flexible modules that can be applied in various combinations to develop advanced Layer 2/3/4+ products. The commands and command modes available on your switch depend on the installed modules. Additionally, for some `show` commands, the output fields might change based on the modules included in the FASTPATH software.

The FASTPATH software suite includes the following modules:

- Switching (Layer 2)
- Routing (Layer 3)
- IPv6 routing
- Multicast
- BGP-4
- Quality of Service
- Management (CLI, Web UI, and SNMP)
- IPv6 Management—Allows management of the FASTPATH device through an IPv6 through an IPv6 address without requiring the IPv6 Routing package in the system. The management address can be associated with the network port (front-panel switch ports), a routine interface (port or VLAN) and the Service port.
- Metro
- Stacking
- Data Center
- Secure Management
- Service Provider

NOTICE

Not all modules are available for all platforms or software releases.

1.9 Command Modes

The CLI groups commands into modes according to the command function. Each of the command modes supports specific FASTPATH software commands. The commands in one mode are not available until you switch to that particular mode, with the exception of the User EXEC mode commands. You can execute the User EXEC mode commands in the Privileged EXEC mode.

The command prompt changes in each command mode to help you identify the current mode. The following table describes the command modes and the prompts visible in that mode.

NOTICE

The command modes available on your switch depend on the software modules that are installed. For example, a switch that does not support BGPv4 does not have the BGPv4 Router Command Mode.

Table 5: CLI Command Modes

Command Mode	Prompt	Mode Description
User EXEC	Switch>	Contains a limited set of commands to view basic system information.
Privileged EXEC	Switch#	Allows you to issue any EXEC command, enter the VLAN Database mode, or enter the Global Configuration mode.
Global Config	Switch (Config) #	Groups general setup commands and permits you to make modifications to the running configuration.
VLAN Database	Switch (Vlan) #	Groups all the VLAN commands.
Interface Config	Switch (Interface slot/port)#	Manages the operation of an interface and provides access to the router interface configuration commands.
	Switch (Interface Loopback id) #	Use this mode to set up a physical port for a specific logical connection operation.
	Switch (Interface Tunnel id) #	
	Switch (Interface slot/port (startrange)-slot/port(endrange))#	You can also use this mode to manage the operation of a range of interfaces. For example the prompt may display as follows:
	Switch (Interface lag lag-intf-num) #	
	Switch (Interface vlan vlan-id) #	Switch (Interface 1/0/1-1/0/4) # Enters LAG Interface configuration mode for the specified LAG. Enters VLAN routing interface configuration mode for the specified VLAN ID.
Line Console	Switch (config-line) #	Contains commands to configure outbound telnet settings and console interface settings, as well as to configure console login/enable authentication.
Line SSH	Switch (config-ssh) #	Contains commands to configure SSH login/enable authentication.
Line Telnet	Switch (config-telnet) #	Contains commands to configure telnet login/enable authentication.
AAA IAS User Config	Switch (Config-IAS-User)#	Allows password configuration for a user in the IAS database.
Mail Server Config	Switch (Mail-Server)#	Allows configuration of the email server.
Policy Map Config	Switch (Config-policy-map) #	Contains the QoS Policy-Map configuration commands.

Table 5: CLI Command Modes (Continued)

Command Mode	Prompt	Mode Description
Policy Class Config	Switch (Config-policy-class-map) #	Consists of class creation, deletion, and matching commands. The class match commands specify Layer 2, Layer 3, and general match criteria.
Class Map Config	Switch (Config-class-map) #	Contains the QoS class map configuration commands for IPv4.
Ipv6_Class-Map Config	Switch (Config-class-map) #	Contains the QoS class map configuration commands for IPv6.
Router OSPF Config	Switch (Config-router) #	Contains the OSPF configuration commands.
Router OSPFv3 Config	Switch (Config rtr) #	Contains the OSPFv3 configuration commands.
Router RIP Config	Switch (Config-router) #	Contains the RIP configuration commands.
BGP Router Config	Switch (Config-router) #	Contains the BGP4 configuration commands.
Route Map Config	Switch (config-route-map) #	Contains the route map configuration commands.
IPv6 Address Family Config	Switch (Config-router-af) #	Contains the IPv6 address family configuration commands.
L2VPN Address Family Config	Switch (config-router-af-l2vpn-evpn)#	Configure Ethernet VPN settings.
Peer Template Config	(Config-rtr-tmpl)#	Contains the BGP peer template configuration commands.
RADIUS Dynamic Authorization Config	(Config-radius-da)	Contains the Radius Dynamic Authorization commands.
MAC Access-list Config	Switch (Config-mac-access-list) #	Allows you to create a MAC Access-List and to enter the mode containing MAC Access-List configuration commands.
IPv4 Access-list Config	Switch (Config-ipv4-acl) #	Allows you to create an IPv4 named or extended Access-List and to enter the mode containing IPv4 Access-List configuration commands.
IPv6 Access-list Config	Switch (Config-ipv6-acl) #	Allows you to create an IPv6 Access-List and to enter the mode containing IPv6 Access-List configuration commands.
Management Access-list Config	Switch (config-macal) #	Allows you to create a Management Access-List and to enter the mode containing Management Access-List configuration commands.
TACACS Config	Switch (Tacacs) #	Contains commands to configure properties for the TACACS servers.
User-Group Configuration	Switch (config-usergroup)	Contains user group commands.
Task-Group Configuration	Switch (config-taskgroup)	Contains task group commands.
DHCP Pool Config	Switch (Config dhcp-pool) #	Contains the DHCP server IP address pool configuration commands.
DHCPv6 Pool Config	Switch (Config dhcp6-pool) #	Contains the DHCPv6 server IPv6 address pool configuration commands.
Stack Global Config	Switch (Config stack) #	Allows you to access the Stack Global Config Mode.

Table 5: CLI Command Modes (Continued)

Command Mode	Prompt	Mode Description
ARP Access-List Config	Switch (Config-arp-access-list) #	Contains commands to add ARP ACL rules in an ARP Access List.
Support Mode	Switch (Support)#	Allows access to the support commands, which should only be used by the manufacturer's technical support personnel as improper use could cause unexpected system behavior and/or invalidate product warranty.
PTP Clock Config	Switch (config-ptp-clk)#	Contains commands to configure IEEE 1588/precision time protocol (PTP) settings.
PTP Port Config	Switch (config-ptp-port)#	Contains commands to configure port settings for the IEEE 1588/PTP clock.
VLAN Config	Switch (vlan vlan-id) #	Contains commands to configure private VLAN settings on a VLAN, FIP snooping, and to configure the RSPAN mode.
Maintenance Domain Config	Switch (config-md)#	Contains commands to create maintenance associations and configure per-maintenance domain parameters.
Maintenance Association Config	Switch (config-ma)#	Contains commands to configure continuity check message (CCM) settings.
Service Instance Config	Switch (config-service-mode)#	Contains commands to configure settings related to Ethernet Virtual Circuits.
ERSPAN Source Session Configuration Mode	Switch (config-erspan-src)#	Configure the source interface for ERSPAN and access ERSPAN Source Session Destination Configuration mode.
ERSPAN Source Session Destination Configuration Mode	Switch (config-erspan-src-dst)#	Configure the ERSPAN origin and destination IPv4 addresses, session ID, and various characteristics of the packets in the ERSPAN traffic.
ERSPAN Destination Session Configuration Mode	Switch (config-erspan-src)#	Configure the destination interface for ERSPAN and access ERSPAN Destination Session Source Configuration mode.
ERSPAN Destination Session Source Configuration Mode	Switch (config-erspan-dst-src)#	Configure the ERSPAN destination IP address and ERSPAN session ID.
Track Configuration Mode	Switch (config-track)#	Configure settings to track the state of an IP Service Level Agreements (SLAs) operation.
IP SLA Configuration Mode	Switch (config-ip-sla)#	Configure an IP SLA ICMP echo operation.
IP SLA ICMP ECHO Configuration Mode	Switch (config-ip-sla-echo)#	Configure IP SLA ICMP parameters.
LDAP Search Map Config	Switch (config-ldap-search-map)#	Configure search map details for fetching user privilege level.
Service Instance Config	Switch (service-mode)#	Configures Ethernet Virtual Service (EVS) service instance settings for an interface.
MiM Tunnel Config	Switch (config-tunnel-minm)#	Configures the virtual MAC-in-MAC tunnel.
MiM Service Instance Config	Switch (config-tunnel-srv)#	Configures the virtual MAC-in-MAC tunnel service instance.
Ethernet Ring Profile Config	Switch(config-erp-profile1)	Configures an Ethernet ring profile.

Table 5: CLI Command Modes (Continued)

Command Mode	Prompt	Mode Description
Ethernet Ring Config	Switch (config-erp-name)#	Configures Ethernet ring settings.
Ethernet Ring Instance Config	Switch (config-erp-inst-number)#	Configures Ethernet ring instance settings.
Ethernet Ring Instance APS-Channel Config	Switch (config-erp-inst-number-aps)#	Configures an Ethernet ring instance APS channel.
MACsec Policy Config	Switch (Config-mka-policy) #	Creates or configures a MACsec Key Agreement (MKA) Protocol policy and enters MKA policy configuration mode.
Key Chain Config	Switch (Config-key-chain) #	Creates or configures a MACsec key chain, and enters Key Chain configuration mode.
Port Profile Config	Switch (Config-port-prof)#	Creates and names a port profile for the specified type of interface, and enters the Port Profile configuration mode.

The following table explains how to enter or exit each mode. To exit a mode and return to the previous mode, enter `exit`. To exit to Privileged EXEC mode, press `Ctrl+Z`.

NOTICE

Pressing `Ctrl+Z` from Privileged EXEC mode exits to User EXEC mode. To exit User EXEC mode, enter `logout`.

Table 6: CLI Mode Access and Exit

Command Mode	Access Method
User EXEC	This is the first level of access.
Privileged EXEC	From the User EXEC mode, enter <code>enable</code> .
Global Config	From the Privileged EXEC mode, enter <code>configure</code> .
VLAN Database	From the Privileged EXEC mode, enter <code>vlan database</code> .
Interface Config	From the Global Config mode, enter: <code>interface slot/port or</code> <code>interface loopback id or</code> <code>interface tunnel id</code> <code>interface slot/port (startrange) -slot/port (endrange)</code> <code>interface lag lag-intf-num</code> <code>interface vlan vlan-id</code>
Line Console	From the Global Config mode, enter <code>line console</code> .
Line SSH	From the Global Config mode, enter <code>line ssh</code> .
Line Telnet	From the Global Config mode, enter <code>line telnet</code> .
AAA IAS User Config	From the Global Config mode, enter <code>aaa ias-user username name</code> .
Mail Server Config	From the Global Config mode, enter <code>mail-server address</code> .
Policy-Map Config	From the Global Config mode, enter <code>policy-map</code> .
Policy-Class-Map Config	From the Policy Map mode enter <code>class</code> .
Class-Map Config	From the Global Config mode, enter <code>class-map</code> , and specify the optional keyword <code>ipv4</code> to specify the Layer 3 protocol for this class. See Section 7.3.1: "class-map" command for more information.

Table 6: CLI Mode Access and Exit (Continued)

Command Mode	Access Method
VPC	From Global Config mode, enter <code>vpc</code> .
Ipv6-Class-Map Config	From the Global Config mode, enter <code>class-map</code> and specify the optional keyword <code>ipv6</code> to specify the Layer 3 protocol for this class. See class-map command for more information.
Router OSPF Config	From the Global Config mode, enter <code>router ospf</code> .
Router OSPFv3 Config	From the Global Config mode, enter <code>ipv6 router ospf</code> .
Router RIP Config	From the Global Config mode, enter <code>router rip</code> .
BGP Router Config	From the Global Config mode, enter <code>router bgp asnumber</code> .
Route Map Config	From the Global Config mode, enter <code>-route-map map-tag</code> .
IPv6 Address Family Config	From the BGP Router Config mode, enter <code>address-family ipv6</code> .
L2VPN Address Family Config	From the BGP Router Config mode, enter <code>address-family l2vpn evpn</code> .
Peer Template Config	From the BGP Router Config mode, enter <code>template peer name</code> to create a BGP peer template and enter Peer Template Configuration mode.
MAC Access-list Config	From the Global Config mode, enter <code>mac access-list extended name</code> .
IPv4 Access-list Config	From the Global Config mode, enter <code>ip access-list name</code> .
IPv6 Access-list Config	From the Global Config mode, enter <code>ipv6 access-list name</code> .
Management Access-list Config	From the Global Config mode, enter <code>management access-list name</code> .
TACACS Config	From the Global Config mode, enter <code>tacacs-server host ip-addr</code> , where <code>ip-addr</code> is the IP address of the TACACS server on your network.
User-Group Configuration Mode	From the Global Config mode, enter <code>usergroup usergroup-name</code> .
Task-Group Configuration Mode	From the Global Config mode, enter <code>taskgroup taskgroup-name</code> .
DHCP Pool Config	From the Global Config mode, enter <code>ip dhcp pool pool-name</code> .
DHCPv6 Pool Config	From the Global Config mode, enter <code>ip dhcpv6 pool pool-name</code> .
Stack Global Config Mode	From the Global Config mode, enter the <code>stack</code> command.
ARP Access-List Config Mode	From the Global Config mode, enter <code>arp access-list</code> .
Support Mode	From the Privileged EXEC mode, enter <code>support</code> . Note: The <code>support</code> command is available only if the <code>techsupport enable</code> command has been issued.
PTP Clock Config	From the Global Config mode, enter the <code>ptp clock boundary domain</code> command.
PTP Port Config	From the PTP Clock Config mode, enter the <code>clock-port</code> command.
VLAN Config	From the Global Config mode, enter <code>vlan vlan-id</code> .
Maintenance Domain Config	From the Global Config mode, enter <code>ethernet cfm domain domain-name level level</code> .
Maintenance Association Config	From the Maintenance Domain Config mode, enter <code>service service-name vlan vlanID</code> .
Service Instance Config	From Interface Config mode, enter <code>service instance</code> .
ERSPAN Source Session Configuration Mode	From the Global Config mode, enter <code>monitor session session-id type erspan-source</code> .

Table 6: CLI Mode Access and Exit (Continued)

Command Mode	Access Method
ERSPAN Source Session Destination Configuration Mode	From the ERSPAN Source Session Configuration Mode, enter <code>destination</code> .
ERSPAN Destination Session Configuration Mode	From the Global Config mode, enter <code>monitor session session-id type erspan-destination</code> .
ERSPAN Destination Session Source Configuration Mode	From the ERSPAN Destination Session Configuration Mode, enter <code>source</code> .
Track Configuration Mode	From Global Config mode, enter <code>track object-number ip sla operation-number</code> .
IP SLA Configuration Mode	From Global Config mode, enter <code>ip sla operation-number</code> .
SLA ICMP ECHO Configuration Mode	From IP SLA Config mode, enter <code>icmp-echo destination-ip-address</code> .
LDAP Search Map Config	From Global Config mode, enter <code>ldap search-map map-name</code> .
Service Instance Config	From Interface Config mode, enter <code>service instance number ethernet name</code> .
MiM Tunnel Config	From Global Config mode, enter <code>ethernet mac-tunnel virtual number</code> .
MiM Service Instance Config	From MiM Tunnel Config mode, enter <code>service instance number</code> .
Ethernet Ring Profile Config	From Global Config mode, enter <code>ethernet ring g8032 profile name</code> .
Ethernet Ring Config	From Global Config mode, enter <code>ethernet ring g8032 name</code> .
Ethernet Ring Instance Config	From Ethernet Ring Config mode, enter <code>instance number</code> .
Ethernet Ring Instance APS-Channel Config	From Ethernet Ring Instance Config mode, enter <code>aps-channel</code> .
MACsec Policy Config	From Global Config mode, enter <code>mka policy {policy-name}</code> .
Key Chain Config	From Global Config mode, enter <code>key chain {key-chain-name} macsec</code> .
Port Profile Config	From Global Config mode, enter <code>port-profile [type {ethernet interface-vlan port-channel}] <name></code> .

1.10 Command Completion and Abbreviation

Command completion finishes spelling the command when you type enough letters of a command to uniquely identify the command keyword. Once you have entered enough letters, press the SPACEBAR or TAB key to complete the word.

Command abbreviation allows you to execute a command when you have entered there are enough letters to uniquely identify the command. You must enter all of the required keywords and parameters before you enter the command.

1.11 CLI Error Messages

If you enter a command and the system is unable to execute it, an error message appears. The following table describes the most common CLI error messages.

Table 7: CLI Error Messages

Message Text	Description
% Invalid input detected at '^' marker.	You entered an incorrect or unavailable command. The carat (^) shows where the invalid text is detected. This message also appears if any of the parameters or values are not recognized.
Command not found / Incomplete command. Use ? to list commands.	You did not enter the required keywords or values.
Ambiguous command	You did not enter enough letters to uniquely identify the command.

1.12 CLI Line-Editing Conventions

The following table describes the key combinations you can use to edit commands or increase the speed of command entry. You can access this list from the CLI by entering `help` from the User or Privileged EXEC modes.

Table 8: CLI Editing Conventions

Key Sequence	Description
Del or Backspace	Delete previous character.
Ctrl+A	Go to beginning of line.
Ctrl+E	Go to end of line.
Ctrl+F	Go forward one character.
Ctrl+B	Go backward one character.
Ctrl+C	Cancel input and go to next line.
Ctrl+D	Delete current character.
Ctrl+U or Ctrl+X	Delete to beginning of line.
Ctrl+K	Delete to end of line.
Ctrl+W	Delete previous word.
Ctrl+T	Transpose previous character.
Ctrl+P	Go to previous line in history buffer.
Ctrl+R	Rewrites or pastes the line.
Ctrl+N	Go to next line in history buffer.
Ctrl+Y	Prints last deleted character.
Ctrl+Q	Enables serial flow.
Ctrl+S	Disables serial flow.

Table 8: CLI Editing Conventions (Continued)

Key Sequence	Description
Ctrl+Z	Return to root command prompt.
Tab, spacebar	Command-line completion.
Exit	Go to next lower command prompt.
?	List available commands, keywords, or parameters.

1.13 Using CLI Help

Enter a question mark (?) at the command prompt to display the commands available in the current mode.

(switch) >?

enable	Enter into user privilege mode.
help	Display help for various special keys.
logout	Exit this session. Any unsaved changes are lost.
password	Change an existing user's password.
ping	Send ICMP echo packets to a specified IP address.
quit	Exit this session. Any unsaved changes are lost.
show	Display Switch Options and Settings.
telnet	Telnet to a remote host.

Enter a question mark (?) after each word you enter to display available command keywords or parameters.

(switch) #network ?

ipv6	Configure IPv6 parameters for system network.
jvamide	Enable/Disable.
mac-address	Configure MAC Address.
mac-type	Select the locally administered or burned-in MAC address.
mgmt_vlan	Configure the Management VLAN ID of the switch.
parms	Configure Network Parameters of the device.
protocol	Select DHCP, BootP, or None as the network config protocol.

If the help output shows a parameter in angle brackets, you must replace the parameter with a value.

(Routing) #network parms ?

<ipaddr>	Enter the IP Address.
none	Reset IP address and gateway on management interface

If there are no additional command keywords or parameters, or if additional parameters are optional, the following message appears in the output.

<cr> **Press Enter to execute the command**

You can also enter a question mark (?) after typing one or more characters of a word to list the available command or parameters that begin with the letters, as shown in the following example.

(switch) #show m?

mac	mac-addr-table	mac-address-table
mail-server	mbuf	monitor

1.14 Accessing the CLI

You can access the CLI by using a direct console connection or by using a telnet or SSH connection from a remote management host.

For the initial connection, you must use a direct connection to the console port. You cannot access the system remotely until the system has an IP address, subnet mask, and default gateway. You can set the network configuration information manually, or you can configure the system to accept these settings from a BOOTP or DHCP server on your network. For more information, see [Section 2.1: "Network Interface Commands"](#).

2/ Management Commands

This chapter describes the management commands available in the FASTPATH CLI.

NOTICE

The commands in this chapter are in one of three functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Clear commands clear some or all of the settings to factory defaults.

2.1 Network Interface Commands

This section describes the commands you use to configure a logical interface for management access. To configure the management VLAN, see [network mgmt_vlan](#) command.

2.1.1 enable (Privileged EXEC Access)

This command gives you access to the Privileged EXEC mode. From the Privileged EXEC mode, you can configure the network interface.

Format enable
Mode User EXEC

2.1.2 do (Privileged EXEC Commands)

This command executes Privileged EXEC mode commands from any of the configuration modes.

Format do *Priv Exec Mode Command*
Mode • Global Config
 • Interface Config
 • VLAN Database
 • Routing Config

Example: The following is an example of the `do` command that executes the Privileged EXEC command `script list` in Global Config Mode.

```
(Routing) #configure
```

```
(Routing)(config)#do script list
```

```
Configuration Script Name      Size(Bytes)
-----
backup-config                  2105
running-config                 4483
startup-config                 445
```

```
3 configuration scripts found.
2041 Kbytes free.
Routing(config)#
```

2.1.3 serviceport ip

This command sets the IP address, the netmask and the gateway of the network management port. You can specify the `none` option to clear the IPv4 address and mask and the default gateway (that is, reset each of these values to 0.0.0.0).

Format serviceport ip {*ipaddr netmask [gateway]* | none}
Mode Privileged EXEC

2.1.4 serviceport protocol

This command specifies the network management port configuration protocol. If you modify this value, the change is effective immediately. If you use the `bootp` parameter, the switch periodically sends requests to a BootP server until a response is received. If you use the `dhcp` parameter, the switch periodically sends requests to a DHCP server until a response is received. If you use the `none` parameter, you must configure the network information for the switch manually.

Format `serviceport protocol {none | bootp | dhcp}`
Mode Privileged EXEC

2.1.5 serviceport protocol dhcp

This command enables the DHCPv4 client on a Service port. If the `client-id` optional parameter is given, the DHCP client messages are sent with the client identifier option.

Default `none`
Format `serviceport protocol dhcp [client-id]`
Mode Privileged EXEC

There is no support for the `no` form of the command `serviceport protocol dhcp client-id`. To remove the `client-id` option from the DHCP client messages, issue the command `serviceport protocol dhcp` without the `client-id` option. The command `serviceport protocol none` can be used to disable the DHCP client and `client-id` option on the interface.

Example: The following shows an example of the command.

```
(Routing) # serviceport protocol dhcp client-id
```

2.1.6 network parms

This command sets the IP address, subnet mask and gateway of the device. The IP address and the gateway must be on the same subnet. When you specify the `none` option, the IP address and subnet mask are set to the factory defaults.

Format `network parms {ipaddr netmask [gateway] | none}`
Mode Privileged EXEC

2.1.7 network protocol

This command specifies the network configuration protocol to be used. If you modify this value, change is effective immediately. If you use the `bootp` parameter, the switch periodically sends requests to a BootP server until a response is received. If you use the `dhcp` parameter, the switch periodically sends requests to a DHCP server until a response is received. If you use the `none` parameter, you must configure the network information for the switch manually.

Default `none`
Format `network protocol {none | bootp | dhcp}`
Mode Privileged EXEC

2.1.8 network protocol dhcp

This command enables the DHCPv4 client on a Network port. If the `client-id` optional parameter is given, the DHCP client messages are sent with the client identifier option.

Default `none`
Format `network protocol dhcp [client-id]`
Mode Global Config

There is no support for the `no` form of the command `network protocol dhcp client-id`. To remove the `client-id` option from the DHCP client messages, issue the command `network protocol dhcp` without the `client-id` option. The command `network protocol none` can be used to disable the DHCP client and `client-id` option on the interface.

Example: The following shows an example of the command.

```
(Routing) # network protocol dhcp client-id
```

2.1.9 network mac-address

This command sets locally administered MAC addresses. The following rules apply:

- Bit 6 of byte 0 (called the U/L bit) indicates whether the address is universally administered (b'0') or locally administered (b'1').
- Bit 7 of byte 0 (called the I/G bit) indicates whether the destination address is an individual address (b'0') or a group address (b'1').
- The second character, of the twelve character `macaddr`, must be 2, 6, A, or E.

A locally administered address must have bit 6 On (b'1') and bit 7 Off (b'0').

Format `network mac-address macaddr`

Mode Privileged EXEC

2.1.10 network mac-type

This command specifies whether the switch uses the burned in MAC address or the locally-administered MAC address.

Default `burnedin`

Format `network mac-type {local | burnedin}`

Mode Privileged EXEC

2.1.10.1 no network mac-type

This command resets the value of MAC address to its default.

Format `no network mac-type`

Mode Privileged EXEC

2.1.11 show network

This command displays configuration settings associated with the switch's network interface. The network interface is the logical interface used for in-band connectivity with the switch using any of the switch's front panel ports. The configuration parameters associated with the switch's network interface do not affect the configuration of the front panel ports through which traffic is switched or routed. The network interface is always considered to be up, whether or not any member ports are up; therefore, the `show network` command will always show `Interface Status as Up`.

Format `show network`

Modes • Privileged EXEC
• User EXEC

Parameter	Description
Interface Status	The network interface status; it is always considered to be up.
IP Address	The IP address of the interface. The factory default value is 0.0.0.0.
Subnet Mask	The IP subnet mask for this interface. The factory default value is 0.0.0.0.
Default Gateway	The default gateway for this IP interface. The factory default value is 0.0.0.0.
IPv6 Administrative Mode	Whether enabled or disabled.

Parameter	Description
IPv6 Address/Length	The IPv6 address and length.
IPv6 Default Router	The IPv6 default router address.
Burned In MAC Address	The burned in MAC address used for in-band connectivity.
Locally Administered MAC Address	If desired, a locally administered MAC address can be configured for in-band connectivity. To take effect, 'MAC Address Type' must be set to 'Locally Administered'. Enter the address as twelve hexadecimal digits (6 bytes) with a colon between each byte. Bit 1 of byte 0 must be set to a 1 and bit 0 to a 0, that is, byte 0 should have the following mask 'xxxx xx10'. The MAC address used by this bridge when it must be referred to in a unique fashion. It is recommended that this be the numerically smallest MAC address of all ports that belong to this bridge. However it is only required to be unique. When concatenated with dot1dStpPriority a unique Bridge Identifier is formed which is used in the Spanning Tree Protocol.
MAC Address Type	The MAC address which should be used for in-band connectivity. The choices are the burned in or the Locally Administered address. The factory default is to use the burned in MAC address.
Configured IPv4 Protocol	The IPv4 network protocol being used. The options are bootp dhcp none.
Configured IPv6 Protocol	The IPv6 network protocol being used. The options are dhcp none.
DHCPv6 Client DUID	The DHCPv6 client's unique client identifier. This row is displayed only when the configured IPv6 protocol is dhcp.
IPv6 Autoconfig Mode	Whether IPv6 Stateless address autoconfiguration is enabled or disabled.
DHCP Client Identifier	The client identifier is displayed in the output of the command only if DHCP is enabled with the <code>client-id</code> option on the network port. See the network protocol dhcp command.

Example: The following shows example CLI display output for the network port.

```
(admin) #show network
```

```
Interface Status..... Up
IP Address..... 10.250.3.1
Subnet Mask..... 255.255.255.0
Default Gateway..... 10.250.3.3
IPv6 Administrative Mode..... Enabled
IPv6 Prefix is ..... fe80::210:18ff:fe82:64c/64
IPv6 Prefix is ..... 2003::1/128
IPv6 Default Router is ..... fe80::204:76ff:fe73:423a
Burned In MAC Address..... 00:10:18:82:06:4C
Locally Administered MAC address..... 00:00:00:00:00:00
MAC Address Type..... Burned In
Configured IPv4 Protocol ..... None
Configured IPv6 Protocol ..... DHCP
DHCPv6 Client DUID ..... 00:03:00:06:00:10:18:82:06:4C
IPv6 Autoconfig Mode..... Disabled
Management VLAN ID..... 1
DHCP Client Identifier..... 0fastpath-0010.1882.160B-v11
```

2.1.12 show serviceport

This command displays service port configuration information.

Format `show serviceport`

Mode

- Privileged EXEC
- User EXEC

Parameter	Description
Interface Status	The network interface status. It is always considered to be up.
IP Address	The IP address of the interface. The factory default value is 0.0.0.0.
Subnet Mask	The IP subnet mask for this interface. The factory default value is 0.0.0.0.
Default Gateway	The default gateway for this IP interface. The factory default value is 0.0.0.0.
IPv6 Administrative Mode	Whether enabled or disabled. Default value is enabled.
IPv6 Address/Length	The IPv6 address and length. Default is Link Local format.
IPv6 Default Router	The IPv6 default router address on the service port. The factory default value is an unspecified address.
Configured IPv4 Protocol	The IPv4 network protocol being used. The options are bootp dhcp none.
Configured IPv6 Protocol	The IPv6 network protocol being used. The options are dhcp none.
DHCPv6 Client DUID	The DHCPv6 client's unique client identifier. This row is displayed only when the configured IPv6 protocol is dhcp.
IPv6 Autoconfig Mode	Whether IPv6 Stateless address autoconfiguration is enabled or disabled.
Burned in MAC Address	The burned in MAC address used for in-band connectivity.
DHCP Client Identifier	The client identifier is displayed in the output of the command only if DHCP is enabled with the <code>client-id</code> option on the service port. See the serviceport protocol command.

Example: The following shows example CLI display output for the service port.

```
(admin) #show serviceport
```

```
Interface Status..... Up
IP Address..... 10.230.3.51
Subnet Mask..... 255.255.255.0
Default Gateway..... 10.230.3.1
IPv6 Administrative Mode..... Enabled
IPv6 Prefix is ..... fe80::210:18ff:fe82:640/64
IPv6 Prefix is ..... 2005::21/128
IPv6 Default Router is ..... fe80::204:76ff:fe73:423a
Configured IPv4 Protocol ..... DHCP
Configured IPv6 Protocol ..... DHCP
DHCPv6 Client DUID ..... 00:03:00:06:00:10:18:82:06:4C
IPv6 Autoconfig Mode..... Disabled
Burned In MAC Address..... 00:10:18:82:06:4D
DHCP Client Identifier..... 0fastpath-0010.1882.160C
```

2.1.13 ip netconf server start

This command enables the starting of the NETCONF server application. If disabled ("no" command) the tasks "restconf_app" is not started and no NETCONF access is provided.

Please note, that the system has to be rebooted to activate the new configuration.

Please note, that the state is stored in the board specific "hpc" file and not in the startup-config file. Therefore it is not indicated for the command "show running-config".

Default enabled
Format `ip netconf server start`
Mode Privileged EXEC

2.1.13.1 no ip netconf server start

This command disables the starting of the NETCONF server application

Format `no ip netconf server start`
Mode Privileged EXEC

2.1.14 ip netconf server disable

This command enables the NETCONF server. If disabled the task "restconf_app" is not started and no NETCONF access is provided.

With this function you can permanently enable the NETCONF server and not only at startup.

NOTICE

Default enabled
Format `ip netconf server disable`
Mode Privileged EXEC

2.1.14.1 no ip netconf server disable

This command disables the NETCONF server. If disabled the task "restconf_app" is not started and no NETCONF access is provided.

With this function you can permanently enable the NETCONF server and not only at startup.

NOTICE

Format `no ip netconf server disable`
Mode Privileged EXEC

2.1.15 show ip netconf server

This command displays the state for the NETCONF server (enabled or disabled). It displays also the state of the NETCONF server application ('show ip netconf start', see above).

Format `show ip netconf server`
Mode Privileged EXEC

2.1.16 show ip netconf server start

This command displays the state for the NETCONF server application (enabled or disabled). An active state and a configured state are indicated. If the active state is 'disabled', the NETCONF server has not been started.

Format `show ip netconf server start`
Mode Privileged EXEC

2.2 Console Port Access Commands

This section describes the commands you use to configure the console port. You can use a serial cable to connect a management host directly to the console port of the switch.

2.2.1 configure

This command gives you access to the Global Config mode. From the Global Config mode, you can configure a variety of system settings, including user accounts. From the Global Config mode, you can enter other command modes, including Line Config mode.

Format configure
Mode Privileged EXEC

2.2.2 line

This command gives you access to the Line Console mode, which allows you to configure various Telnet settings and the console port, as well as to configure console login/enable authentication.

Format line {console | telnet | ssh}
Mode Global Config

Parameter	Description
console	Console terminal line.
telnet	Virtual terminal for remote console access (Telnet).
ssh	Virtual terminal for secured remote console access (SSH).

Example: The following shows an example of the CLI command.

```
(Routing)(config)#line telnet
(Routing)(config-telnet)#
```

2.2.3 serial baudrate

This command specifies the communication rate of the terminal interface. The supported rates are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

Default 9600
Format serial baudrate {1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200}
Mode Line Config

2.2.3.1 no serial baudrate

This command sets the communication rate of the terminal interface.

Format no serial baudrate
Mode Line Config

2.2.4 serial timeout

This command specifies the maximum connect time (in minutes) without console activity. A value of 0 indicates that a console can be connected indefinitely. The time range is 0 to 160.

Default 5
Format serial timeout 0-160
Mode Line Config

2.2.4.1 no serial timeout

This command sets the maximum connect time (in minutes) without console activity.

Format no serial timeout
Mode Line Config

2.2.5 show serial

This command displays serial communication settings for the switch.

Format show serial
Modes • Privileged EXEC
 • User EXEC

Parameter	Description
Serial Port Login Timeout (minutes)	The time, in minutes, of inactivity on a serial port connection, after which the switch will close the connection. A value of 0 disables the timeout.
Baud Rate (bps)	The default baud rate at which the serial port will try to connect.
Character Size (bits)	The number of bits in a character. The number of bits is always 8.
Flow Control	Whether Hardware Flow Control is enabled or disabled. Hardware Flow Control is always disabled.
Stop Bits	The number of Stop bits per character. The number of Stop bits is always 1.
Parity	The parity method used on the Serial Port. The Parity Method is always None.

2.3 Telnet Commands

This section describes the commands you use to configure and view Telnet settings. You can use Telnet to manage the device from a remote management host.

2.3.1 ip telnet server enable

Use this command to enable Telnet connections to the system and to enable the Telnet Server Admin Mode. This command opens the Telnet listening port.

Default enabled
Format ip telnet server enable
Mode Privileged EXEC

2.3.1.1 no ip telnet server enable

Use this command to disable Telnet access to the system and to disable the Telnet Server Admin Mode. This command closes the Telnet listening port and disconnects all open Telnet sessions.

Format no ip telnet server enable
Mode Privileged EXEC

2.3.2 ip telnet port

This command configures the TCP port number on which the Telnet server listens for requests.

Default 23
Format ip telnet port 1-65535
Mode Privileged EXEC

2.3.2.1 no ip telnet port

This command restores the Telnet server listen port to its factory default value.

Format no ip telnet port

Mode Privileged EXEC

2.3.3 telnet

This command establishes a new outbound Telnet connection to a remote host. The host value must be a valid IP address or host name. Valid values for port should be a valid decimal integer in the range of 0 to 65535, where the default value is 23. If *[debug]* is used, the current Telnet options enabled is displayed. The optional *line* parameter sets the outbound Telnet operational mode as *linemode* where, by default, the operational mode is character mode. The *localecho* option enables local echo.

Format telnet ip-address/hostname port [debug] [line] [localecho]

Modes • Privileged EXEC
• User EXEC

2.3.4 transport input telnet

This command regulates new Telnet sessions. If enabled, new Telnet sessions can be established until there are no more sessions available. An established session remains active until the session is ended or an abnormal network error ends the session.

NOTICE

If the Telnet Server Admin Mode is disabled, Telnet sessions cannot be established. Use the `ip telnet server enable` command to enable Telnet Server Admin Mode.

Default enabled

Format transport input telnet

Mode Line Config

2.3.4.1 no transport input telnet

Use this command to prevent new Telnet sessions from being established.

Format no transport input telnet

Mode Line Config

2.3.5 transport output

This command regulates new outbound Telnet or SSH connections. If enabled, new outbound Telnet or SSH sessions can be established until the system reaches the maximum number of simultaneous outbound Telnet or SSH sessions allowed. If disabled, no new Telnet or SSH session can be established. An established session remains active until the session is ended or an abnormal network error ends it.

Default enabled

Format transport output {telnet|ssh}

Mode Line Config

2.3.5.1 no transport output

Use this command to disable new outbound Telnet or SSH connection. If disabled, no new outbound Telnet or SSH connection can be established.

Format no transport output
Mode Line Config

2.3.6 session-limit

This command specifies the maximum number of simultaneous outbound Telnet sessions. A value of 0 indicates that no outbound Telnet session can be established.

Default 5
Format session-limit 0-5
Mode Line Config

2.3.6.1 no session-limit

This command sets the maximum number of simultaneous outbound Telnet sessions to the default value.

Format no session-limit
Mode Line Config

2.3.7 session-timeout

This command sets the Telnet session timeout value. The timeout value unit of time is minutes.

Default 5
Format session-timeout 1-160
Mode Line Config

2.3.7.1 no session-timeout

This command sets the Telnet session timeout value to the default. The timeout value unit of time is minutes.

Format no session-timeout
Mode Line Config

2.3.8 telnetcon maxsessions

This command specifies the maximum number of Telnet connection sessions that can be established. A value of 0 indicates that no Telnet connection can be established. The range is 0 to 5.

Default 5
Format telnetcon maxsessions 0-5
Mode Privileged EXEC

2.3.8.1 no telnetcon maxsessions

This command sets the maximum number of Telnet connection sessions that can be established to the default value.

Format no telnetcon maxsessions
Mode Privileged EXEC

2.3.9 telnetcon timeout

This command sets the Telnet connection session timeout value, in minutes. A session is active as long as the session has not been idle for the value set. The time is a decimal value from 1 to 160.

NOTICE

When you change the timeout value, the new value is applied to all active and inactive sessions immediately. Any sessions that have been idle longer than the new timeout value are disconnected immediately.

Default	5
Format	telnetcon timeout 1-160
Mode	Privileged EXEC

2.3.9.1 no telnetcon timeout

This command sets the Telnet connection session timeout value to the default.

NOTICE

Changing the timeout value for active sessions does not become effective until the session is accessed again. Also, any keystroke activates the new timeout duration.

Format	no telnetcon timeout
Mode	Privileged EXEC

2.3.10 show telnet

This command displays the current outbound Telnet settings. In other words, these settings apply to Telnet connections initiated from the switch to a remote system.

Format	show telnet
Modes	<ul style="list-style-type: none"> Privileged EXEC User EXEC

Parameter	Description
Outbound Telnet Login Timeout	The number of minutes an outbound Telnet session is allowed to remain inactive before being logged off.
Maximum Number of Outbound Telnet Sessions	The number of simultaneous outbound Telnet connections allowed.
Allow New Outbound Telnet Sessions	Indicates whether outbound Telnet sessions will be allowed.

2.3.11 show telnetcon

This command displays the current inbound Telnet settings. In other words, these settings apply to Telnet connections initiated from a remote system to the switch.

Format	show telnetcon
Modes	<ul style="list-style-type: none"> Privileged EXEC User EXEC

Parameter	Description
Remote Connection Login Timeout (minutes)	This object indicates the number of minutes a remote connection session is allowed to remain inactive before being logged off. May be specified as a number from 1 to 160. The factory default is 5.
Maximum Number of Remote Connection Sessions	This object indicates the number of simultaneous remote connection sessions allowed. The factory default is 5.
Allow New Telnet Sessions	New Telnet sessions will not be allowed when this field is set to no. The factory default value is yes.
Telnet Server Admin Mode	If Telnet Admin mode is enabled or disabled.
Telnet Server Port	The configured TCP port number on which the Telnet server listens for requests. (The default is 23.)

2.4 Secure Shell Commands

This section describes the commands you use to configure Secure Shell (SSH) access to the switch. Use SSH to access the switch from a remote management host.

The system allows a maximum of five SSH sessions.

NOTICE

2.4.1 ip ssh

Use this command to enable SSH access to the system. (This command is the short form of the `ip ssh server enable` command.)

Default	disabled
Format	<code>ip ssh</code>
Mode	Privileged EXEC

2.4.1.1 no ip ssh

Use this command to disable SSH access to the system.

Format	<code>no ip ssh</code>
Mode	Privileged EXEC

2.4.2 ip ssh port

Use this command to configure the TCP port number on which the SSH server listens for requests. Valid port numbers are from 1 to 65535.

Default	22
Format	<code>ip ssh port 1-65535</code>
Mode	Privileged EXEC

2.4.2.1 no ip ssh port

Use this command to restore the SSH server listen port to its factory default value.

Format	<code>no ip ssh port</code>
Mode	Privileged EXEC

2.4.3 ip ssh pubkey-auth

Use this command to enable public key authentication for incoming SSH sessions.

Default	disabled
Format	ip ssh pubkey-auth
Mode	Privileged EXEC

2.4.3.1 no ip ssh pubkey-auth

Use this command to disable SSH access to the system.

Format	no ip ssh pubkey-auth
Mode	Privileged EXEC

2.4.4 ip ssh server algorithm encryption

Use this command to specify the encryption algorithms used to establish the SSH connection. The command also defines the order of the encryption algorithms.

Default	All encryption algorithms are enabled by default.
Format	ip ssh server algorithm encryption {[aes128-ctr] [aes192-ctr] [aes256-ctr] [chacha20-poly1305@openssh.com]}
Mode	Privileged EXEC

Example: The following shows an example of the command.

```
(Routing)#ip ssh server algorithm encryption aes128-ctr aes192-ctr
```

2.4.4.1 no ip ssh server algorithm encryption

Use the no form of the command to disable the encryption algorithm.

Format	no ip ssh server algorithm encryption {[aes128-ctr] [aes192-ctr] [aes256-ctr] [chacha20-poly1305@openssh.com]}
Mode	Privileged EXEC

2.4.5 ip ssh server algorithm hostkey

Use this command to specify the host key algorithms used to establish the SSH connection. This command also defines the order of host key algorithms.

Default	All hostkey algorithms are enabled by default.
Format	ip ssh server algorithm hostkey {[ssh-rsa] [rsa-sha2-256] [rsa-sha2-512] [ecdsa-sha2-nistp256] [ecdsa-sha2-nistp384] [ecdsa-sha2-nistp521]}
Mode	Privileged EXEC

Example: Following is an example of the command.

```
(Routing)#ip ssh server algorithm hostkey ssh-rsa ecdsa-sha2-nistp384
```

2.4.5.1 no ip ssh server algorithm hostkey

Use the `no` form of the command to disable the host key algorithm.

Format `no ip ssh server algorithm hostkey {[ssh-rsa] [rsa-sha2-256] [rsa-sha2-512]
[ecdsa-sha2-nistp256] [ecdsa-sha2-nistp384] [ecdsa-sha2-nistp521]}`

Mode Privileged EXEC

2.4.6 ip ssh server algorithm mac

Use this command to specify the Message Authentication Code algorithms used to establish the SSH connection. The command also defines the order of the MAC algorithms.

Default All MAC algorithms are enabled by default.

Format `ip ssh server algorithm mac {[hmac-sha1] [hmac-sha1-etm@openssh.com]
[hmac-md5-etm@openssh.com] [hmac-sha2-256] [hmac-sha2-512]
[hmac-sha1-96-etm@openssh.com] [hmac-md5-96-etm@openssh.com] [hmac-md5]
[hmac-sha2-256-etm@openssh.com] [hmac-sha2-512-etm@openssh.com]}`

Mode Privileged EXEC

Example: The following shows an example of the command.

```
(Routing)#ip ssh server algorithm mac hmac-md5-etm@openssh.com hmac-sha2-256 hmac-sha1
```

2.4.6.1 no ip ssh server algorithm mac

Use the `no` form of the command to disable the MAC algorithm.

Format `no ip ssh server algorithm mac {[hmac-sha1] [hmac-sha1-etm@openssh.com] [hmac-md5-
etm@openssh.com] [hmac-sha2-256] [hmac-sha2-512] [hmac-sha1-96-etm@openssh.com]
[hmac-md5-96-etm@openssh.com] [hmac-md5] [hmac-sha2-256-etm@openssh.com]
[hmac-sha2-512-etm@openssh.com]} no ip ssh server algorithm kex`

Mode Privileged EXEC

2.4.7 ip ssh server algorithm kex

Use this command to specify the key exchange algorithms used to establish the SSH connection. This command also defines the order of the Kex algorithms.

Default All Kex algorithms are enabled by default.

Format `ip ssh server algorithm kex {[curve25519-sha256] [curve25519-sha256@libssh.org]
[ecdh-sha2-nistp256] [ecdh-sha2-nistp384] [ecdh-sha2-nistp521]
[diffie-hellman-group-exchange-sha256] [diffie-hellman-group16-sha512]
[diffie-hellman-group18-sha512] [diffie-hellman-group14-sha256]
[diffie-hellman-group14-sha1]}`

Mode Privileged EXEC

Example: The following shows an example of the command.

```
(Routing)#ip ssh server algorithm kex curve25519-sha256 ecdh-sha2-nistp384
```

2.4.7.1 no ip ssh server algorithm kex

Use the `no` form of the command to disable the key exchange algorithm.

Format	<code>no ip ssh server algorithm kex {[curve25519-sha256] [curve25519-sha256@libssh.org] [ecdh-sha2-nistp256] [ecdh-sha2-nistp384] [ecdh-sha2-nistp521] [diffie-hellman-group-exchange-sha256] [diffie-hellman-group16-sha512] [diffie-hellman-group18-sha512] [diffie-hellman-group14-sha256] [diffie-hellman-group14-sha1]}</code>
Mode	Privileged EXEC

2.4.8 ip ssh server enable

This command enables the IP secure shell server. No new SSH connections are allowed, but the existing SSH connections continue to work until timed-out or logged-out.

Default	enabled
Format	<code>ip ssh server enable</code>
Mode	Privileged EXEC

2.4.8.1 no ip ssh server enable

This command disables the IP secure shell server.

Format	<code>no ip ssh server enable</code>
Mode	Privileged EXEC

2.4.9 ip ssh authentication-retries

Use this command to specify the maximum authentication retries allowed per SSH connection.

Default	3
Format	<code>ip ssh authentication-retries <0-5></code>
Mode	Privileged EXEC

Example: The following shows an example of the command.

```
(Routing)#ip ssh authentication-retries 2
```

2.4.9.1 no ip ssh authentication-retries

Use the `no` form of the command to set the default value.

Format	<code>no ip ssh authentication-retries</code>
Mode	Privileged EXEC

2.4.10 netconf ssh

Use this command to enable the Network Configuration Protocol (NETCONF) server over SSH. Generate RSA and DSA keys using the [Section 2.5.6: "crypto key generate rsa"](#) and [Section 2.5.7: "crypto key generate dsa"](#) commands prior to enabling the NETCONF server.

Default	none
Format	<code>netconf ssh</code>
Mode	Global Config

Example: The following is an example of the command.

```
(Routing)(Config)#crypto key generate rsa
(Routing)(Config)#
(Routing)(Config)#crypto key generate dsa
(Routing)(Config)#

(Routing)(Config)#netconf ?
ssh                Enable NETCONF over SSH 2.

(Routing)(Config)#netconf ssh
(Routing)(Config)#
```

2.4.10.1 no netconf ssh

Use the `no` form of the command to disable NETCONF server.

Format `no netconf ssh`
Mode Global Config

2.4.11 sshcon maxsessions

This command specifies the maximum number of SSH connection sessions that can be established. A value of 0 indicates that no ssh connection can be established. The range is 0 to 5.

Default 5
Format `sshcon maxsessions 0-5`
Mode Privileged EXEC

2.4.11.1 no sshcon maxsessions

This command sets the maximum number of allowed SSH connection sessions to the default value.

Format `no sshcon maxsessions`
Mode Privileged EXEC

2.4.12 sshcon timeout

This command sets the SSH connection session timeout value, in minutes. A session is active as long as the session has been idle for the value set. The time is a decimal value from 1 to 160.

Changing the timeout value for active sessions does not become effective until the session is re accessed. Also, any key-stroke activates the new timeout duration.

Default 5
Format `sshcon timeout 1-160`
Mode Privileged EXEC

2.4.12.1 no sshcon timeout

This command sets the SSH connection session timeout value, in minutes, to the default.

Changing the timeout value for active sessions does not become effective until the session is re accessed. Also, any key-stroke activates the new timeout duration.

Format `no sshcon timeout`
Mode Privileged EXEC

2.4.13 show ip ssh

This command displays the SSH settings.

Format show ip ssh
Mode Privileged EXEC

Parameter	Description
Administrative Mode	This field indicates whether the administrative mode of SSH is enabled or disabled.
SSH Port	The SSH port.
Protocol Level	The SSH protocol version. This field may have the values of version 1, version 2, or both version 1 and version 2.
SSH Sessions Currently Active	The number of SSH sessions currently active.
Max SSH Sessions Allowed	The maximum number of SSH sessions allowed.
SSH Timeout	The SSH timeout value in minutes.
Keys Present	Indicates whether the SSH RSA, DSA, and ECDSA key files are present on the device. The length of the respective keys and the key encryption status (if the key is encrypted) are displayed in parenthesis.
Key Generation in Progress	Indicates whether RSA, DSA, or ECDSA key files generation is currently in progress.
SSH Public Key Authentication Mode	Indicates whether the password less login for the SSH client is enabled or not.
SCP Server Administrative Mode	Indicates whether the SCP server is enabled on the switch. To allow file transfers from a host system to the switch using SCP push operations, the SCP server must be enabled.
Max SSH Authentication Tries	Displays the maximum number of authentication retries supported per SSH connection.
Encryption Algorithms	Displays the encryption algorithms used for the SSH connection.
MAC Algorithms	Displays the Message Authentication Code algorithms used for the SSH connection.
KEX Algorithms	Displays the Key Exchange algorithms that are used over the SSH connection.
HostKey Algorithms	Displays the host key algorithms that are used over the SSH connection.

Example: The following shows example CLI display output for the command.

```
(Routing)(Config)#show ip ssh
```

SSH Configuration

```
Administrative Mode: ..... Enabled
SSH Port: ..... 22
Protocol Level: ..... Version 2
SSH Sessions Currently Active: ..... 0
Max SSH Sessions Allowed: ..... 5
SSH Timeout (mins): ..... 5
Keys Present: ..... DSA(1024, Encrypted)
                  RSA(1024, Encrypted)
                  ECDSA(384, Encrypted)

Key Generation In Progress: ..... None
SSH Public Key Authentication Mode: ..... Disabled
SCP server Administrative Mode: ..... Disabled
Max SSH authentication tries:..... 3
Encryption Algorithms:..... aes128-ctr
                           aes192-ctr
                           aes256-ctr
                           chacha20-poly1305@openssh.com

MAC Algorithms:..... hmac-sha1
```

```

hmac-sha1-etm@openssh.com
hmac-md5-etm@openssh.com
hmac-sha2-256
hmac-sha2-512
hmac-sha1-96-etm@openssh.com
hmac-md5-96-etm@openssh.com
hmac-md5
hmac-sha2-256-etm@openssh.com
hmac-sha2-512-etm@openssh.com

KEX Algorithms:..... curve25519-sha256
                    curve25519-sha256@libssh.org
                    ecdh-sha2-nistp256
                    ecdh-sha2-nistp384
                    ecdh-sha2-nistp521
                    diffie-hellman-group-exchange-sha256
                    diffie-hellman-group16-sha512
                    diffie-hellman-group18-sha512
                    diffie-hellman-group14-sha256
                    diffie-hellman-group14-sha1

HostKey Algorithms:..... rsa-sha2-256
                        rsa-sha2-512
                        ecdsa-sha2-nistp256
                        ecdsa-sha2-nistp384
                        ecdsa-sha2-nistp521

```

2.4.14 ssh

Use this command to establish an outbound SSH session for the DUT to a remote host.

Format `ssh [-l user_name] [-p port_number] {ip-address | hostname}`

Mode Privileged EXEC

Parameter	Description
-l <i>user_name</i>	Specify the user name to log in on the remote machine. If this parameter is not specified, the <i>user_name</i> currently logged in to the DUT is used as the user name.
-p <i>port_number</i>	Specify the port number used to establish the SSH session. If this parameter is not specified, port number 22 is used as the port number.
<i>ip-address</i>	The IP address of the host to which to establish the SSH connection.
<i>hostname</i>	The hostname of the host to which to establish the SSH connection.

2.4.15 ssh session-limit

Use this command to specify the maximum number of outbound SSH sessions that can be established simultaneously. A value of 0 (zero) indicates that no outbound SSH session can be established. The range is 0 to 5.

Default 5

Format `ssh session-limit 0-5`

Mode Global Config

2.4.15.1 no ssh session-limit

This command sets to the default value the maximum number of outbound telnet sessions that can be established simultaneously.

Format `no ssh session-limit`

Mode Global Config

2.4.16 ssh timeout

Use this command to set the outbound SSH session timeout value, in minutes. A value of 0 (zero) indicates that the session remains active indefinitely. The time is a decimal value from 0 to 160.

Default 0
Format ssh timeout 0-160
Mode Global Config

2.4.16.1 no ssh timeout

This command sets to the default value the outbound SSH session timeout value, in minutes.

Format no ssh timeout
Mode Global Config

2.4.17 show netconf

Use this command to display the NETCONF server status.

Format show netconf
Mode Privileged EXEC

Example: The following shows example CLI display output.

```
(Routing)#show netconf
```

```
NETCONF Server Status..... Running
```

2.4.18 show ssh

Use this command to display the current outbound SSH settings.

Format show ssh
Mode Privileged EXEC

Parameter	Description
Outbound SSH Admin Mode	Indicates if outbound SSH sessions can be established.
Outbound SSH Login Timeout (minutes)	Indicates the number of minutes an outbound telnet session is allowed to remain inactive before being logged off.
Maximum Number of Outbound SSH Sessions	Indicates the number of simultaneous outbound SSH connections allowed.
Number of Active Outbound SSH Sessions	Indicates the number of simultaneous outbound SSH connections active.

2.5 Management Security Commands

This section describes commands you use to generate keys and certificates, which you can do in addition to loading them as before.

2.5.1 crypto certificate generate

Use this command to generate a self-signed certificate for HTTPS. This command enters the Crypto Certificate Generation mode. Enter the fields, such as `key-generate`, `duration`, `location`, and so on. The generated RSA key for SSL has a length specified by the `key-generate` field. The `exit` command attempts to generate the self-signed certificate. Use the `end` command to exit Crypto Certificate Generation mode without generating a certificate.

NOTICE

Starting with FASTPATH 8.4, the switch uses SHA2-256 to sign the generated certificate instead of SHA1, and the key length of the certificate generated is changed from 1024 to 2048 bits. This change in key size is only for the newly generated certificates and does not alter any functionality with the existing or loaded certificates.

Format `crypto certificate 1-2 generate`
Mode Global Config

Example: The following example shows the fields entered by the user to generate a self-signed certificate.

```
(Routing)(config)#crypto certificate 1 generate
(Routing)(config-crypto-cert-gen)#?
common-name            Specifies the common name.
country                Specifies the country name.
do                      Run Privileged Exec mode commands.
duration               Specifies number of days a self-signed
                        certification would be valid.
email                  Specifies the contact email address.
exit                    To exit from the mode.
key-generate           Regenerate SSL RSA key. If unspecified defaults to
                        1024.
location               Specifies the location or city name.
organization-name      Specifies the organization name
organization-unit      Specifies the organization internal unit
show                   Display Switch Options and Settings.
state                  Specifies the state or province name.
(Routing)(config-crypto-cert-gen)#
(Routing)(config-crypto-cert-gen)#key-generate 1024
(Routing)(config-crypto-cert-gen)#exit
```

Certification Generation Successful..

```
(Routing)(config)#
```

2.5.1.1 no crypto certificate

Use this command to delete the HTTPS certificate files from the device, regardless of whether they are self-signed or downloaded from an outside source.

Format `no crypto certificate 1-2`
Mode Global Config

2.5.2 crypto certificate import

Use this command to import a signed certificate provided by the Certification Authority (CA). The imported certificate must be based on a certificate request created by the `crypto certificate request` Privileged EXEC command. Enter an external certificate (signed by the Certification Authority) to the switch. To end the session, add a period on a separate line after the input, and press `Enter`. The signed certificate must contain the switch public key, match the RSA key on the switch, and must be in X509 PEM text format.

Format `crypto certificate 1-2 import`
Mode Global Config

Example: The following example imports a certificate signed by the Certification Authority for HTTPS.

```
(Routing)(Config)#crypto certificate 1 import
```

Please paste the input now, add a period (.) on a separate line after the input, and press `Enter`.

```
-----BEGIN CERTIFICATE-----
MIIBrDCCARWgAwIBAgIJANI+zML5qm1oMA0GCSqGSIb3DQEBCwUAMBgxFjAUBgNV
BAMMDTEwLjEzMC44Ni4yMTcwHhcNNzAwMTAxMDM0MzY3WWhcNNzEwMTAxMDM0MzY3
WjAYMRYwFAYDVQQLDAA0xMC4xMzAuODYuMjE3MIGfMA0GCSqGSIb3DQEBAQUAA4GN
ADCBiQKBgQCZs0yuz2MlQ8ab+Y9vcRgqJdakeL8z4XLNRRD1AsNcOE6GXwskDrT8
hx0r7MywrO4J6bPfQG2t63ee3KUyPS+B60dxwmNycRwbUZabxD87MmBwx90tUULY
AkNCUKXG6I9kxUXry4CNb0mFtVpTHDr+xqWbmqemRjB3VpUXOueewIDAQABMA0G
CSqGSIb3DQEBCwUAA4GBAHycAeQZv80Vxcw+hWFNsWePkD6VdM8o3ecV9kcCcFuV
SreKkICC6HBuPKVxqcoVoGbBiRSMGcDJ4XD9vEWWHZv1QiIn8Z1jy+0SpEArUI0i
myM305c1eG/4baIci1ccIJgwjwxZwAPd6kz+0tXHHLn/+Y2akg3sev6oXTLTCsv
-----END CERTIFICATE-----
.
```

Certificate imported successfully

```
(Routing)(Config)#
```

2.5.3 crypto certificate request

Use this command to generate and display a certificate request for HTTPS. This command enters the Crypto Certificate Request mode. The certificate request that is generated using this command is sent to the Certification Authority for signing. The certificate request is generated in Base64-encoded X509 format.

Before generating a certificate request, you must first generate a self-signed certificate using the [crypto certificate generate](#) command in Global Configuration mode, to sign the certificate request. Make sure to re-enter the identical values in the certificate request fields as were entered in the self-signed certificate generated by the [crypto certificate generate](#) command.

Format `crypto certificate 1-2 request`
Mode Global Config

Example: The following is an example crypto certificate request.

```
(Routing)(Config)#crypto certificate 1 request
(Routing)(config-crypto-cert-req)#?
common-name            Specifies the common name.
country                Specifies the country name.
do                      Run Privileged Exec mode commands.
email                  Specifies the contact email address.
exit                    To exit from the mode.
location                Specifies the location or city name.
organization-name      Specifies the organization name
organization-unit      Specifies the organization internal unit
show                    Display Switch Options and Settings.
state                   Specifies the state or province name.
subject-alternative-name Specifies the Subject Alernative Name.
```

```
(Routing)(config-crypto-cert-req)# exit

-----BEGIN CERTIFICATE REQUEST-----
MIIBUTCBuwIBAjASMRADgYDVQQDDAcwLjAuMC4wMIGfMA0GCSqGSIb3DQEBAQUA
A4GNADCBiQKBgQC+pfOyHFijXe/2DDwedT1GkZKX8PP1/4F35KyaounA35kHGw9x
+y+1T5hMfOererTbkLdoM8taPOYipv+gJ978DL8tNMB1MJHAcPokAmuv+PDNYaGK
sY1Y+L/Ajge7qh3iCO/HR/wPenKab4fChbyKA5x7GFriPs4YWGxbv1X2wQIDAQAB
oAAwDQYJKoZIhvcNAQELBQADgYEADXHN2ScDYGnHfTrqj16+5XDJW66Pxi4r/JPs
BVcF+QKrwItwq6AqGwJDHDVYfvc5FGnpW3vYbfovRuSa1bNGmS/iUOXmpjYQryQW
AwTt2DTNPxiuZZjumfjT/utWmdFPsaibGyjcZU/HyDDFsrC7ukLWrXro6fbjvxwX
mnxt7FQ=
-----END CERTIFICATE REQUEST-----

(Routing)(config)#
```

NOTICE

The Subject Alternative Name (SAN) is an extension to the X.509 specification that allows users to specify additional host names for a single SSL certificate. Some browsers will not accept the Common Name field in an SSL certificate and require the SAN field instead.

FASTPATH supports adding the SAN field to the certificate request. The following sample SAN formats are supported.

```
DNS:example.com
```

```
DNS:*.example.com
```

```
DNS:xyz.com, IP:10.10.20.1
```

```
DNS.1:myserver.com, DNS.2:xyz.com, IP:10.10.32.1
```

2.5.4 crypto key encrypt write

Use this command to encrypt key files with a user-provided passphrase. The key file to be encrypted is indicated by using an argument to the command. On successful encryption, the system configuration is saved to NVRAM automatically. The encrypted key file replaces the plain-text key file on flash.

Format `crypto key encrypt write {rsa | dsa | ecdsa | sslt-cert-key cert-num | sslt-client-cert-key client-key-num} passphrase passphrase`

Mode Global Config

Parameter	Description
<code>rsa</code>	RSA key pair for SSH.
<code>dsa</code>	DSA key pair for SSH.
<code>ecdsa</code>	ECDSA key pair for SSH.
<code>cert-num</code>	The SSL certificate key.
<code>client-key-num</code>	The SSL client certificate key.
<code>passphrase</code>	The passphrase must be at least 8 characters long.

2.5.5 crypto key decrypt write

This command is the equivalent of a `no crypto key encrypt` command and is used to decrypt key files with the user-provided passphrase. The key file to be decrypted is indicated by using an argument to the command.

Format `crypto key decrypt write {rsa | dsa | ecdsa | sslt-cert-key cert-num | sslt-client-cert-key client-key-num} passphrase passphrase`

Mode Global Config

Parameter	Description
rsa	RSA key pair for SSH.
dsa	DSA key pair for SSH.
ecdsa	ECDSA key pair for SSH.
cert-num	The SSL certificate key.
client-key-num	The SSL client certificate key.
passphrase	The passphrase must be at least 8 characters long.

2.5.6 crypto key generate rsa

Use this command to generate an RSA key pair for SSH. The new key files will overwrite any existing generated or downloaded RSA key files.

Format crypto key generate rsa <key-Len>
Mode Global Config

Parameter	Description
key-len	Key length for the RSA key in bits. Valid lengths are 1024, 2048, and 3072.

2.5.6.1 no crypto key generate rsa

Use this command to delete the RSA key files from the device.

Format no crypto key generate rsa
Mode Global Config

2.5.7 crypto key generate dsa

Use this command to generate a DSA key pair for SSH. The new key files will overwrite any existing generated or downloaded DSA key files.

Format crypto key generate dsa <key-Len>
Mode Global Config

Parameter	Description
key-len	Key length for the DSA key in bits. The valid length is 1024.

2.5.7.1 no crypto key generate dsa

Use this command to delete the DSA key files from the device.

Format no crypto key generate dsa
Mode Global Config

2.5.8 crypto key generate ecdsa

Use this command to generate an ECDSA key pair for SSH. The new key files overwrite any existing generated or downloaded ECDSA key files.

Format crypto key generate ecdsa key-Len
Mode Global Config

Parameter	Description
key-len	Key length for the ECDSA key in bits. Valid lengths are 256, 384, and 521.

2.5.8.1 no crypto key generate ecdsa

Use this command to delete the ECDSA key files from the device.

Format no crypto key generate ecdsa

Mode Global Config

2.5.9 crypto key pubkey-chain ssh

Use this command to enter the Public Key Configuration mode to manually specify public keys for SSH clients or an individual user.

Format crypto key pubkey-chain ssh user-key *user-name*

Mode Global Config

Example: Following is an example of the CLI command.

```
(Routing)(Config)#crypto key pubkey-chain ssh user-key test rsa
```

```
(Routing)(config-pubkey-key)#key-String "ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEAfvovva0rICLGoTJ46ZMRknjAk8pBEz3Y4DijzV7oim+wW7DI5mFUULI3cT1110cjGHeQF03
phufEDcK45Cr0nHCD37zDwjN5B2+YFtVq6h4dQGfBFJvNvJ/PmqDt5iti/jAvRXn4NzHA03byn8/
yHUsrzI6Syd3FZfaBvD+Shxpgx+pZkkLRXHgZ1L/s7uxOpu6aWwjhZEFz5RjX//chT5J3uHn++w9Yt/
3CwEenZeF4o0wEji5DTnPFkTnHxm8s4NSWHPKYOsN8LW23ooEmU0moRU0KJx7/
Zeuw36fI6RvEIFbTmX6a59GRBPpaMh9bHBAGxDA4X9x5AXTrsqS1Q=="
```

```
(Routing)(config-pubkey-key)#exit
```

```
(Routing)(config)#
```

2.5.9.1 no crypto key pubkey-chain ssh

Use this command to erase all the SSH server public key chains or the public key for a user.

Format no crypto key pubkey-chain ssh [*user-key user-name*]

Mode Global Config

2.5.10 crypto dhparam size

Use this command to set the Diffie Hellman (DH) parameter. Diffie Hellman parameters are used in the Diffie-Hellman key exchange mechanism used while establishing SSL connections. The DH parameters are generated by the switch once and re-used for all SSL connections established thereafter. While the DH parameters are being generated, the SSLT admin mode remains disabled operationally.

When the DH parameters are successfully generated, an informational message is logged to let the user know that the parameters have been generated and the configured DH parameter is applied.

Default The default DH parameter is 1024 bit.

Format crypto dhparam size [*1024|2048*]

Mode Global Config

2.5.10.1 no crypto dhparam size

Use this command to set the Diffie Hellman parameter size to the default.

Format no crypto dhparam size
Mode Global Config

2.5.11 show crypto certificate mycertificate

Use this command to display the SSH certificates present on the switch.

Format show crypto certificate mycertificate [number]
Mode Privileged EXEC

Parameter	Description
number	Specifies the certificate number. Range: 1 to 2 digits.

Example: The following shows example display output for the CLI command.

```
(Routing)#show crypto certificate mycertificate

-----BEGIN CERTIFICATE-----
MIIBrDCCARWgAwIBAgIJANI+zML5qm1oMA0GCSqGSIb3DQEBCwUAMBgxFjAUBGNV
BAMMDTEwLjEzMC44Ni4yMTcwHhcNNzAwMTAxMDM0MzYwLjEzMC44Ni4yMTcwHhcNNzEwMTAxMDM0MzYw
WjAYMRYwFAYDVQDDA0xMC4xMzAuODYuMjE3MIGfMA0GCSqGSIb3DQEBAQUAA4GN
ADCBiQKBgQCZs0yuz2M1Q8ab+Y9vcRgqJdakeL8z4XLNRRD1AsNcOE6GXwskDrT8
hx0r7MywrO4J6bPfqG2t63ee3KUyPS+B60dxwmNycRwbUZabxD87MmBwx90tUULY
AkNCUKXG6I9kxUXry4CNbOmFtVpTHDr+xqWbmpQemRjB3VpUXOueewIDAQABMA0G
CSqGSIb3DQEBCwUAA4GBAHycAeQZv80Vxcw+hWFNswePkD6VdM8o3ecV9kcCcFuV
SreKkIC6HBuPKVxqcoVoGbBiRSMGcDJ4XD9vEWWHZv1QiIn8Z1jy+0SpEAruIOi
myM305c1eG/4baIci1ccIJgWjwxZwAPd6kz+0tXHhWLn/+Y2akg3sev6oXTLTCsv
-----END CERTIFICATE-----
Issued by: 10.130.86.200
Valid from Jan 1 03:43:37 1970 GMT to Jan 1 03:43:37 1971 GMT
Subject: /CN=10.130.86.200
Fingerprint: 970A9E32A301507C28D1E36805109C77
```

(Routing)#

2.5.12 show crypto key mypubkey

Use this command to display the SSH certificates present on the switch.

Format show crypto key mypubkey
Mode Privileged EXEC

Example: The following shows example display output for the CLI command.

```
(Routing)#show crypto key mypubkey

RSA Key Data:
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQGD1xwi3s2eakSEsmMDoRIF748Q7pChNctFsSJOaD7esTIgGHhFFL3i2EPn9V0h2A+8tFg
2kXaiIzqwzy9kTbhmcn/tCtRyBkvmplVe2z+AKwdHQX00ZzdLjtTv4/c4XTE4F6jg/
LBKdhFb4+qGr6PekbGbuMpp4rvJF76r8wXX1sw==
Fingerprint (Hex): MD5:ad:bb:2b:dd:c0:4b:8e:bc:f1:99:35:05:25:00:d5:cd
Fingerprint (Bubble Babble): xicag-duvek-fulir-lelab-sumyk-selar-suzys-fopum-cavis-gebyh-coxax

DSA Key Data:
```

```
ssh-dss AAAAB3NzaC1kc3MAAACBANrQifFkVewhGrGtOM8tzm1gig7vdp3zRY81jIiQF8uks8x2f/
WDPau1aZa+wf8pmt0y+nAv9rPmYDnM0Ife8X+uu669xd15+FWkrSqe8B6c1NXVDJxDqJIgqOuNjxBj5W+hzwvQODTndVJm9L2
3hi+0zxt0DcWfvFVJILFNhjHAAAAFQC00qsPDniPrEn7wNUZH2r2mwGohwAAAIbECr5kreyIwwVBXq05yuSc+khzQ5aDdHBaEK
k4RIqqqXvPUMzyaH/
nR84TOX1syUcP51xK1noo5ayVwUZKp9Gf43NC1KQmq4cI30VsNswvwn6tvm6+Brsw+DA2KcOxgeGjCZTEZOZxzsQD+OSndE51o
6GBKQdA577NFoo3SzmfwAAAIeA04qsY12WD1NBf86Ga7kX1EZYpVyNo8tmz3tk899P4VoZFRDw9BzrC/
j723Vd127j0u8oddJKwliXWFSi4nbWg5NdiaSxtBH5v0nzs3GK59QIirXAJp3ZKMaTzn26PT1emLpw9zxwDpjRLmtpUIKG464K
ZQwIzSjhcdJAgDmyVU=
Fingerprint (Hex): MD5:50:4e:c7:aa:ff:41:48:0f:f1:f6:46:4a:1e:db:e2:a7
Fingerprint (Bubble Babble): xomal-radyc-rebid-hodid-gelos-pekyn-voduz-cidom-damen-mogeb-hoxox
```

(Routing)#

2.5.13 show crypto key pubkey-chain ssh

Use this command to display the SSH client's public keys stored on the switch.

Format show crypto key pubkey-chain ssh
Mode Privileged EXEC

Example: The following shows example display output for the CLI command.

(Routing)#show crypto key pubkey-chain ssh

```
Username                               Fingerprint
-----
test      MD5:19:8c:81:e3:cd:5c:2a:8a:91:cb:5e:35:a4:43:93:91
```

(Routing)#

2.5.14 show crypto dhparam

Use this command to display the Diffie Hellman parameter size used by the SSL tunnel.

Format show crypto dhparam
Mode Privileged EXEC

Example: The following shows example display output for the CLI command.

```
show crypto dhparam
DH param size ..... 1024
DH Parameter generation status ..... In progress
```

2.6 Hypertext Transfer Protocol Commands

This section describes the commands you use to configure Hypertext Transfer Protocol (HTTP) and secure HTTP access to the switch. Access to the switch by using a Web browser is enabled by default. Everything you can view and configure by using the CLI is also available by using the Web.

2.6.1 ip http accounting exec, ip https accounting exec

This command applies user exec (start-stop/stop-only) accounting list to the line methods HTTP and HTTPS.

The user exec accounting list should be created using the command [aaa accounting](#).

NOTICE

Format ip {http|https} accounting exec {default|listname}
Mode Global Config

Parameter	Description
http/https	The line method for which the list needs to be applied.
default	The default list of methods for authorization services.
listname	An alphanumeric character string used to name the list of accounting methods.

2.6.1.1 no ip http/https accounting exec

This command deletes the authorization method list.

Format no ip {http|https} accounting exec {default|listname}
Mode Global Config

2.6.2 ip http authentication

Use this command to specify authentication methods for http server users. The default configuration is the local user database is checked. This action has the same effect as the command `ip http authentication local`. The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify `none` as the final method in the command line. For example, if `none` is specified as an authentication method after `radius`, no authentication is used if the RADIUS server is down.

Default local
Format ip http authentication *method1* [*method2...*]
Mode Global Config

Parameter	Description
ldap	Uses the list of all LDAP servers for authentication.
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Example: The following example configures the http authentication.

```
(switch)(config)# ip http authentication radius local
```

2.6.2.1 no ip http authentication

Use this command to return to the default.

Format no ip http authentication
Mode Global Config

2.6.3 ip https authentication

Use this command to specify authentication methods for https server users. The default configuration is the local user database is checked. This action has the same effect as the command `ip https authentication local`. The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify `none` as the final method in the command line. For example, if `none` is specified as an authentication method after `radius`, no authentication is used if the RADIUS server is down.

Default local
Format ip https authentication *method1* [*method2...*]
Mode Global Config

Parameter	Description
ldap	Uses the list of all LDAP servers for authentication.
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Example: The following example configures https authentication.

```
(switch)(config)# ip https authentication radius local
```

2.6.3.1 no ip https authentication

Use this command to return to the default.

Format no ip https authentication

Mode Global Config

2.6.4 ip http server

This command enables access to the switch through the Web interface. When access is enabled, the user can login to the switch from the Web interface. When access is disabled, the user cannot login to the switch's Web server. Disabling the Web interface takes effect immediately. All interfaces are affected.

The option *[start]* enables the starting of the WEB server application.

Note, that you have to reboot the system if the new configuration should become active!

Note, that the state is stored in the board specific "hpc" file and not in the startup-config file. Therefore it is not indicated for the command "show running-config".

Default enabled

Format ip http server [*start*]

Mode Privileged EXEC

2.6.4.1 no ip http server

This command disables access to the switch through the Web interface. When access is disabled, the user cannot login to the switch's Web server.

The option *[start]* disables the starting of the WEB server application. If disabled, no WEB access is provided.

Format no ip http server [*start*]

Mode Privileged EXEC

2.6.5 ip http secure-server

This command is used to enable the secure socket layer for secure HTTP.

Default disabled

Format ip http secure-server

Mode Privileged EXEC

2.6.5.1 no ip http secure-server

This command is used to disable the secure socket layer for secure HTTP.

Format no ip http secure-server
Mode Privileged EXEC

2.6.6 ip http port

This command configures the TCP port number on which the HTTP server listens for requests.

Default 80
Format ip http port *1025-65535*
Mode Privileged EXEC

2.6.6.1 no ip http port

This command restores the HTTP server listen port to its factory default value.

Format no ip http port
Mode Privileged EXEC

2.6.7 ip http rest-api port

This command configures the HTTP TCP port number on which the OpEN restful API server listens for restful requests.

Default 8080
Format ip http rest-api port *1025-65535*
Mode Privileged EXEC

2.6.7.1 no ip http rest-api port

This command restores the OpEN restful API HTTP server listen port to its factory default value.

Format no ip http rest-api port
Mode Privileged EXEC

2.6.8 ip http rest-api secure-port

This command configures the HTTPS TCP port number on which the OpEN restful API server listens for secure restful requests

Default 8443
Format ip http rest-api secure-port *1025-65535*
Mode Privileged EXEC

2.6.8.1 no ip http rest-api secure-port

This command restores the OpEN restful API HTTP server listen port to its factory default value.

Format no ip http rest-api secure-port
Mode Privileged EXEC

2.6.9 ip http session hard-timeout

This command configures the hard timeout for un-secure HTTP sessions in hours. Configuring this value to zero will give an infinite hard-timeout. When this timeout expires, the user will be forced to re-authenticate. This timer begins on initiation of the web session and is unaffected by the activity level of the connection.

Default 24
Format ip http session hard-timeout 1-168
Mode Privileged EXEC

2.6.9.1 no ip http session hard-timeout

This command restores the hard timeout for un-secure HTTP sessions to the default value.

Format no ip http session hard-timeout
Mode Privileged EXEC

2.6.10 ip http session maxsessions

This command limits the number of allowable un-secure HTTP sessions. Zero is the configurable minimum.

Default 16
Format ip http session maxsessions 0-16
Mode Privileged EXEC

2.6.10.1 no ip http session maxsessions

This command restores the number of allowable un-secure HTTP sessions to the default value.

Format no ip http session maxsessions
Mode Privileged EXEC

2.6.11 ip http session soft-timeout

This command configures the soft timeout for un-secure HTTP sessions in minutes. Configuring this value to zero will give an infinite soft-timeout. When this timeout expires the user will be forced to reauthenticate. This timer begins on initiation of the Web session and is restarted with each access to the switch.

Default 5
Format ip http session soft-timeout 1-60
Mode Privileged EXEC

2.6.11.1 no ip http session soft-timeout

This command resets the soft timeout for un-secure HTTP sessions to the default value.

Format no ip http session soft-timeout
Mode Privileged EXEC

2.6.12 ip http secure-certificate

Use this command to configure the active certificate for HTTPS.

Format ip http secure-certificate
Mode Privileged EXEC

2.6.13 ip http secure-ciphersuite

Use this command to specify the cipher suites to be used over an HTTPS connection. If the user does not specify the cipher suites, the server and the client negotiate a connection with the cipher suite that they both support.

Default	All cipher suite options are enabled by default.
Format	<code>ip http secure-ciphersuite {[aes-128-cbc-sha][aes-256-cbc-sha] [dhe-aes-128-cbc-sha] [dhe-aes-cbc-sha2][dhe-aes-gcm-sha2] [ecdhe-rsa-aes-cbc-sha2][ecdhe-rsa-aes-gcm-sha2] [rsa-aes-cbc-sha2][rsa-aes-gcm-sha2]}</code>
Mode	Privileged EXEC

Example: The following shows an example of the command.

```
(Routing)#ip http secure-ciphersuite aes-128-cbc-sha aes-256-cbc-sha dhe-aes-128-cbc-sha dhe-aes-cbc-sha2
```

2.6.13.1 no ip http secure-ciphersuite

Use the `no` form of the command to set all the cipher suite options.

Format	<code>no ip http secure-ciphersuite</code>
Mode	Privileged EXEC

2.6.14 ip http secure-session hard-timeout

This command configures the hard timeout for secure HTTP sessions in hours. When this timeout expires, the user is forced to reauthenticate. This timer begins on initiation of the Web session and is unaffected by the activity level of the connection. The secure-session hard-timeout can not be set to zero (infinite).

Default	24
Format	<code>ip http secure-session hard-timeout 1-168</code>
Mode	Privileged EXEC

2.6.14.1 no ip http secure-session hard-timeout

This command resets the hard timeout for secure HTTP sessions to the default value.

Format	<code>no ip http secure-session hard-timeout</code>
Mode	Privileged EXEC

2.6.15 ip http secure-session maxsessions

This command limits the number of secure HTTP sessions. Zero is the configurable minimum.

Default	16
Format	<code>ip http secure-session maxsessions 0-16</code>
Mode	Privileged EXEC

2.6.15.1 no ip http secure-session maxsessions

This command restores the number of allowable secure HTTP sessions to the default value.

Format	<code>no ip http secure-session maxsessions</code>
Mode	Privileged EXEC

2.6.16 ip http secure-session soft-timeout

This command configures the soft timeout for secure HTTP sessions in minutes. Configuring this value to zero will give an infinite soft-timeout. When this timeout expires, you are forced to reauthenticate. This timer begins on initiation of the Web session and is restarted with each access to the switch. The secure-session soft-timeout can not be set to zero (infinite).

Default 5
Format ip http secure-session soft-timeout 1-60
Mode Privileged EXEC

2.6.16.1 no ip http secure-session soft-timeout

This command restores the soft timeout for secure HTTP sessions to the default value.

Format no ip http secure-session soft-timeout
Mode Privileged EXEC

2.6.17 ip http secure-port

This command is used to set the SSL port where port can be 1025 to 65535 and the default is port 443.

Default 443
Format ip http secure-port *portid*
Mode Privileged EXEC

2.6.17.1 no ip http secure-port

This command is used to reset the SSL port to the default value.

Format no ip http secure-port
Mode Privileged EXEC

2.6.18 ip http secure-protocol

Use this command to specify the secure protocol to be used over an HTTPs connection. If you do not specify the protocol, the server and client negotiate a connection with the protocol that they both support.

Default All protocol options are enabled by default.
Format ip http secure-protocol {[TLS1.0][TLS1.1][TLS1.2][TLS1.3]}
Mode Privileged EXEC

Example: The following is an example of the command.

```
(Routing)# ip http secure-protocol TLS1.1 TLS1.2
```

2.6.18.1 no ip http secure-protocol

Use the no form of the command to set all the protocol options.

Format no ip http secure-protocol {[TLS1.0][TLS1.1][TLS1.2][TLS1.3]}
Mode Privileged EXEC

2.6.19 show ip http

This command displays the http settings for the switch.

Using the option `[server start]`, the command displays the state for the WEB server application (enabled or disabled). An active state and a configured state are indicated. If the active state is 'disabled', the WEB server application has not been started.

Format `show ip http [server start]`

Mode Privileged EXEC

Parameter	Description
HTTP Mode (Unsecure)	The unsecure HTTP server administrative mode.
Java Mode	The java applet administrative mode which applies to both secure and unsecure web connections.
HTTP Port	The configured TCP port on which the HTTP server listens for requests. (The default is 80.)
Maximum Allowable HTTP Sessions	The number of allowable unsecure http sessions.
HTTP Session Hard Timeout	The hard timeout for unsecure http sessions in hours.
HTTP Session Soft Timeout	The soft timeout for unsecure http sessions in minutes.
HTTP Mode (Secure)	The secure HTTP server administrative mode.
HTTP Operational Mode (Secure)	Displays the operational status of HTTPS.
Secure Port	The secure HTTP server port number.
Secure Protocol Levels	The protocol level may have the values of TLS1.0, TLS1.1, TLS1.2, and TLS1.3.
Maximum Allowable HTTPS Sessions	The number of allowable secure http sessions.
HTTPS Session Hard Timeout	The hard timeout for secure http sessions in hours.
HTTPS Session Soft Timeout	The soft timeout for secure http sessions in minutes.
Certificate Present	Indicates whether the secure-server certificate files are present on the device.
User Selected Certificate	Displays the user-configured certificate for secure HTTP.
Active Certificate	Displays the active certificate configured for secure http.
Expired Certificate	Displays the expired certificates if NTP time is synced.
Certificate Generation in Progress	Indicates whether certificate generation is currently in progress.
RESTful API HTTP Port	The HTTPS TCP port number on which the OpEN RESTful API server listens for RESTful requests.
RESTful API HTTPS Port	The HTTPS TCP port number on which the OpEN RESTful API server listens for secure RESTful requests.
DH Key Exchange	Displays whether the DH Key Exchange is enabled or disabled.
Server Ciphersuite	Displays the Ciphersuites to be used over HTTPS connection.

Example: The following shows example command output.

```
(Switching)#show ip http
```

```
HTTP Mode (Unsecure)..... Enabled
HTTP Port..... 80
Maximum Allowable HTTP Sessions..... 16
```

```

HTTP Session Hard Timeout..... 24 hours
HTTP Session Soft Timeout..... 5 minutes

HTTP Mode (Secure)..... Enabled
HTTP Operational Mode (Secure)..... Enabled
Secure Port..... 443
Secure Protocol Level(s)..... TLS1.0 TLS1.1 TLS1.2 TLS1.3
Maximum Allowable HTTPS Sessions..... 16
HTTPS session hard timeout..... 24 hours
HTTPS session soft timeout..... 5 minutes
Certificate Present..... 1 2
User Selected Certificate..... 1
Active Certificate..... 1
Expired Certificate..... Not Applicable (No NTP time source)
Certificate Generation In Progress..... None
DH Key Exchange..... Enabled
Server Ciphersuite..... aes-128-cbc-sha
                        aes-256-cbc-sha
                        dhe-aes-128-cbc-sha
                        dhe-aes-cbc-sha2
                        dhe-aes-gcm-sha2
                        ecdhe-rsa-aes-cbc-sha2
                        ecdhe-rsa-aes-gcm-sha2
                        rsa-aes-cbc-sha2
                        rsa-aes-gcm-sha2

```

2.7 Access Commands

Use the commands in this section to close remote connections or to view information about connections to the system.

2.7.1 disconnect

Use the `disconnect` command to close HTTP, HTTPS, Telnet or SSH sessions. Use `all` to close all active sessions, or use `session-id` to specify the session ID to close. To view the possible values for `session_id`, use the `show login session` command.

Format `disconnect {session_id | all}`
Mode Privileged EXEC

2.7.2 linuxsh

Use the `linuxsh` command to access the Linux shell. Use the `exit` command to exit the Linux shell and return to the FASTPATH CLI. The shell session will timeout after five minutes of inactivity. The inactivity timeout value can be changed using the `session-timeout` command in Line Console mode.

Default `ip-port:2324`
Format `linuxsh [ip-port]`
Mode Privileged EXEC

Parameter	Description
<code>ip-port</code>	The IP port number on which the telnet daemon listens for connections. <code>ip-port</code> is an integer from 1 to 65535. The default value is 2324.

2.7.3 show login session

This command displays current Telnet, SSH, and serial port connections to the switch, as well as all remote connections (including SSH). This command displays truncated user names. Use the `show login session long` command to display the complete user names.

Format show loginsession
Mode Privileged EXEC

Parameter	Description
ID	Login Session ID.
User Name	The name the user entered to log on to the system.
Connection From	IP address of the remote client machine or EIA-232 for the serial port connection.
Idle Time	Time this session has been idle.
Session Time	Total time this session has been connected.
Session Type	Shows the type of session, which can be HTTP, HTTPS, telnet, serial, or SSH.

2.7.4 show loginsession long

This command displays the complete user names of the users currently logged in to the switch.

Format show loginsession long
Mode Privileged EXEC

Example: The following shows an example of the command.

```
(switch) #show loginsession long
User Name
-----
admin
test1111test1111test1111test1111test1111test1111test1111test1111
```

2.8 User Account Commands

This section describes the commands you use to add, manage, and delete system users. FASTPATH software has two default users: admin and guest. The admin user can view and configure system settings, and the guest user can view settings.

NOTICE

You cannot delete the admin user. There is only one user allowed with level-15 privileges. You can configure up to five level-1 users on the system.

2.8.1 aaa authentication login

Use this command to set authentication at login. The default and optional list names created with the command are used with the `aaa authentication login list-name method` command, where `list-name` is any character string used to name this list. The `method` argument identifies the list of methods that the authentication algorithm tries, in the given sequence.

The additional methods of authentication are used only if the previous method returns an error, not if there is an authentication failure. To ensure that the authentication succeeds even if all methods return an error, specify `none` as the final method in the command line. For example, if `none` is specified as an authentication method after `radius`, no authentication is used if the RADIUS server is down.

- Default**
- `defaultList`. Used by the console and only contains the method `none`.
 - `networkList`. Used by telnet and SSH and only contains the method `local`.

Format aaa authentication login {default | *List-name*} *method1* [*method2...*]

Mode Global Config

Parameter	Description
default	Uses the listed authentication methods that follow this argument as the default list of methods when a user logs in.
list-name	Character string of up to 15 characters used to name the list of authentication methods activated when a user logs in.
method1... [method2...]	At least one from the following: <ul style="list-style-type: none"> • <code>enable</code>. Uses the enable password for authentication. • <code>ldap</code>. Uses the list of all LDAP servers for authentication. • <code>line</code>. Uses the line password for authentication. • <code>local</code>. Uses the local username database for authentication. • <code>none</code>. Uses no authentication. • <code>radius</code>. Uses the list of all RADIUS servers for authentication. • <code>tacacs</code>. Uses the list of all TACACS servers for authentication.

Example: The following shows an example of the command.

```
(switch)(config)# aaa authentication login default radius local enable none
```

2.8.1.1 no aaa authentication login

This command returns to the default.

Format `aaa authentication login {default | List-name}`

Mode Global Config

2.8.2 aaa authentication enable

Use this command to set authentication for accessing higher privilege levels. The default enable list is `enableList`. It is used by console, and contains the method as `enable` followed by `none`.

A separate default enable list, `enableNetList`, is used for Telnet and SSH users instead of `enableList`. This list is applied by default for Telnet and SSH, and contains `enable` followed by deny methods. In FASTPATH, by default, the enable password is not configured. That means that, by default, Telnet and SSH users will not get access to Privileged EXEC mode. On the other hand, with default conditions, a console user always enter the Privileged EXEC mode without entering the `enable` password.

The default and optional list names created with the `aaa authentication enable` command are used with the `enable authentication` command. Create a list by entering the `aaa authentication enable list-name method` command where `list-name` is any character string used to name this list. The `method` argument identifies the list of methods that the authentication algorithm tries in the given sequence.

The user manager returns ERROR (not PASS or FAIL) for `enable` and `line` methods if no password is configured, and moves to the next configured method in the authentication list. The method `none` reflects that there is no authentication needed.

The user will only be prompted for an enable password if one is required. The following authentication methods do not require passwords:

1. `none`
2. `deny`
3. `enable` (if no enable password is configured)
4. `line` (if no line password is configured)

Example: See the following examples:

- a. `aaa authentication enable default enable none`
- b. `aaa authentication enable default line none`
- c. `aaa authentication enable default enable radius none`
- d. `aaa authentication enable default line tacacs none`

Examples a and b do not prompt for a password, however because examples c and d contain the radius and tacacs methods, the password prompt is displayed.

If the login methods include only enable, and there is no enable password configured, then FASTPATH does not prompt for a username. In such cases, FASTPATH only prompts for a password. FASTPATH supports configuring methods after the local method in authentication and authorization lists. If the user is not present in the local database, then the next configured method is tried.

The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify `none` as the final method in the command line.

Use the `show authorization methods` command to display information about the authentication methods.

NOTICE

Requests sent by the switch to a RADIUS server include the username \$enable\$, where x is the requested privilege level. For enable to be authenticated on Radius servers, add \$enable\$ users to them. The login user ID is now sent to TACACS+ servers for enable authentication.

Default	default
Format	aaa authentication enable {default <i>List-name</i> } <i>method1</i> [<i>method2...</i>]
Mode	Global Config

Parameter	Description
default	Uses the listed authentication methods that follow this argument as the default list of methods, when using higher privilege levels.
list-name	Character string used to name the list of authentication methods activated, when using access higher privilege levels. Range: 1 to 15 characters.
method1 [method2...]	Specify at least one from the following: <ul style="list-style-type: none"> deny. Used to deny access. enable. Uses the enable password for authentication. ldap. Uses the list of all LDAP servers for authentication. line. Uses the line password for authentication. none. Uses no authentication. radius. Uses the list of all RADIUS servers for authentication. tacacs. Uses the list of all TACACS+ servers for authentication.

Example: The following example sets authentication when accessing higher privilege levels.

```
(switch)(config)# aaa authentication enable default enable
```

2.8.2.1 no aaa authentication enable

Use this command to return to the default configuration.

Format	no aaa authentication enable {default <i>List-name</i> }
Mode	Global Config

2.8.3 aaa authorization

Use this command to configure command and exec authorization method lists. This list is identified by `default` or a user-specified `list-name`. If `tacacs` is specified as the authorization method, authorization commands are notified to a TACACS+ server. If `none` is specified as the authorization method, command authorization is not applicable. A maximum of five authorization method lists can be created for the `commands` type.

NOTICE

Local method is not supported for command authorization. Command authorization with RADIUS will work if, and only if, the applied authentication method is also radius

Per-Command Authorization

When authorization is configured for a line mode, the user manager sends information about an entered command to the AAA server. The AAA server validates the received command, and responds with either a PASS or FAIL response. If approved, the command is executed. Otherwise, the command is denied and an error message is shown to the user. The various utility commands like `tftp`, and `ping`, and outbound telnet should also pass command authorization. Applying the script is treated as a single command apply script, which also goes through authorization. Startup-config commands applied on device boot-up are not an object of the authorization process.

The per-command authorization usage scenario follows.

1. Configure Authorization Method List

```
aaa authorization commands listname tacacs radius none
```
2. Apply AML to an Access Line Mode (console, telnet, SSH)

```
authorization commands listname
```
3. Commands entered by the user will go through command authorization using TACACS+ or RADIUS server and will be accepted or denied.

Exec Authorization

When exec authorization is configured for a line mode, the user may not be required to use the `enable` command to enter Privileged EXEC mode. If the authorization response indicates that the user has sufficient privilege levels for Privileged EXEC mode, the user bypasses User EXEC mode entirely.

The exec authorization usage scenario is this:

1. Configure Authorization Method List

```
aaa authorization exec listname method1 [method2....]
```
2. Apply AML to an Access Line Mode (console, telnet, SSH)

```
authorization exec listname
```
3. When the user logs in, in addition to authentication, authorization will be performed to determine if the user is allowed direct access to Privileged EXEC mode.

Format `aaa authorization {commands|exec} {default|list-name} method1[method2]`

Mode Global Config

Parameter	Description
<code>commands</code>	Provides authorization for all user-executed commands.
<code>exec</code>	Provides exec authorization.
<code>default</code>	The default list of methods for authorization services.
<code>list-name</code>	Alphanumeric character string used to name the list of authorization methods.
<code>method</code>	TACACS+/RADIUS/Local and none are supported.

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#aaa authorization exec default tacacs+ none
(Routing) (Config)#aaa authorization commands default tacacs+ none
```

2.8.3.1 no aaa authorization

This command deletes the authorization method list.

Format *no aaa authorization {commands/exec} {default/list-name}*
Mode Global Config

2.8.4 authorization commands

This command applies a command authorization method list to an access method (console, telnet, ssh). For usage scenarios on per command authorization, see the [aaa authorization](#) command.

Format *authorization commands [default/list-name]*
Mode Line console, Line telnet, Line SSH

Parameter	Description
commands	This causes command authorization for each command execution attempt.

2.8.4.1 no authorization commands

This command removes command authorization from a line config mode.

Format *no authorization {commands/exec}*
Mode Line console, Line telnet, Line SSH

Example: The following shows an example of the command.

```
(Switching) (Config)#line console
(Switching) (Config-line)#authorization commands list2
(Switching) (Config-line)#exit
```

2.8.5 authorization exec

This command applies a command authorization method list to an access method so that the user may not be required to use the enable command to enter Privileged EXEC mode. For usage scenarios on exec authorization, see the [aaa authorization](#) command.

Format *authorization exec list-name*
Mode Line console, Line telnet, Line SSH

Parameter	Description
list-name	The command authorization method list.

2.8.5.1 no authorization exec

This command removes command authorization from a line config mode.

Format *no authorization exec*
Mode Line console, Line telnet, Line SSH

2.8.6 authorization exec default

This command applies a default command authorization method list to an access method so that the user may not be required to use the enable command to enter Privileged EXEC mode. For usage scenarios on exec authorization, see the [aaa authorization](#) command.

Format *authorization exec default*
Mode Line console, Line telnet, Line SSH

2.8.6.1 no authorization exec default

This command removes command authorization from a line config mode.

Format *no authorization exec default*
Mode Line console, Line telnet, Line SSH

2.8.7 show authorization methods

This command displays the configured authorization method lists.

Format *show authorization methods*
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

(Switching) #show authorization methods

```

Command Authorization List      Method
-----
dfltCmdAuthList                tacacs      none
list2                          none        undefined
list4                          tacacs      undefined

Line      Command Method List
-----
Console   dfltCmdAuthList
Telnet    dfltCmdAuthList
SSH       dfltCmdAuthList

Exec Authorization List      Method
-----
dfltExecAuthList            tacacs      none
list2                       none        undefined
list4                       tacacs      undefined

Line      Exec Method List
-----
Console   dfltExecAuthList
Telnet    dfltExecAuthList
SSH       dfltExecAuthList

```

2.8.8 enable authentication

Use this command to specify the authentication method list when accessing a higher privilege level from a remote telnet or console.

Format *enable authentication {default | list-name}*
Mode Line Config

Parameter	Description
default	Uses the default list created with the <code>aaa authentication enable</code> command.
list-name	Uses the indicated list created with the <code>aaa authentication enable</code> command.

Example: The following example specifies the default authentication method when accessing a higher privilege level console.

```
(switch)(config)# line console
(switch)(config-line)# enable authentication default
```

2.8.8.1 no enable authentication

Use this command to return to the default specified by the `enable authentication` command.

Format `no enable authentication`

Mode Line Config

2.8.9 username (Global Config)

Use the `username` command in Global Config mode to add a new user to the local user database. The default privilege level is 1. This command can be used to unlock a locked user account for an already existing user. Using the `encrypted` keyword allows the administrator to transfer local user passwords between devices without having to know the passwords. When the `password` parameter is used along with `encrypted` parameter, the password must be exactly 128 hexadecimal characters in length. If the password strength feature is enabled, this command checks for password strength and returns an appropriate error if it fails to meet the password strength criteria. Giving the optional parameter `override-complexity-check` disables the validation of the password strength.

The command `username username password` does not accept plain text format. Specify the password in encrypted format.

As of FASTPATH release 8.8, script files or config files that have `username` commands with a plain text password in the command line will fail. Specify the password in encrypted format.

The command `username <name> password <password> level <level> encrypted [override-complexity-check]` is deprecated in FASTPATH release 8.9. This command displays the password in running-configuration in encrypted mode for the default encryption type. If `enable password` is configured, `username <name> password <password> encryption-type <encryption-type> level <level> encrypted [override-complexity-check]` is displayed in the running-configuration for both default and non-default encryption types.

Format `username name {password password [encryption-type <encryption-type>] [encrypted [override-complexity-check] | level level [encrypted [override-complexity-check]] | override-complexity-check]} | {level level [override-complexity-check] password [encryption-type <encryption-type>] | {email-id email-address} mfa-enable}`

Mode Global Config

Parameter	Description
name	The name of the user. Range: 1 to 64 characters.
password	The authentication password for the user. Range: 8 to 64 characters. This value can be zero if the <code>no passwords min-length</code> command has been executed. The special characters allowed in the password include <code>! # \$ % & ' () * + , - . / : ; < = > @ [\] ^ _ ` { } ~</code> .
level	The user level. Level 0 can be assigned by a level 15 user to another user to suspend that user's access. Range 0 to 15. Enter access level 1 for read access [non-privileged (<code>switch> prompt</code>)] or level 15 for read/write access [highest privilege (<code>switch# prompt</code>)]. If not specified where it is optional, the privilege level is 1. <ul style="list-style-type: none"> If Privilege level = 1 (Read-Only), users will not be able to enter Privilege Exec mode.
encrypted	Encrypted password entered or copied from another switch configuration.

Parameter	Description
encryption-type	Specifies encryption algorithm type, either MD5, AES, SHA256, or SHA512. The <code>encryption-type</code> default value is AES.
override-complexity-check	Disables the validation of the password strength.
email-id	The email address for the user.
mfa-enable	Enables or disables the multi-factor authentication feature at the user level.

Example: Command `username username password` does not accept plain text format.

```
(Switching)(Config)#username admin password ?
```

```
<cr>                               Press enter to execute the command.
```

```
<password>                          Enter the password in encrypted format
```

Example: The following examples configure users with encrypted passwords.

```
(Switching)(Config)#username test password
0a51d780be1a0240b8cc7c69fe0479dbf07644e1094b25fb43ebe2fa72f649e42ad9711bf5c33f9a7eb88efd8b9945347b
264e0c52b3a47db05f886caae9f42b encrypted override-complexity-check
```

```
(Switching)(Config)#username test123 password
0a51d780be1a0240b8cc7c69fe0479dbf07644e1094b25fb43ebe2fa72f649e42ad9711bf5c33f9a7eb88efd8b9945347b
264e0c52b3a47db05f886caae9f42b encrypted
```

```
(Switching)(Config)#username test123 password
0a51d780be1a0240b8cc7c69fe0479dbf07644e1094b25fb43ebe2fa72f649e42ad9711bf5c33f9a7eb88efd8b9945347b
264e0c52b3a47db05f886caae9f42b encryption-type aes level 1 encrypted
```

```
(Switching)(Config)#username test123 password $1$2ESg0XHN$/a/pbeNOwQWbpSLVQEvgd/ encryption-type
md5 level 1 encrypted
```

```
(Switching)(Config)#username test password $1$2ESg0XHN$/a/pbeNOwQWbpSLVQEvgd/ encryption-type md5
encrypted override-complexity-check
```

Example: The following examples configure users with plain text passwords.

```
(Switching)(Config)#username bob level 15 password
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

```
(Switching)(Config)#username bob level 15 password encryption-type aes
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

```
(Switching)(Config)#username bob level 15 password encryption-type md5
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

```
(Switching)(Config)#username test encryption-type aes level 1 override-complexity-check password
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

```
(Switching)(Config)#username test123 encryption-type md5 level 15 password
```

```
Enter new password:*****
```

Confirm new password:*****

(Switching)(Config)#username test1234 override-complexity-check password

Enter new password:*****

Confirm new password:*****

2.8.9.1 no username

Use this command to remove a user name.

Format no username *name*

Mode Global Config

2.8.10 username nopassword

Use this command to remove an existing user's password (NULL password).

Format username *name* nopassword [*Level Level*]

Mode Global Config

Parameter	Description
name	The name of the user. Range: 1 to 32 characters.
password	The authentication password for the user. Range 8 to 64 characters.
level	The user level. Level 0 can be assigned by a level 15 user to another user to suspend that user's access. Range 0 to 15.

2.8.11 username unlock

Use this command to allow a locked user account to be unlocked. Only a user with read/write access can reactivate a locked user account.

Format username *name* unlock

Mode Global Config

2.8.12 show users

This command displays the configured user names and their settings. The `show users` command displays truncated user names. Use the `show users long` command to display the complete usernames. The `show users` command is only available for users with Level 15 privileges. The SNMPv3 fields will only be displayed if SNMP is available on the system.

Format show users

Mode Privileged EXEC

Parameter	Description
User Name	The name the user enters to login using the serial port, Telnet or Web.
Access Mode	Shows whether the user is able to change parameters on the switch (Level 15) or is only able to view them (Level 1). As a factory default, the "admin" user has Level 15 access and the "guest" has Level 1 access.
SNMPv3 Access Mode	The SNMPv3 Access Mode. If the value is set to <code>ReadWrite</code> , the SNMPv3 user is able to set and retrieve parameters on the system. If the value is set to <code>ReadOnly</code> , the SNMPv3 user is only able to retrieve parameter information. The SNMPv3 access mode may be different than the CLI and Web access mode.

Parameter	Description
SNMPv3 Authentication	The authentication protocol to be used for the specified login user.
SNMPv3 Encryption	The encryption protocol to be used for the specified login user.

2.8.13 show users long

This command displays the complete usernames of the configured users on the switch.

Format show users long

Mode Privileged EXEC

Example: The following shows an example of the command.

```
(switch) #show users long
User Name
-----
admin
guest
test1111test1111test1111test1111
```

2.8.14 show users accounts

This command displays the local user status with respect to user account lockout and password aging. This command displays truncated user names. Use the `show users long` command to display the complete usernames.

Format show users accounts [detail]

Mode Privileged EXEC

Parameter	Description
User Name	The local user account's user name.
Access Level	The user's access level (1 for read-access, non-privilege (switch>prompt) or 15 for read/write access, highest privilege (switch# prompt).
Password Aging	Number of days, since the password was configured, until the password expires.
Password Expiry Date	The current password expiration date in date format.
Lockout	Indicates whether the user account is locked out (true or false).
Multi Factor Authentication	Displays the multi-factor authentication mode for the user.
Email information	Displays the email information configured for the user.

If the detail keyword is included, the following additional fields display.

Parameter	Description
Password Override Complexity Check	Displays the user's Password override complexity check status. By default it is disabled.
Password Strength	Displays the user password's strength (Strong or Weak). This field is displayed only if the Password Strength feature is enabled.
Encryption Type	Displays the encryption type used to store the user password.

Example: The following example displays information about the local user database.

```
(switch)#show users accounts
```

UserName	Privilege	Password Aging	Password Expiry date	Lockout	Multi Factor Authentication	Email Information
admin	15	---	---	False	Disable	----
guest	1	---	---	False	Disable	----
vinay	1	---	---	False	Enable	vs@br.com

```
console#show users accounts detail
```

```

UserName..... admin
Privilege..... 15
Password Aging..... ---
Password Expiry..... ---
Lockout..... False
Override Complexity Check..... Disable
Password Strength..... ---
Encryption Type..... AES
Multifactor Authentication..... Disable
Email Information..... ---

UserName..... guest
Privilege..... 1
Password Aging..... ---
Password Expiry..... ---
Lockout..... False
Override Complexity Check..... Disable
Password Strength..... ---
Encryption Type..... AES
Multifactor Authentication..... Disable
Email Information..... ---

UserName..... vinay
Privilege..... 1
Password Aging..... ---
Password Expiry..... ---
Lockout..... False
Override Complexity Check..... Disable
Password Strength..... Strong
Encryption Type..... MD5
Multifactor Authentication..... Enable
Email Information..... vs@br.com

```

2.8.15 show users login-history [long]

Use this command to display information about the login history of users.

Format show users login-history [long]

Mode Privileged EXEC

2.8.16 show users login-history [username]

Use this command to display information about the login history of users.

Format show users login-history [username *name*]

Mode Privileged EXEC

Parameter	Description
name	Name of the user. Range: 1 to 20 characters.

Example: The following example shows user login history outputs.

```
Console>show users login-history
Login Time      Username  Protocol  Location
-----
Jan 19 2005 08:23:48 Bob       Serial
Jan 19 2005 08:29:29 Robert    HTTP      172.16.0.8
Jan 19 2005 08:42:31 John      SSH       172.16.0.1
Jan 19 2005 08:49:52 Betty     Telnet    172.16.1.7
```

2.8.17 login authentication

Use this command to specify the login authentication method list for a line (console, telnet, or SSH). The default configuration uses the default set with the command `aaa authentication login`.

Format `login authentication {default | list-name}`

Mode Line Configuration

Parameter	Description
default	Uses the default list created with the <code>aaa authentication login</code> command.
list-name	Uses the indicated list created with the <code>aaa authentication login</code> command.

Example: The following example specifies the default authentication method for a console.

```
(switch) (config)# line console
(switch) (config-line)# login authentication default
```

2.8.17.1 no login authentication

Use this command to return to the default specified by the `authentication login` command.

Format `no login authentication`

Mode Line Configuration

2.8.18 mfa-enable

Use this command to enable the multi-factor authentication (MFA) feature at a global level.

Default disable

Format `mfa-enable`

Mode Global Config

2.8.18.1 no mfa enable

Use the `no` form of the command to disable the multi-factor authentication (MFA) feature at a global level.

Format `no mfa-enable`

Mode Global Config

2.8.19 show mfa

This command displays whether multi-factor authentication (MFA) is enabled globally for all the users whose authentication is performed based on the switch user accounts configuration.

Format show mfa
Mode Privileged EXEC

Example: The following shows example command output.

```
#show mfa
```

```
Multifactor Authentication : Disabled
```

2.8.20 password

This command allows the currently logged in user to change his or her password without having Level 15 read/write privileges.

Format password cr
Mode User EXEC

Example: The following is an example of the command.

```
console>password
```

```
Enter old password:*****
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

2.8.21 password (Line Configuration)

Use the `password` command in Line Configuration mode (console/telnet/ssh) to specify a password on a line. The default configuration is no password is specified. This command allows the administrator to input the password in encrypted format, which aids in transferring the password between devices without having to know the password.

The `password` command does not accept plain text format. Specify the password in encrypted format.

The command `password <password> encrypted` is deprecated in FASTPATH release 8.9. This command displays the password in running-configuration in encrypted mode for the default encryption type. If `enable password` is configured, `password <password> encryption-type <encryption-type> encrypted` is displayed in the running-configuration for both default and non-default encryption types.

Format password [encryption-type <encryption-type>] | password [encryption-type <encryption-type> encrypted]
Mode Line Config

Parameter	Description
password	Specify the password for this level in encrypted format. Range: 8 to 64 characters.
encryption-type	Specify the encryption algorithm type as MD5, AES, SHA256, or SHA512. The default value of <code>encryption-type</code> is AES.
encrypted	The password entered or copied from another switch configuration, and is already encrypted. If specified in encrypted format, the <code><password></code> parameter must be exactly: <ul style="list-style-type: none"> • 128 hexadecimal characters for AES. • 34 characters for MD5 salt hash. • 63 characters for SHA256 salt hash. • 106 characters for SHA512 salt hash.

Example: The following example configures the plain text password with AES encryption-type.

```
(Switching)(Config-line)#password encryption-type aes
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following example configures the plain text password with MD5 encryption-type:

```
(Switching)(Config-line)#password encryption-type md5
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the plain text password with SHA256 encryption-type:

```
(Switching)(Config-line)#password encryption-type sha256
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the plain text password with SHA512 encryption-type:

```
(Switching)(Config-line)#password encryption-type sha512
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following example configures the encrypted password with AES encryption-type:

```
(Switching)(Config-line)#password $1$GF72IvBW$zGbca69j/D4w0w6j2x97g/ encryption-type md5 encrypted
```

Example: The following example configures the encrypted password with MD5 encryption-type:

```
(Switching)(Config-line)#password
```

```
0a51d780be1a0240b8cc7c69fe0479dbf07644e1094b25fb43ebe2fa72f649e42ad9711bf5c33f9a7eb88efd8b9945347b  
264e0c52b3a47db05f886caae9f42b encryption-type aes encrypted
```

Example: The following shows an example of the command to configure the encrypted password with SHA256 encryption-type:

```
(Switching)(Config-line)#password
```

```
$5$VY7PUMQFNfPHhiJg$9LQ8.X2NrPO/FUS2n/Jh0kawWUWVU4F3Hcc1bEsIKn1 encryption-type sha256 encrypted
```

Example: The following shows an example of the command to configure the encrypted password with SHA512 encryption-type:

```
(Switching)(Config-line)#password
```

```
$6$S6hkMVlgRR6JDnYk$SPs/8l.qiI9XtLcuJgcNF.K6R./licpoCBxbptRMSG3KFzKoxUaaOBmdHPpq1QPej/s0geak/  
89zW0a0YPhZj1 encryption-type sha512 encrypted
```

2.8.21.1 no password (Line Configuration)

Use this command to remove the password on a line.

Format no password

Mode Line Config

2.8.22 password (User EXEC)

Use this command to allow a user to change the password for only that user. This command should be used after the password has aged. The user is prompted to enter the old password and the new password.

Format password
Mode User EXEC

Example: The following example shows the prompt sequence for executing the password command.

```
(switch)>password
Enter old password:*****
Enter new password:*****
Confirm new password:*****
```

2.8.23 password (aaa IAS User Config)

This command is used to configure a password for a user. An optional parameter [encrypted] is provided to indicate that the password given to the command is already pre-encrypted.

Format password *password* [encrypted]
Mode aaa IAS User Config

2.8.23.1 no password (aaa IAS User Config)

This command is used to clear the password of a user.

Format no password
Mode aaa IAS User Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#aaa ias-user username client-1
(Routing) (Config-aaa-ias-User)#password client123
(Routing) (Config-aaa-ias-User)#no password
```

Example: The following is an example of adding an MAB Client to the Internal user database.

```
(Routing) #
(Routing) #configure
(Routing) (Config)#aaa ias-user username 1f3ccb1157
(Routing) (Config-aaa-ias-User)#password 1f3ccb1157
(Routing) (Config-aaa-ias-User)#exit
(Routing) (Config)#
```

2.8.24 enable password (Privileged EXEC)

Use the `enable password` configuration command to set a local password to control access to the privileged EXEC mode. This command allows the administrator to input the password in encrypted format, which aids in transferring the enable password between devices without having to know the password.

The command `enable password` does not accept plain text format. Specify the password in encrypted format.

The command `enable password <password> encrypted` is deprecated in FASTPATH release 8.9. This command displays the password in running-configuration in encrypted mode for the default encryption type. If `enable password` is configured, `enable password <password> encryption-type <encryption-type> encrypted` is displayed in the running-configuration for both default and non-default encryption types.

Format enable password [encryption-type <encryption-type>] | [*password* [encryption-type <encryption-type>] encrypted]
Mode Privileged EXEC

Parameter	Description
password	Specify the password for this level in encrypted format. Range: 8 to 64 characters.
encryption-type	Specify the encryption algorithm type as MD5, AES, SHA256, or SHA512. The default value of <code>encryption-type</code> is AES.
encrypted	The password entered or copied from another switch configuration, and is already encrypted. If specified in encrypted format, the <code><password></code> parameter must be exactly: <ul style="list-style-type: none"> • 128 hexadecimal characters for AES. • 34 characters for MD5 salt hash. • 63 characters for SHA256 salt hash. • 106 characters for SHA512 salt hash.

Example: The following shows an example of the command to configure the plain text password with AES encryption-type.

```
(Switching)#enable password encryption-type aes
```

```
Enter old password:*****
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the plain text password with MD5 encryption-type.

```
(Switching)#enable password encryption-type md5
```

```
Enter old password:*****
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the plain text password with SHA256 encryption-type:

```
(Switching)#enable password encryption-type sha256
```

```
Enter old password:*****
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the plain text password with SHA512 encryption-type:

```
(Switching)#enable password encryption-type sha512
```

```
Enter old password:*****
```

```
Enter new password:*****
```

```
Confirm new password:*****
```

Example: The following shows an example of the command to configure the encrypted password with AES encryption-type:

```
(Switching)#enable password
0a51d780be1a0240b8c7c69fe0479dbf07644e1094b25fb43ebe2fa72f649e42ad9711bf5c33f9a7eb88efd8b9945347b
264e0c52b3a47db05f886caae9f42b encrypted
```

Example: The following shows an example of the command to configure the encrypted password with MD5 encryption-type:

```
(Switching)#enable password $1$GF72IvBW$zGbca69j/D4w0w6j2x97g/ encryption-type md5 encrypted
```

Example: The following shows an example of the command to configure the encrypted password with SHA256 encryption-type:

```
(Switching)#enable password $5$JYTa212z1PHc6kez$0b71dnNSz5tZ3kYY8LRBLpcW3bhk0GuUeJKP6yAcYQ. encryption-type sha256 encrypted
```

Example: The following shows an example of the command to configure the encrypted password with SHA512 encryption-type:

```
(Switching)#enable password $6$NhDherQkCG1zEc0B$Tt3zA044btrRo2B0HsjhWQJkD34Dyp0mvEmSf0n2K6XKXp0grJLWpcijRA7wXtBFUPvLaHCvThiu7AYwaeBqV1 encryption-type sha512 encrypted
```

2.8.24.1 no enable password (Privileged EXEC)

Use the `no enable password` command to remove the password requirement.

Format `no enable password`
Mode Privileged EXEC

2.8.25 passwords min-length

Use this command to enforce a minimum password length for local users. The value also applies to the `enable password`. The valid range is 8 to 64.

Default 8
Format `passwords min-length 8-64`
Mode Global Config

2.8.25.1 no passwords min-length

Use this command to set the minimum password length to the default value.

Format `no passwords min-length`
Mode Global Config

2.8.26 passwords history

Use this command to set the number of previous passwords that are stored for each user account. When a local user changes his or her password, the user will not be able to reuse any password stored in password history. This ensures that users do not reuse their passwords often. The valid range is 0 to 10.

Password history is not effective if the password encryption type is MD5, SHA256, or SHA512.

NOTICE

Default 0
Format `passwords history 0-10`
Mode Global Config

2.8.26.1 no passwords history

Use this command to set the password history to the default value.

Format no passwords history
Mode Global Config

2.8.27 passwords aging

Use this command to implement aging on passwords for local users. When a user's password expires, the user will be prompted to change it before logging in again. The valid range is 1 to 365. The default is 0, or no aging.

Default 0
Format passwords aging 1-365
Mode Global Config

2.8.27.1 no passwords aging

Use this command to set the password aging to the default value.

Format no passwords aging
Mode Global Config

2.8.28 passwords lock-out

Use this command to strengthen the security of the switch by locking user accounts that have failed login due to wrong passwords. When a lockout count is configured, a user that is logged in must enter the correct password within that count. Otherwise the user will be locked out from further switch access. Only a user with read/write (Level 15) access can reactivate a locked user account. Password lockout does not apply to logins from the serial console. The valid range is 1 to 5. The default is 0, or no lockout count enforced.

Default 0
Format passwords lock-out 1-5
Mode Global Config

2.8.28.1 no passwords lock-out

Use this command to set the password lock-out count to the default value.

Format no passwords lock-out
Mode Global Config

2.8.29 passwords strength-check

Use this command to enable the password strength feature. It is used to verify the strength of a password during configuration.

Password strength check is not applicable for passwords configured in encrypted format.

NOTICE

Default Disable
Format passwords strength-check
Mode Global Config

2.8.29.1 no passwords strength-check

Use this command to set the password strength checking to the default value.

Format no passwords strength-check
Mode Global Config

2.8.30 passwords strength maximum consecutive-characters

Use this command to set the maximum number of consecutive characters that a password can contain. If a password has consecutive characters more than the configured maximum, it fails to configure. The valid range is 0 to 15. The default is 0. A maximum of 0 means no restriction on that set of characters.

Default 0
Format passwords strength maximum consecutive-characters 0-15
Mode Global Config

2.8.30.1 no passwords strength maximum consecutive-characters

Use this command to reset the maximum consecutive characters to the default value.

Format no passwords strength maximum consecutive-characters
Mode Global Config

2.8.31 passwords strength maximum repeated-characters

Use this command to set the maximum number of repeated characters that a password can contain. If a password has repetition of characters more than the configured maximum, it fails to configure. The valid range is 0 to 15. The default is 0. A maximum of 0 means no restriction on that set of characters.

Default 0
Format passwords strength maximum repeated-characters 0-15
Mode Global Config

2.8.31.1 no passwords strength maximum repeated-characters

Use this command to reset the maximum repeated characters to the default value.

Format no passwords strength maximum repeated-characters
Mode Global Config

2.8.32 passwords strength minimum uppercase-letters

Use this command to enforce a minimum number of uppercase letters that a password should contain. The valid range is 0 to 16. The default is 2. A minimum of 0 means no restriction on that set of characters.

Default 2
Format passwords strength minimum uppercase-letters 0-16
Mode Global Config

2.8.32.1 no passwords strength minimum uppercase-letters

Use this command to reset the minimum uppercase letters required in a password to the default value.

Format no passwords minimum uppercase-letter
Mode Global Config

2.8.33 passwords strength minimum lowercase-letters

Use this command to enforce a minimum number of lowercase letters that a password should contain. The valid range is 0 to 16. The default is 2. A minimum of 0 means no restriction on that set of characters.

Default 2
Format passwords strength minimum lowercase-letters *0-16*
Mode Global Config

2.8.33.1 no passwords strength minimum lowercase-letters

Use this command to reset the minimum lower letters required in a password to the default value.

Format no passwords minimum lowercase-letter
Mode Global Config

2.8.34 passwords strength minimum numeric-characters

Use this command to enforce a minimum number of numeric characters that a password should contain. The valid range is 0 to 16. The default is 2. A minimum of 0 means no restriction on that set of characters.

Default 2
Format passwords strength minimum numeric-characters *0-16*
Mode Global Config

2.8.34.1 no passwords strength minimum numeric-characters

Use this command to reset the minimum numeric characters required in a password to the default value.

Format no passwords minimum numeric-characters
Mode Global Config

2.8.35 passwords strength minimum special-characters

Use this command to enforce a minimum number of special characters that a password should contain. The valid range is 0 to 16. The default is 2. A minimum of 0 means no restriction on that set of characters.

Default 2
Format passwords strength minimum special-characters *0-16*
Mode Global Config

2.8.35.1 no passwords strength minimum special-characters

Use this command to reset the minimum special characters required in a password to the default value.

Format no passwords minimum special-characters
Mode Global Config

2.8.36 passwords strength minimum character-classes

Use this command to enforce a minimum number of characters classes that a password should contain. Character classes are uppercase letters, lowercase letters, numeric characters and special characters. The valid range is 0 to 4. The default is 4.

Default 4
Format passwords strength minimum character-classes *0-4*
Mode Global Config

2.8.36.1 no passwords strength minimum character-classes

Use this command to reset the minimum number of character classes required in a password to the default value.

Format no passwords minimum character-classes

Mode Global Config

2.8.37 passwords strength exclude-keyword

Use this command to exclude the specified keyword while configuring the password. The password does not accept the keyword in any form (in between the string, case in-sensitive and reverse) as a substring. The user can configure up to a maximum of three keywords.

Format passwords strength exclude-keyword *keyword*

Mode Global Config

2.8.37.1 no passwords strength exclude-keyword

Use this command to reset the restriction for the specified keyword or all the keywords configured.

Format no passwords strength exclude-keyword [*keyword*]

Mode Global Config

2.8.38 passwords unlock timer

Use this command to configure the password unlock time. If the user account is locked, after this unlock time, the user is unlocked. By default, the unlock time is 5 minutes and the valid range is 1 to 60 minutes.

Default 5 minutes

Format passwords unlock timer <1-60>

Mode Global Config

Example: The following is an example command to configure the password unlock time.

```
(Switching)(Config)#passwords unlock timer 2
```

2.8.38.1 no passwords unlock timer

Use the no form of the command to set the password unlock time to the default.

Format no passwords unlock timer

Mode Global Config

Example: The following is an example of the command.

```
(Switching)(Config)#no passwords unlock timer
```

2.8.39 passwords unlock timer mode

Use this command to configure the password unlock timer mode. If the user account is locked, if the timer mode is enabled after the unlock time, the user account is unlocked, otherwise the account will be in locked state only. By default, the unlock timer mode is disabled.

Default disable

Format passwords unlock timer mode {enable|disable}

Mode Global Config

Example: The following are examples of the command.

```
(Switching)(Config)#passwords unlock timer mode enable
```

```
(Switching)(Config)#passwords unlock timer mode disable
```

2.8.39.1 no passwords unlock timer mode

Use the `no` version of the command to set the password unlock timer mode to the default.

Format `no passwords unlock timer mode`

Mode Global Config

Example: The following is an example of the command.

```
(Switching)(Config)#no passwords unlock timer mode
```

2.8.40 users passwd

Use this command to change a password. Passwords are a maximum of 64 alphanumeric characters. If a user is authorized for authentication or encryption is enabled, the password length must be at least eight alphanumeric characters. The password is case sensitive. When you change a password, a prompt asks for the old password. If there is no password, press Enter. You must enter the `username` in the same case you used when you added the user. To see the case of the `username`, enter the `show users` command.

NOTICE

To specify a blank password in the configuration script, you must specify it as a space within quotes, for example, " ". For more information about creating configuration scripts, see [Section 2.13: "Configuration Scripting Commands"](#).

Default no password

Format `users passwd username`

Mode Privileged EXEC

2.8.41 show passwords configuration

Use this command to display the configured password management settings.

Format `show passwords configuration`

Mode Privileged EXEC

Parameter	Description
Minimum Password Length	The minimum number of characters required when changing passwords.
Password History	Number of passwords to store for reuse prevention.
Password Aging	Length in days that a password is valid.
Lockout Attempts	Number of failed password login attempts before lockout.
Minimum Password Uppercase Letters	The minimum number of uppercase characters required when configuring passwords.
Minimum Password Lowercase Letters	The minimum number of lowercase characters required when configuring passwords.
Minimum Password Numeric Characters	The minimum number of numeric characters required when configuring passwords.
Maximum Password Consecutive Characters	The maximum number of consecutive characters required that the password should contain when configuring passwords.

Parameter	Description
Maximum Password Repeated Characters	The maximum number of repetition of characters that the password should contain when configuring passwords.
Minimum Password Character Classes	The minimum number of character classes (uppercase, lowercase, numeric and special) required when configuring passwords.
Password Exclude-Keywords	The set of keywords to be excluded from the configured password when strength checking is enabled.
Unlock Timer Mode	Use the unlock timer mode to keep the user account locked or unlocked after unlock time. The mode is either enable or disable. The default is disable.
Unlock Time (mins)	The time after which a locked user account can be unlocked. The user can configure the unlock time from 1 to 60 minutes. By default, the unlock time is 5 minutes.

Example: The following shows example CLI display output for the command.

(Routing) #show passwords configuration

```

Passwords Configuration
-----
Minimum Password Length..... 8
Password History..... 0
Password Aging (days)..... 0
Lockout Attempts..... 0
Password Strength Check..... Enable
Minimum Password Uppercase Letters..... 4
Minimum Password Lowercase Letters..... 4
Minimum Password Numeric Characters..... 3
Minimum Password Special Characters..... 3
Maximum Password Consecutive Characters..... 3
Maximum Password Repeated Characters..... 3
Minimum Password Character Classes..... 4
Password Exclude Keywords..... brcm, brcm1,brcm2
Unlock Timer Mode..... Enable
Unlock Time (mins)..... 5

```

2.8.42 show passwords result

Use this command to display the last password set result information.

Format show passwords result

Mode Privileged EXEC

Parameter	Description
Last User Whose Password Is Set	Shows the name of the user with the most recently set password.
Password Strength Check	Shows whether password strength checking is enabled.
Last Password Set Result	Shows whether the attempt to set a password was successful. If the attempt failed, the reason for the failure is included.

Example: The following shows example CLI display output for the command.

```

# show passwords result
Last User whose password is set ..... brcm
Password strength check ..... Enable
Last Password Set Result:
Reason for failure: Could not set user password! Password should contain at least 4 uppercase
letters.

```

2.8.43 aaa ias-user username

The Internal Authentication Server (IAS) database is a dedicated internal database used for local authentication of users for network access through the IEEE 802.1X feature.

Use the `aaa ias-user username` command in Global Config mode to add the specified user to the internal user database. This command also changes the mode to AAA User Config mode.

Format `aaa ias-user username user`

Mode Global Config

2.8.43.1 no aaa ias-user username

Use this command to remove the specified user from the internal user database.

Format `no aaa ias-user username user`

Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #
(Routing) #configure
(Routing) (Config)#aaa ias-user username client-1
(Routing) (Config-aaa-ias-User)#exit
(Routing) (Config)#no aaa ias-user username client-1
(Routing) (Config)#
```

2.8.44 aaa session-id

Use this command in Global Config mode to specify if the same session-id is used for Authentication, Authorization and Accounting service type within a session.

Default common

Format `aaa session-id [common | unique]`

Mode Global Config

Parameter	Description
common	Use the same session-id for all AAA Service types.
unique	Use a unique session-id for all AAA Service types.

2.8.44.1 no aaa session-id

Use this command in Global Config mode to reset the `aaa session-id` behavior to the default.

Format `no aaa session-id [unique]`

Mode Global Config

2.8.45 aaa accounting

Use this command in Global Config mode to create an accounting method list for user EXEC sessions, user-executed commands, or DOT1X. This list is identified by default or a user-specified `list_name`. Accounting records, when enabled for a line-mode, can be sent at both the beginning and at the end (`start-stop`) or only at the end (`stop-only`). If `none` is specified, then accounting is disabled for the specified list. If `tacacs` is specified as the accounting method, accounting records are notified to a TACACS+ server. If `radius` is the specified accounting method, accounting records are notified to a RADIUS server.

NOTICE

- A maximum of five Accounting Method lists can be created for each exec and commands type.
- Only the default Accounting Method list can be created for DOT1X. There is no provision to create more.
- The same list-name can be used for both exec and commands accounting type
- AAA Accounting for commands with RADIUS as the accounting method is not supported.
- Start-stop or None are the only supported record types for DOT1X accounting. Start-stop enables accounting and None disables accounting.
- RADIUS is the only accounting method type supported for DOT1X accounting.

Format `aaa accounting {exec | commands | dot1x} {default | list_name} {start-stop | stop-only | none} method1 [method2...]`

Mode Global Config

Parameter	Description
exec	Provides accounting for a user EXEC terminal sessions.
commands	Provides accounting for all user executed commands.
dot1x	Provides accounting for DOT1X user commands.
default	The default list of methods for accounting services.
list-name	Character string used to name the list of accounting methods.
start-stop	Sends a start accounting notice at the beginning of a process and a stop accounting notice at the beginning of a process and a stop accounting notice at the end of a process.
stop-only	Sends a stop accounting notice at the end of the requested user process.
none	Disables accounting services on this line.
method	Use either TACACS or radius server for accounting purposes.

Example: The following shows an example of the command.

```
(Routing) #
(Routing) #configure
(Routing) #aaa accounting commands default stop-only tacacs
(Routing) #aaa accounting exec default start-stop radius
(Routing) #aaa accounting dot1x default start-stop radius
(Routing) #aaa accounting dot1x default none
(Routing) #exit
```

For the same set of accounting type and list name, the administrator can change the record type, or the methods list, without having to first delete the previous configuration.

```
(Routing) #
(Routing) #configure
(Routing) #aaa accounting exec ExecList stop-only tacacs
(Routing) #aaa accounting exec ExecList start-stop tacacs
(Routing) #aaa accounting exec ExecList start-stop tacacs radius
```

The first aaa command creates a method list for exec sessions with the name ExecList, with `record-type` as stop-only and the `method` as TACACS+. The second command changes the `record type` to start-stop from stop-only for the same method list. The third command, for the same list changes the `methods list` to {tacacs,radius} from {tacacs}.

2.8.45.1 no aaa accounting

This command deletes the accounting method list.

Format `no aaa accounting {exec | commands | dot1x} {default | list_name default}`

Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #
(Routing) #configure
(Routing) #aaa accounting commands userCmdAudit stop-only tacacs radius
(Routing) #no aaa accounting commands userCmdAudit
(Routing) #exit
```

2.8.46 aaa accounting update

Use this command to configure interim accounting records.

Default newinfo: Disabled
 Periodic: 5 minutes

Format aaa accounting update [newinfo [periodic 1-200] | periodic 1-200]

Mode Global Config

Parameter	Description
newinfo	Indicates that updates should be sent to the RADIUS server whenever there is a new information available, such as "Re-authentication of the client."
periodic	The interval at which interim accounting records are sent, in minutes

2.8.46.1 no aaa accounting update

This command resets sending the interim accounting records.

Format no aaa accounting update

Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#aaa accounting update newinfo periodic 20
```

2.8.47 password (AAA IAS User Configuration)

Use this command to specify a password for a user in the IAS database. An optional parameter `encrypted` is provided to indicate that the password given to the command is already pre-encrypted.

Format password *password* [encrypted]

Mode AAA IAS User Config

Parameter	Description
password	Password for this level. Range: 8 to 64 characters
encrypted	Encrypted password to be entered, copied from another switch configuration.

2.8.47.1 no password (AAA IAS User Configuration)

Use this command to clear the password of a user.

Format no password

Mode AAA IAS User Config

Example: The following shows an example of the command.

```
(Routing) #
(Routing) #configure
```

```
(Routing) (Config)#aaa ias-user username client-1
(Routing) (Config-aaa-ias-User)#password client123
(Routing) (Config-aaa-ias-User)#no password
```

Example: The following is an example of adding a MAB Client to the Internal user database.

```
(Routing) #
(Routing) #configure
(Routing) (Config)#aaa ias-user username 1f3ccb1157
(Routing) (Config-aaa-ias-User)#password 1f3ccb1157
(Routing) (Config-aaa-ias-User)#exit
(Routing) (Config)#
```

2.8.48 clear aaa ias-users

Use this command to remove all users from the IAS database.

Format clear aaa ias-users
Mode Privileged EXEC

Parameter	Description
password	Password for this level. Range: 8 to 64 characters
encrypted	Encrypted password to be entered, copied from another switch configuration.

Example: The following is an example of the command.

```
(Routing) #
(Routing) #clear aaa ias-users
(Routing) #
```

2.8.49 show aaa ias-users

Use this command to display configured IAS users and their attributes. Passwords configured are not shown in the show command output.

Format show aaa ias-users [username]
Mode Privileged EXEC

Example: The following is an example of the command.

```
(Routing) #
(Routing) #show aaa ias-users
```

```
UserName
-----
Client-1
Client-2
```

Example: Following are the IAS configuration commands shown in the output of show running-config command. Passwords shown in the command output are always encrypted.

```
aaa ias-user username client-1
password a45c74fdf50a558a2b5cf05573cd633bac2c6c598d54497ad4c46104918f2c encrypted
exit
```

2.8.50 accounting

Use this command in Line Configuration mode to apply the accounting method list to a line config (console/telnet/ssh).

Format accounting {exec | commands } {default | Listname}
Mode Line Configuration

Parameter	Description
exec	Causes accounting for an EXEC session.
commands	This causes accounting for each command execution attempt. If a user is enabling accounting for exec mode for the current line-configuration type, the user will be logged out.
default	The default Accounting List
listname	Enter a string of not more than 15 characters.

Example: The following is a example of the command.

```
(Routing) #
(Routing) #configure
(Routing) (Config)#line telnet
(Routing)(Config-line)# accounting exec default
(Routing) #exit
```

2.8.50.1 no accounting

Use this command to remove accounting from a Line Configuration mode.

Format no accounting {exec|commands]
Mode Line Configuration

2.8.51 show accounting

Use this command to display ordered methods for accounting lists.

Format show accounting
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #show accounting
Number of Accounting Notifications sent at beginning of an EXEC session:      0
Errors when sending Accounting Notifications beginning of an EXEC session:    0
Number of Accounting Notifications at end of an EXEC session:                 0
Errors when sending Accounting Notifications at end of an EXEC session:       0
Number of Accounting Notifications sent at beginning of a command execution:  0
Errors when sending Accounting Notifications at beginning of a command execution: 0
Number of Accounting Notifications sent at end of a command execution:        0
Errors when sending Accounting Notifications at end of a command execution:    0
```

2.8.52 show accounting methods

Use this command to display configured accounting method lists.

Format show accounting methods
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #
(Routing) #show accounting methods
```

Acct Type	Method Name	Record Type	Method Type
Exec	dfltExecList	start-stop	TACACS
Commands	dfltCmdsList	stop-only	TACACS
Commands	UserCmdAudit	start-stop	TACACS

```
DOT1X          dfltDot1xList    start-stop    radius
```

Line	EXEC Method List	Command Method List
Console	dfltExecList	dfltCmdsList
Telnet	dfltExecList	dfltCmdsList
SSH	dfltExecList	UserCmdAudit

2.8.53 show accounting update

Use this command to display configured accounting interim update information.

Format show accounting update
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #
(Routing) #show accounting update

aaa accounting  update newinfo  : Enabled
aaa accounting  update periodic : 10 minutes
```

2.8.54 clear accounting statistics

This command clears the accounting statistics.

Format clear accounting statistics
Mode Privileged EXEC

2.8.55 show domain-name

This command displays the configured domain-name.

Format show domain-name
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #
(Routing) #show domain-name

Domain           : Enable
Domain-name      : abc
```

2.9 SNMP Commands

This section describes the commands you use to configure Simple Network Management Protocol (SNMP) on the switch. You can configure the switch to act as an SNMP agent so that it can communicate with SNMP managers on your network.

2.9.1 snmp-server

This command sets the name and the physical location of the switch, and the organization responsible for the network. The parameters `name`, `loc`, and `con` can be up to 255 characters in length.

Default none
Format snmp-server {sysname *name* | location *loc* | contact *con*}
Mode Global Config

NOTICE

To clear the snmp-server, enter an empty string in quotation marks. For example, `snmp-server {sysname " "}` clears the system name.

2.9.2 snmp-server community

This command adds (and names) a new SNMP community, and optionally sets the access mode, allowed IP address, and create a view for the community.

NOTICE

- No SNMP communities exist by default. Prior to FASTPATH 8.2, two SNMPv2 communities (public and private) were created by default.
- Community names in the SNMP Community Table must be unique. When making multiple entries using the same community name, the first entry is kept and processed and all duplicate entries are ignored.

Default	None
Format	<code>snmp-server community <i>community-string</i> [{ro rw su}] [ipaddress <i>ip-address</i> [ipmask <i>ip-mask</i>]] [view <i>view-name</i>]</code>
Mode	Global Config

Parameter	Description
community-string	A name associated with the switch and with a set of SNMP managers that manage it with a specified privileged level. The length of <code>community-string</code> can be up to 20 case-sensitive characters.
ro rw su	The access mode of the SNMP community, which can be read-only (<code>ro</code>), read-write (<code>rw</code>), or super user (<code>su</code>).
ip-address	The associated community SNMP packet sending address. It is used along with an optional IP mask value to denote an individual client or range of IP addresses from which SNMP clients may access the device using the specified <code>community-string</code> . If unspecified, access from any host is permitted.
ip-mask	The optional IP mask. This value is AND'ed with the IP address to determine the range of permitted client IP addresses.
view-name	The name of the view to create or update.

2.9.2.1 no snmp-server community

This command removes this community name from the table. The `name` is the community name to be deleted.

Format	<code>no snmp-server community <i>community-name</i></code>
Mode	Global Config

2.9.3 snmp-server community-group

This command configures a community access string to permit access using the SNMPv1 and SNMPv2c protocols.

Format	<code>snmp-server community-group <i>community-string</i> <i>group-name</i> [ipaddress <i>ipaddress</i>]</code>
Mode	Global Config

Parameter	Description
community-string	The community which is created and then associated with the group. The range is 1 to 20 characters.

Parameter	Description
group-name	The name of the group that the community is associated with. The range is 1 to 30 characters.
ipaddress	Optionally, the IPv4 address that the community may be accessed from.

2.9.4 snmp-server enable traps violation

The Port MAC locking component interprets this command and configures violation action to send an SNMP trap with default trap frequency of 30 seconds. The Global command configures the trap violation mode across all interfaces valid for port-security. There is no global trap mode as such.

For other port security commands, see [Section 4.39: "Port Security Commands"](#).

NOTICE

Default	disabled
Format	snmp-server enable traps violation
Mode	<ul style="list-style-type: none"> • Global Config • Interface Config

2.9.4.1 no snmp-server enable traps violation

This command disables the sending of new violation traps.

Format	no snmp-server enable traps violation
Mode	Interface Config

2.9.5 snmp-server enable traps

This command enables the Authentication flag.

Default	enabled
Format	snmp-server enable traps
Mode	Global Config

2.9.5.1 no snmp-server enable traps

This command disables the Authentication flag.

Format	no snmp-server enable traps
Mode	Global Config

2.9.6 snmp-server port

This command configures the UDP port number on which the SNMP server listens for requests.

Default	161
Format	snmp-server port 1025-65535
Mode	Privileged EXEC

2.9.6.1 no snmp-server port

This command restores the SNMP server listen port to its factory default value.

Format no snmp-server port
Mode Privileged EXEC

2.9.7 snmp trap link-status

This command enables link status traps on an interface or range of interfaces.

This command is valid only when the Link Up/Down Flag is enabled.

NOTICE

Format snmp trap link-status
Mode Interface Config

2.9.7.1 no snmp trap link-status

This command disables link status traps by interface.

NOTE: This command is valid only when the Link Up/Down Flag is enabled.

This command is valid only when the Link Up/Down Flag is enabled.

NOTICE

Format no snmp trap link-status
Mode Interface Config

2.9.8 snmp trap link-status all

This command enables link status traps for all interfaces.

This command is valid only when the Link Up/Down Flag is enabled.

NOTICE

Format snmp trap link-status all
Mode Global Config

2.9.8.1 no snmp trap link-status all

This command disables link status traps for all interfaces.

This command is valid only when the Link Up/Down Flag is enabled.

NOTICE

Format no snmp trap link-status all
Mode Global Config

2.9.9 snmp-server enable traps linkmode

This command may not be available on all platforms.

NOTICE

This command enables Link Up/Down traps for the entire switch. When enabled, link traps are sent only if the Link Trap flag setting associated with the port is enabled. See the [show snmp](#) command.

Default enabled
Format snmp-server enable traps linkmode
Mode Global Config

2.9.9.1 no snmp-server enable traps linkmode

This command disables Link Up/Down traps for the entire switch.

Format no snmp-server enable traps linkmode
Mode Global Config

2.9.10 snmp-server enable traps multiusers

This command enables Multiple User traps. When the traps are enabled, a Multiple User Trap is sent when a user logs in to the terminal interface (EIA 232 or Telnet) and there is an existing terminal interface session.

Default enabled
Format snmp-server enable traps multiusers
Mode Global Config

2.9.10.1 no snmp-server enable traps multiusers

This command disables Multiple User traps.

Format no snmp-server enable traps multiusers
Mode Global Config

2.9.11 snmp-server enable traps stpmode

This command enables the sending of new root traps and topology change notification traps.

Default enabled
Format snmp-server enable traps stpmode
Mode Global Config

2.9.11.1 no snmp-server enable traps stpmode

This command disables the sending of new root traps and topology change notification traps.

Format no snmp-server enable traps stpmode
Mode Global Config

2.9.12 snmp-server engineID local

This command configures the SNMP engine ID on the local device.

Default	The engine ID is configured automatically, based on the device MAC address.
Format	<code>snmp-server engineID local {engineid-string default}</code>
Mode	Global Config

Parameter	Description
engineid-string	A hexadecimal string identifying the engine ID, used for localizing configuration. The engine ID must be an even length in the range of 6 to 32 hexadecimal characters.
default	Sets the engine ID to the default string, based on the device MAC address.



Changing the engine ID will invalidate all SNMP configurations that exist on the box.

2.9.12.1 no snmp-server engineID local

This command removes the specified engine ID.

Default	The engine ID is configured automatically, based on the device MAC address.
Format	<code>no snmp-server engineID local</code>
Mode	Global Config

2.9.13 snmp-server filter

This command creates a filter entry for use in limiting which traps will be sent to a host.

Default	No filters are created by default.
Format	<code>snmp-server filter filtername oid-tree {included excluded}</code>
Mode	Global Config

Parameter	Description
filtername	The label for the filter being created. The range is 1 to 30 characters.
oid-tree	The OID subtree to include or exclude from the filter. Subtrees may be specified by numerical (1.3.6.2.4) or keywords (system), and asterisks may be used to specify a subtree family (1.3.*.4).
included	The tree is included in the filter.
excluded	The tree is excluded from the filter.

2.9.13.1 no snmp-server filter

This command removes the specified filter.

Default	No filters are created by default.
Format	<code>snmp-server filter filtername [oid-tree]</code>
Mode	Global Config

2.9.14 snmp-server group

This command creates an SNMP access group.

Default	Generic groups are created for all versions and privileges using the default views.
Format	<code>snmp-server group <i>group-name</i> {v1 v2c v3 {noauth auth priv}}</code> <code>[context <i>context-name</i>] [read <i>read-view</i>] [write <i>write-view</i>] [notify <i>notify-view</i>]</code>
Mode	Global Config

Parameter	Description
group-name	The group name to be used when configuring communities or users. The range is 1 to 30 characters.
v1	This group can only access using SNMPv1.
v2	This group can only access using SNMPv2c.
v3	This group can only access using SNMPv3.
noauth	This group can be accessed only when not using Authentication or Encryption. Applicable only if SNMPv3 is selected.
auth	This group can be accessed only when using Authentication but not Encryption. Applicable only if SNMPv3 is selected.
priv	This group can be accessed only when using both Authentication and Encryption. Applicable only if SNMPv3 is selected.
context-name	The SNMPv3 context used during access. Applicable only if SNMPv3 is selected.
read-view	The view this group will use during GET requests. The range is 1 to 30 characters.
write-view	The view this group will use during SET requests. The range is 1 to 30 characters.
notify-view	The view this group will use when sending out traps. The range is 1 to 30 characters.

2.9.14.1 no snmp-server group

This command removes the specified group.

Format	<code>no snmp-server group <i>group-name</i> {v1 v2c 3 {noauth auth priv}}</code> <code>[context <i>context-name</i>]</code>
Mode	Global Config

2.9.15 snmp-server host

This command configures traps to be sent to the specified host.

Default	No default hosts are configured.
Format	<code>snmp-server host <i>host-addr</i> {informs [timeout <i>seconds</i>] [retries <i>retries</i>]</code> <code> traps version {1 2c }} community-string [udp-port <i>port</i>] [filter <i>filter-name</i>]</code>
Mode	Global Config

Parameter	Description
host-addr	The IPv4 or IPv6 address of the host to which to send the trap or inform.
traps	Send SNMP traps to the host. This option is selected by default.
version 1	Sends SNMPv1 traps. This option is not available if informs is selected.
version 2	Sends SNMPv2c traps. This option is not available if informs is selected. This option is selected by default.
informs	Send SNMPv2 informs to the host.
seconds	The number of seconds to wait for an acknowledgment before resending the Inform. The default is 15 seconds. The range is 1 to 300 seconds.
retries	The number of times to resend an Inform. The default is 3 attempts. The range is 0 to 255 retries.

Parameter	Description
community-string	Community string sent as part of the notification. The range is 1 to 20 characters.
port	The SNMP Trap receiver port. The default is port 162.
filter-name	The filter name to associate with this host. Filters can be used to specify which traps are sent to this host. The range is 1 to 30 characters.

2.9.15.1 no snmp-server host

This command removes the specified host entry.

Format no snmp-server host *host-addr* [traps|informs]

Mode Global Config

2.9.16 snmp-server user

This command creates an SNMPv3 user for access to the system. Option aes128 is for encryption.

Default No default users are created.

Format snmp-server user *username groupname* [*remote engineid-string*] [{noauth} {auth-md5 *password* | auth-sha *password* | auth-sha512 *password* | auth-md5-key *md5-key* | auth-sha-key *sha-key* | auth-sha512-key *sha512-key*} [priv-des *password* | priv-aes128 *password* | priv-des-key *des-key* | priv-aes128-key *aes128-key*]

Mode Privileged EXEC

Parameter	Description
username	The username the SNMPv3 user will connect to the switch as. The range is 1 to 30 characters.
group-name	The name of the group to which the user belongs. The range is 1 to 30 characters.
engineid-string	The engine ID of the remote management station that this user will be connecting from. The range is 5 to 32 characters.
password	The password the user will use for the authentication or encryption mechanism. The range is 1 to 32 characters.
md5-key	A pregenerated MD5 authentication key. The length is 32 characters.
sha-key	A pregenerated SHA authentication key. The length is 48 characters.
sha512-key	A pregenerated SHA512 authentication key. The length is 128 characters.
des-key	A pregenerated DES encryption key. The length is 32 characters if MD5 is selected, 48 characters if SHA is selected.
priv-aes128-key	A pregenerated AES128 encryption key. The length is 32 characters if MD5 is selected, 48 characters if SHA is selected, and 128 characters if SHA512 is selected.
priv-aes128	Advanced encryption standard 128 password.
noauth	noauth is for SNMP users without authentication and encryption.

2.9.16.1 no snmp-server user

This command removes the specified SNMPv3 user.

Format no snmp-server user *username*

Mode Privileged EXEC

2.9.17 snmp-server view

This command creates or modifies an existing view entry that is used by groups to determine which objects can be accessed by a community or user.

Default Views are created by default to provide access to the default groups.

Format `snmp-server viewname oid-tree {included|excluded}`

Mode Global Config

Parameter	Description
viewname	The label for the view being created. The range is 1 to 30 characters.
oid-tree	The OID subtree to include or exclude from the view. Subtrees may be specified by numerical (1.3.6.2.4) or keywords (system), and asterisks may be used to specify a subtree family (1.3.*.4).
included	The tree is included in the view.
excluded	The tree is excluded from the view.

2.9.17.1 no snmp-server view

This command removes the specified view.

Format `no snmp-server view viewname [oid-tree]`

Mode Global Config

2.9.18 snmp-server v3-host

This command configures traps to be sent to the specified host.

Default No default hosts are configured.

Format `snmp-server v3-host host-addr username [traps | informs [timeout seconds] [retries retries]] [auth | noauth | priv] [udpport port] [filter filtername]`

Mode Global Config

Parameter	Description
host-addr	The IPv4 or IPv6 address of the host to which to send the trap or inform.
user-name	User used to send a Trap or Inform message. This user must be associated with a group that supports the version and access method. The range is 1 to 30 characters.
traps	Send SNMP traps to the host. This is the default option.
informs	Send SNMP informs to the host.
seconds	Number of seconds to wait for an acknowledgement before resending the Inform. The default is 15 seconds. The range is 1 to 300 seconds.
retries	Number of times to resend an Inform. The default is 3 attempts. The range is 0 to 255 retries.
auth	Enables authentication but not encryption.
noauth	No authentication or encryption. This is the default.
priv	Enables authentication and encryption.
port	The SNMP Trap receiver port. This value defaults to port 162.
filter-name	The filter name to associate with this host. Filters can be used to specify which traps are sent to this host. The range is 1 to 30 characters.

2.9.19 snmptrap source-interface

Use this command in Global Configuration mode to configure the global source-interface (Source IP address) for all SNMP communication between the SNMP client and the server.

Format `snmptrap source-interface {slot/port | loopback Loopback-id|tunnel tunnel-id|
vlan vlan-id}`

Mode Global Configuration

Parameter	Description
slot/port	The unit identifier assigned to the switch.
loopback-id	Configures the loopback interface. The range of the loopback ID is 0 to 7.
tunnel-id	Configures the IPv6 tunnel interface. The range of the tunnel ID is 0 to 7.
vlan-id	Configures the VLAN interface to use as the source IP address. The range of the VLAN ID is 1 to 4093.

2.9.19.1 no snmptrap source-interface

Use this command in Global Configuration mode to remove the global source-interface (Source IP selection) for all SNMP communication between the SNMP client and the server.

Format `no snmptrap source-interface`

Mode Global Configuration

2.9.20 snmptrap ipaddr snmpversion

This command modifies the SNMP version of a trap. The maximum length of *name* is 16 case-sensitive alphanumeric characters. The *snmpversion* parameter options are *snmpv1* or *snmpv2*.

This command does not support a no form.

NOTICE

Format `snmptrap ipaddr snmpversion name snmpversion`

Mode Global Configuration

2.9.21 snmptrap ip6addr snmpversion

This command modifies the SNMP version of a trap. The maximum length of *name* is 16 case-sensitive alphanumeric characters. The *snmpversion* parameter options are *snmpv1* or *snmpv2*.

This command does not support a no form.

NOTICE

Format `snmptrap ip6addr snmpversion name snmpversion`

Mode Global Configuration

2.9.22 show snmp

This command displays the current SNMP configuration.

Format `show snmp`

Mode Privileged EXEC

Parameter	Description	
Community Table	Community-String	The community string for the entry. This is used by SNMPv1 and SNMPv2 protocols to access the switch.
	Community-Access	The type of access the community has: <ul style="list-style-type: none"> • Read only • Read write • su
	View Name	The view to which this community has access.
	IP Address	Access to this community is limited to this IP address.
Community Group Table	Community-String	The community this mapping configures
	Group Name	The group to which this community is assigned.
	IP Address	The IP address to which this community is limited.
Host Table	Target Address	The address of the host to which traps will be sent.
	Type	The type of message that will be sent, either traps or informs.
	Community	The community to which traps will be sent.
	Version	The version of SNMP the trap will be sent as.
	UDP Port	The UDP port to which the trap or inform will be sent.
	Filter name	The filter the traps will be limited by for this host.
	TO Sec	The number of seconds before informs will time out when sending to this host.
Retries	The number of times informs will be sent after timing out.	

2.9.23 show snmp engineID

This command displays the currently configured SNMP engine ID.

Format `show snmp engineID`

Mode Privileged EXEC

Parameter	Description
Local SNMP EnginID	The current configuration of the displayed SNMP engine ID.

2.9.24 show snmp filters

This command displays the configured filters used when sending traps.

Format `show snmp filters [filtername]`

Mode Privileged EXEC

Parameter	Description
Name	The filter name for this entry.
OID Tree	The OID tree this entry will include or exclude.
Type	Indicates if this entry includes or excludes the OID Tree.

2.9.25 show snmp group

This command displays the configured groups.

Format `show snmp group [groupname]`

Mode Privileged EXEC

Parameter	Description
Name	The name of the group.
Security Model	Indicates which protocol can access the system using this group.
Security Level	Indicates the security level allowed for this group.
Read View	The view to which this group provides read access.
Write View	The view to which this group provides write access.
Notify View	The view to which this group provides trap access.

2.9.26 show snmp-server

This command displays the current SNMP server user configuration.

Format `show snmp-server`

Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing)#show snmp-server
```

```
SNMP Server Port..... 161
```

2.9.27 show snmp source-interface

Use this command in Privileged EXEC mode to display the configured global source interface (Source IP address) details used for an SNMP client. The IP address of the selected interface is used as source IP for all communications with the server.

Format `show snmp source-interface`

Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing)# show snmp source-interface
```

```
SNMP trap Client Source Interface.....0/1
```

```
SNMP trap Client Source IPv4 Address.....1.1.1.1 [Down]
```

2.9.28 show snmp user

This command displays the currently configured SNMPv3 users.

Format `show snmp user [username]`

Mode Privileged EXEC

Parameter	Description
Name	The name of the user.
Group Name	The group that defines the SNMPv3 access parameters.
Auth Method	The authentication algorithm configured for this user.
Privilege Method	The encryption algorithm configured for this user.
Remote Engine ID	The engine ID for the user defined on the client machine.

Example: The following shows example command output.

```
(localhost)(Config)#show snmp user
```

Name	Group Name	Auth Meth	Priv Meth	Remote Engine ID
admin	DefaultWrite	SHA512	AES128	800011ae03bca511bec3a5
test	grp1	SHA512	AES128	800011ae03bca511bec3a5

2.9.29 show snmp views

This command displays the currently configured views.

Format show snmp views [viewname]

Mode Privileged EXEC

Parameter	Description
Name	The view name for this entry.
OID Tree	The OID tree that this entry will include or exclude.
Type	Indicates if this entry includes or excludes the OID tree.

2.9.30 show trapflags

This command displays trap conditions. The command's display shows all the enabled OSPFv2 and OSPFv3 trapflags. Configure which traps the switch should generate by enabling or disabling the trap condition. If a trap condition is enabled and the condition is detected, the SNMP agent on the switch sends the trap to all enabled trap receivers. You do not have to reset the switch to implement the changes. Cold and warm start traps are always generated and cannot be disabled.

The indication for SFP present traps has been added by Kontron

Format show trapflags

Mode Privileged EXEC

Parameter	Description
Authentication Flag	Can be enabled or disabled. The factory default is enabled. Indicates whether authentication failure traps will be sent.
Link Up/Down Flag	Can be enabled or disabled. The factory default is enabled. Indicates whether link status traps will be sent.
Multiple Users Flag	Can be enabled or disabled. The factory default is enabled. Indicates whether a trap will be sent when the same user ID is logged into the switch more than once at the same time (either through Telnet or the serial port).
Spanning Tree Flag	Can be enabled or disabled. The factory default is enabled. Indicates whether spanning tree traps are sent.
ACL Traps	May be enabled or disabled. The factory default is disabled. Indicates whether ACL traps are sent.
DVMRP Traps	Can be enabled or disabled. The factory default is disabled. Indicates whether DVMRP traps are sent.
OSPFv2 Traps	Can be enabled or disabled. The factory default is disabled. Indicates whether OSPF traps are sent. If any of the OSPF trap flags are not enabled, the command displays <i>disabled</i> . Otherwise, the command shows all the enabled OSPF traps' information.
OSPFv3 Traps	Can be enabled or disabled. The factory default is disabled. Indicates whether OSPF traps are sent. If any of the OSPFv3 trap flags are not enabled, the command displays <i>disabled</i> . Otherwise, the command shows all the enabled OSPFv3 traps' information.
PIM Traps	Can be enabled or disabled. The factory default is disabled. Indicates whether PIM traps are sent.

Parameter	Description
MAC Notification Traps	Indicates whether MAC notification global trap status is enabled or disabled.
SFP Present Traps	Indicates, whether the SFP present status has changed

2.9.31 snmp-server enable traps edac

This command enables EDAC traps. If enabled the EDAC counters are monitored and if any counter is not 0, a SNMP trap is generated.

The command "snmp-server enable traps" is a standard Fastpath command. The standard Fastpath command "show trapflags" indicates the status of the traps.

Default	enabled
Format	snmp-server enable traps edac
Mode	Global Config

2.9.31.1 no snmp-server enable traps edac

This command disables EDAC traps. If enabled the EDAC counters are monitored and if any counter is not 0, a SNMP trap is generated.

Format	no snmp-server enable traps edac
Mode	Global Config

2.9.32 show board edac

This command displays the EDAC counters. For each Memory Controller (mc) and each row (csrow) the corrected error count (CE) and uncorrected error count (UE) is displayed. Additionally the state for the monitoring of EDAC counters is displayed.

Format	show board edac
Mode	Privileged Exec

2.9.33 snmp-server enable traps all

This command enables all traps.

Default	enabled
Format	snmp-server enable traps all
Mode	Global Config

2.9.33.1 no snmp-server enable traps

This command disables all traps.

Format	no snmp-server enable traps all
Mode	Global Config

2.9.34 show snmp-server

This is a standard FASTPATH command to display snmp-server parameters. The command is extended by Kontron (parameter 'sysinfo') to display additionally snmp-server system information. This consists of the name, the physical location of the switch or the organisation responsible for network. All parameters are listed for 'all'. This information is provided for the SNMP in the standard MIB-2 in OIDs "sysName", "sysLocation" and "sysContact".

Format `show snmp-server [sysinfo {sysname | location | contact | all}]`
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing)#show snmp-server
```

```
SNMP Server Port..... 161
```

2.10 IPMI trap Commands

2.10.1 snmp-server enable traps ipmi

The command enables the generation of IPMI SEL traps. If enabled, SNMP traps are sent for all new SEL entries. If you generate filters (next chapter) the trap is only generated for SEL entries which fit one of the filter rules.

Format `snmp-server enable traps ipmi`
Mode Global Config

2.10.1.1 no snmp-server enable traps ipmi

The command disables the generation of IPMI SEL traps.

Format `no snmp-server enable traps ipmi`
Mode Global Config

2.10.2 set board ipmi-filter

This command configures a filter for the IPMI SEL trap. When executing this command you enter the "trap-filter" mode.

Format `set board ipmi-filter <1-20>`
Mode Privileged Exec

2.10.3 enable (filter)

This command enables the filter rule.

Format `enable`
Mode Trap Filter

2.10.3.1 no enable (filter)

This command disables the filter rule.

Format `no enable`
Mode Trap Filter

2.10.4 type (filter)

This command specifies the sensor type for which a trap should be sent. The type is either 'all' for all types (default) or a pre-defined sensor type (by related name) or a value (decimal or hexadecimal).

Format `type [all | analog | discrete | temperature | voltage | current | fan | <value>]`
Mode Trap Filter

2.10.5 status (filter)

This command specifies the state for which a trap should be sent. Relevant only for analog sensors. The state is either 'all' for all states (default) or a special state.

Format status [*all* | *non-critical* | *critical* | *non-recoverable*]
Mode Trap Filter

2.10.6 assert (filter)

This command specifies if a trap should be sent for assert or deassert event. This can be used for discrete and analog sensors. For analog sensors assert means going low for lower thresholds and going high for upper thresholds. The assertion is either 'all' for all assertion states (default) or a special assertion state.

Format assert [*all* | *asserted* | *deasserted*]
Mode Trap Filter

2.10.7 show board ipmi-filter

This command displays the configured filter rules.

Format show board ipmi-filter
Mode Privileged Exec

2.11 RADIUS Commands

This section describes the commands you use to configure the switch to use a Remote Authentication Dial-In User Service (RADIUS) server on your network for authentication and accounting.

2.11.1 aaa server radius dynamic-author

This command enables CoA functionality and enters dynamic authorization local server configuration mode.

Default Not applicable
Format aaa server radius dynamic-author
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#aaa server radius dynamic-author
(Routing) (Config-radius-da)#
```

2.11.1.1 no aaa server radius dynamic-author

This command disables CoA functionality.

Default None
Format no aaa server radius dynamic-author
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#no aaa server radius dynamic-author
```

2.11.2 authentication command bounce-port ignore

This command configures the device to ignore a RADIUS server bounce-host-port command. The bounce-host-port command causes a host to flap the link on an authentication port. The link flap causes DHCP renegotiation from one or more hosts connected to this port.

Default FALSE (Bounce-Port messages will be processed)
Format authentication command bounce-port ignore
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#authentication command bounce-port ignore
```

2.11.2.1 no authentication command bounce-port ignore

This command resets the device to the default value so that RADIUS server bounce-host-port commands are processed.

Format no authentication command bounce-port ignore
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#no authentication command bounce-port ignore
```

2.11.3 authentication command disable-port ignore

This command configures the device to ignore a RADIUS server disable-host-port command. The disable-host-port command puts the host port to D-Disabled state with reason as coa disabled. The D-Disabled port with reason as coa disabled can be re-enabled either if the autorecovery cause is enabled for CoA after the expiry of the autorecovery timer or manually by the administrator by not shutting down the port.

Default L7_DISABLE (DUT will process disable-host-port messages)
Format authentication command disable-port ignore
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#authentication command disable-port ignore
```

2.11.3.1 no authentication command disable-port ignore

This command resets the device to the default value so that RADIUS server disable-host-port commands are processed.

Format no authentication command disable-port ignore
Mode Global Config

Example: The following shows an example of the command.

```
(Routing) #configure
(Routing) (Config)#no authentication command disable-port ignore
```


2.11.4 auth-type

Use this command to specify the type of authorization that the device uses for RADIUS clients. The client must match the configured attributes for authorization.

Default All
Format auth-type { any | all | session-key }
Mode Dynamic Authorization

```
(Routing) (Config-radius-da)#auth-type all
```

2.11.4.1 no auth-type

Use this command to reset the specified authorization type that the device must use for RADIUS clients.

Default None
Format no auth-type
Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no auth-type
```

2.11.5 authorization network radius

Use this command to enable the switch to accept VLAN assignment by the radius server.

Default disable
Format authorization network radius
Mode Global Config

2.11.5.1 no authorization network radius

Use this command to disable the switch to accept VLAN assignment by the radius server.

Format no authorization network radius
Mode Global Config

2.11.6 clear radius dynamic-author statistics

This command clears radius dynamic authorization global counters and per-DAS client counters.

Default None
Format clear radius dynamic-author statistics [client {all | < ip | ipv6 | host name>}]
Mode Privileged EXEC

Example: The following shows an example of the command.

```
(Routing) #clear radius dynamic-author statistics
Are you sure you want to clear statistics? (y/n) y
Statistics cleared.
```

2.11.7 client

Use this command to configure the IP address or IPv6 address or hostname of the AAA server client. Use the optional `server-key` keyword and string argument to configure the server key at the client level.

Default None
Format `client { ip-address | ipv6-address | hostname } [server-key [0|7] key-string]`
Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#client 10.0.0.1 server-key 7 device1
```

2.11.7.1 no client

Use this command to remove the configured Dynamic Authorization client and the key associated with that client in the device.

Default None
Format `no client { ip-address | ipv6-address | hostname }`
Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no client 10.0.0.1
```

2.11.8 debug aaa coa

Use this command to display debug information for CoA processing.

Default None
Format `debug aaa coa`
Mode Dynamic Authorization

2.11.9 debug aaa pod

Use this command to display debug messages related to packet of disconnect (POD) packets.

Default None
Format `debug aaa pod`
Mode Dynamic Authorization

2.11.10 ignore server-key

Use this optional command to configure the device to ignore the server key.

Default Disable
Format `ignore server-key`
Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#ignore server-key
```

2.11.10.1 no ignore server-key

Use this optional command to configure the device not to ignore the server key (that is, it resets the ignore server key property on the device).

Format no ignore server-key

Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no ignore server-key
```

2.11.11 ignore session-key

Use this optional command to configure the device to ignore the session key.

Default Disable

Format ignore session-key

Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#ignore session-key
```

2.11.11.1 no ignore session-key

Use this optional command to configure the device to not ignore the session key (that is, it resets the ignore session key property on the device).

Format no ignore session-key

Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no ignore session-key
```

2.11.12 port

Use this command to specify the UDP port on which a device listens for RADIUS requests from configured RADIUS clients. The supported range for the port-number is 1025 to 65535.

Default 3799

Format port *port-number*

Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#port 1700
```

2.11.12.1 no port

Use this command to reset the configured UDP port on which a device listens for RADIUS requests from configured RADIUS clients.

Default 3799

Format no port

Mode Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no port
```

2.11.13 radius accounting mode

This command is used to enable the RADIUS accounting function.

Default disabled
Format radius accounting mode
Mode Global Config

2.11.13.1 no radius accounting mode

This command is used to set the RADIUS accounting function to the default value - that is, the RADIUS accounting function is disabled.

Format no radius accounting mode
Mode Global Config

2.11.14 radius server attribute

This command specifies the RADIUS client to use the specified RADIUS attribute in the RADIUS requests. The supported attributes are as follows:

- 4: Include the NAS-IP Address attribute. If the specific IP address is configured while enabling this attribute, the RADIUS client uses that IP address while sending NAS-IP-Address attribute in RADIUS communication.
- 95: Include the NAS-IPv6-Address attribute. If the specific IPv6 address is configured while enabling this attribute, the RADIUS client uses that IPv6 address while sending NAS-IPv6-Address attribute in RADIUS communication.
- 30: This command configures the format in which the MAC address is sent to the RADIUS server in attribute 30.
- 31: This command configures the format in which the MAC address is sent to the RADIUS server in attribute 31 (Calling-Station-ID).
- 32: This command configures the format in which the MAC address is sent to the RADIUS server in attribute 32 (NAS-Identifier).

Default (Attribute 30 and 31 only) MAC address format: legacy lower case
Format radius server attribute {4 [*ipaddr*] | 95 [*ipv6_addr*] | {30 | 31 | 32} mac-format {*legacy lower-case* | *upper-case* | *ietf lower-case* | *upper-case* | *unformatted lower-case* | *upper-case* }}
Mode Global Config

Parameter	Description
4	NAS-IP-Address attribute to be used in RADIUS requests.
<i>ipaddr</i>	The IP address of the server.
<i>ipv6_addr</i>	The IPv6 address of the server.
<i>ietf</i>	Format the MAC address as xx-xx-xx-xx-xx-xx.
<i>legacy</i>	Format the MAC address as xx:xx:xx:xx:xx:xx
<i>unformatted</i>	Format the MAC address as aaaabbbbcccc.

Example: The following shows an example of the command.

```
(Switch) (Config) #radius server attribute 4 192.168.37.60
```

Example: The following shows an example of the command.

```
(Switch) (Config) #(Config)#radius server attribute 95 3ffe:ffff:100:f101::1
```

Example: The following shows an example of the command.

```
(Switch) (Config) #(Config)#radius server attribute 31 mac-format unformatted lower-case
```

2.11.14.1 no radius server attribute

The `no` version of this command resets the RADIUS attributes to their default values. For attributes 4 and 95, this command disables the specified attribute global parameter for the RADIUS client. When this parameter is disabled, the RADIUS client does not send the NAS-IP-Address or NAS-IPv6-Address attribute in RADIUS requests.

Format `no radius server attribute {4 [ipaddr] | 95 [ipv6_addr] | {30 | 31 | 32} mac-format}`
Mode Global Config

2.11.15 radius server attribute 32 include-in-access-req

When this command is configured with the `32` option, the RADIUS attribute 32 (NAS-Identifier) is sent to the RADIUS server in access-request and accounting-request messages. The `format` option specifies the RADIUS Attribute 32 format. If the format is not configured, a default format (`%m`) is used.

Default Attribute is not sent
Format `radius server attribute 32 include-in-access-req [format format]`
Mode Global Config

Parameter	Description
<code>format</code>	<p>The format value can be 2 to 128 characters or one or more of the following:</p> <ul style="list-style-type: none"> • <code>%m</code>: MAC address • <code>%i</code>: IP address • <code>%h</code>: Host Name • <code>%d</code>: Domain Name. <p>Note: If the <code>format</code> parameter is not configured, the default format <code>%m</code> is used.</p>

Example: The following shows an example of the command.

```
(Switch) (Config) #(Config)#radius server attribute 32 include-in-access-req format %i
```

2.11.15.1 no radius server attribute 32 include-in-access-req

This command disables sending RADIUS attribute 32.

Format `no radius server attribute 32 include-in-access-req`
Mode Global Config

2.11.16 radius server attribute 44 include-in-access-req

When this command is configured with the `44` option, the RADIUS attribute 44 (Accounting-Session-ID) is sent to the RADIUS server in access-request messages. The same accounting session ID is used in the subsequent accounting requests sent to the RADIUS server.

Default Attribute is not sent
Format `radius server attribute 44 include-in-access-req`
Mode Global Config

2.11.16.1 no radius server attribute include-in-access-req

This command disables sending RADIUS attribute 44.

Format `no radius server attribute 44 include-in-access-req`
Mode Global Config

2.11.17 radius server deadtime

This command configures the dead time (in minutes) for all RADIUS authentication servers. The dead time is the amount of time to skip a RADIUS server that is not responding to authentication requests. The valid deadtime range is 0 to 2000 minutes.

Default 0
Format radius server deadtime *minutes*
Mode Global Config

2.11.17.1 no radius server deadtime

This command resets the deadtime for all RADIUS authentication servers to the default value.

Format no radius server deadtime
Mode Global Config

2.11.18 radius server dead-criteria

This command configures the condition under which a RADIUS server is considered to be dead. The criteria configured for both the dead time and the number of tries need to be satisfied before a RADIUS server is consider as unavailable.

Default Time: 20 seconds
 Tries 4
Format radius server dead-criteria time *seconds* tries *tries*
Mode Global Config

Parameter	Description
time	Number of seconds during which a RADIUS client need not get a valid response from the RADIUS server. The valid range is 1 to 120 seconds.
tries	Number of times that a RADIUS client attempts to get a valid response before the RADIUS server is considered as unavailable. The valid range is 1 to 100.

Example: The following shows an example of the command.

```
(Switch) (Config)# radius server dead-criteria time 40 tries 6
```

2.11.18.1 no radius server dead-criteria

This command resets the dead criteria for all RADIUS servers to the default value.

Format no radius server dead-criteria {time | tries}
Mode Global Config

2.11.19 radius server host

This command configures the IPv4/IPv6 address or DNS name to use for communicating with the RADIUS server of a selected server type. While configuring the IPv4/IPv6 address or DNS name for the authenticating or accounting servers, you can also configure the deadtime, port number, and server name. If the authenticating and accounting servers are configured without a name, the command uses the Default_RADIUS_Auth_Server and Default_RADIUS_Acct_Server as the default names, respectively. The same name can be configured for more than one authenticating servers and the name should be unique for accounting servers. The RADIUS client allows the configuration of a maximum 32 authenticating and accounting servers.

If you use the `auth` parameter, the command configures the IPv4/IPv6 address or hostname to use to connect to a RADIUS authentication server. You can configure up to three servers per RADIUS client. If the maximum number of configured servers is reached, the command fails until you remove one of the servers by issuing the `no` form of the command. If you use the optional `port` parameter, the command configures the UDP port number to use when connecting to the configured RADIUS server. The `port` number range is 1 to 65535, with 1812 being the default value. If you use the optional `deadtime` parameter, the command configures the deadtime to use for the configured RADIUS server. The deadtime value is 0 to 2000 (in minutes), with 0 being the default.

NOTICE

To reconfigure a RADIUS authentication server to use the default UDP port, set the `port` parameter to 1812.

If you use the `acct` token, the command configures the IPv4/IPv6 address or hostname to use for the RADIUS accounting server. You can only configure one accounting server. If an accounting server is currently configured, use the `no` form of the command to remove it from the configuration. The IPv4/IPv6 address or hostname you specify must match that of a previously configured accounting server. If you use the optional `port` parameter, the command configures the UDP port to use when connecting to the RADIUS accounting server. If a `port` is already configured for the accounting server, the new `port` replaces the previously configured `port`. The `port` must be a value in the range 0 to 65535, with 1813 being the default. If you use the optional `deadtime` parameter, the command configures the deadtime to use for the configured RADIUS server. The deadtime value is 0 to 2000 (in minutes), with 0 being the default.

NOTICE

To reconfigure a RADIUS authentication server to use the default UDP port, set the `port` parameter to 1813.

Format `radius server host {auth | acct} {ipaddr | ipv6addr | dnsname} [name servername] [port 0-65535] [deadtime 0-2000][usage all|authmgr|login]`

Mode Global Config

Parameter	Description
<code>ipaddr</code>	The IP address of the server.
<code>ipv6addr</code>	The IPv6 address of the server.
<code>dnsname</code>	The DNS name of the server.
<code>0-65535</code>	The port number to use to connect to the specified RADIUS server.
<code>servername</code>	The alias name to identify the server.
<code>deadtime</code>	The amount of time to skip a RADIUS server that is not responding to authentication requests. The valid deadtime range is 0 to 2000 minutes
<code>usage</code>	Indicates the usage type of the RADIUS server configured. The type can be one of the following values: <ul style="list-style-type: none"> <code>login</code> <code>authmgr</code> <code>all</code> Use the usage type to restrict the types of authentication sent to a particular RADIUS server <ul style="list-style-type: none"> The <code>login</code> selection restricts authentication requests to switch administrator logins. The <code>authmgr</code> setting restricts authentication requests to 802.1x and MAB authentications. The default variable setting is <code>all</code> .

2.11.19.1 no radius server host

The `no` version of this command deletes the configured server entry from the list of configured RADIUS servers. If the RADIUS authenticating server being removed is the active server in the servers that are identified by the same server name, then the RADIUS client selects another server for making RADIUS transactions. If the `auth` token is used, the previously configured RADIUS authentication server is removed from the configuration. Similarly, if the `acct` token is used, the previously configured RADIUS accounting server is removed from the configuration. The `ipaddr` | `ipv6addr` | `dnsname` parameter must match the IPv4/IPv6 address or DNS name of the previously configured RADIUS authentication / accounting server.

Format `no radius server host {auth | acct} {ipaddr | ipv6addr | dnsname}`
Mode Global Config

Example: The following shows an example of the command.

```
(Switch) (Config) #radius server host acct 192.168.37.60
(Switch) (Config) #radius server host acct 192.168.37.60 port 1813
(Switch) (Config) #radius server host auth 192.168.37.60 name Network1_RS port 1813
(Switch) (Config) #radius server host acct 192.168.37.60 name Network2_RS
(Switch) (Config) #no radius server host acct 192.168.37.60
```

2.11.20 radius server host link-local

This command configures the link-local-address of the RADIUS server and the outgoing interface to be used by the RADIUS client to communicate with the RADIUS server. The outgoing interface can be any physical interface or service port or network port.

Default None
Format `radius server host {auth | acct} link-local Link-Local-address interface {sSlot/port | network | serviceport } [name servername] [port port]`
Mode Global Config

Parameter	Description
link-local-address	The IP address of the server.
interface	The interface for the RADIUS client to use for outgoing RADIUS messages.
servername	The alias name to identify the server.
port	The port number to use to connect to the specified RADIUS server.

Example: The following shows examples of the command.

```
(Switch) (Config) #radius server host auth link-local fe80::208:a1ff:fe7e:4519 interface network
name auth_server port 1813
```

```
(Switch) (Config) #radius server host acct link-local fe80::208:a1ff:fe7e:4519 interface
serviceport name acct_server port 1813
```

2.11.20.1 no radius server host link-local

This command removes the configured radius server link-local-address.

Default None
Format `radius server host {auth | acct} link-local Link-Local-address`
Mode Global Config

Example: The following shows an example of the command.

```
(Switch) (Config) #no radius server host auth link-local fe80::208:a1ff:fe7e:4519
```


2.11.21 radius server host test

This command configures automated tests for configured RADIUS servers. When a test user name is configured for a RADIUS server, the client sends periodic test probes to the server. The RADIUS server responds with a reject message. The receipt of a response is an indication of liveness of the server. Test probes are sent to server based configured time interval in minutes, idle time.

Default Idle time: 60 minutes

Format radius server host {auth | acct} {ipaddr | ipv6addr | hostname} test username name [deadtime 0-2000] [idle-time 1-35791] [name servername] [port 1-65535]

Mode Global Config

Parameter	Description
ipaddr	The IP address of the server.
ipv6addr	The IPv6 address of the server.
hostname	The host name of the server.
username	RADIUS server test user name.
deadtime	The amount of time to skip a RADIUS server that is not responding to authentication requests. The valid deadtime range is 0 to 2000 minutes.
idle-time	The number of minutes between test probes, which is in the range of 1 to 35792 minutes.
name	Identification name to the server.
port	A Layer 4 port number in the range of 1 to 65535 (the default is 1813).

Example: The following shows an example of the command.

```
(Routing)(Config)# radius server acct 10.22.11.33 test username dummy idle-time 2
```

2.11.21.1 no radius server host test

This command disables RADIUS server test user name. It can also be used to set server idle-time to default value.

Format no radius server host {auth | acct} {ipaddr | ipv6addr | hostname} test username

Mode Global Config

2.11.22 radius server key

This command configures the key to be used in RADIUS client communication with the specified server. The key can be configured for all RADIUS servers or, depending on whether the `auth` or `acct` token is used, the shared secret is configured for the particular RADIUS authentication or accounting server. The IP address or IPv6 address or hostname, when provided, must match a previously configured server. When this command is executed, the secret is prompted.

Text-based configuration supports RADIUS server's secrets in encrypted and non-encrypted format. When you save the configuration, these secret keys are stored in encrypted format only. If you want to enter the key in encrypted format, enter the key along with the encrypted keyword. In the command's display, these secret keys are displayed in encrypted format. You cannot show these keys in plain text format.

The secret must be an alphanumeric value not exceeding 64 characters.

NOTICE

Format radius server key [auth | acct | encrypted password] {ipaddr | ipv6addr | hostname} encrypted password

Mode Global Config

Parameter	Description
ipaddr	The IP address of the server.
dnsname	The DNS name of the server.
password	The password in encrypted format.

Example: The following shows an example of the CLI command.

```
radius server key acct 10.240.4.10 encrypted encrypt-string
```

2.11.22.1 no radius server key

This command removes the shared secret used for the RADIUS servers.

Format no radius server key [{acct | auth} {ipaddr | ipv6address | hostname}]

Mode Global Config

2.11.23 radius server load-balance

This command configures the load-balancing algorithm used by the RADIUS client to manage authentication and accounting requests sent to configured RADIUS servers. The load-balancing configuration is configured for a group of RADIUS servers or global default RADIUS server group. A server group is identified as a group of RADIUS servers using the same configured server name.

The supported load-balancing method is based on the least number of outstanding requests. In this mode, the RADIUS client selects a configured RADIUS server that has the least number of pending requests. Before selecting a new server, the number of pending requests on the current server in use should be more than configured batch size value.

Default Method: None
Batch size: 25

Format radius server load-balance {acct | auth} {name *servername* | radius} method {least-outstanding [batch-size 1-2147483647] | none}

Mode Global Config

Parameter	Description
acct	Configure the RADIUS accounting server group.
auth	Configure the RADIUS authentication server group.
name	The RADIUS server group name.
radius	Server using default identification name.
method	Load balance based on the lowest number of outstanding requests.
none	Do not load balance.

Example: The following shows examples of the command.

```
(Routing) (Config)# radius server load-balance acct name group1 method least-outstanding batch-size 40
```

```
(Routing) (Config)# radius server load-balance auth radius method least-outstanding batch-size 30
```

2.11.23.1 no radius server load-balance

The no version of this command disables the load-balancing algorithm to be used for the specified RADIUS server.

Format no radius server load-balance {auth | acct} {radius | name *servername*} method

Mode Global Config

2.11.24 radius server msgauth

This command enables the message authenticator attribute to be used for the specified RADIUS Authenticating server.

Format radius server msgauth {ipaddr / ipv6addr / dnsname}

Mode Global Config

Parameter	Description
ipaddr	The IP address of the server.
ipv6addr	The IPv6 address of the server.
dnsname	The DNS name of the server.

2.11.24.1 no radius server msgauth

The no version of this command disables the message authenticator attribute to be used for the specified RADIUS Authenticating server.

Format no radius server msgauth {ipaddr / ipv6addr / dnsname}

Mode Global Config

2.11.25 radius server primary

This command specifies a configured server that should be the primary server in the group of servers which have the same server name. Multiple primary servers can be configured for each number of servers that have the same name. When the RADIUS client has to perform transactions with an authenticating RADIUS server of specified name, the client uses the primary server that has the specified server name by default. If the RADIUS client fails to communicate with the primary server for any reason, the client uses the backup servers configured with the same server name. These backup servers are identified as the Secondary type.

Format radius server primary {ipaddr / ipv6addr / dnsname}

Mode Global Config

Parameter	Description
ip addr	The IP address of the RADIUS Authenticating server.
dnsname	The DNS name of the server.

2.11.26 radius server retransmit

This command configures the global parameter for the RADIUS client that specifies the number of transmissions of the messages to be made before attempting the fall back server upon unsuccessful communication with the current RADIUS authenticating server. When the maximum number of retries are exhausted for the RADIUS accounting server and no response is received, the client does not communicate with any other server.

Default 4

Format radius server retransmit *retries*

Mode Global Config

Parameter	Description
retries	The maximum number of transmission attempts in the range of 1 to 15.

2.11.26.1 no radius server retransmit

The `no` version of this command sets the value of this global parameter to the default value.

Format `no radius server retransmit`

Mode Global Config

2.11.27 radius source-interface

Use this command to specify the physical or logical interface to use as the RADIUS client source interface (Source IP address). If configured, the address of source Interface is used for all RADIUS communications between the RADIUS server and the RADIUS client. The selected source-interface IP address is used for filling the IP header of RADIUS management protocol packets. This allows security devices (firewalls) to identify the source packets coming from the specific switch.

If a source-interface is not specified, the primary IP address of the originating (outbound) interface is used as the source address. If the configured interface is down, the RADIUS client falls back to its default behavior.

Format `radius source-interface {unit/slot/port | loopback loopback-id | vLan vLan-id}`

Mode Global Config

Parameter	Description
slot/port	The unit identifier assigned to the switch.
loopback-id	Configures the loopback interface. The range of the loopback ID is 0 to 7.
vlan-id	Configures the VLAN interface to use as the source IP address. The range of the VLAN ID is 1 to 4093.

2.11.27.1 no radius source-interface

Use this command to reset the RADIUS source interface to the default settings.

Format `no radius source-interface`

Mode Global Config

2.11.28 radius server timeout

This command configures the global parameter for the RADIUS client that specifies the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received. The timeout value is an integer in the range of 1 to 30.

Default 5

Format `radius server timeout seconds`

Mode Global Config

Parameter	Description
retries	The maximum number of transmission attempts in the range 1 to 30.

2.11.28.1 no radius server timeout

The `no` version of this command sets the timeout global parameter to the default value.

Format `no radius server timeout`

Mode Global Config

2.11.29 radius server vsa send

This command enables the processing of Cisco dynamic ACL vendor-specific attributes sent by the RADIUS server. Use the `authentication` keyword to allow the processing of attributes for authentication.

Default	Disabled
Format	<code>radius server vsa send [authentication]</code>
Mode	Global Config

2.11.29.1 no radius server vsa send

The no version of this command sets the Cisco dynamic VSA processing to the default value.

Format	<code>no radius server vsa send [authentication]</code>
Mode	Global Config

2.11.30 server-key

Use this command to configure a global shared secret that is used for all dynamic authorization clients that do not have an individual shared secret key configured.

Default	None
Format	<code>server-key [7] key-string</code>
Mode	Dynamic Authorization

Parameter	Description
0	An unencrypted key is to be entered
7	An encrypted key is to be entered
string	The shared secret string. The maximum length is 128 characters for unencrypted key and 256 characters for encrypted key. Overrides the global setting for this client only. Enclose in quotation marks to use special characters or embedded blanks.

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)# server-key encrypted mydevice
```

2.11.30.1 no server-key

Use this command to remove the global shared secret key configuration.

Default	None
Format	<code>no server-key</code>
Mode	Dynamic Authorization

Example: The following shows an example of the command.

```
(Routing) (Config-radius-da)#no server-key
```

2.11.31 show radius

This command displays the values configured for the global parameters of the RADIUS client.

Format	<code>show radius</code>
Mode	Privileged EXEC

Parameter	Description
Number of Configured Authentication Servers	The number of RADIUS Authentication servers that have been configured.
Number of Configured Accounting Servers	The number of RADIUS Accounting servers that have been configured.
Number of Named Authentication Server Groups	The number of configured named RADIUS server groups.
Number of Named Accounting Server Groups	The number of configured named RADIUS server groups.
Number of Dead RADIUS Authentication Servers	The number of RADIUS authentication servers that are considered to be unresponsive based on the dead-time criteria.
Number of Dead RADIUS Accounting Servers	The number of RADIUS accounting servers that are considered to be unresponsive based on the dead-time criteria.
Number of Retransmits	The configured value of the maximum number of times a request packet is retransmitted.
Dead Time	The amount of time to skip a RADIUS server that is not responding to authentication requests.
RADIUS Server VSA Authentication	Indicates whether VSA authentication is enabled for the configured RADIUS server.
Dead Criteria Time	Number of seconds during which a RADIUS client need not get a valid response from the RADIUS server.
Dead Criteria Tries	Number of times that a RADIUS client attempts to get a valid response before the RADIUS server is considered as unavailable.
Timeout Duration	The configured timeout value, in seconds, for request retransmissions.
RADIUS Accounting Mode	A global parameter to indicate whether the accounting mode for all the servers is enabled or not.
RADIUS Attribute 4 Mode	A global parameter to indicate whether the NAS-IP-Address attribute has been enabled to use in RADIUS requests.
RADIUS Attribute 4 Value	A global parameter that specifies the IP address to be used in the NAS-IP-Address attribute to be used in RADIUS requests.
RADIUS Attribute 95 Mode	A global parameter to indicate whether the NAS-IPv6-Address attribute has been enabled to use in RADIUS requests.
RADIUS Attribute 95 Value	A global parameter that specifies the IPv6 address to be used in the NAS-IPv6-Address attribute to be used in RADIUS requests.
RADIUS Attribute 30 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 30.
RADIUS Attribute 31 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 31 (Calling-Station-ID).
RADIUS Attribute 32 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 32 (NAS-Identifier).
RADIUS Attribute 32 include in access request	Indicates whether RADIUS attribute 32 is sent to the RADIUS server in access-request and accounting-request messages.
RADIUS Attribute 32 format	The format for RADIUS attribute 32, which is one or more of the following: <ul style="list-style-type: none"> • %m: MAC address • %i: IP address • %h: Host Name • %d: Domain Name.

Parameter	Description
RADIUS Attribute 44 include in access request	Indicates whether RADIUS attribute 44 is sent to the RADIUS server in access-request and accounting-request messages.

Example: The following shows example CLI display output for the command.

(Switch) #show radius

```

Number of Configured Authentication Servers.... 1
Number of Configured Accounting Servers..... 1
Number of Named Authentication Server Groups... 1
Number of Named Accounting Server Groups..... 1
Number of Dead RADIUS Authentication Servers... 0
Number of Dead RADIUS Accounting Servers..... 0
Number of Retransmits..... 4
Dead Time..... 0
Radius Server VSA Authentication: ..... Enabled
Dead Criteria Time..... 20
Dead Criteria Tries..... 4
Timeout Duration..... 5
RADIUS Accounting Mode..... Disable
RADIUS Attribute 4 Mode..... Disable
RADIUS Attribute 4 Value..... 0.0.0.0
RADIUS Attribute 95 Mode..... Disable
RADIUS Attribute 95 Value..... ::
RADIUS Attribute 30 Mac Format..... legacy lower-case
RADIUS Attribute 31 Mac Format..... ietf upper-case
RADIUS Attribute 32 Mac Format..... legacy lower-case
RADIUS Attribute 32 include in access request.. Enable
RADIUS Attribute 32 format..... %i.%d.%m
RADIUS Attribute 44 include in access request.. Disable

```

2.11.32 show radius servers

This command displays the summary and details of RADIUS authenticating servers configured for the RADIUS client.

Format show radius servers {*ipaddress* | *ipv6addr* | *dnsname*} | name [*servername*]}

Mode Privileged EXEC

Parameter	Description
Command Variables	
<i>ipaddress</i>	The IP address of the authenticating server.
<i>ipv6addr</i>	The IPv6 address of the server.
<i>dnsname</i>	The DNS name of the authenticating server.
<i>servername</i>	The alias name to identify the server.
Command Output Fields	
Current	The * symbol preceding the server host address specifies that the server is currently active.
Host Address	The IP address of the host.
Server Name	The name of the authenticating server.
Port	The port used for communication with the authenticating server.
Type	Specifies whether this server is a primary or secondary type.
Current Host Address (*)	An asterisk (*) indicates which configured RADIUS host is the currently active authenticating server.
Number of Retransmits	The configured value of the maximum number of times a request packet is retransmitted.

Parameter	Description
Dead Time	The amount of time to skip a RADIUS server that is not responding to authentication requests.
Timeout Duration	The configured timeout value, in seconds, for request retransmissions.
RADIUS Server VSA Authentication	Indicates whether the system processes Cisco dynamic ACL vendor-specific attributes sent by RADIUS Server.
Server State	The administrative state of the RADIUS server.
Server Immortal State	Indicates whether the server is an immortal RADIUS server, which is a dead server that is marked as alive after being determined to be dead because it is the last server known to be alive
Test User	The name of the configured RADIUS server test user.
Idle Time	The number of minutes between RADIUS server test probes,
RADIUS Accounting Mode	A global parameter to indicate whether the accounting mode for all the servers is enabled or not.
RADIUS Attribute 4 Mode	A global parameter to indicate whether the NAS-IP-Address attribute has been enabled to use in RADIUS requests.
RADIUS Attribute 4 Value	A global parameter that specifies the IP address to be used in NAS-IP-Address attribute used in RADIUS requests.
RADIUS Attribute 95 Mode	A global parameter to indicate whether the NAS-IPv6-Address attribute has been enabled to use in RADIUS requests.
RADIUS Attribute 95 Value	A global parameter that specifies the IPv6 address to be used in the NAS-IPv6-Address attribute to be used in RADIUS requests.
RADIUS Attribute 30 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 30.
RADIUS Attribute 31 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 31 (Calling-Station-ID).
RADIUS Attribute 32 MAC Format	The format in which the MAC address is sent to the RADIUS server in attribute 32 (NAS-Identifier).
RADIUS Attribute 32 include in access request	Indicates whether RADIUS attribute 32 is sent to the RADIUS server in access-request and accounting-request messages.
RADIUS Attribute 32 format	The format for RADIUS attribute 32, which is one or more of the following: <ul style="list-style-type: none"> • %m: MAC address • %i: IP address • %h: Host Name • %d: Domain Name.
RADIUS Attribute 44 include in access request	Indicates whether RADIUS attribute 44 is sent to the RADIUS server in access-request and accounting-request messages.
Link local interface	If configured, the link local IPv6 address.
Secret Configured	Yes or No Boolean value that indicates whether this server is configured with a secret.
Message Authenticator	A global parameter to indicate whether the Message Authenticator attribute is enabled or disabled.

Example: The following shows example CLI display output for the command.

(Switch) #show radius servers

```

Cur  Host Address          Server Name          Port  Type
rent
-----
*    192.168.37.200      Network1_RADIUS_Server  1813  Primary
    192.168.37.201      Network2_RADIUS_Server  1813  Secondary
    192.168.37.202      Network3_RADIUS_Server  1813  Primary
    192.168.37.203      Network4_RADIUS_Server  1813  Secondary

```



```
(Switch) #show radius servers name
```

Current Host Address	Server Name	Type
-----192.168.37.200		
Network1_RADIUS_Server	Secondary	
192.168.37.201	Network2_RADIUS_Server	Primary
192.168.37.202	Network3_RADIUS_Server	Secondary
192.168.37.203	Network4_RADIUS_Server	Primary

```
(Switch) #show radius servers 2.2.2.2
```

```
RADIUS Server Name..... Default-RADIUS-Server
Current Server IP Address..... 2.2.2.2
Number of Retransmits..... 4
Timeout Duration..... 5
RADIUS Server VSA Authentication..... Enable
Server State..... Up
Server Immortal State..... False
Load Balance..... Disable
Test User.....
Idle Time..... 60
RADIUS Accounting Mode..... Disable
RADIUS Attribute 4 Mode..... Disable
RADIUS Attribute 4 Value..... 0.0.0.0
RADIUS Attribute 30 Mac Format..... legacy lower-case
RADIUS Attribute 31 Mac Format..... legacy lower-case
RADIUS Attribute 32 Mac Format..... legacy lower-case
RADIUS Attribute 32 include in access request.. Disable
RADIUS Attribute 32 format..... %m
RADIUS Attribute 44 include in access request.. Disable
Port..... 1812
Type..... Secondary
Secret Configured..... Yes
Message Authenticator..... Enable
```

2.11.33 show radius server dynamic-author

Use this command to display the dynamic authorization server parameters.

Format show radius server dynamic-author

Mode User EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) # show radius server dynamic-author
```

```
AdminMode..... Enabled
Port..... 1700
Auth Type..... any
Global Secret Key..... lv17india
Ignore server-key..... Disabled
Ignore session-key..... Disabled
CoA Bounce-Host-Port..... Accept
CoA Disable-Host-Port..... Accept
```

Client Address	Secret

10.89.108.26	N/A
1.1.1.1	lv17india

2.11.34 show radius server dynamic-author statistics

Use this command to display the dynamic authorization server global counters and per DAS client counters.

Format show radius server dynamic-author statistics [client {all | <ip| ipv6 | host name>}]
Mode User EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) # show radius server dynamic-author statistics
```

```
Number of CoA Requests Received..... 5
Number of CoA ACK Responses Sent..... 2
Number of CoA NAK Responses Sent..... 3
Number of CoA Requests Ignored..... 1
Number of CoA Missing/Unsupported Attribute R.. 0
Number of CoA Session Context Not Found Reque.. 2
Number of CoA Invalid Attribute Value Request.. 0
Number of Administratively Prohibited Request.. 0
```

Example: The following shows example CLI display output for the command.

```
(Routing) # show radius server dynamic-author statistics client all
```

```
DAC Address..... 10.89.108.26
Number of CoA Requests Received..... 4
Number of CoA ACK Responses Sent..... 0
Number of CoA NAK Responses Sent..... 4
Number of CoA Requests Ignored..... 0
Number of CoA Missing/Unsupported Attribute Requests.. 0
Number of CoA Session Context Not Found Requests..... 4
Number of CoA Invalid Attribute Value Requests..... 0
Number of Administratively Prohibited Requests..... 0
```

```
DAC Address..... 10.52.139.190
Number of CoA Requests Received..... 3
Number of CoA ACK Responses Sent..... 0
Number of CoA NAK Responses Sent..... 3
Number of CoA Requests Ignored..... 3
Number of CoA Missing/Unsupported Attribute Requests.. 0
Number of CoA Session Context Not Found Requests..... 0
Number of CoA Invalid Attribute Value Requests..... 0
Number of Administratively Prohibited Requests..... 0
```

Example: The following shows example CLI display output for the command.

```
(Routing) # show radius server dynamic-author statistics client 10.89.108.26
```

```
DAC Address..... 10.89.108.26
Number of CoA Requests Received..... 4
Number of CoA ACK Responses Sent..... 0
Number of CoA NAK Responses Sent..... 4
Number of CoA Requests Ignored..... 0
Number of CoA Missing/Unsupported Attribute Requests.. 0
Number of CoA Session Context Not Found Requests..... 4
Number of CoA Invalid Attribute Value Requests..... 0
Number of Administratively Prohibited Requests..... 0
```

2.11.35 show radius accounting

This command displays a summary of configured RADIUS accounting servers.

Format show radius accounting {name [servername] | ipaddr | ipv6address | hostname}
Mode Privileged EXEC

Parameter	Description
servername	An alias name to identify the server.
ipaddr	The IPv4 address of the server.
ipv6address	The IPv6 address of the server.
hostname	The DNS resolvable hostname of the server.

If you use the `name` parameter without the `servername` option, then only the accounting mode and the RADIUS accounting server details are displayed.

Parameter	Description
Server Name	The name of the accounting server.
Host Address	The IP address or configured name of the host.
Port	The port used for communication with the accounting server.
Secret Configured	Yes or No Boolean value indicating whether this server is configured with a secret.

Example: The following shows example CLI display output for the command.

(Routing) #show radius accounting name

Server Name	Host Address	Port	Secret Configured
Default-RADIUS-Server	acctServer	1813	No
backupAcct	192.168.10.55	1813	No
testServer	fe80::1	1813	No

If you specify the hostname, IPv4 or IPv6 address of the accounting server, the following RADIUS accounting server details are displayed.

Parameter	Description
RADIUS Accounting Server IP Address	The IPv4 address, IPv6 address, link local address, or configured hostname of the host.
RADIUS Accounting Server Name	The name of the accounting server.
RADIUS Accounting Mode	The mode of the accounting server.
Link local interface	If configured, the interface associated with the link-local IPv6 address.
Port	The port used for communication with the accounting server.
Secret Configured	Yes or No Boolean value indicating whether this server is configured with a secret.
Server State	The administrative state of the server.
Server Immortal State	Indicates whether the server is an immortal RADIUS server, which is a dead server that is marked as alive after being determined to be dead because it is the last server known to be alive
Test User	The name of the configured RADIUS server test user.
Idle Time	The number of minutes between RADIUS server test probes,
Number of Dead servers in Named Server Group	When the <code>name</code> <code>servername</code> options are used, this field shows the number of RADIUS servers in the named server group that are determined to be dead.

Example: The following shows example command output.

(Routing) #show radius accounting acctServer

```
RADIUS Accounting Server IP Address..... 192.168.10.55
RADIUS Accounting Server Name..... backupAcct
RADIUS Accounting Mode..... Disable
Link local interface..... Not Available
```

```

Port..... 1813
Secret Configured..... No
Server State..... Up
Server Immortal State..... False
Test User..... testUser
Idle Time..... 3233

```

```
(Routing) #show radius accounting fe80::1
```

```

RADIUS Accounting Server IP Address..... fe80::1
RADIUS Accounting Server Name..... testServer
RADIUS Accounting Mode..... Disable
Link local interface..... 1/0/3
Port..... 1813
Secret Configured..... No
Server State..... Up
Server Immortal State..... False
Test User..... testUser
Idle Time..... 3233

```

2.11.36 show radius accounting servers

This command displays the configured RADIUS accounting servers and its name.

Format show radius accounting servers

Mode Privileged EXEC

The command displays the information the following table describes.

Parameter	Description
Selected Server	If an asterisk (*) appears in the first column, the RADIUS accounting server is the primary server for its group.
Host Address	The IPv4 address, IPv6 address, link local address, or configured hostname of the host.
Server Name	The name of the accounting server.
Port	The port used for communication with the accounting server.

Example: The following shows example CLI display output for the command.

```
(Routing) #show radius accounting servers
```

```

* Host Address          Server Name          Port
-----
* 10.25.4.10           group1               1813
* 10.25.4.5            Default-RADIUS-Server 1813
  10.25.4.4            group1               1813

```

* currently selected server

2.11.37 show radius accounting statistics

This command displays a summary of statistics for the configured RADIUS accounting servers.

Format show radius accounting statistics [{ipaddr | ipv6addr | dnsname} | name [servername]]

Mode Privileged EXEC

Parameter	Description
ipaddr	The IP address of the server.
dnsname	The DNS name of the server.
servername	The alias name to identify the server.

Parameter	Description
RADIUS Accounting Server Name	The name of the accounting server.
Server Host Address	The IP address of the host.
Round Trip Time	The time interval, in hundredths of a second, between the most recent Accounting-Response and the Accounting-Request that matched it from this RADIUS accounting server.
Requests	The number of RADIUS Accounting-Request packets sent to this server. This number does not include retransmissions.
Retransmission	The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server.
Responses	The number of RADIUS packets received on the accounting port from this server.
Malformed Responses	The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed accounting responses.
Bad Authenticators	The number of RADIUS Accounting-Response packets containing invalid authenticators received from this accounting server.
Pending Requests	The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response.
Timeouts	The number of accounting timeouts to this server.
Unknown Types	The number of RADIUS packets of unknown types, which were received from this server on the accounting port.
Packets Dropped	The number of RADIUS packets received from this server on the accounting port and dropped for some other reason.

Example: The following shows example CLI display output for the command.

```
(Switch) #show radius accounting statistics 192.168.37.200
```

```
RADIUS Accounting Server Name..... Default_RADIUS_Server
Host Address..... 192.168.37.200
Round Trip Time..... 0.00
Requests..... 0
Retransmissions..... 0
Responses..... 0
Malformed Responses..... 0
Bad Authenticators..... 0
Pending Requests..... 0
Timeouts..... 0
Unknown Types..... 0
Packets Dropped..... 0
```

```
(Switch) #show radius accounting statistics name Default_RADIUS_Server
```

```
RADIUS Accounting Server Name..... Default_RADIUS_Server
Host Address..... 192.168.37.200
Round Trip Time..... 0.00
Requests..... 0
Retransmissions..... 0
Responses..... 0
Malformed Responses..... 0
Bad Authenticators..... 0
Pending Requests..... 0
Timeouts..... 0
Unknown Types..... 0
Packets Dropped..... 0
```

2.11.38 show radius source-interface

Use this command in Privileged EXEC mode to display the configured RADIUS client source-interface (Source IP address) information.

Format show radius source-interface

Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Switch)#show radius source-interface
```

```
RADIUS Client Source Interface..... 0/1
RADIUS Client Source IPv4 Address..... 192.168.0.1           [Up]
RADIUS Client Source IPv6 Address..... 200:23::12           [Up]
```

2.11.39 show radius statistics

This command displays the summary statistics of configured RADIUS Authenticating servers.

Format show radius statistics [{ipaddr | ipv6addr | dnsname} | name [servername]]

Mode Privileged EXEC

Parameter	Description
ipaddr	The IP address of the server.
dnsname	The DNS name of the server.
servername	The alias name to identify the server.
RADIUS Server Name	The name of the authenticating server.
Server Host Address	The IP address of the host.
Access Requests	The number of RADIUS Access-Request packets sent to this server. This number does not include retransmissions.
Access Retransmissions	The number of RADIUS Access-Request packets retransmitted to this RADIUS authentication server.
Access Accepts	The number of RADIUS Access-Accept packets, including both valid and invalid packets, that were received from this server.
Access Rejects	The number of RADIUS Access-Reject packets, including both valid and invalid packets, that were received from this server.
Access Challenges	The number of RADIUS Access-Challenge packets, including both valid and invalid packets, that were received from this server.
Malformed Access Responses	The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed access responses.
Bad Authenticators	The number of RADIUS Access-Response packets containing invalid authenticators or signature attributes received from this server.
Pending Requests	The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response.
Timeouts	The number of authentication timeouts to this server.
Unknown Types	The number of packets of unknown type that were received from this server on the authentication port.
Packets Dropped	The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

Example: The following shows example CLI display output for the command.

```
(Switch) #show radius statistics 192.168.37.200
```

```
RADIUS Server Name..... Default_RADIUS_Server
```

```

Server Host Address..... 192.168.37.200
Access Requests..... 0.00
Access Retransmissions..... 0
Access Accepts..... 0
Access Rejects..... 0
Access Challenges..... 0
Malformed Access Responses..... 0
Bad Authenticators..... 0
Pending Requests..... 0
Timeouts..... 0
Unknown Types..... 0
Packets Dropped..... 0

```

```
(Switch) #show radius statistics name Default_RADIUS_Server
```

```

RADIUS Server Name..... Default_RADIUS_Server
Server Host Address..... 192.168.37.200
Access Requests..... 0.00
Access Retransmissions..... 0
Access Accepts..... 0
Access Rejects..... 0
Access Challenges..... 0
Malformed Access Responses..... 0
Bad Authenticators..... 0
Pending Requests..... 0
Timeouts..... 0
Unknown Types..... 0
Packets Dropped..... 0

```

2.12 TACACS+ Commands

TACACS+ provides access control for networked devices using one or more centralized servers. Similar to RADIUS, this protocol simplifies authentication by making use of a single database that can be shared by many clients on a large network. TACACS+ is based on the TACACS protocol (described in RFC1492) but additionally provides for separate authentication, authorization, and accounting services. The original protocol was UDP based with messages passed in clear text over the network; TACACS+ uses TCP to ensure reliable delivery and a shared key configured on the client and daemon server to encrypt all messages.

2.12.1 tacacs-server host

Use the `tacacs-server host` command in Global Configuration mode to configure a TACACS+ server. This command enters into the TACACS+ configuration mode. Use the `ip-address`, `ipv6-address`, or `hostname` parameter to specify the IPv4 address, IPv6 address, or hostname of the TACACS+ server. To specify multiple hosts, multiple `tacacs-server host` commands can be used.

Format `tacacs-server host {ip-address | ipv6-address | hostname}`

Mode Global Config

2.12.1.1 no tacacs-server host

Use the `no tacacs-server host` command to delete the specified hostname or IP address. The `ip-address`, `ipv6-address`, or `hostname` parameter is the IPv4 address, IPv6 address, or hostname of the TACACS+ server.

Format `no tacacs-server host {ip-address | ipv6-address | hostname}`

Mode Global Config

2.12.2 tacacs-server host link-local

Use this command to configure the link-local-address of the TACACS+ server and the outgoing interface to be used by the TACACS+ client to communicate with the TACACS+ server. The outgoing interface can be any physical interface, the service port, or the network port.

Format tacacs-server host link-local *Link-Local-address* interface {*slot/port* | network | serviceport}

Mode Global Config

2.12.2.1 no tacacs-server host link-local

Use this command to remove the configured TACACS+ server link-local address.

Format no tacacs-server host link-local

Mode Global Config

2.12.3 tacacs-server key

Use the `tacacs-server key` command to set the authentication and encryption key for all TACACS+ communications between the switch and the TACACS+ daemon. The `key-string` parameter has a range of 0 to 128 characters and specifies the authentication and encryption key for all TACACS communications between the switch and the TACACS+ server. This key must match the key used on the TACACS+ daemon.

Text-based configuration supports TACACS server's secrets in encrypted and non-encrypted format. When you save the configuration, these secret keys are stored in encrypted format only. If you want to enter the key in encrypted format, enter the key along with the encrypted keyword. In command's display, these secret keys are displayed in encrypted format. You cannot show these keys in plain text format.

Format tacacs-server key [*key-string* | encrypted *key-string*]

Mode Global Config

2.12.3.1 no tacacs-server key

Use the `no tacacs-server key` command to disable the authentication and encryption key for all TACACS+ communications between the switch and the TACACS+ daemon. The `key-string` parameter has a range of 0 to 128 characters. This key must match the key used on the TACACS+ daemon.

Format no tacacs-server key *key-string*

Mode Global Config

2.12.4 tacacs-server kestring

Use the `tacacs-server kestring` command to set the global authentication encryption key used for all TACACS+ communications between the TACACS+ server and the client.

Format tacacs-server kestring

Mode Global Config

Example: The following shows an example of the CLI command.

```
(Switching)(Config)#tacacs-server kestring
Enter tacacs key:*****
Re-enter tacacs key:*****
```

2.12.5 tacacs-server source-interface

Use this command in Global Configuration mode to configure the source interface (Source IP address) for TACACS+ server configuration. The selected source-interface IP address is used for filling the IP header of management protocol packets. This allows security devices (firewalls) to identify the source packets coming from the specific switch.

If a source-interface is not specified, the primary IP address of the originating (outbound) interface is used as the source address.

Format tacacs-server source-interface {slot/port|loopback loopback-id|vlan vlan-id}
Mode Global Config

Parameter	Description
slot/port	The unit identifier assigned to the switch, in slot/port format.
loopback-id	Configuration of the loopback interface. The range of the loopback ID is 0 to 7.
network	Use the network source IP address.
serviceport	Use the serviceport source IP address.
vlan-id	Configures the VLAN interface to use as the source IP address. The range of the VLAN ID is 1 to 4093.

Example: The following shows an example of the command.

```
(Config)#tacacs-server source-interface loopback 0
(Config)#tacacs-server source-interface 1/0/1
(Config)#no tacacs-server source-interface
```

2.12.5.1 no tacacs-server source-interface

Use this command in Global Configuration mode to remove the global source interface (Source IP selection) for all TACACS+ communications between the TACACS+ client and the server.

Format no tacacs-server source-interface
Mode Global Config

2.12.6 tacacs-server timeout

Use the `tacacs-server timeout` command to set the timeout value for communication with the TACACS+ servers. The `timeout` parameter has a range of 1 to 30 and is the timeout value in seconds. If you do not specify a timeout value, the command sets the global timeout to the default value. TACACS+ servers that do not use the global timeout will retain their configured timeout values.

Default 5
Format tacacs-server timeout timeout
Mode Global Config

2.12.6.1 no tacacs-server timeout

Use the `no tacacs-server timeout` command to restore the default timeout value for all TACACS servers.

Format no tacacs-server timeout
Mode Global Config

2.12.7 key

Use the `key` command in TACACS Server Configuration mode to specify the authentication and encryption key for all TACACS communications between the device and the TACACS server. This key must match the key used on the TACACS daemon. The `key-string` parameter specifies the key name. For an empty string, use `" "`. (Range: 0 to 128 characters).

Text-based configuration supports TACACS server's secrets in encrypted and non-encrypted format. When you save the configuration, these secret keys are stored in encrypted format only. If you want to enter the key in encrypted format, enter the key along with the encrypted keyword. In command's display, these secret keys are displayed in encrypted format. You cannot show these keys in plain text format.

Format key [key-string | encrypted key-string]
Mode TACACS Server Config

2.12.8 keystring

Use the `keystring` command in TACACS Server Configuration mode to set the TACACS+ server-specific authentication encryption key used for all TACACS+ communications between the TACACS+ server and the client.

Format `keystring`
Mode TACACS Server Config

Example: The following shows an example of the command.

```
(Switching)(Config)#tacacs-server host 1.1.1.1
(Switching)(Tacacs)#keystring
```

```
Enter tacacs key:*****
Re-enter tacacs key:*****
```

2.12.9 port

Use the `port` command in TACACS Server Configuration mode to specify a server port number. The server `port-number` range is 0 to 65535.

Default 49
Format `port port-number`
Mode TACACS Server Config

2.12.10 priority (TACACS Server Config)

Use the `priority` command in TACACS Server Configuration mode to specify the order in which servers are used, where 0 (zero) is the highest priority. The `priority` parameter specifies the priority for servers. The highest priority is 0 (zero), and the range is 0 to 65535.

Default 0
Format `priority priority`
Mode TACACS Server Config

2.12.11 timeout

Use the `timeout` command in TACACS Server Configuration mode to specify the timeout value in seconds. If no timeout value is specified, the global value is used. The `timeout` parameter has a range of 1 to 30 and is the timeout value in seconds.

Format `timeout timeout`
Mode TACACS Server Config

2.12.12 show tacacs

Use the `show tacacs` command to display the configuration, statistics and source interface details of the TACACS+ client.

Format `show tacacs [ip-address | ipv6-address | hostname]`
Mode Privileged EXEC

Parameter	Description
Host address	The IP address or hostname of the configured TACACS+ server.
Port	The configured TACACS+ server port number.
TimeOut	The timeout in seconds for establishing a TCP connection.

Parameter	Description
Priority	The preference order in which TACACS+ servers are contacted. If a server connection fails, the next highest priority server is contacted.

Example: The following examples show output of this command.

```
(Routing)#show tacacs
Global Timeout: 5
```

Host address	Port	Timeout	Priority	Link Local Interface
10.27.3.6	49	Global	0	
200:25:dead:beaf::1	49	Global	0	Not Available

2.12.13 show tacacs source-interface

Use the `show tacacs source-interface` command in Global Config mode to display the configured global source interface details used for a TACACS+ client. The IP address of the selected interface is used as source IP for all communications with the server.

Format `show tacacs source-interface`

Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Config)# show tacacs source-interface
TACACS Client Source Interface     : loopback 0
TACACS Client Source IPv4 Address  : 1.1.1.1 [UP]
```

2.13 Configuration Scripting Commands

Configuration Scripting allows you to generate text-formatted script files representing the current configuration of a system. You can upload these configuration script files to a PC or UNIX system and edit them. Then, you can download the edited files to the system and apply the new configuration. You can apply configuration scripts to one or more switches with no or minor modifications.

Use the `show running-config` command (see the [show running-config](#) command) to capture the running configuration into a script. Use the `copy` command (see [copy](#) command) to transfer the configuration script to or from the switch.

Use the `show` command to view the configuration stored in the startup-config, backup-config, or factory-defaults file.

You should use scripts on systems with default configuration; however, you are not prevented from applying scripts on systems with non-default configurations.

Scripts must conform to the following rules:

- Script files are not distributed across the stack, and only live in the unit that is the primary unit at the time of the file download.
- The file extension must be `.scr`.
- A maximum of ten scripts are allowed on the switch.
- The combined size of all script files on the switch shall not exceed 2048 KB.
- The maximum number of configuration file command lines is 2000.

You can type single-line annotations at the command prompt to use when you write test or configuration scripts to improve script readability. The exclamation point (!) character flags the beginning of a comment. The comment flag character can begin a word anywhere on the command line, and all input following this character is ignored. Any command line that begins with the "!" character is recognized as a comment line and ignored by the parser.

The following lines show an example of a script:

```
! Script file for displaying management access

show telnet !Displays the information about remote connections

! Display information about direct connections
```

```
show serial
```

```
! End of the script file!
```

NOTICE

To specify a blank password for a user in the configuration script, you must specify it as a space within quotation marks. For example, to change the password for user jane from a blank password to hello, the script entry is as follows:

```
users passwd jane
" "
hello
hello
```

2.13.1 script apply

This command applies the commands in the script to the switch. The `scriptname` parameter is the name of the script to apply.

Format `script apply scriptname`

Mode Privileged EXEC

2.13.2 script delete

This command deletes a specified script where the `scriptname` parameter is the name of the script to delete. The `all` option deletes all the scripts present on the switch.

Format `script delete {scriptname | all}`

Mode Privileged EXEC

2.13.3 script list

This command lists all scripts present on the switch as well as the remaining available space.

Format `script list`

Mode Privileged EXEC

Parameter	Description
Configuration Script	Name of the script.
Size	Privileged EXEC

2.13.4 script show

This command displays the contents of a script file, which is named `scriptname`.

Format `script show scriptname`

Mode Privileged EXEC

Parameter	Description
Output Format	<code>line number: line contents</code>

2.13.5 script validate

This command validates a script file by parsing each line in the script file where `scriptname` is the name of the script to validate. The `validate` option is intended to be used as a tool for script development. Validation identifies potential problems. It might not identify all problems with a given script on any given device.

Format `script validate scriptname`
Mode Privileged EXEC

2.14 Prelogin Banner, System Prompt, and Host Name Commands

This section describes the commands you use to configure the prelogin banner and the system prompt. The prelogin banner is the text that displays before you login at the `USER:` prompt.

2.14.1 copy (pre-login banner)

The `copy` command includes the option to upload or download the CLI Banner to or from the switch. You can specify local URLs by using FTP, TFTP, SFTP, SCP, or Xmodem.

The parameter `ipaddress` is also a valid parameter for routing packages that support IPv6.

NOTICE

Default none
Format `copy <tftp://<ipaddr>/<filepath>/<filename>> nvram:clibanner`
 `copy nvram:clibanner <tftp://<ipaddr>/<filepath>/<filename>>`
Mode Privileged EXEC

2.14.2 set prompt

This command changes the name of the prompt. The length of name may be up to 64 alphanumeric characters.

Format `set prompt prompt_string`
Mode Privileged EXEC

2.14.3 hostname

This command sets the system hostname. It also changes the prompt. The length of name may be up to 64 alphanumeric, case-sensitive characters.

Format `hostname hostname`
Mode Privileged EXEC

2.14.4 show clibanner

Use this command to display the configured prelogin CLI banner. The prelogin banner is the text that displays before displaying the CLI prompt.

Default No contents to display before displaying the login prompt.
Format `show clibanner`
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #show clibanner
Banner Message configured :
=====

-----
TEST
-----
```

2.14.5 set clibanner

Use this command to configure the prelogin CLI banner before displaying the login prompt.

Format `set clibanner line`
Mode Global Config

Parameter	Description
line	Banner text where "" (double quote) is a delimiting character. The banner message can be up to 2000 characters.

2.14.5.1 no set clibanner

Use this command to unconfigure the prelogin CLI banner.

2.15 Warpcore™ Expandable Port Configuration

Format `no set clibanner`
Mode Global Config

Some devices contain expandable ports which may be configured to present a different number of ports and speeds. The Warpcore on the BCM56846, for example, may be configured as one 40G QSFP port or four 10G ports. The expandable port configuration mode allows you to dynamically configure platforms containing such ports.

2.15.1 hardware profile portmode

Use the `hardware profile portmode` command to configure a 40G QSFP port in either 4x10G mode or 1x40G mode or a 100G QSFP port in either 1x100G, 2x50G, or 4x25G mode.

This command can only be executed on interfaces that support the expandable ports feature. Entering the command on any other type of interface will give an error.

This command does not operate in interface range mode.

NOTICE

Default The default mode for QSFP ports is platform-specific.
Format `hardware profile portmode mode`
Mode Interface Config

Parameter	Description
mode	<p>The available modes depend on the platform. Possible modes are:</p> <ul style="list-style-type: none"> 1x40g: Configure the port as a single 40G port using four lanes. 4x10g: Configure the port as four 10G ports, each on a separate lane. This mode requires the use of a suitable 4x10G to 1x40G pigtail cable. 1x100g: Configure the port as a single 100G port using four lanes. The 100G ports may be reconfigured as 40G ports using the <code>interface speed</code> command. 2x50g: Configure the port as two 50G ports, each using two lanes. This mode requires the use of a suitable 1x100G to 2x50G pigtail cable 4x25g: Configure the port as a four 25G ports, each on a separate lane. This mode requires the use of a suitable 4x25G to 1x100G pigtail cable. The 4x25G ports may be reconfigured as 4x10G ports with the <code>interface speed</code> command.

2.15.1.1 no hardware profile portmode

Use the no form of the `hardware profile portmode` command to return the port to the default mode.

Format `no hardware profile portmode`

Mode Interface Config

2.15.2 show interfaces hardware profile

Use the `show interfaces hardware profile` command in Privileged EXEC mode to display the hardware profile information for the ports that support the expandable feature. The command displays the 40G interface and the corresponding 10G interfaces or the 100G interface and the corresponding 25G or 50G interfaces. Because any hardware profile configuration is only effective with the next boot of the switch, the configured mode may be different than the operational mode of the interface. Therefore, this command also displays the configured mode and the operational mode of the interface.

The user can optionally specify an interface or all expandable interfaces to display.

Format `show interfaces hardware profile [interface]`

Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

NOTICE

The port mappings can vary from platform to platform. This example is only for illustration, and may not represent the actual port mappings on all platforms.

```
(Routing) #show interfaces hardware profile
          Configured Oper
40G Interface 10G Interfaces Mode      Mode
-----
0/1           0/17-20      1x40G    4x10G
0/2           0/21-24      1x40G    1x40G
```

```
(Routing) #show interfaces hardware profile 0/1
          Configured Oper
40G Interface 10G Interfaces Mode      Mode
-----
0/1           0/17-20      1x40G    4x10G
```

For platforms that support expandable ports (high density ports that can be split into multiple lane modes), additional information is displayed in the output.

```
(Routing) #show interfaces hardware profile
```

100G/40G Interface	Configured Mode	Operating Mode	Expandable Options	Expanded Interfaces
0/81	1x40G	1x40G	4x10G	0/93-96
0/82	1x40G	1x40G	4x10G	0/97-100
0/83	1x40G	1x40G	4x10G	0/101-104
0/84	1x40G	1x40G	4x10G	0/105-108
0/85	1x100G	1x100G	4x25G 2x50G	0/109-112 0/125-126
0/86	1x100G	1x100G	4x25G 2x50G	0/113-116 0/127-128
0/87	1x100G	1x100G	4x25G 2x50G	0/117-120 0/129-130
0/88	1x100G	1x100G	4x25G 2x50G	0/121-124 0/131-132

(Routing) #show interfaces hardware profile 0/85

100G/40G Interface	Configured Mode	Operating Mode	Expandable Options	Expanded Interfaces
0/85	4x25G	4x25G	4x25G 2x50G	0/109-112 0/125-126

2.16 Port Profile Commands

The Port Profile feature eases the configuration of the same set of commands on multiple interfaces of the same type by clubbing those commands in the single group called port profile.

FASTPATH supports the following interface types for port profiles:

- Ethernet
- Port channel
- VLAN routing

A port profile can be referenced in another port profile to inherit its properties to the other port profile.

2.16.1 port-profile

Use this command to create and name a port profile for the specified type of interface, and enter the port-profile configuration mode.

Port profile names can include only the following characters:

- a-z
- A-Z
- 0-9
- No special characters are allowed, except for the following:
 - . (dot)
 - - (hyphen)
 - _ (underscore)

The maximum length of the port profile name is 80 characters. The name of the port profile is case sensitive.

Default	Default type is ethernet.
Format	port-profile [type {ethernet interface-vlan port-channel}] <name>
Mode	Global Config

Example: The following shows an example of the command.

```
(Routing)#configure
(Routing)(Config)#port-profile type ethernet test
(Routing)(Config-port-prof)#
```


2.16.1.1 no port-profile

Use this command to delete the port profile for the specified type of interface.

Default	Default type is ethernet.
Format	<code>no port-profile <name></code>
Mode	Global Config

Example: The following shows an example of the command.

```
(Routing)#configure
(Routing)(Config)#no port-profile test
```

2.16.2 state enabled

This command is required to enable the specific port profile to be applied to the interfaces. A port profile can be configured and inherit that port profile onto a range of interfaces before it is enabled. Only after the state of the port profile is enabled can the configurations take effect on the specified interfaces.

Default	disabled
Format	<code>state enabled</code>
Mode	Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#state enabled
```

2.16.2.1 no state enabled

Use this command to remove the applied configurations on the interfaces associated with the port profile.

Default	disabled
Format	<code>no state enabled</code>
Mode	Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#no state enabled
```

2.16.3 description (Port Profile Config)

Use this command to describe the port profile.

Default	none
Format	<code>description <description></code>
Mode	Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#description "Ethernet port profile"
```

2.16.3.1 no description (Port Profile Config)

Use this command to remove the description of the port profile.

Default	none
Format	<code>no description</code>
Mode	Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#no description
```

2.16.4 inherit port-profile (Port Profile Config)

Use this command to inherit the specified port profile into another port profile.

Default none
Format inherit port-profile <name>
Mode Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#inherit port-profile test
```

2.16.4.1 no inherit port-profile

Use this command to remove the inherited port-profile.

Default none
Format no inherit port-profile <name>
Mode Port Profile Config

Example: The following shows an example of the command.

```
(Routing)(Config-port-prof)#no inherit port-profile test
```

2.16.5 inherit port-profile (Interface Config)

Use this command to assign a port profile to an interface or to a range of interfaces.

Default none
Format inherit port-profile <name>
Mode Interface Config

Example: The following shows examples of the command.

Example 1:

```
(Routing)(Interface 0/1)#inherit port-profile test
```

Example 2:

```
(Routing)(Interface 0/3-0/6)#inherit port-profile test
```

Example 3:

```
(Routing)(Interface 0/8,0/11-0/12)#inherit port-profile test
```

2.16.5.1 no inherit port-profile (Interface Config)

Use this command to remove the inherited port profile to an interface or to a range of interfaces.

Default none
Format no inherit port-profile <name>
Mode Interface Config

Example: The following shows an example of the command.

```
(Routing)(Interface 0/1)#no inherit port-profile test
```


Example 2

```
(Routing)# show port-profile name test
```

```
port-profile test
  type: Ethernet
  description: ethernet_port_profile
  status: disabled
  inherit:
  config attributes:
    authentication port-control force-authorized
    load-interval 90
    no shutdown
  evaluated config attributes:
    authentication port-control force-authorized
    load-interval 90
    no shutdown
  assigned interfaces:
    0/1, 0/3 - 0/6, 0/8, 0/11 - 0/12
```

Example 3

```
(Routing)# show port-profile brief
```

```
-----
```

Port Profile	Profile Type	Profile State	Conf Items	Eval Items	Assigned Intfs
profile1	ethernet	disabled	0	0	0
profile2	ethernet	disabled	0	0	0

```
-----
```

Example 4

```
(Routing)# show port-profile expand-interface
```

```
port-profile P1
  Ethernet1/1
  bandwidth 1000

port-profile P2
  Ethernet1/2
  bandwidth 100

port-profile P3
  Ethernet1/3
  bandwidth 10000
```

Example 5

```
(Routing)# show port-profile expand-interface name P1
```

```
port-profile P1
  Ethernet1/1
  bandwidth 1000
```

Example 6

```
(Routing)# show port-profile sync-status
```

```
-----
```

Port Profile	Out of Sync
p1	0/1
p2	None

```
-----
```

```
(Routing)#show port-profile sync-status interface 0/1
```

```
Port Profile Name: p1
Sync Status: In sync
```

```
(Routing)#show port-profile sync-status interface 0/1
```

```
Port Profile Name: p1
Sync Status: Out of sync
Recovery Steps:
1. Remove the unsupported or failed commands from the profile.
2. Remove the inheritance of the port profile from the interface.
3. Add the inheritance again.
```

2.16.7 show running-config port-profile

Use this command to display the configuration related to the port-profiles.

Format show running-config port-profile [<port-profile-name>]
Mode User EXEC

Example: The following shows examples of the commands.

Example 1

```
(Routing)#show running-config port-profile
port-profile type ethernet "p2"
description "p2"
state enabled
bandwidth 20000
load-interval 30
exit
```

```
port-profile type ethernet "p1"
inherit port-profile "p2"
description "test"
state enabled
load-interval 90
bandwidth 1000
shutdown
auto-negotiate
exit
```

```
interface 0/1
inherit port-profile test
exit
```

Example 2

```
(Routing)#show running-config port-profile p1
port-profile type ethernet "p1"
inherit port-profile "p2"
description "test"
state enabled
load-interval 90
bandwidth 1000
shutdown
auto-negotiate
exit
```

```
interface 0/1
inherit port-profile test
exit
```

3/ Utility Commands

This chapter describes the utility commands available in the FASTPATH CLI.

NOTICE

The commands in this chapter are in one of four functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Copy commands transfer or save configuration and informational files to and from the switch.
- Clear commands clear some or all of the settings to factory defaults.

3.1 AutoInstall Commands

The AutoInstall feature enables the automatic update of the image and configuration of the switch. This feature enables touchless or low-touch provisioning to simplify switch configuration and imaging.

AutoInstall includes the following support:

- Downloading an image from TFTP server using DHCP option 125. The image update can result in a downgrade or upgrade of the firmware on the switch.
- Automatically downloading a configuration file from a TFTP server when the switch is booted with no saved configuration file.
- Automatically downloading an image from a TFTP server in the following situations:
 - When the switch is booted with no saved configuration found.
 - When the switch is booted with a saved configuration that has AutoInstall enabled.

When the switch boots and no configuration file is found, it attempts to obtain an IP address from a network DHCP server. The response from the DHCP server includes the IP address of the TFTP server where the image and configuration files are located.

After acquiring an IP address and the additional relevant information from the DHCP server, the switch downloads the image file or configuration file from the TFTP server. A downloaded image is automatically installed. A downloaded configuration file is saved to non-volatile memory.

NOTICE

AutoInstall from a TFTP server can run on any IP interface, including the network port, service port, and in-band routing interfaces (if supported). To support AutoInstall, the DHCP client is enabled operationally on the service port, if it exists, or the network port, if there is no service port.

3.1.1 boot autoinstall

Use this command to operationally start or stop the AutoInstall process on the switch. The command is non-persistent and is not saved in the startup or running configuration file.

Default stopped
Format boot autoinstall {start | stop}
Mode Privileged EXEC

3.1.2 boot host retrycount

Use this command to set the number of attempts to download a configuration file from the TFTP server.

Default 3
Format boot host retrycount 1-3
Mode Privileged EXEC

3.1.2.1 no boot host retrycount

Use this command to set the number of attempts to download a configuration file to the default value.

Format no boot host retrycount
Mode Privileged EXEC

3.1.3 boot host dhcp

Use this command to enable AutoInstall on the switch for the next reboot cycle. The command does not change the current behavior of AutoInstall and saves the command to NVRAM.

Default enabled
Format boot host dhcp
Mode Privileged EXEC

3.1.3.1 no boot host dhcp

Use this command to disable AutoInstall for the next reboot cycle.

Format no boot host dhcp
Mode Privileged EXEC

3.1.4 boot host autosave

Use this command to automatically save the downloaded configuration file to the startup-config file on the switch. When autosave is disabled, you must explicitly save the downloaded configuration to non-volatile memory by using the `write memory` or `copy system:running-config nvram:startup-config` command. If the switch reboots and the downloaded configuration has not been saved, the AutoInstall process begins, if the feature is enabled.

Default disabled
Format boot host autosave
Mode Privileged EXEC

3.1.4.1 no boot host autosave

Use this command to disable automatically saving the downloaded configuration on the switch.

Format no boot host autosave
Mode Privileged EXEC

3.1.5 boot host autoreboot

Use this command to allow the switch to automatically reboot after successfully downloading an image. When autoreboot is enabled, no administrative action is required to activate the image and reload the switch.

Default enabled
Format boot host autoreboot
Mode Privileged EXEC

3.1.5.1 no boot host autoreboot

Use this command to prevent the switch from automatically rebooting after the image is downloaded by using the Auto-Install feature.

Format no boot host autoreboot
Mode Privileged EXEC

3.1.6 erase startup-config

Use this command to erase the text-based configuration file stored in non-volatile memory. If the switch boots and no startup-config file is found, the AutoInstall process automatically begins.

Format erase startup-config
Mode Privileged EXEC

3.1.7 erase factory-defaults

Use this command to erase the text-based factory-defaults file stored in non-volatile memory.

Default Disable
Format erase factory-defaults
Mode Privileged EXEC

3.1.8 show autoinstall

This command displays the current status of the AutoInstall process.

Format show autoinstall
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(switch) #show autoinstall
AutoInstall Mode..... Stopped
AutoInstall Persistent Mode..... Disabled
AutoSave Mode..... Disabled
AutoReboot Mode..... Enabled
AutoInstall Retry Count..... 3
```

3.1.9 boot autoinstall file

This command allows selection of an arbitrary configuration file at system startup time based on system specific addresses.

When executed during early system startup, the startup code will look for a boot autoinstall file command with a system-address and slot-address specification matching the current values.

Entries without slot-address qualifier will match any slot-address, entries without system-address will match any system address. The entry without qualifier is the configuration used as a default configuration.

Entries with more qualifiers take precedence. So it is possible to define default and/or fall back configurations.

Once a matching configuration file is identified, its content is compared to the current startup-config that is being applied. If they are identical, startup will proceed normally. If they differ, the configured file will be copied and replace the currently executing startup-config file and FASTPATH will be restarted, equivalent to a reload fast command being executed.

NOTICE

If using this feature the configured file will be copied over the current startup file. Modifications saved (e.g. with 'write memory') will be written to the current startup file which will be overwritten by the next reboot! To save modifications in the configured file use e.g. *show running-config nvram:file <configfile>*.

The meaning of system-address and slot-address are board specific:

Board	slot-address (<slot-addr>)	system-address (<sys-addr>)
CP6940	ga-addr	sga-addr

Format boot autoinstall file <filename> <sys-addr> <number>
 boot autoinstall file <filename> <slot-addr> <number>
 boot autoinstall file <filename> <sys-addr> <number> <slot-addr> <number>

Mode Privileged EXEC

3.1.9.1 no boot autoinstall file

This command disables the selection of an arbitrary configuration file at system startup time based on system specific addresses.

Format no boot autoinstall file <filename> <sys-addr> <number>
 no boot autoinstall file <filename> <slot-addr> <number>
 no boot autoinstall file <filename> <sys-addr> <number> <slot-addr> <number>

Mode Privileged EXEC

3.1.10 show autoinstall file

This commands lists all specified configuration file relationships and last/next selected configuration file name.

The specified configuration files are listed with the name and the related system and slot address (-1 means any).

Additionally the last selected configuration file name (used by the last reboot) and the next selected configuration file name are indicated. If the next selected configuration file name is not existing or not readable, a related warning is displayed. If no configuration file has been configured or none of the configuration files are matching (system-address/slot-address don't fit), "none/default" is indicated.

Format show autoinstall file

Mode Privileged EXEC, User EXEC

3.1.11 boot autoinstall file disable

Using this command, automatic configuration file selection configured with boot autoinstall file commands can be globally disabled. This is useful to temporarily disable selection of configuration files while retaining the boot autoinstall file commands in the running configuration.

Format boot autoinstall file disable

Mode Privileged EXEC

3.1.11.1 no boot autoinstall file disable

This command re-enables automatic configuration file selection configured with boot autoinstall files.

Format no boot autoinstall file disable

Mode Privileged EXEC

3.1.12 boot autoinstall dhcp startup-config

When this command is enabled, the logic will change related to the standard Fastpath handling.

A received configuration file will be compared to the permanent configuration stored in /mnt/fastpath/startup-config. If it is different, it will be copied to /mnt/fastpath/startup-config and the switch will be rebooted.

This command thus enables standard auto configuration via startup-config files received from a DHCP/TFTP server.

Format boot autoinstall dhcp startup-config
Mode Privileged EXEC

3.1.12.1 no boot autoinstall dhcp startup-config

This command disables auto configuration via startup-config files received from a DHCP/TFTP server.

Format no boot autoinstall dhcp startup-config
Mode Privileged EXEC

3.2 Bonjour Commands

Bonjour is a protocol developed by Apple to provide zero-configuration networking over IP. The Bonjour protocol provides IP configuration without a server, name resolution without a name server, and the ability for a Bonjour-capable client to discover specific services in the network. The client does not need any information about the network to use the functionality that Bonjour provides.

Bonjour advertises the services (HTTP, HTTPS, Telnet, SSH) that are supported by the software. FASTPATH does not parse the services available on the network; it publishes the list of the services that are available with the FASTPATH-based device.

3.2.1 bonjour run

Use this command to enable Bonjour on the switch.

Default enabled
Format bonjour run
Mode Global Config

3.2.1.1 no bonjour run

Use this command to disable Bonjour on the switch.

Format no bonjour run
Mode Global Config

3.2.2 show bonjour

Use this command to show information about the Bonjour service and configuration on the switch.

Format show bonjour
Mode Privileged EXEC

Example: The following shows an example of the command.

```
(Routing) #show bonjour
```

```
Bonjour Administration Mode: Enabled
```

```
Published Services:
```

#	Service Name	Type	Domain	Port	TXT data
1	switchD4B273	_http._tcp.	local.	80	path=/ -----
2	switchD4B273	_telnet._tcp.	local.	23	

3.3 CLI Output Filtering Commands

3.3.1 show xxx|include "string"

The command `xxx` is executed and the output is filtered to only show lines containing the `"string"` match. All other non-matching lines in the output are suppressed.

Example: The following shows an example of the CLI command.

```
(Routing) #show running-config | include "spanning-tree"
```

```
spanning-tree configuration name "00-02-BC-42-F9-33"
spanning-tree bpduguard
spanning-tree bpdufilter default
```

3.3.2 show xxx|include "string" exclude "string2"

The command `xxx` is executed and the output is filtered to only show lines containing the `"string"` match and not containing the `"string2"` match. All other non-matching lines in the output are suppressed. If a line of output contains both the include and exclude strings then the line is not displayed.

Example: The following shows an example of the CLI command.

```
(Routing) #show running-config | include "spanning-tree" exclude "configuration"
```

```
spanning-tree bpduguard
spanning-tree bpdufilter default
```

3.3.3 show xxx|exclude "string"

The command `xxx` is executed and the output is filtered to show all lines not containing the `"string"` match. Output lines containing the `"string"` match are suppressed.

Example: The following shows an example of the CLI command.

```
(Routing) #show interface 0/1
```

```
Packets Received Without Error..... 0
Packets Received With Error..... 0
Broadcast Packets Received..... 0
Receive Packets Discarded..... 0
Packets Transmitted Without Errors..... 0
Transmit Packets Discarded..... 0
Transmit Packet Errors..... 0
Collision Frames..... 0
Time Since Counters Last Cleared..... 281 day 4 hr 9 min 0 sec
```

```
(Routing) #show interface 0/1 | exclude "Packets"
```

```
Transmit Packet Errors..... 0
Collision Frames..... 0
Time Since Counters Last Cleared..... 20 day 21 hr 30 min 9 sec
```

3.3.4 show xxx|begin "string"

The command `xxx` is executed and the output is filtered to show all lines beginning with and following the first line containing the `"string"` match. All prior lines are suppressed.

Example: The following shows an example of the CLI command.

```
(Routing) #show port all | begin "1/1"
```

1/1	Enable	Down	Disable	N/A	N/A
1/2	Enable	Down	Disable	N/A	N/A
1/3	Enable	Down	Disable	N/A	N/A
1/4	Enable	Down	Disable	N/A	N/A
1/5	Enable	Down	Disable	N/A	N/A
1/6	Enable	Down	Disable	N/A	N/A

```
(Routing) #
```

3.3.5 show xxx|section "string"

The command `xxx` is executed and the output is filtered to show only lines included within the sections identified by lines containing the `"string"` match and ending with the first line containing the default end-of-section identifier (that is, `"exit"`).

Example: The following shows an example of the CLI command.

```
(Routing) #show running-config | section "interface 0/1"
```

```
interface 0/1
no spanning-tree port mode
exit
```

3.3.6 show xxx|section "string" "string2"

The command `xxx` is executed and the output is filtered to only show lines included within the sections identified by lines containing the `"string"` match and ending with the first line containing the `"string2"` match. If multiple sessions matching the specified string match criteria are part of the base output, then all instances are displayed.

3.3.7 show xxx|section "string" include "string2"

The command `xxx` is executed and the output is filtered to only show lines included within the sections identified by lines containing the `"string"` match and ending with the first line containing the default end-of-section identifier (that is, `"exit"`) and that include the `"string2"` match. This type of filter command could also include `"exclude"` or user-defined end-of-section identifier parameters as well.

3.3.8 show xxx|count "string"

The command `xxx` is executed and the output is filtered to only count lines containing the `"string"` match. All lines in the output are suppressed however the count is displayed.

Example: The following shows an example of the CLI command.

```
(Routing) #show port all
```

Intf	Type	Admin Mode	Physical Mode	Physical Status	Link Status	Link Trap	LACP Mode	Actor Timeout
1/0/1		Enable	Auto		Down	Enable	Enable	long
1/0/2		Enable	Auto		Down	Enable	Enable	long
1/0/3		Enable	Auto		Down	Enable	Enable	long
1/0/4		Enable	Auto		Down	Enable	Enable	long
1/0/5		Enable	Auto	1000 Full	Up	Enable	Enable	long
1/0/6		Enable	Auto	1000 Full	Up	Enable	Enable	long
1/0/7		Enable	Auto	1000 Full	Up	Enable	Enable	long
1/0/8		Enable	Auto	1000 Full	Up	Enable	Enable	long
1/0/9		Enable	Auto		Down	Enable	Enable	long
1/0/10		Enable	Auto		Down	Enable	Enable	long
1/0/11		Enable	Auto		Down	Enable	Enable	long
1/0/12		Enable	Auto		Down	Enable	Enable	long
1/0/13		Enable	Auto		Down	Enable	Enable	long
1/0/14		Enable	Auto		Down	Enable	Enable	long
1/0/15		Enable	Auto		Down	Enable	Enable	long

1/0/16	Enable	Auto	Down	Enable	Enable	long
1/0/17	Enable	Auto	Down	Enable	Enable	long
1/0/18	Enable	Auto	Down	Enable	Enable	long
1/0/19	Enable	Auto	Down	Enable	Enable	long
1/0/20	Enable	Auto	Down	Enable	Enable	long
1/0/21	Enable	Auto	Down	Enable	Enable	long
1/0/22	Enable	Auto	Down	Enable	Enable	long
1/0/23	Enable	Auto	Down	Enable	Enable	long
1/0/24	Enable	Auto	Down	Enable	Enable	long
1/0/25	Enable	10G Full	Detach	Enable	Enable	long
1/0/26	Enable	10G Full	Detach	Enable	Enable	long
1/0/27	Enable	10G Full	Detach	Enable	Enable	long
1/0/28	Enable	10G Full	Detach	Enable	Enable	long
0/3/1	Enable		Down	Disable	N/A	N/A
0/3/2	Enable		Down	Disable	N/A	N/A
0/3/3	Enable		Down	Disable	N/A	N/A
0/3/4	Enable		Down	Disable	N/A	N/A
0/3/5	Enable		Down	Disable	N/A	N/A
0/3/6	Enable		Down	Disable	N/A	N/A

```
(Routing) #show port all | count "Up"
```

"Up" occurs in four lines.

3.4 Dual Image Commands

These commands are only available on selected Linux-based platforms.

NOTICE

FASTPATH software supports a dual image feature that allows the switch to have two software images in the permanent storage. You can specify which image is the active image to be loaded in subsequent reboots. This feature allows reduced down-time when you upgrade or downgrade the software.

3.4.1 delete

This command deletes the backup image file from the permanent storage or the core dump file from the local file system. The optional `unit` parameter is valid only on Stacks. Error will be returned, if this parameter is provided, on stand-alone systems. In a stack, the `unit` parameter identifies the node on which this command must be executed. When this parameter is not supplied, the command is executed on all nodes in a Stack.

Format `delete [unit] backup`
 `delete core-dump-file file-name | all`

Mode Privileged EXEC

3.4.2 boot system

This command activates the specified image. It will be the active-image for subsequent reboots and will be loaded by the boot loader. The current active-image is marked as the backup-image for subsequent reboots. If the specified image does not exist on the system, this command returns an error message. The optional `unit` parameter is valid only in Stacking, where the `unit` parameter identifies the node on which this command must be executed. When this parameter is not supplied, the command is executed on all nodes in a Stack.

Format `boot system [unit] {active | backup}`

Mode Privileged EXEC

3.4.3 show bootvar

This command displays the version information and the activation status for the current active and backup images on the supplied unit (node) of the Stack. If you do not specify a unit number, the command displays image details for all nodes on the Stack. The command also displays any text description associated with an image. This command, when used on a stand-alone system, displays the switch activation status. For a stand-alone system, the `unit` parameter is not valid.

Format `show bootvar [unit]`

Mode Privileged EXEC

3.5 System Information and Statistics Commands

This section describes the commands you use to view information about system features, components, and configurations.

3.5.1 load-interval

This command changes the length of time for which data is used to compute load statistics. The value is given in seconds, and must be a multiple of 30. The allowable range for `interval` is from 30 to 600 seconds. The smaller the value of the load interval is, the more accurate is the instantaneous rate given by load statistics. Smaller values may affect system performance.

Default 300 seconds

Format `load-interval interval`

Mode Interface Config

Example: The following shows an example of the command.

```
(Routing) (Interface 0/1)#load-interval 30
```

3.5.1.1 no load-interval

This command resets the load interval on the interface to the default value.

Format `load-interval interval`

Mode Interface Config

3.5.2 show arp switch

This command displays the contents of the IP stack's Address Resolution Protocol (ARP) table. The IP stack only learns ARP entries associated with the management interfaces—network or service ports. ARP entries associated with routing interfaces are not listed.

Format `show arp switch`

Mode Privileged EXEC

Parameter	Description
IP Address	IP address of the management interface or another device on the management network.
MAC Address	Hardware MAC address of that device.
Interface	For a service port the output is <i>Management</i> . For a network port, the output is the <i>slot/port</i> of the physical interface.

3.5.3 show eventlog

This command displays the event log, which contains error messages from the system. The event log is not cleared on a system reset. The *unit* is the switch identifier.

Format show eventlog [*unit*]

Mode Privileged EXEC

Parameter	Description
File	The file in which the event originated.
Line	The line number of the event.
Task Id	The task ID of the event.
Code	The event code.
Time	The time this event occurred.
Unit	The unit for the event.

Event log information is retained across a switch reset.

NOTICE

3.5.4 show hardware

This command displays inventory information for the switch.

NOTICE

The `show version` command and the `show hardware` command display the same information. In future releases of the software, the `show hardware` command will not be available. For a description of the command output, see the [show version](#) command

Format show hardware

Mode Privileged EXEC

3.5.5 show version

This command displays inventory information for the switch.

NOTICE

The `show version` command will replace the `show hardware` command in future releases of the software.

Format show version

Mode Privileged EXEC

Parameter	Description
System Description	Text used to identify the product name of this switch.
Machine Type	The machine model as defined by the Vital Product Data.
Machine Model	The machine model as defined by the Vital Product Data
Serial Number	The unique box serial number for this switch.
FRU Number	The field replaceable unit number.
Part Number	Manufacturing part number.
Maintenance Level	Hardware changes that are significant to software.

Parameter	Description
Manufacturer	Manufacturer descriptor field.
Burned in MAC Address	Universally assigned network address.
Software Version	The release.version.revision number of the code currently running on the switch.
Operating System	The operating system currently running on the switch.
Network Processing Device	The type of the processor microcode.
Additional Packages	The additional packages incorporated into this system.

3.5.6 show platform vpd

This command displays vital product data for the switch.

Format show platform vpd

Mode User Privileged

The following information is displayed.

Parameter	Description
Operational Code Image File Name	Build Signature loaded into the switch
Software Version	Release Version Maintenance Level and Build (RVMB) information of the switch.
Timestamp	Timestamp at which the image is built

Example: The following shows example CLI display output for the command.

(Routing) #show platform vpd

```
Operational Code Image File Name..... FastPath-Ent-esw-xgs4-gto-BL20R-CS-6AIQHSr3v7m14b35
Software Version..... 3.7.14.35
Timestamp..... Thu Mar 7 14:36:14 IST 2013
```

3.5.7 show interface

This command displays a summary of statistics for a specific interface or a count of all CPU traffic based upon the argument.

Format show interface {slot/port | all | switchport | lag lag-id}

Mode Privileged EXEC

The display parameters, when the argument is slot/port or lag lag-id, are as follows:

Parameter	Description
Packets Received Without Error	The total number of packets (including broadcast packets and multicast packets) received by the processor.
Packets Received With Error	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Broadcast Packets Received	The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.
Receive Packets Discarded	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffered space.
Packets Transmitted Without Error	The total number of packets transmitted out of the interface.

Parameter	Description
Transmit Packets Discarded	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Transmit Packets Errors	The number of outbound packets that could not be transmitted because of errors.
Collisions Frames	The best estimate of the total number of collisions on this Ethernet segment.
Load Interval	The length of time for which data is used to compute load statistics. The value is given in seconds, and must be a multiple of 30. The allowable range is from 30 to 600 seconds
Bits Per Second Received	Approximate number of bits per second received. This value is an exponentially weighted average and is affected by the configured load-interval.
Bits Per Second Transmitted	Approximate number of bits per second transmitted. This value is an exponentially weighted average and is affected by the configured load-interval.
Packets Per Second Received	Approximate number of packets per second received. This value is an exponentially weighted average and is affected by the configured load-interval.
Packets Per Second Transmitted	Approximate number of packets per second transmitted. This value is an exponentially weighted average and is affected by the configured load-interval.
Percent Utilization Received	Value of link utilization in percentage representation for the RX line.
Percent Utilization Transmitted	Value of link utilization in percentage representation for the TX line.
Link Flaps	The number of link flaps (link up and down cycle) that have occurred.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

The display parameters, when the argument is `switchport` are as follows:

Parameter	Description
Packets Received Without Error	The total number of packets (including broadcast packets and multicast packets) received by the processor.
Broadcast Packets Received	The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.
Packets Received With Error	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Packets Transmitted Without Error	The total number of packets transmitted out of the interface.
Broadcast Packets Transmitted	The total number of packets that higher-level protocols requested to be transmitted to the Broadcast address, including those that were discarded or not sent.
Transmit Packet Errors	The number of outbound packets that could not be transmitted because of errors.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds since the statistics for this switch were last cleared.

Example: The following shows example command output.

```
(Routing) #show interface 1/0/1
```

```
Packets Received Without Error..... 0
Packets Received With Error..... 0
Broadcast Packets Received..... 0
Receive Packets Discarded..... 0
Packets Transmitted Without Errors..... 0
Transmit Packets Discarded..... 0
Transmit Packet Errors..... 0
Collision Frames..... 0
Load Interval..... 300
Bits Per Second Received..... 0
Bits Per Second Transmitted..... 0
```

```

Packets Per Second Received..... 0
Packets Per Second Transmitted..... 0
Percent Utilization Received..... 0%
Percent Utilization Transmitted..... 0%
Time Since Counters Last Cleared..... 377 day 6 hr 9 min 10 sec

```

(Routing) #

3.5.8 show interfaces status

Use this command to display interface information, including the description, port state, speed and auto-neg capabilities. The command is similar to `show port all` but displays additional fields like interface description and port-capability.

The description of the interface is configurable through the existing command `description <name>` which has a maximum length of 64 characters that is truncated to 28 characters in the output. The long form of the description can be displayed using `show port description`. The interfaces displayed by this command are physical interfaces, LAG interfaces and VLAN routing interfaces.

The command `show interfaces status all` displays the configured vlan/trunk for each port under the VLAN column.

Format `show interfaces status [{slot/port | vlan id}]`

Mode Privileged EXEC

Parameter	Description
Port	The interface associated with the rest of the data in the row.
Name	The descriptive user-configured name for the interface.
Link State	Indicates whether the link is up or down.
Physical Mode	The speed and duplex settings on the interface.
Physical Status	Indicates the port speed and duplex mode for physical interfaces. The physical status for LAGs is not reported. When a port is down, the physical status is unknown.
Media Type	The media type of the interface.
Flow Control Status	The IEEE 802.3x flow control status.
Flow Control	The configured IEEE 802.3x flow control mode.
VLAN	When switchport mode for an interface is configured as trunk, this column displays Trunk. For switchport mode other than trunk, only the VLAN ID is displayed. The mode is not displayed.

Example: The following shows example CLI display output for the command `show interfaces status all`.

(Switching) #show interfaces status all

Port	Name	Link State	Physical Mode	Physical Status	Media Type	Flow Control	VLAN
0/1		Down	Auto		Unknown	Inactive	1
0/2		Down	Auto		Unknown	Inactive	22
0/3		Down	Auto		Unknown	Inactive	5,1
0/4		Down	Auto		Unknown	Inactive	1
0/5		Down	Auto		Unknown	Inactive	trunk
0/6		Down	Auto		Unknown	Inactive	10,1
0/7		Down	Auto		Unknown	Inactive	1
0/8		Down	Auto		Unknown	Inactive	1
0/9		Down	Auto		Unknown	Inactive	1
0/10		Down	Auto		Unknown	Inactive	1
0/11		Down	Auto		Unknown	Inactive	1
0/12		Down	Auto		Unknown	Inactive	1
0/13		Down	10G Full		Unknown	Inactive	1
0/14		Down	10G Full		Unknown	Inactive	1
3/1		Detach				N/A	

3/2	Detach	N/A
3/3	Detach	N/A
3/4	Detach	N/A
3/5	Detach	N/A
3/6	Detach	N/A
3/7	Detach	N/A
3/8	Detach	N/A
3/9	Detach	N/A

3.5.9 show interfaces traffic

Use this command to display interface traffic information.

Format show interfaces traffic [*slot/port*]

Mode Privileged EXEC

Parameter	Description
Interface Name	The interface associated with the rest of the data in the row.
Congestion Drops	The number of packets that have been dropped on the interface due to congestion.
TX Queue	The number of bytes in the transmit queue.
RX Queue	The number of bytes in the receive queue.
Color Drops: Green	The number of green packets that were dropped.
Color Drops: Yellow	The number of yellow (conformed) packets that were dropped.
Color Drops: Red	The number of red (exceeded) packets that were dropped.
WRED TX Queue	The number of packets in the WRED transmit queue.
ECN Tx Queue	The number of packets in the ECN transmit queue.

Example: The following shows example CLI display output for the command.

```
(Routing) #show interfaces traffic
Intf      Congestion  Tx Queue  Rx Queue  Color Drops (Pkts)      WRED Tx      ECN Tx
Name      Drops(Pkts) (KB)      (KB)      Green     Yellow      Red          Queue(KB) (Pkts)
-----
0/1        0           0         0         NA        0           0           0           0           0
0/2        0           0         0         NA        0           0           0           0           0
0/3        0           0         0         NA        0           0           0           0           0
0/4        0           0         0         NA        0           0           0           0           0
0/5        0           0         0         NA        0           0           0           0           0
0/6        0           0         0         NA        0           0           0           0           0
0/7        0           0         0         NA        0           0           0           0           0
0/8        0           0         0         NA        0           0           0           0           0
0/9        0           0         0         NA        0           0           0           0           0
0/10       0           0         0         NA        0           0           0           0           0
0/11       0           0         0         NA        0           0           0           0           0
```

The show interfaces traffic <u/s/p> command displays per cos queue statistics.

```
(Routing) #show interfaces traffic 0/1
Interface Name..... 0/1
Congestion Drops(Pkts)..... 0
Tx Queue(KB)..... 0
Rx Queue(KB)..... NA
Color Drops Green(Pkts)..... 0
Color Drops Yellow(Pkts)..... 0
Color Drops Red(Pkts)..... 0
WRED Tx Queue(KB)..... 0
ECN Tx(Pkts)..... 0
```

CoS Queue statistics

CoS	Total Drops (Pkts)	Total (KB)	Peak (KB)	Current (KB)	Average
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	8	0	0	0
8	NA	NA	NA	NA	1344550

NOTICE

- If `counter` is not supported in hardware, the `show` command displays the counter value as NA.
- The `clear counters` command clears all the new counters except `peak count` as this is a status value not a counter.

3.5.10 show interface counters

This command displays a short summary of the statistics for all interfaces.

Format `show interface counters`

- Mode**
- Privileged EXEC
 - User EXEC

Parameter	Description
Port	The interface associated with the rest of the data in the row.
InOctects	The total number of octets received on the interface.
InUcastPkts	The total number of unicast packets received on the interface.
InMcastPkts	The total number of multicast packets received on the interface.
InBcastPkts	The total number of broadcast packets received on the interface.
InDropPkts	The number of packets dropped at the ingress.
Rx Error	The number of error packets (FCS, Jabbers, Undersize, and so on) captured at the ingress.
OutOctects	The total number of octets transmitted by the interface.
OutUcastPkts	The total number of unicast packets transmitted by the interface.
OutMcastPkts	The total number of multicast packets transmitted by the interface.
OutBcastPkts	The total number of broadcast packets transmitted by the interface.
OutDropPkts	The number of packets dropped at the egress.
Tx Error	The number of error packets (FCS, Jabbers, Undersize, and so on) captured at the egress.

Example: The following shows example CLI display output for the command.

(Routing) #show interface counters

Port	InOctets	InUcastPkts	InMcastPkts	InBcastPkts	InDropPkts
Rx Error					

0/1	0	0	0	0	0
0/2	0	0	0	0	0
0/3	7186336	0	76181	14757	12
0/4	7731501	13097	55309	3356	0
0/5	298587	0	2468	0	0
0/6	0	0	0	0	0

Port Tx Error	OutOctets	OutUcastPkts	OutMcastPkts	OutBcastPkts	OutDropPkts		
0/1	0	0	0	0	0	0	0
0/2	0	0	0	0	0	0	0
0/3	6284609	70	50423	3542	7	0	0
0/4	9122028	13670	78689	14951	0	0	0
0/5	13279037	70	124151	18307	0	0	0
0/6	0	0	0	0	0	0	0

3.5.11 show interfaces diag

Use this command to provide debugging information about the interface with a single command, instead of using multiple commands. The last reason code is printed in the output whenever the link is down.

The command consolidates all information related to port flaps, which includes:

- Admin state, fault type—local or remote
- XCVR info (voltage, power, and so on)
- Software-driven disables (err-disabled)
- Statistics

Format show interfaces diag *slot/port*

Mode Privileged EXEC

Example: The following shows example CLI display output for the command when the port is up.

```
(Routing)#show interfaces diag 1/0/4
Thu Jan 1 00:01:09 1970
1/0/4 is Up, line protocol is up
Description :
MTU 1500 bytes, BW 1000000 kbps
LineSpeed is 1000 Full, Auto-negotiation is on
Time Since Counters Last Cleared : 0 day 0 hr 0 min 17 sec
Link Down Event Counter : 0
input rate is 0 packet/sec, 0 bits/sec
output rate is 0 packet/sec, 0 bits/sec
Input statistics:
0 packets, 0 octets
0 Multicasts, 0 Broadcasts, 0 Unicasts
0 Errors, 0 Discarded, 0 Jabber
0 Overruns, 0 FCS, 0 Undersize
Output statistics:
23 packets, 4378 octets
23 Multicasts, 0 Broadcasts, 0 Unicasts
0 Output errors, 0 Collisions, 6 Discarded
```

Example: The following shows example CLI display output for the command when the port is local Admin down.

```
Sun Jan 4 18:05:16 1970
0/23 is Down, line protocol status is phy-link-down
Interface is Administratively Down.
Description : abcd
MTU 1500 bytes, BW 10000000 kbps
LineSpeed is 10G Full, Auto-negotiation is off
Time Since Counters Last Cleared : 3 day 18 hr 4 min 52 sec
Link Down Event Counter : 0
input rate is 0 packet/sec, 0 bits/sec
output rate is 0 packet/sec, 0 bits/sec
Input statistics:
0 packets, 0 octets
0 Multicasts, 0 Broadcasts, 0 Unicasts
0 Errors, 0 Discarded, 0 Jabber
```

```

0 Overruns, 0 FCS, 0 Undersize
Output statistics:
23 packets, 4378 octets
23 Multicasts, 0 Broadcasts, 0 Unicasts
0 Output errors, 0 Collisions, 6 Discarded

```

Example: The following shows example CLI display output for the command when the port is down because of remote port admin shutdown.

```

0/1 is Down, line protocol status is phy-link-down
Local Fault. Reason Code - 0x0
Description :
MTU 1500 bytes, BW 100000000 kbps
LineSpeed is 100G Full, Auto-negotiation is off
Time Since Counters Last Cleared : 3 day 0 hr 48 min 25 sec
Link Down Event Counter : 0
input rate is 0 packet/sec, 0 bits/sec
output rate is 0 packet/sec, 0 bits/sec
Input statistics:
0 packets, 0 octets
0 Multicasts, 0 Broadcasts, 0 Unicasts
0 Errors, 0 Discarded, 0 Jabber
0 Overruns, 0 FCS, 0 Undersize
Output statistics:
23 packets, 4378 octets
23 Multicasts, 0 Broadcasts, 0 Unicasts
0 Output errors, 0 Collisions, 6 Discarded

```

Example: The following shows example CLI display output for the command when the port is down because of err-disabled.

```

0/1 is Down, line protocol status is err-disabled
Interface down by UDLD
Description :
MTU 1500 bytes, BW 100000000 kbps
LineSpeed is 100G Full, Auto-negotiation is off
Time Since Counters Last Cleared : 3 day 0 hr 48 min 25 sec
Link Down Event Counter : 0
input rate is 0 packet/sec, 0 bits/sec
output rate is 0 packet/sec, 0 bits/sec
Input statistics:
0 packets, 0 octets
0 Multicasts, 0 Broadcasts, 0 Unicasts
0 Errors, 0 Discarded, 0 Jabber
0 Overruns, 0 FCS, 0 Undersize
Output statistics:
23 packets, 4378 octets
23 Multicasts, 0 Broadcasts, 0 Unicasts
0 Output errors, 0 Collisions, 6 Discarded

```

3.5.12 show interface ethernet

This command displays detailed statistics for a specific interface or for all CPU traffic based upon the argument.

Format show interface ethernet {slot/port | all}
Mode Privileged EXEC

When you specify a value for slot/port, the command displays the following information.

Parameter	Description
Packets Received	<ul style="list-style-type: none"> • Total Packets Received (Octets) - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including Frame Check Sequence (FCS) octets). This object can be used as a reasonable estimate of Ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. The result of this equation is the value Utilization which is the percent utilization of the Ethernet segment on a scale of 0 to 100 percent. • Packets Received 64 Octets - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets). • Packets Received 65-127 Octets - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets). • Packets Received 128-255 Octets - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets). • Packets Received 256-511 Octets - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets). • Packets Received 512-1023 Octets - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets). • Packets Received 1024-1518 Octets - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets). • Packets Received > 1518 Octets - The total number of packets received that were longer than 1522 octets (excluding framing bits, but including FCS octets) and were otherwise well formed. • Packets RX and TX 64 Octets - The total number of packets (including bad packets) received and transmitted that were 64 octets in length (excluding framing bits but including FCS octets). • Packets RX and TX 65-127 Octets - The total number of packets (including bad packets) received and transmitted that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets). • Packets RX and TX 128-255 Octets - The total number of packets (including bad packets) received and transmitted that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets). • Packets RX and TX 256-511 Octets - The total number of packets (including bad packets) received and transmitted that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Parameter	Description
Packets Received (con't)	<ul style="list-style-type: none"> • Packets RX and TX 512-1023 Octets - The total number of packets (including bad packets) received and transmitted that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets). • Packets RX and TX 1024-1518 Octets - The total number of packets (including bad packets) received and transmitted that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets). • Packets RX and TX 1519-2047 Octets - The total number of packets received and transmitted that were between 1519 and 2047 octets in length inclusive (excluding framing bits, but including FCS octets) and were otherwise well formed. • Packets RX and TX 1523-2047 Octets - The total number of packets received and transmitted that were between 1523 and 2047 octets in length inclusive (excluding framing bits, but including FCS octets) and were otherwise well formed. • Packets RX and TX 2048-4095 Octets - The total number of packets received that were between 2048 and 4095 octets in length inclusive (excluding framing bits, but including FCS octets) and were otherwise well formed. • Packets RX and TX 4096-9216 Octets - The total number of packets received that were between 4096 and 9216 octets in length inclusive (excluding framing bits, but including FCS octets) and were otherwise well formed.
Packets Received Successfully	<ul style="list-style-type: none"> • Total Packets Received Without Error - The total number of packets received that were without errors. • Unicast Packets Received - The number of subnetwork-unicast packets delivered to a higher-layer protocol. • Multicast Packets Received - The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address. • Broadcast Packets Received - The total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.
Receive Packets Discarded	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
Received Packet Error Counts	<ul style="list-style-type: none"> • Total Packets Received with MAC Errors - The total number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol. • Jabbers Received - The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that this definition of jabber is different than the definition in IEEE 802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms. • Fragments/Undersize Received - The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets). • Alignment Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with a non-integral number of octets. • FCS Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets. • Overruns - The total number of frames discarded as this port was overloaded with incoming packets, and could not keep up with the inflow. • uRPF Discards - The number of packets dropped due to failing the uRPF.

Parameter	Description
Received Packets Not Forwarded	<ul style="list-style-type: none"> • <code>Total Received Packets Not Forwarded</code> - A count of valid frames received which were discarded (in other words, filtered) by the forwarding process • <code>802.3x Pause Frames Received</code> - A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode. • <code>Unacceptable Frame Type</code> - The number of frames discarded from this port due to being an unacceptable frame type.
Packets Transmitted Octets	<ul style="list-style-type: none"> • <code>Total Packets Transmitted (Octets)</code> - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of Ethernet utilization. If greater precision is desired, the <code>etherStatsPkts</code> and <code>etherStatsOctets</code> objects should be sampled before and after a common interval. • <code>Packets Transmitted 64 Octets</code> - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets). • <code>Packets Transmitted 65-127 Octets</code> - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets). • <code>Packets Transmitted 128-255 Octets</code> - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets). • <code>Packets Transmitted 256-511 Octets</code> - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets). • <code>Packets Transmitted 512-1023 Octets</code> - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets). • <code>Packets Transmitted 1024-1518 Octets</code> - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets). • <code>Packets Transmitted > 1518 Octets</code> - The total number of packets transmitted that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed. • <code>Max Frame Size</code> - The maximum size of the Info (non-MAC) field that this port will receive or transmit. • <code>Maximum Transmit Unit</code> - The maximum Ethernet payload size.
Packets Transmitted Successfully	<ul style="list-style-type: none"> • <code>Total Packets Transmitted Successfully</code>- The number of frames that have been transmitted by this port to its segment. • <code>Unicast Packets Transmitted</code> - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent. • <code>Multicast Packets Transmitted</code> - The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent. • <code>Broadcast Packets Transmitted</code> - The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.
Transmit Packets Discarded	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

Parameter	Description
Transmit Errors	<ul style="list-style-type: none"> • <code>Total Transmit Errors</code> - The sum of Single, Multiple, and Excessive Collisions. • <code>FCS Errors</code> - The total number of packets transmitted that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets. • <code>Underrun Errors</code> - The total number of frames discarded because the transmit FIFO buffer became empty during frame transmission.
Transmit Discards	<ul style="list-style-type: none"> • <code>Total Transmit Packets Discards</code> - The sum of single collision frames discarded, multiple collision frames discarded, and excessive frames discarded. • <code>Single Collision Frames</code> - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision. • <code>Multiple Collision Frames</code> - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision. • <code>Excessive Collisions</code> - A count of frames for which transmission on a particular interface fails due to excessive collisions. • <code>Port Membership Discards</code> - The number of frames discarded on egress for this port due to egress filtering being enabled.
Protocol Statistics	<ul style="list-style-type: none"> • <code>802.3x Pause Frames Transmitted</code> - A count of MAC Control frames transmitted on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode. • <code>GVRP PDUs Received</code> - The count of GVRP PDUs received in the GARP layer. • <code>GVRP PDUs Transmitted</code> - The count of GVRP PDUs transmitted from the GARP layer. • <code>GVRP Failed Registrations</code> - The number of times attempted GVRP registrations could not be completed. • <code>GMRP PDUs Received</code> - The count of GMRP PDUs received in the GARP layer. • <code>GMRP PDUs Transmitted</code> - The count of GMRP PDUs transmitted from the GARP layer. • <code>GMRP Failed Registrations</code> - The number of times attempted GMRP registrations could not be completed. • <code>STP BPDUs Transmitted</code> - Spanning Tree Protocol Bridge Protocol Data Units sent. • <code>STP BPDUs Received</code> - Spanning Tree Protocol Bridge Protocol Data Units received. • <code>RST BPDUs Transmitted</code> - Rapid Spanning Tree Protocol Bridge Protocol Data Units sent. • <code>RSTP BPDUs Received</code> - Rapid Spanning Tree Protocol Bridge Protocol Data Units received. • <code>MSTP BPDUs Transmitted</code> - Multiple Spanning Tree Protocol Bridge Protocol Data Units sent. • <code>MSTP BPDUs Received</code> - Multiple Spanning Tree Protocol Bridge Protocol Data Units received. • <code>SSTP BPDUs Transmitted</code> - Shared Spanning Tree Protocol Bridge Protocol Data Units sent. • <code>SSTP BPDUs Received</code> - Shared Spanning Tree Protocol Bridge Protocol Data Units received.
Dot1x Statistics	<ul style="list-style-type: none"> • <code>EAPOL Frames Transmitted</code> - The number of Extensible Authentication Protocol over LAN (EAPOL) frames of any type that have been transmitted by this authenticator. • <code>EAPOL Start Frames Received</code> - The number of valid EAPOL start frames that have been received by this authenticator.

Parameter	Description
Traffic Load Statistics	<ul style="list-style-type: none"> • Load Interval - The length of time for which data is used to compute load statistics. The value is given in seconds, and must be a multiple of 30. The allowable range is from 30 to 600 seconds • Bits Per Second Received - Approximate number of bits per second received. This value is an exponentially weighted average and is affected by the configured load-interval. • Bits Per Second Transmitted - Approximate number of bits per second transmitted. This value is an exponentially weighted average and is affected by the configured load-interval. • Packets Per Second Received - Approximate number of packets per second received. This value is an exponentially weighted average and is affected by the configured load-interval. • Packets Per Second Transmitted - Approximate number of packets per second transmitted. This value is an exponentially weighted average and is affected by the configured load-interval. • Percent Utilization Received - Value of link utilization in percentage representation for the RX line. • Percent Utilization Transmitted - Value of link utilization in percentage representation for the TX line.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

If you use the `all` keyword, the following information appears for all interfaces on the switch.

Parameter	Description
Port	The Interface ID.
Bytes Tx	The total number of bytes transmitted by the interface.
Bytes Rx	The total number of bytes transmitted by the interface.
Packets Tx	The total number of packets transmitted by the interface.
Packets Rx	The total number of packets transmitted by the interface.

3.5.13 show interface lag

Use this command to display configuration information about the specified LAG interface.

Format `show interface lag lag-intf-num`

Mode Privileged EXEC

Parameters	Description
Packets Received Without Error	The total number of packets (including broadcast packets and multicast packets) received on the LAG interface
Packets Received With Error	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Broadcast Packets Received	The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.
Receive Packets Discarded	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
Packets Transmitted Without Error	The total number of packets transmitted out of the LAG.
Transmit Packets Discarded	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

Parameters	Description
Transmit Packets Errors	The number of outbound packets that could not be transmitted because of errors.
Collisions Frames	The best estimate of the total number of collisions on this Ethernet segment.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds since the statistics for this LAG were last cleared.

3.5.14 show fiber-ports optical-transceiver

This command displays the diagnostics information of the SFP like Temp, Voltage, Current, Input Power, Output Power, Tx Fault, and LOS. The values are derived from the SFP's A2 (Diagnostics) table using the I²C interface.

Format show fiber-ports optical-transceiver {all | slot/port}

Mode Privileged EXEC

Parameter	Description
Temp	Internally measured transceiver temperature.
Voltage	Internally measured supply voltage.
Current	Measured TX bias current.
Output Power	Measured optical output power relative to 1mW.
Input Power	Measured optical power received relative to 1mW.
TX Fault	Transmitter fault.
LOS	Loss of signal.

Example: The following information shows an example of the command output.

(Switch) #show fiber-ports optical-transceiver all

Port	Temp [C]	Voltage [Volt]	Current [mA]	Output Power [dBm]	Input Power [dBm]	TX Fault	LOS
0/49	39.3	3.256	5.0	-2.234	-2.465	No	No
0/50	33.9	3.260	5.3	-2.374	-40.000	No	Yes
0/51	32.2	3.256	5.6	-2.300	-2.897	No	No

3.5.15 show fiber-ports optical-transceiver-info

This command displays the SFP vendor related information like Vendor Name, Serial Number of the SFP, Part Number of the SFP. The values are derived from the SFP's A0 table using the I²C interface.

Format show fiber-ports optical-transceiver-info {all | slot/port}

Mode Privileged EXEC

Parameter	Description
Vendor Name	The vendor name is a 16 character field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h). The vendor name shall be the full name of the corporation, a commonly accepted abbreviation of the name of the corporation, the SCSI company code for the corporation, or the stock exchange code for the corporation.
Length (50um, OM2)	This value specifies link length that is supported by the transceiver while operating in compliance with applicable standards using 50 micron multimode OM2 [500MHz*km at 850nm] fiber. A value of 0 means that the transceiver does not support 50 micron multimode fiber or that the length information must be determined from the transceiver technology.

Parameter	Description
Length (62.5um, OM1)	This value specifies link length that is supported by the transceiver while operating in compliance with applicable standards using 62.5 micron multimode OM1 [200 MHz*km at 850 nm, 500 MHz*km at 1310 nm] fiber. A value of 0 means that the transceiver does not support 62.5 micron multimode fiber or that the length information must be determined from the transceiver technology.
Vendor SN	The vendor serial number (vendor SN) is a 16 character field that contains ASCII characters, left-aligned and padded on the right with ASCII spaces (20h), defining the vendor's serial number for the transceiver. A value of all 0s in the 16-byte field indicates that the vendor SN is unspecified.
Vendor PN	The vendor part number (vendor PN) is a 16-byte field that contains ASCII characters, left aligned and padded on the right with ASCII spaces (20h), defining the vendor part number or product name. A value of all 0s in the 16-byte field indicates that the vendor PN is unspecified.
BR, nominal	The nominal bit (signaling) rate (BR, nominal) is specified in units of 100 MBd, rounded off to the nearest 100 MBd. The bit rate includes those bits necessary to encode and delimit the signal as well as those bits carrying data information. A value of 0 indicates that the bit rate is not specified and must be determined from the transceiver technology. The actual information transfer rate will depend on the encoding of the data, as defined by the encoding value.
Vendor Rev	The vendor revision number (vendor rev) contains ASCII characters, left aligned and padded on the right with ASCII spaces (20h), defining the vendor's product revision number. A value of all 0s in this field indicates that the vendor revision is unspecified.

Example: The following information shows an example of the command output.

```
(Switch) #show fiber-ports optical-transceiver-info all
```

Port	Vendor Name	Link Length		Serial Number	Part Number	Nominal Bit Rate	
		50um [m]	62.5um [m]			[Mb/s]	Rev
0/49	BROADCOM	8	3	A7N2018414	AXM761	10300	10
0/51	BROADCOM	8	3	A7N2018472	AXM761	10300	10
0/52	BROADCOM	8	3	A7N2018501	AXM761	10300	10

3.5.16 show mac-addr-table

This command displays the forwarding database entries. These entries are used by the transparent bridging function to determine how to forward a received frame.

Enter `all` or `no` parameter to display the entire table. Enter a MAC Address and VLAN ID to display the table entry for the requested MAC address on the specified VLAN. Enter the `count` parameter to view summary information about the forwarding database table. Use the `interface slot/port` parameter to view MAC addresses on a specific interface.

Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number. Use the `vlan vlan_id` parameter to display information about MAC addresses on a specified VLAN.

On a service provider build with the PBB package, the command shows the forwarding database table and additionally shows the ISID-MAC entries learned on the DUT. To view only the ISID-MAC entries on the DUT, provide the option `isid` to the `show mac-addr-table` command. MAC entries of other BEB's are not shown in the pass-through BEB `mac-addr-table` for bidirectional traffic between them.

Format `show mac-addr-table {all|vlan vlan_id|interface slot/port/macaddr[macMask][vlan]|isid isid/count}`

Mode Privileged EXEC

The following information displays if you do not enter a parameter, the keyword `all`, or the MAC address and VLAN ID.

Parameter	Description
VLAN ID	The VLAN in which the MAC address is learned.
MAC Address	A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB.
Interface	The port through which this address was learned.
Interface Index	This object indicates the ifIndex of the interface table entry associated with this port.
Status	The status of this entry. The meanings of the values are: <ul style="list-style-type: none"> • Static—The value of the corresponding instance was added by the system or a user when a static MAC filter was defined. It cannot be relearned. • Learned—The value of the corresponding instance was learned by observing the source MAC addresses of incoming traffic, and is currently in use. • Management—The value of the corresponding instance (system MAC address) is also the value of an existing instance of dot1dStaticAddress. It is identified with interface 0/1. and is currently used when enabling VLANs for routing. • Self—The value of the corresponding instance is the address of one of the switch's physical interfaces (the system's own MAC address). • GMRP Learned—The value of the corresponding was learned using GMRP and applies to Multicast. • Other—The value of the corresponding instance does not fall into one of the other categories.

If you enter `vlan vlan_id`, only the MAC Address, Interface, and Status fields appear. If you enter the `interface slot/port` parameter, in addition to the MAC Address and Status fields, the VLAN ID field also appears.

The following information displays if you enter the `count` parameter:

Parameter	Description
Dynamic Address count	Number of MAC addresses in the forwarding database that were automatically learned.
Static Address (User-defined) count	Number of MAC addresses in the forwarding database that were manually entered by a user.
Total MAC Addresses in use	Number of MAC addresses currently in the forwarding database.
Total MAC Addresses available	Number of MAC addresses the forwarding database can handle.

3.5.17 process cpu threshold

Use this command to configure the CPU utilization thresholds. The Rising and Falling thresholds are specified as a percentage of CPU resources. The utilization monitoring time period can be configured from 5 seconds to 86400 seconds in multiples of 5 seconds. The CPU utilization threshold configuration is saved across a switch reboot. Configuring the falling utilization threshold is optional. If the falling CPU utilization parameters are not configured, then they take the same value as the rising CPU utilization parameters.

Format `process cpu threshold type total rising 1-100 interval`

Mode Global Config

Parameter	Description
rising threshold	The percentage of CPU resources that, when exceeded for the configured rising interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled).
rising interval	The duration of the CPU rising threshold violation, in seconds, that must be met to trigger a notification. The range is 5 to 86400. The default is 0 (disabled).

Parameter	Description
falling threshold	The percentage of CPU resources that, when usage falls below this level for the configured interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled). A notification is triggered when the total CPU utilization falls below this level for a configured period of time. The falling utilization threshold notification is made only if a rising threshold notification was previously done. The falling utilization threshold must always be equal or less than the rising threshold value. The CLI does not allow setting the falling threshold to be greater than the rising threshold.
falling interval	The duration of the CPU falling threshold, in seconds, that must be met to trigger a notification. The range is 5 to 86400. The default is 0 (disabled).

3.5.18 show process app-list

This command displays the user and system applications.

This command is available in Linux 2.6 only.

NOTICE

Format show process app-list

Mode Privileged EXEC

Parameter	Description
ID	The application identifier.
Name	The name that identifies the process.
PID	The number the software uses to identify the process.
Admin Status	The administrative status of the process.
Auto Restart	Indicates whether the process will automatically restart if it stops.
Running Status	Indicates whether the process is currently running or stopped.

Example: The following shows example CLI display output for the command.

ID	Name	PID	Admin Status	Auto Restart	Running Status
1	dataplane	15309	Enabled	Disabled	Running
2	switchdrvr	15310	Enabled	Disabled	Running
3	syncdb	15314	Enabled	Disabled	Running
4	lighttpd	18718	Enabled	Enabled	Running
5	syncdb-test	0	Disabled	Disabled	Stopped
6	proctest	0	Disabled	Enabled	Stopped
7	user.start	0	Enabled	Disabled	Stopped

3.5.19 show process app-resource-list

This command displays the configured and in-use resources of each application.

This command is available in Linux 2.6 only.

NOTICE

Format show process app-resource-list

Mode Privileged EXEC

Parameter	Description
ID	The application identifier.
Name	The name that identifies the process.
PID	The number the software uses to identify the process.
Memory Limit	The maximum amount of memory the process can consume.
CPU Share	The maximum percentage of CPU utilization the process can consume.
Memory Usage	The amount of memory the process is currently using.
Max Mem Usage	The maximum amount of memory the process has used at any given time since it started.

(Routing) #show process app-resource-list

ID	Name	PID	Memory Limit	CPU Share	Memory Usage	Max Mem Usage
1	switchdrv	251	Unlimited	Unlimited	380 MB	381 MB
2	syncdb	252	Unlimited	Unlimited	0 MB	0 MB
3	syncdb-test	0	Unlimited	Unlimited	0 MB	0 MB
4	proctest	0	10 MB	20%	0 MB	0 MB
5	utelnetd	0	Unlimited	Unlimited	0 MB	0 MB
6	lxshTelnetd	0	Unlimited	Unlimited	0 MB	0 MB
7	user.start	0	Unlimited	Unlimited	0 MB	0 MB

3.5.20 show process cpu

This command provides the percentage utilization of the CPU by different tasks.

NOTICE

- It is not necessarily the traffic to the CPU, but different tasks that keep the CPU busy.
- This command is available in Linux 2.6 only.

Format show process cpu [*1-n* | all]

Mode Privileged EXEC

Parameter	Description
Free	System wide free memory
Alloc	System wide allocated memory (excluding cache, file system used space)
Pid	Process or Thread Id
Name	Process or Thread Name
5Secs	CPU utilization sampling in 5Secs interval
60Secs	CPU utilization sampling in 60Secs interval
300Secs	CPU utilization sampling in 300Secs interval
Total CPU Utilization	Total CPU utilization % within the specified window of 5Secs, 60Secs and 300Secs.

Example: The following shows example CLI display output for the command using Linux.

(Routing) #show process cpu

Memory Utilization Report

status bytes

free 106450944

alloc 423227392

CPU Utilization:

PID	Name	5 Secs	60 Secs	300 Secs

765	_interrupt_thread	0.00%	0.01%	0.02%
767	bcmL2X.0	0.58%	0.35%	0.28%
768	bcmCNTR.0	0.77%	0.73%	0.72%
773	bcmRX	0.00%	0.04%	0.05%
786	cpuUtilMonitorTask	0.19%	0.23%	0.23%
834	dot1s_task	0.00%	0.01%	0.01%
810	hapiRxTask	0.00%	0.01%	0.01%
805	dtlTask	0.00%	0.02%	0.02%
863	spmTask	0.00%	0.01%	0.00%
894	ip6MapLocalDataTask	0.00%	0.01%	0.01%
908	RMONTask	0.00%	0.11%	0.12%

Total CPU Utilization		1.55%	1.58%	1.50%

3.5.21 show process proc-list

This application displays the processes started by applications created by the Process Manager.

This command is available in Linux 2.6 only.

NOTICE

Format show process proc-list

Mode Privileged EXEC

Parameter	Description
PID	The number the software uses to identify the process.
Process Name	The name that identifies the process.
Application ID-Name	The application identifier and its associated name.
Child	Indicates whether the process has spawned a child process.
VM Size	Virtual memory size.
VM Peak	The maximum amount of virtual memory the process has used at a given time.
FD Count	The file descriptors count for the process.

Example: The following shows example CLI display output for the command.

(Routing) #show process proc-list

PID	Process Name	Application ID-Name	Chld	VM Size (KB)	VM Peak (KB)	FD Count
15260	procmgr	0-procmgr	No	1984	1984	8
15309	dataplane	1-dataplane	No	293556	293560	11
15310	switchdrv	2-switchdrv	No	177220	177408	57
15314	syncdb	3-syncdb	No	2060	2080	8
18718	lighttpd	4-lighttpd	No	5508	5644	11
18720	lua_magnet	4-lighttpd	Yes	12112	12112	7
18721	lua_magnet	4-lighttpd	Yes	25704	25708	7

3.5.22 show running-config

Use this command to display or capture the current setting of different protocol packages supported on the switch. This command displays or captures commands with settings and configurations that differ from the default value. To display or capture the commands with settings and configurations that are equal to the default value, include the `all` option.

The command output displays the non-default option configured as part of the command, in addition to the existing non-default configuration that each interface has.

NOTICE

Show running-config does not display the User Password, even if you set one different from the default.

The output is displayed in script format, which can be used to configure another switch with the same configuration. If the optional *scriptname* is provided with a file name extension of ".scr", the output is redirected to a script file.

NOTICE

- If you issue the `show running-config` command from a serial connection, access to the switch through remote connections (such as Telnet) is suspended while the output is being generated and displayed.
- If you use a text-based configuration file, the `show running-config` command only displays configured physical interfaces (that is, if any interface only contains the default configuration, that interface will be skipped from the `show running-config` command output). This is true for any configuration mode that contains nothing but default configuration. That is, the command to enter a particular config mode, followed immediately by its exit command, are both omitted from the `show running-config` command output (and hence from the startup-config file when the system configuration is saved.)

Use the following keys to navigate the command output.

Key	Action
Enter	Advance one line.
Space Bar	Advance one page.
q	Stop the output and return to the prompt.

Note that `--More--` or `(q)uit` is displayed at the bottom of the output screen until you reach the end of the output.

This command captures the current settings of OSPFv2 and OSPFv3 trapflag status:

- If all the flags are enabled, then the command displays `trapflags all`.
- If all the flags in a particular group are enabled, then the command displays `trapflags group name all`.
- If some, but not all, of the flags in that group are enabled, the command displays `trapflags groupname flag-name`.

Format `show running-config [all | scriptname]`

Mode Privileged EXEC

3.5.23 show running-config interface

Use this command to display the running configuration for a specific interface. Valid interfaces include physical, LAG, loopback, tunnel and VLAN interfaces.

The `show running-config [interface slot/port]` command output displays the non-default option configured as part of the command, in addition to the existing non-default configuration that each interface has.

Format `show running-config interface {interface | lag {Lag-intf-num} | loopback {Loopback-id} | tunnel {tunnel-id} | vlan {vlan-id}}`

Mode Privileged EXEC

Parameter	Description
interface	Running configuration for the specified interface.
lag-intf-num	Running configuration for the LAG interface.
loopback-id	Running configuration for the loopback interface.
tunnel-id	Running configuration for the tunnel interface.
vlan-id	Running configuration for the VLAN routing interface.

You can display the following information using the command.

Parameter	Description
interface	Enter an interface in unit/slot/port format.
lag	Display the running config for a specified lag interface.
loopback	Display the running config for a specified loopback interface.
tunnel	Display the running config for a specified tunnel interface.
vlan	Display the running config for a specified vlan routing interface.

Example: The following shows example CLI display output for the command.

```
(Routing) #show running-config interface 0/1
!Current Configuration:
!
interface 0/1
addport 3/1
exit
(Routing) #
```

3.5.24 show

This command displays the content of text-based configuration files from the CLI. The text-based configuration files (`startup-config`, `backup-config`, and `factory-defaults`) are saved compressed in flash. With this command, the files are decompressed while displaying their content.

Format `show { startup-config | backup-config | factory-defaults }`

Mode Privileged EXEC

Parameter	Description
startup-config	Display the content of the startup-config file.
backup-config	Display the content of the backup-config file.
factory-defaults	Display the content of the factory-defaults file.

Example: The following shows example CLI display output for the command using the `startup-config` parameter.

```
(Routing) #show startup-config
!Current Configuration:
!
!System Description "Quanta LB6M, 8.1.14.41, Linux 2.6.27.47, U-Boot 2009.06 (Apr 19 2011 -
15:57:06)"
!System Software Version "8.1.14.41"
!System Up Time            "0 days 0 hrs 48 mins 19 secs"
!Cut-through mode is configured as disabled
!Additional Packages      BGP-4,QOS,IPv6,IPv6 Management,Routing,Data Center
!Current System Time: Oct 14 05:42:12 2022
!
vlan database
vlan 10
exit
configure
ipv6 router ospf
exit
line console
exit
line telnet
exit
line ssh
exit
!
```

```
--More-- or (q)uit
interface 0/1
description 'intf1'
exit
router ospf
exit
exit
```

Example: The following shows example CLI display output for the command using the `backup-config` parameter.

```
(Routing) #show backup-config
!Current Configuration:
!
!System Description "Quanta LB6M, 8.1.14.41, Linux 2.6.27.47, U-Boot 2009.06 (Apr 19 2011 -
15:57:06)"
!System Software Version "8.1.14.41"
!System Up Time          "0 days 0 hrs 48 mins 19 secs"
!Cut-through mode is configured as disabled
!Additional Packages     BGP-4,QOS,IPv6,IPv6 Management,Routing,Data Center
!Current System Time: Oct 14 05:42:12 2022
!
vlan database
vlan 10
exit
configure
ipv6 router ospf
exit
line console
exit
line telnet
exit
line ssh
exit
!
--More-- or (q)uit
interface 0/1
description 'intf1'
exit
router ospf
exit
exit
```

Example: The following shows example CLI display output for the command using the `factory-defaults` parameter.

```
(Routing) #show factory-defaults
!Current Configuration:
!
!System Description "Quanta LB6M, 8.1.14.41, Linux 2.6.27.47, U-Boot 2009.06 (Apr 19 2011 -
15:57:06)"
!System Software Version "8.1.14.41"
!System Up Time          "0 days 0 hrs 48 mins 19 secs"
!Cut-through mode is configured as disabled
!Additional Packages     BGP-4,QOS,IPv6,IPv6 Management,Routing,Data Center
!Current System Time: Oct 14 05:42:12 2022
!
vlan database
vlan 10
exit
configure
ipv6 router ospf
exit
line console
exit
line telnet
exit
line ssh
```

```

exit
!
--More-- or (q)uit
interface 0/1
description 'intf1'
exit
router ospf
exit
exit

```

3.5.25 dir

Use this command to list the files in the directory `/mnt/fastpath` in flash from the CLI.

Format dir
Mode Privileged EXEC

(Routing) #dir

```

0 drwx          2048 May 09 2002 16:47:30 .
0 drwx          2048 May 09 2002 16:45:28 ..
0 -rwx          592 May 09 2002 14:50:24 slog2.txt
0 -rwx          72 May 09 2002 16:45:28 boot.dim
0 -rwx           0 May 09 2002 14:46:36 olog2.txt
0 -rwx       13376020 May 09 2002 14:49:10 image1
0 -rwx           0 Apr 06 2001 19:58:28 fsyssize
0 -rwx          1776 May 09 2002 16:44:38 slog1.txt
0 -rwx           356 Jun 17 2001 10:43:18 crashdump.ct1
0 -rwx          1024 May 09 2002 16:45:44 sslt.rnd
0 -rwx       14328276 May 09 2002 16:01:06 image2
0 -rwx           148 May 09 2002 16:46:06 hpc_broad.cfg
0 -rwx           0 May 09 2002 14:51:28 olog1.txt
0 -rwx           517 Jul 23 2001 17:24:00 ssh_host_key
0 -rwx       69040 Jun 17 2001 10:43:04 log_error_crashdump
0 -rwx           891 Apr 08 2000 11:14:28 sslt_key1.pem
0 -rwx           887 Jul 23 2001 17:24:00 ssh_host_rsa_key
0 -rwx           668 Jul 23 2001 17:24:34 ssh_host_dsa_key
0 -rwx           156 Apr 26 2001 13:57:46 dh512.pem
0 -rwx           245 Apr 26 2001 13:57:46 dh1024.pem
0 -rwx           0 May 09 2002 16:45:30 slog0.txt

```

3.5.26 show sysinfo

This command displays switch information.

Format show sysinfo
Mode Privileged EXEC

Parameter	Description
Switch Description	Text used to identify this switch.
System Name	Name used to identify the switch. The factory default is blank. To configure the system name, see the <code>name</code> command.
System Location	Text used to identify the location of the switch. The factory default is blank. To configure the system location, see the <code>location</code> command.
System Contact	Text used to identify a contact person for this switch. The factory default is blank. To configure the system location, see the <code>contact</code> command.
System ObjectID	The base object ID for the switch's enterprise MIB.
System Up Time	The time in days, hours and minutes since the last switch reboot.
MIBs Supported	A list of MIBs supported by this agent.

Parameter	Description
noMibs	Displays system information excluding MIB information.

3.5.27 show tech-support

Use the `show tech-support` command to display system and configuration information when you contact technical support. The output of the `show tech-support` command combines the output of the following commands and includes log history files from previous runs.

- `show version`
- `show sysinfo`
- `show port all`
- `show isdp neighbors`
- `show logging`
- `show event log`
- `show logging buffered`
- `show msg-queue`
- `show trap log`
- `show running-config`

Including the optional `ospf` parameter also displays OSPF information.

Format `show tech-support [ospf|ospfv3]`

Mode Privileged EXEC

3.5.28 length value

Use this command to set the pagination length to value number of lines for the sessions specified by configuring on different Line Config modes (telnet/ssh/console) and is persistent.

Example: Length command on Line Console mode applies for Serial Console session.

Default 24

Format `length value`

Mode Line Config

3.5.28.1 no length value

Use this command to set the pagination length to the default value number of lines.

Format `no length value`

Mode Line Config

3.5.29 terminal length

Use this command to set the pagination length to value number of lines for the current session. This command configuration takes an immediate effect on the current session and is nonpersistent.

Default 24 lines per page

Format `terminal length value`

Mode Privileged EXEC

3.5.29.1 no terminal length

Use this command to set the value to the length value configured on Line Config mode depending on the type of session.

Format no terminal length *value*
Mode Privileged EXEC

3.5.30 show terminal length

Use this command to display all the configured terminal length values.

Format show terminal length
Mode Privileged EXEC

Example: The following shows example CLI display output for the command.

```
(Routing) #show terminal length
Terminal Length:
-----
For Current Session..... 24
For Serial Console..... 24
For Telnet Sessions..... 24
For SSH Sessions..... 24
```

3.5.31 memory free low-watermark processor

Use this command to get notifications when the CPU free memory falls below the configured threshold. A notification is generated when the free memory falls below the threshold. Another notification is generated once the available free memory rises to 10 percent above the specified threshold. To prevent generation of excessive notifications when the CPU free memory fluctuates around the configured threshold, only one Rising or Falling memory notification is generated over a period of 60 seconds. The threshold is specified in kilobytes. The CPU free memory threshold configuration is saved across a switch reboot.

Format memory free low-watermark processor *1-1034956*
Mode Global Config

Parameter	Description
low-watermark	When CPU free memory falls below this threshold, a notification message is triggered. The range is 1 to the maximum available memory on the switch. The default is 0 (disabled).

3.5.32 clear mac-addr-table

Use this command to dynamically clear learned entries from the forwarding database. Using the following options, the user can specify the set of dynamically-learned forwarding database entries to clear.

Default No default value.
Format clear mac-addr-table {all | vlan *vlanId* | interface *slot/port* | *macAddr* [*macMask*]}
Mode Privileged EXEC

Parameter	Description
all	Clears dynamically learned forwarding database entries in the forwarding database table.
vlan <i>vlanId</i>	Clears dynamically learned forwarding database entries for this <i>vlanId</i> .
interface <i>slot/port</i>	Clears forwarding database entries learned on for the specified interface.

Parameter	Description
macAddr macMask	Clears dynamically learned forwarding database entries that match the range specified by MAC address and MAC mask. When MAC mask is not entered, only specified MAC is removed from the forwarding database table.

3.5.33 clear mac-address-table notification

Use this command to clear the counters used in the MAC notification feature, such as the number of MAC entries added, the number of MAC entries removed, and notifications sent.

Default	none
Format	clear mac-address-table notification
Mode	Privileged EXEC

3.5.34 mac-address-table notification change

Use this command to enable the MAC notification feature and its parameters history-size and interval. MAC address notification allows the operator to receive an SNMP trap or inform when a MAC address is learned by the switch or the MAC address ages out of the MAC address table. MAC movement is treated as deletion of an entry on the old port, and addition of an entry on the new port.

Default	<ul style="list-style-type: none"> MAC address notification is disabled by default. The default history size is 1. The default notification interval is 1 second.
Format	mac-address-table notification change [history-size <size> interval <seconds>]
Mode	Global Configuration

Parameter	Description
history-size	Configures the size of the MAC address table. The range is 1 to 255.
interval	Configures the SNMP trap notification interval. The range is 1 to 2147483647.

3.5.34.1 no mac-address-table notification change

Use this command to disable the MAC notification feature.

Format	no mac-address-table notification change [history-size <size> interval <seconds>]
Mode	Global Configuration

3.5.35 show nvram:file

This command displays the files existing in the configuration directory (without argument) or related to the argument <path/file>. The argument may contain a relative or absolute pathname and/or a filename with or without wild-card characters. The file are listed in alphabetical order.

This command is using the Shell command "ls -l <path/file>".

Format show nvram:file [<path/file>]
show nvram:file usb:[/<path/file>] (if available)

Mode Privileged EXEC

3.6 Logging Commands

This section describes the commands you use to configure system logging, and to view logs and the logging settings.

3.6.1 logging buffered

This command enables logging to an in-memory log.

Default disabled; critical when enabled

Format logging buffered

Mode Global Config

3.6.1.1 no logging buffered

This command disables logging to in-memory log.

Format no logging buffered

Mode Global Config

3.6.2 logging buffered threshold

Use this command to configure the logging buffered threshold that acts as high water-mark to set off an alert, using e-mail, if configured, and a console log. The parameter indicates the maximum percentage of the allocated logging buffer pool that is used by the logging subsystem during a normal run. If the logging subsystem exceeds usage of the pre-allocated buffer pool beyond this point, an alert event and a console log are generated.

The logging buffered threshold can be configured only when the In-Memory log behavior is configured as Stop-on-Full. The default behavior is Wrap and the threshold does not apply to this mode.

Default 80

Format logging buffered threshold <1-100>

Mode Global Config

Example: The following shows an example of the command.

(Routing) (Config)#logging buffered ?

```
<cr>                               Press enter to execute the command.
<severitylevel|[0-7]>             Enter Logging Severity Level (emergency|0, alert|1, critical|2, error|3,
                                   warning|4, notice|5, info|6,debug|7).
wrap                               Log Wrapping Configuration
threshold                          The percentage of logging buffer not to be exceeded for normal run
```

3.6.3 logging buffered wrap

This command enables wrapping of in-memory logging when the log file reaches full capacity. Otherwise, when the log file reaches full capacity, logging stops.

Default	enabled
Format	logging buffered wrap
Mode	Privileged EXEC

3.6.3.1 no logging buffered wrap

This command disables wrapping of in-memory logging and configures logging to stop when the log file capacity is full.

Format	no logging buffered wrap
Mode	Privileged EXEC

3.6.4 logging cli-command

This command enables the CLI command logging feature, which enables the FASTPATH software to log all CLI commands issued on the system. The commands are stored in a persistent log. Use the [show logging persistent](#) command to display the stored history of CLI commands.

Default	enabled
Format	logging cli-command
Mode	Global Config

3.6.4.1 no logging cli-command

This command disables the CLI command Logging feature.

Format	no logging cli-command
Mode	Global Config

3.6.5 logging console

This command enables logging to the console. You can specify the *severitylevel* value as either an integer from 0 to 7 or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7).

Default	disabled; critical when enabled
Format	logging console [<i>severitylevel</i>]
Mode	Global Config

3.6.5.1 no logging console

This command disables logging to the console.

Format	no logging console
Mode	Global Config

3.6.6 logging host

This command configures the logging host parameters. You can configure up to eight hosts.

Default	<ul style="list-style-type: none"> port: 514 (for UDP) and 6514 (for TLS) authentication mode: anonymous certificate index: 0 level: critical (2)
Format	<code>logging host {hostaddress hostname} addresstype tls [anon x509name] certificate-index {port severitylevel}</code>
Mode	Global Config

Parameter	Description
hostaddress host-name	The IP address of the logging host.
address-type	Indicates the type of address being passed: DNS or IPv4.
tls	Enables TLS security for the host.
anon x509name	The type of authentication mode: anonymous or x509name.
certificate-index	The certificate number to be used for authentication. The valid range is 0 to 8. Index 0 is used to the default file.
port	A port number from 1 to 65535.
severitylevel	Specify this value as either an integer from 0 to 7, or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7).

Example: The following shows examples of the command.

```
(Routing) (Config)# logging host google.com dns 214
(Routing) (Config)# logging host 10.130.64.88 ipv4 214 6
(Routing) (Config)# logging host 5.5.5.5 ipv4 tls anon 6514 debug
(Routing) (Config)# logging host 5.5.5.5 ipv4 tls x509name 3 6514 debug
```

3.6.7 logging host reconfigure

This command enables logging host reconfiguration.

Format	<code>logging host reconfigure hostindex</code>
Mode	Global Config

Parameter	Description
hostindex	Enter the Logging Host Index for which to change the IP address.

3.6.8 logging host remove

This command disables logging to host. See the [show logging hosts](#) command for a list of host indexes.

Format	<code>logging host remove hostindex</code>
Mode	Global Config

3.6.9 logging protocol

Use this command to configure the logging protocol version number as 0 or 1. RFC 3164 uses version 0 and RFC 5424 uses version 1.

Default	The default is version 0 (RFC 3164).
Format	<code>logging protocol {0 1}</code>
Mode	Global Config

3.6.10 logging syslog

This command enables syslog logging. Use the optional *facility* parameter to set the default facility used in syslog messages for components that do not have an internally assigned facility. The *facility* value can be one of the following keywords: *kernel*, *user*, *mail*, *system*, *security*, *syslog*, *lpr*, *nntp*, *uucp*, *cron*, *auth*, *ftp*, *ntp*, *audit*, *alert*, *clock*, *local0*, *local1*, *local2*, *local3*, *local4*, *local5*, *local6*, *local7*. The default facility is *local7*.

Default disabled
Format logging syslog [*facility facility*]
Mode Global Config

3.6.10.1 no logging syslog

This command disables syslog logging.

Format no logging syslog [*facility*]
Mode Global Config

3.6.11 logging syslog port

This command enables syslog logging. The *portid* parameter is an integer with a range of 1 to 65535.

Default disabled
Format logging syslog port *portid*
Mode Global Config

3.6.11.1 no logging syslog port

This command disables syslog logging.

Format no logging syslog port
Mode Global Config

3.6.12 logging syslog source-interface

This command configures the syslog source-interface (source IP address) for syslog server configuration. The selected source-interface IP address is used for filling the IP header of management protocol packets. This allows security devices (firewalls) to identify the source packets coming from the specific switch. If a source-interface is not specified, the primary IP address of the originating (outbound) interface is used as the source address.

Format logging syslog source-interface {*slot/port* | {*loopback loopback-id*} | {*vlan vlan-id*}}
Mode Global Config

Parameter	Description
slot/port	VLAN or port-based routing interface.
loopback-id	Configures the loopback interface to use as the source IP address. The range of the loopback ID is 0 to 7.
tunnel-id	Configures the tunnel interface to use as the source IP address. The range of the tunnel ID is 0 to 7.
vlan-id	Configures the VLAN interface to use as the source IP address. The range of the VLAN ID is 1 to 4093.

Example: The following shows examples of the command.

```
(config)#logging syslog source-interface loopback 0
(config)#logging syslog source-interface tunnel 0
```

```
(config)#logging syslog source-interface 0/4/1
(config)#logging syslog source-interface 1/0/1
```

3.6.12.1 no logging syslog source-interface

This command disables syslog logging.

Format no logging syslog
Mode Global Config

3.6.13 show logging

This command displays logging configuration information.

Format show logging
Mode Privileged EXEC

Parameter	Description
Logging Client Local Port	Port on the collector/relay to which syslog messages are sent.
Logging Client USB File Name	
Logging Client Source Interface	Shows the configured syslog source-interface (source IP address).
Logging Client Source IPv4 Address	
CLI Command Logging	Shows whether CLI Command logging is enabled or disabled.
Logging Protocol	The logging protocol version number. <ul style="list-style-type: none"> 0: RFC 3164 1: RFC 5424
Console Logging	Shows whether console logging is enabled.
Console Logging Severity Filter	The minimum severity to log to the console log. Messages with an equal or lower numerical severity are logged.
Buffered Logging	Shows whether buffered logging is enabled.
Buffered Logging Severity Filter	
Buffered Logging Threshold (%)	Displays the maximum percentage of the allocated logging buffer pool that can be used by the logging subsystem during a normal run. If the logging subsystem exceeds the usage of the pre-allocated buffer pool beyond this point, an alert event and a console log are generated.
Persistent Logging	Shows whether persistent logging is enabled.
Persistent Logging Severity Filter	The minimum severity at which the logging entries are retained after a system reboot.
Syslog Logging	Shows whether syslog logging is enabled.
Syslog Logging Facility	Shows the value set for the facility in syslog messages.
Log Messages Received	Number of messages received by the log process. This includes messages that are dropped or ignored.
Log Messages Dropped	Number of messages that could not be processed due to error or lack of resources.
Log Messages Relayed	Number of messages sent to the collector/relay.

Example: The following shows example CLI display output for the command.

```
(Routing) #show logging
```

```

Logging Client Local Port      : 514
Logging Client USB File Name  :
Logging Client Source Interface : vlan 1
Logging Client Source IPv4 Address : 169.254.100.100 [Up]
CLI Command Logging          : disabled
Logging protocol              : 0
Console Logging               : disabled
Console Logging Severity Filter : error
Buffered Logging              : enabled
Buffered Logging Severity Filter : notice
Buffered Logging Threshold (%) : 80
Persistent Logging            : disabled
Persistent Logging Severity Filter : alert

Syslog Logging                : disabled
Syslog Logging Facility       : local7

Log Messages Received         : 15945
Log Messages Dropped          : 0
Log Messages Relayed          : 0

```

3.6.14 show logging buffered

This command displays buffered logging (system startup and system operation logs). The user can specify the time period for which the logs are to be displayed. The command display logs timestamped within the start and end times specified. Both the start and end time arguments are optional. If the end time is not specified, the current time is used.

Format show logging buffered {[start <time> <date>] [end <time> <date>]}

Mode Privileged EXEC

Parameter	Description
time	Expressed in a 24-hour clock, in the form of hours:minutes. For example, 8:00 is 8:00 a.m. and 20:00 is 8:00 p.m.
date	Expressed in the format day month year.
Buffered (In-Memory) Logging	Shows whether the In-Memory log is enabled or disabled.
Buffered Logging Wrapping Behavior	The behavior of the In Memory log when faced with a log full situation.
Buffered Log Count	The count of valid entries in the buffered log.
Buffered Logging Threshold (lines)	Displays the maximum number of buffered logs based on the Buffer Logging Threshold (%).

Example: The following shows example CLI display output for the command.

```
(Routing)#show logging buffered
```

```

Buffered (In-Memory) Logging      : enabled
Buffered Logging Wrapping Behavior : On
Buffered Log Count                : 85
Buffered Log Threshold (lines)    : 160

```

3.6.15 show logging hosts

This command displays all configured logging hosts. Use the "|" character to display the output filter options.

Format show logging hosts

Mode Privileged EXEC

Parameter	Description
Host Index	(Used for deleting hosts.)
IP Address / Host-name	IP address or hostname of the logging host.
Severity Level	The minimum severity to log to the specified address. The possible values are emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7).
Port	The server port number, which is the port on the local host from which syslog messages are sent.
Status	Status field provides the current status of snmp row status. (Active, Not in Service, Not Ready).
Mode	The type of security: UDP or TLS.
Auth	The type of authentication mode: anonymous or x509name.
Cert #	The certificate number to be used for authentication. The valid range is 0 to 8. Index 0 is used to the default file.

Example: The following shows example CLI display output for the command.

```
(Routing) #show logging hosts
Index  IP Address/Hostname  Severity  Port  Status  Mode
-----
1      1.1.1.17              critical  514   Active  udp
2      10.130.191.90         debug    10514 Active  tls
3      5.5.5.5                debug    333   Active  tls

Auth    Cert#
-----

x509name 6
x509name 4
```

3.6.16 show logging persistent

Use the `show logging persistent` command to display persistent log entries. The user can specify the time period for which the logs are to be displayed. The command display logs timestamped within the start and end times specified. Both the start and end time arguments are optional. If the end time is not specified, the current time is used.

If `log-files` is specified, the system persistent log files are displayed. `Persistent Logging` in the display output indicates whether persistent logging is enabled or disabled. `Persistent Log Count` in the display output indicates the number of persistent log entries.

Format `show logging persistent {[start <time> <date>] [end <time> <date>]} [log-files | previous]<cr>`

Mode Privileged EXEC

Options	Description
time	Expressed in a 24-hour clock, in the form of hours:minutes. For example, 8:00 is 8:00 a.m. and 20:00 is 8:00 p.m.
date	Expressed in the format day month year.
none	Display persistent log entries.
log-files	Display the list of persistent log files existing in the system.
previous	Display persistent log entries from the last reboot.

Example: The following shows example CLI display output for the command.

```
(Switching) #show logging persistent
```

```
Persistent Logging    : disabled
Persistent Log Count  : 0
```

```
(Switching) #show logging persistent log-files
```

```
Persistent Log Files:
```

```
slog0.txt
slog1.txt
```

3.6.17 show logging traplogs

This command displays SNMP trap events and statistics.

Format show logging traplogs

Mode Privileged EXEC

Parameter	Description
Number of Traps Since Last Reset	The number of traps since the last boot.
Trap Log Capacity	The number of traps the system can retain.
Number of Traps Since Log Last Viewed	The number of new traps since the command was last executed.
Log	The log number.
System Time Up	How long the system had been running at the time the trap was sent.
Trap	The text of the trap message.

3.6.18 clear logging buffered

This command clears buffered logging (system startup and system operation logs).

Format clear logging buffered

Mode Privileged EXEC

3.7 Email Alerting and Mail Server Commands

3.7.1 logging email

This command enables email alerting and sets the lowest severity level for which log messages are emailed. If you specify a severity level, log messages at or above this severity level, but below the urgent severity level, are emailed in a non-urgent manner by collecting them together until the log time expires. You can specify the *severitylevel* value as either an integer from 0 to 7 or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7).

Default disabled; when enabled, log messages at or above severity Warning (4) are emailed
Format logging email [*severitylevel*]
Mode Global Config

3.7.1.1 no logging email

This command disables email alerting.

Format no logging email
Mode Global Config

3.7.2 logging email urgent

This command sets the lowest severity level at which log messages are emailed immediately in a single email message. Specify the *severitylevel* value as either an integer from 0 to 7 or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7). Specify none to indicate that log messages are collected and sent in a batch email at a specified interval.

Default Alert (1) and emergency (0) messages are sent immediately.
Format logging email urgent {*severitylevel* | none}
Mode Global Config

3.7.2.1 no logging email urgent

This command resets the urgent severity level to the default value.

Format no logging email urgent
Mode Global Config

3.7.3 logging email message-type to-addr

This command configures the email address to which messages are sent. The message types supported are urgent, non-urgent, and both. For each supported severity level, multiple email addresses can be configured. The *to-email-addr* variable is a standard email address, for example admin@yourcompany.com.

Format logging email message-type {urgent |non-urgent |both} to-addr *to-email-addr*
Mode Global Config

3.7.3.1 no logging email message-type to-addr

This command removes the configured to-addr field of email.

Format no logging email message-type {urgent |non-urgent |both} to-addr *to-email-addr*
Mode Global Config

3.7.4 logging email from-addr

This command configures the email address of the sender (the switch).

Default switch@broadcom.com
Format logging email from-addr *from-email-addr*
Mode Global Config

3.7.4.1 no logging email from-addr

This command removes the configured email source address.

Format no logging email from-addr *from-email-addr*
Mode Global Config

3.7.5 logging email message-type subject

This command configures the subject line of the email for the specified type.

Default For urgent messages: Urgent Log Messages
 For non-urgent messages: Non Urgent Log Messages
Format logging email message-type {urgent |non-urgent |both} subject *subject*
Mode Global Config

3.7.5.1 no logging email message-type subject

This command removes the configured email subject for the specified message type and restores it to the default email subject.

Format no logging email message-type {urgent |non-urgent |both} subject
Mode Global Config

3.7.6 logging email logtime

This command configures how frequently non-urgent email messages are sent. Non-urgent messages are collected and sent in a batch email at the specified interval. The valid range is every 30 to 1440 minutes.

Default 30 minutes
Format logging email logtime *minutes*
Mode Global Config

3.7.6.1 no logging email logtime

This command resets the non-urgent log time to the default value.

Format no logging email logtime
Mode Global Config

3.7.7 logging traps

NOTICE

The `logging traps` command is being deprecated and will be removed in the next FASTPATH release

This command sets the severity at which SNMP traps are logged and sent in an email. Specify the *severitylevel* value as either an integer from 0 to 7 or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), info (6), or debug (7).

Default Info (6) messages and higher are logged.
Format `logging traps severitylevel`
Mode Global Config

3.7.7.1 no logging traps

This command resets the SNMP trap logging severity level to the default value.

Format `no logging traps`
Mode Global Config

3.7.8 logging email test message-type

This command sends an email to the SMTP server to test the email alerting function.

Format `logging email test message-type {urgent |non-urgent |both} message-body message-body`
Mode Global Config

3.7.9 show logging email config

This command displays information about the email alert configuration.

Format `show logging email config`
Mode Privileged EXEC

Parameter	Description
Email Alert Logging	The administrative status of the feature: enabled or disabled
Email Alert From Address	The email address of the sender (the switch).
Email Alert Urgent Severity Level	The lowest severity level that is considered urgent. Messages of this type are sent immediately.
Email Alert Non Urgent Severity Level	The lowest severity level that is considered non-urgent. Messages of this type, up to the urgent level, are collected and sent in a batch email. Log messages that are less severe are not sent in an email message at all.
Email Alert Trap Severity Level	The lowest severity level at which traps are logged.
Email Alert Notification Period	The amount of time to wait between non-urgent messages.
Email Alert To Address Table	The configured email recipients.
Email Alert Subject Table	The subject lines included in urgent (Type 1) and non-urgent (Type 2) messages.
For Msg Type urgent, subject is	The configured email subject for sending urgent messages.

Parameter	Description
For Msg Type non-urgent, subject is	The configured email subject for sending non-urgent messages.

3.7.10 show logging email statistics

This command displays email alerting statistics.

Format show logging email statistics

Mode Privileged EXEC

Parameter	Description
Email Alert Operation Status	The operational status of the email alerting feature.
No of Email Failures	The number of email messages that have attempted to be sent but were unsuccessful.
No of Email Sent	The number of email messages that were sent from the switch since the counter was cleared.
Time Since Last Email Sent	The amount of time that has passed since the last email was sent from the switch.

3.7.11 clear logging email statistics

This command resets the email alerting statistics.

Format clear logging email statistics

Mode Privileged EXEC

3.7.12 mail-server

This command configures the SMTP server to which the switch sends email alert messages and changes the mode to Mail Server Configuration mode. The server address can be in the IPv4, IPv6, or DNS name format.

Format mail-server {*ip-address* | *ipv6-address* | *hostname*}

Mode Global Config

3.7.12.1 no mail-server

This command removes the specified SMTP server from the configuration.

Format no mail-server {*ip-address* | *ipv6-address* | *hostname*}

Mode Global Config

3.7.13 security

This command sets the email alerting security protocol by enabling the switch to use TLS authentication with the SMTP Server. If the TLS mode is enabled on the switch but the SMTP sever does not support TLS mode, no email is sent to the SMTP server.

Default none

Format security {*tlsv1* | *none*}

Mode Mail Server Config

3.7.14 port

This command configures the TCP port to use for communication with the SMTP server. The recommended port for TLSv1 is 465, and for no security (that is, none) it is 25. However, any nonstandard port in the range 1 to 65535 is also allowed.

Default 25
Format port {465 | 25 | 1-65535}
Mode Mail Server Config

3.7.15 username (Mail Server Config)

This command configures the login ID the switch uses to authenticate with the SMTP server.

Default admin
Format username *name*
Mode Mail Server Config

3.7.16 password

This command configures the password the switch uses to authenticate with the SMTP server.

Default admin
Format password *password*
Mode Mail Server Config

3.7.17 show mail-server config

This command displays information about the email alert configuration.

Format show mail-server {*ip-address* | *hostname* | all} config
Mode Privileged EXEC

Parameter	Description
No of mail servers configured	The number of SMTP servers configured on the switch.
Email Alert Mail Server Address	The IPv4/IPv6 address or DNS hostname of the configured SMTP server.
Email Alert Mail Server Port	The TCP port the switch uses to send email to the SMTP server.
Email Alert Security Protocol	The security protocol (TLS or none) the switch uses to authenticate with the SMTP server.
Email Alert Username	The username the switch uses to authenticate with the SMTP server.
Email Alert Password	The password the switch uses to authenticate with the SMTP server.

3.8 System Utility and Clear Commands

This section describes the commands you use to help troubleshoot connectivity issues and to restore various configurations to their factory defaults.

3.8.1 traceroute

Use the `traceroute` command to discover the routes that IPv4 or IPv6 packets actually take when traveling to their destination through the network on a hop-by-hop basis. Traceroute continues to provide a synchronous response when initiated from the CLI.

The user may specify the source IP address or the virtual router of the traceroute probes. Recall that traceroute works by sending packets that are expected not to reach their final destination, but instead trigger ICMP error messages back to the source address from each hop along the forward path to the destination. By specifying the source address, the user can determine where along the forward path there is no route back to the source address. Note that this is only useful if the route from source to destination and destination to source is symmetric.) It would be common, for example, to send a traceroute from an edge router to a target higher in the network using a source address from a host subnet on the edge router. This would test reachability from within the network back to hosts attached to the edge router. Alternatively, one might send a traceroute with an address on a loopback interface as a source to test reachability back to the loopback interface address.

In the CLI, the user may specify the source as an IPv4 address, IPv6 address, a virtual router, or as a routing interface. When the source is specified as a routing interface, the traceroute is sent using the primary IPv4 address on the source interface. With SNMP, the source must be specified as an address. The source cannot be specified in the web UI.

FASTPATH will not accept an incoming packet, such as a traceroute response, that arrives on a routing interface if the packet's destination address is on one of the out-of-band management interfaces (service port or network port). Similarly, FASTPATH will not accept a packet that arrives on a management interface if the packet's destination is an address on a routing interface. Thus, it would be futile to send a traceroute on a management interface using a routing interface address as source, or to send a traceroute on a routing interface using a management interface as source. When sending a traceroute on a routing interface, the source must be that routing interface or another routing interface. When sending a traceroute on a management interface, the source must be on that management interface. For this reason, the user cannot specify the source as a management interface or management interface address. When sending a traceroute on a management interface, the user should not specify a source address, but instead let the system select the source address from the outgoing interface.

Default	<ul style="list-style-type: none"> count: 3 probes interval: 3 seconds size: 0 bytes port: 33434 maxTtl: 30 hops maxFail: 5 probes initTtl: 1 hop
Format	<pre>traceroute {ip-address [ipv6] {ipv6-address hostname}} [initTtl initTtl] [maxTtl maxTtl] [maxFail maxFail] [interval interval] [count count] [port port] [size size] [source {ip-address ipv6-address unit/slot/port}]</pre>
Mode	Privileged EXEC

Using the following options, you can specify the initial and maximum time-to-live (TTL) in probe packets, the maximum number of failures before termination, the number of probes sent for each TTL, and the size of each probe.

Parameter	Description
<code>ipaddressf</code>	The <code>ipaddress</code> value should be a valid IP address.
<code>ipv6-address</code>	The <code>ipv6-address</code> value should be a valid IPv6 address.
<code>hostname</code>	The <code>hostname</code> value should be a valid hostname.
<code>ipv6</code>	The optional <code>ipv6</code> keyword can be used before <code>ipv6-address</code> or <code>hostname</code> . Giving the <code>ipv6</code> keyword before the <code>hostname</code> tries it to resolve to an IPv6 address.
<code>initTtl</code>	Use <code>initTtl</code> to specify the initial time-to-live (TTL), the maximum number of router hops between the local and remote system. Range is 0 to 255.

Parameter	Description
maxTtl	Use <code>maxTtl</code> to specify the maximum TTL. Range is 1 to 255.
maxFail	Use <code>maxFail</code> to terminate the traceroute after failing to receive a response for this number of consecutive probes. Range is 0 to 255.
interval	Use the optional <code>interval</code> parameter to specify the time between probes, in seconds. If a response is not received within this interval, then traceroute considers that probe a failure (printing *) and sends the next probe. If traceroute does receive a response to a probe within this interval, then it sends the next probe immediately. Range is 1 to 60 seconds.
count	Use the optional <code>count</code> parameter to specify the number of probes to send for each TTL value. Range is 1 to 10 probes.
port	Use the optional <code>port</code> parameter to specify destination UDP port of the probe. This should be an unused port on the remote destination system. Range is 1 to 65535.
size	Use the optional <code>size</code> parameter to specify the size, in bytes, of the payload of the Echo Requests sent. Range is 0 to 65507 bytes.
source	Use the optional <code>source</code> parameter to specify the source IP address or interface for the traceroute.

The following are examples of the CLI command.

Example: traceroute Success:

```
(Routing) # traceroute 10.240.10.115 initTtl 1 maxTtl 4 maxFail 0 interval 1 count 3 port 33434 size 43
```

Traceroute to 10.240.10.115 ,4 hops max 43 byte packets:

```
1 10.240.4.1 708 ms 41 ms 11 ms
2 10.240.10.115 0 ms 0 ms 0 ms
```

Hop Count = 1 Last TTL = 2 Test attempt = 6 Test Success = 6

Example: traceroute ipv6 Success

```
(Routing) # traceroute 2001::2 initTtl 1 maxTtl 4 maxFail 0 interval 1 count 3 port 33434 size 43
```

Traceroute to 2001::2 hops max 43 byte packets:

```
1 2001::2 708 ms 41 ms 11 ms
```

The above command can also be execute with the optional `ipv6` parameter as follows:

```
(Routing) # traceroute ipv6 2001::2 initTtl 1 maxTtl 4 maxFail 0 interval 1 count 3 port 33434 size 43
```

Example: traceroute Failure:

```
(Routing) # traceroute 10.40.1.1 initTtl 1 maxFail 0 interval 1 count 3 port 33434 size 43
```

Traceroute to 10.40.1.1 ,30 hops max 43 byte packets:

```
1 10.240.4.1 19 ms 18 ms 9 ms
2 10.240.1.252 0 ms 0 ms 1 ms
3 172.31.0.9 277 ms 276 ms 277 ms
4 10.254.1.1 289 ms 327 ms 282 ms
5 10.254.21.2 287 ms 293 ms 296 ms
6 192.168.76.2 290 ms 291 ms 289 ms
7 0.0.0.0 0 ms *
```

Hop Count = 6 Last TTL = 7 Test attempt = 19 Test Success = 18

Example: traceroute ipv6 Failure

```
(Routing)# traceroute 2001::2 initTtl 1 maxFail 0 interval 1 count 3 port 33434 size 43
```

Traceroute to 2001::2 hops max 43 byte packets:

```
1 3001::1 708 ms 41 ms 11 ms
2 4001::2 250 ms 200 ms 193 ms
```

```

3  5001::3  289 ms    313 ms    278 ms
4  6001::4  651 ms     41 ms     270 ms
5           0          0 ms *
Hop Count = 4 Last TTL = 5 Test attempt = 1 Test Success = 0

```

3.8.2 clear config

This command resets the configuration to the factory defaults without powering off the switch. When you issue this command, a prompt appears to confirm that the reset should proceed. When you enter *y*, you automatically reset the current configuration on the switch to the default values. It does not reset the switch.

Format `clear config`
Mode Privileged EXEC

3.8.3 clear config interface

This command resets the configuration in the specified interface or range of interfaces to the factory defaults without powering off the switch. When you issue this command, a prompt appears to confirm that the reset should proceed. When you enter *y*, you automatically reset the current configuration on the interface or interfaces to the default values. It does not reset the switch.

The `clear config interface` command clears the configuration only for commands issued in Interface Config mode. Interface-related commands which were not issued in Interface Config mode, such as enabling routing on a VLAN interface, cannot be cleared using this command

Format `clear config interface {slot/port | lag lag_id | vlan vlan_id | loopback loopback_id}`
Mode Privileged EXEC

3.8.4 clear counters

This command clears the statistics for a specified *slot/port*, for all the ports, or for an interface on a VLAN based on the argument, including the loop protection counters. The command accepts up to 255 character length ACL names. If a virtual router is specified, the statistics for the ports on the virtual router are cleared. If no router is specified, the information for the default router will be displayed.

Format `clear counters {slot/port | all | vlan id}`
Mode Privileged EXEC

3.8.5 clear igmpsnooping

This command clears the tables managed by the IGMP Snooping function and attempts to delete these entries from the Multicast Forwarding Database.

Format `clear igmpsnooping`
Mode Privileged EXEC

3.8.6 clear ip access-list counters

This command clears the counters of the specified IP ACL and IP ACL rule. The command accepts up to 255-character length ACL names.

Format `clear ip access-list counters acl-ID | acl-name rule-id`
Mode Privileged EXEC

3.8.7 clear ipv6 access-list counters

This command clears the counters of the specified IP ACL and IP ACL rule. The command accepts up to 255-character length ACL names.

Format `clear ipv6 access-list counters acl-name rule-id`
Mode Privileged EXEC

3.8.8 clear mac access-list counters

This command clears the counters of the specified MAC ACL and MAC ACL rule. The command accepts up to 255 character length ACL names.

Format `clear mac access-list counters acl-name rule-id`
Mode Privileged EXEC

3.8.9 clear traplog

This command clears the trap log.

Format `clear traplog`
Mode Privileged EXEC

3.8.10 clear vlan

This command resets VLAN configuration parameters to the factory defaults. When the VLAN configuration is reset to the factory defaults, the following are some scenarios regarding GVRP and MVRP that happen.

1. Static VLANs are deleted.
2. GVRP is restored to the factory default as a result of handling the VLAN RESTORE NOTIFY event. Because GVRP is disabled by default, this means that GVRP should be disabled and all of its dynamic VLANs should be deleted.
3. MVRP is restored to the factory default as a result of handling the VLAN RESTORE NOTIFY event. Because MVRP is enabled by default, this means that any VLANs already created by MVRP are unaffected. However, for customer platforms where MVRP is disabled by default, then the MVRP behavior should match GVRP. That is, MVRP is disabled and the MVRP VLANs are deleted.

Format `clear vlan`
Mode Privileged EXEC

3.8.11 clear vlan stats

This command clears the supported per-VLAN statistics for the VLANs specified.

Format `clear vlan [vlan-list] stats`
Mode Privileged EXEC

Example: Clear statistics on VLAN 10.

(Switching) # `clear vlan 10 stats`

Example: Clear statistics on multiple VLANs 10, 20, and 30.

(Switching) # `clear vlan 10,20,30 stats`

Example: Clear statistics on all available VLANs.

(Switching) # `clear vlan stats`

3.8.12 logout

This command closes the current telnet connection or resets the current serial connection.

Save configuration changes before logging out.

NOTICE

- Format** `logout`
- Modes**
- Privileged EXEC
 - User EXEC

3.8.13 ping

Use this command to determine whether another computer is on the network. Ping provides a synchronous response when initiated from the CLI and Web interfaces.

- Default**
- The default count is 1.
 - The default interval is 3 seconds.
 - The default size is 0 bytes.
- Format**
- ```
ping {ip-address| hostname | {ipv6 {interface {slot/port | vlan 1-4093 |
loopback loopback-id | network | serviceport | tunnel tunnel-id } Link-Local-address} |
ip6addr | hostname} [count count] [interval 1-60] [size size] [source ip-address |
ip6addr | {slot/port | vlan 1-4093 | serviceport | network}] [outgoing-interface
{slot/port | vlan 1-4093 | serviceport | network}]
```
- Modes**
- Privileged EXEC
  - User EXEC

Using the following options, you can specify the number and size of Echo Requests and the interval between Echo Requests.

| Parameter          | Description                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| address            | IPv4 or IPv6 addresses to ping.                                                                                                                                                                                                                                                                         |
| count              | Use the <code>count</code> parameter to specify the number of ping packets (ICMP Echo requests) that are sent to the destination address specified by the <code>ip-address</code> field. The range for <code>count</code> is 1 to 15 requests.                                                          |
| size               | Use the <code>size</code> parameter to specify the size, in bytes, of the payload of the Echo Requests sent. Range is 0 to 65507 bytes.                                                                                                                                                                 |
| source             | Use the <code>source</code> parameter to specify the source IP/IPv6 address or interface to use when sending the Echo requests packets.                                                                                                                                                                 |
| hostname           | Use the <code>hostname</code> parameter to resolve to an IPv4 or IPv6 address. The <code>ipv6</code> keyword is specified to resolve the hostname to IPv6 address. The IPv4 address is resolved if no keyword is specified.                                                                             |
| ipv6               | The optional keyword <code>ipv6</code> can be used before the <code>ipv6-address</code> or <code>hostname</code> argument. Using the <code>ipv6</code> optional keyword before <code>hostname</code> tries to resolve it directly to the IPv6 address. Also used for pinging a link-local IPv6 address. |
| interface          | Use the <code>interface</code> keyword to ping a link-local IPv6 address over an interface.                                                                                                                                                                                                             |
| link-local-address | The <code>link-local</code> IPv6 address to ping over an interface.                                                                                                                                                                                                                                     |
| outgoing-interface | Use the <code>outgoing-interface</code> parameter to specify the outgoing interface for multicast IP/IPv6 ping.                                                                                                                                                                                         |

The following are examples of the CLI command.

**Example:** IPv4 ping success:

```
(Routing) #ping 10.254.2.160 count 3 interval 1 size 255
Pinging 10.254.2.160 with 255 bytes of data:
```

```
Received response for icmp_seq = 0. time = 275268 usec
Received response for icmp_seq = 1. time = 274009 usec
Received response for icmp_seq = 2. time = 279459 usec
```

```
----10.254.2.160 PING statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 274/279/276
```

**Example:** IPv6 ping success

```
(Routing) #ping 2001::1
Pinging 2001::1 with 64 bytes of data:
```

```
Send count=3, Receive count=3 from 2001::1
Average round trip time = 3.00 ms
```

**Example:** IPv4 ping failure:

#### In Case of Unreachable Destination:

```
(Routing) # ping 192.168.254.222 count 3 interval 1 size 255
Pinging 192.168.254.222 with 255 bytes of data:
Received Response: Unreachable Destination
Received Response :Unreachable Destination
Received Response :Unreachable Destination
----192.168.254.222 PING statistics----
3 packets transmitted,3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/0/0
```

#### In Case Of Request TimedOut:

```
(Routing) # ping 1.1.1.1 count 1 interval 3
Pinging 1.1.1.1 with 0 bytes of data:

----1.1.1.1 PING statistics----
1 packets transmitted,0 packets received, 100% packet loss
round-trip (ms) min/avg/max = 0/0/0
```

**Example:** IPv6 ping failure

```
(Routing) #ping ipv6 2001::4
Pinging 2001::4 with 64 bytes of data:
```

```
Send count=3, Receive count=0 from 2001::4
Average round trip time = 0.00 ms
```

### 3.8.14 quit

This command closes the current telnet connection or resets the current serial connection. The system asks you whether to save configuration changes before quitting.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| <b>Format</b> | quit                                                                                     |
| <b>Modes</b>  | <ul style="list-style-type: none"> <li>• Privileged EXEC</li> <li>• User EXEC</li> </ul> |

### 3.8.15 reload

This command resets the switch without powering it off. Reset means that all network connections are terminated and the boot code executes. The switch uses the stored configuration to initialize the switch. You are prompted to confirm that the reset should proceed. The LEDs on the switch indicate a successful reset.

**Format** reload [configuration [scriptname]]

**Mode** Privileged EXEC

| Parameter     | Description                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------------------|
| configuration | Gracefully reloads the configuration. If no configuration file is specified, the startup-config file is loaded. |
| scriptname    | The configuration file to load. The scriptname must include the extension.                                      |

### 3.8.16 dying-gasp

Use this command to allow a dying-gasp notification to be sent through Syslog or Ethernet-OAM when the switch loses power or resets abruptly. The switch reset might be due to an unexpected software failure, a LOG\_ERROR, or a user-triggered switch reload. The Dying Gasp feature also notifies dying gasp events as SNMP trap to the trap receiver

The ability to send a dying-gasp notification on loss of power depends on the platform hardware capability. The switch hardware must be able to supply back power for approximately 300 ms to send the dying gasp notification after the abrupt power loss or reset occurs.

**Format** dying-gasp primary {syslog | ethernet-oam | snmptrap} secondary { syslog | ethernet-oam | snmptrap}

**Mode** Global Config

| Parameter    | Description                       |
|--------------|-----------------------------------|
| primary      | Dying Gasp primary notification   |
| secondary    | Dying Gasp secondary notification |
| ethernet-oam | Enable Ethernet-OAM notification  |
| syslog       | Enable system logger              |
| snmptrap     | Enable SNMP trap notification     |

#### 3.8.16.1 no dying-gasp

This command disables the sending of dying gasp notifications.

**Format** no dying-gasp

**Mode** Global Config

### 3.8.17 show dying-gasp

This command displays the dying gasp configuration status.

**Format** show dying-gasp status

**Mode** Privileged EXEC

The command displays the information shown in the following table.

| Parameter                 | Description                                                                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dying Gasp Primary Mode   | Identifies the primary notification mode, which can be one of the following: <ul style="list-style-type: none"> <li>• Syslog</li> <li>• Ethernet-OAM</li> <li>• SnmpTrap</li> </ul>   |
| Dying Gasp Secondary Mode | Identifies the secondary notification mode, which can be one of the following: <ul style="list-style-type: none"> <li>• Syslog</li> <li>• Ethernet-OAM</li> <li>• SnmpTrap</li> </ul> |

### 3.8.18 copy

The `copy` command uploads and downloads files to and from the switch. You can also use the `copy` command to manage the dual images (active and backup) on the file system. Upload and download files from a server using FTP, TFTP, Xmodem, Ymodem, and Zmodem. If FTP is used, a password is required.

SFTP and SCP are available as additional transfer methods if the software package supports secure management. CLI-based file transfers using the HTTP and HTTPS protocols are supported on selected platforms where a native `wget` utility is available.

**Format** `copy source destination [source option] [{verify | noverify}][checkcert | nocheckcert]`

**Mode** Privileged EXEC

Replace the `source` and `destination` parameters with the options in Table 9, "Copy Parameters," on page 198. For the `url` source or destination, use one of the following values:

```
{xmodem | tftp://ipaddr|hostname|ipv6address|hostname/filepath/filename [noal] | sftp|scp://
username@ipaddr | ipv6address/filepath/filename | ftp://user@ipaddress | hostname/filepath/filename
| http://{user@}ipaddr|hostname/filepath/filename | https://{user@}ipaddr|hostname/filepath/
filename}
```

The optional `source option` parameters specify the source-interface or source IP address for the `copy` command. The selected source-interface IP address is to be used for filling the IP header of management protocol packets (SCP, SFTP and TFTP). This allows security devices (firewalls) to identify the source packets coming from the specific switch. If a source-interface is not specified, the primary IP address of the originating (outbound) interface is used as source address. When the user selects the source interface for SCP, SFTP, TFTP applications, it (re)binds the interface source IP address with the server. The source interface is not supported for HTTP/HTTPS protocols.

The `verify | noverify` options are only available if the image/configuration verify options feature is enabled (see the `file verify` command). `verify` specifies that digital signature verification will be performed for the specified downloaded image or configuration file. `noverify` specifies that no verification will be performed.

For HTTPS transfers, the `[checkcert | nocheckcert]` options are available to enable or disable server certificate validation. This option is valid only for HTTPS file transfer. If no option is specified, default action is applied for HTTPS file transfer.

The keyword `ias-users` supports the downloading of the IAS user database file. When the IAS users file is downloaded, the switch IAS user's database is replaced with the users and its attributes available in the downloaded file. In the command `copy url ias-users`, for `url` one of the following is used for IAS users file:

```
{ { tftp://<ipaddr | hostname> | <ipv6address | hostname> /<filepath>/<filename> } | { sftp | scp:/
/<username>@<ipaddress>/<filepath>/<filename> } }
```

#### NOTICE

The maximum length for the file path is 160 characters, and the maximum length for the file name is 31 characters.

For FTP, TFTP, SFTP, and SCP, the `ipaddr|hostname` parameter is the IP address or host name of the server, `filepath` is the path to the file, and `filename` is the name of the file you want to upload or download. For SFTP and SCP, the `username` parameter is the username for logging into the remote server using SSH.

`ip6address` is also a valid parameter for routing packages that support IPv6.

## NOTICE

For platforms that include stacking, use the optional `[unit unit id]` parameter (when available) to specify the stack member to use as the source for the item to copy. If no unit is specified, the item is copied from the stack manager.

To copy OpenFlow SSL certificates to the switch using TFTP or XMODEM, using only the following options pertinent to the OpenFlow SSL certificates.

**Format**            `copy [<mode/file>] nvram:{openflow-ssl-ca-cert | openflow-ssl-cert | openflow-ssl-priv-key}`

**Mode**             Privileged EXEC

## CAUTION

Remember to upload the existing `fastpath.cfg` file off the switch prior to loading a new release.

Table 9: Copy Parameters

| Source                                               | Destination                              | Description                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>nvram:application:sourcefilename</code>        | <code>url</code>                         | Filename of source application file.                                                                                                                                                                                                                                                                      |
| <code>nvram:backup-config</code>                     | <code>nvram:startup-config</code>        | Copies the backup configuration to the startup configuration.                                                                                                                                                                                                                                             |
| <code>nvram:clibanner</code>                         | <code>url</code>                         | Copies the CLI banner to a server.                                                                                                                                                                                                                                                                        |
| <code>nvram:cpupktcapture.pcap [unit unit id]</code> | <code>url</code>                         | Uploads CPU packets capture file.                                                                                                                                                                                                                                                                         |
| <code>nvram:crash-log</code>                         | <code>url</code>                         | Copies the crash log to a server.                                                                                                                                                                                                                                                                         |
| <code>nvram:errorlog</code>                          | <code>url</code>                         | Copies the error log file to a server.                                                                                                                                                                                                                                                                    |
| <code>nvram:factory-defaults</code>                  | <code>url</code>                         | Uploads factory defaults file.                                                                                                                                                                                                                                                                            |
| <code>nvram:log</code>                               | <code>url</code>                         | Copies the log file to a server.                                                                                                                                                                                                                                                                          |
| <code>nvram:file &lt;src-file&gt;</code>             | <code>url</code>                         | This command copies (uploads) a specified source file <code>&lt;srcfile&gt;</code> to a specified URL. The specified filename can be a relative name related to the configuration directory or an absolute filename.                                                                                      |
| <code>nvram:file &lt;src-file&gt;</code>             | <code>nvram:startup-config</code>        | This command copies a specified source file <code>&lt;src-file&gt;</code> as the current configuration. The specified destination filename can be a relative name related to the configuration directory or an absolute filename. The configuration will become active only after a reboot of the system. |
| <code>nvram:file &lt;src-file&gt;</code>             | <code>nvram:file &lt;destfile&gt;</code> | This command copies a specified source file <code>&lt;src-file&gt;</code> to a specified destination file <code>&lt;destfile&gt;</code> . The specified source and destination filename can be a relative name related to the configuration directory or an absolute filename.                            |
| <code>nvram:startup-config</code>                    | <code>nvram:file &lt;destfile&gt;</code> | This command copies the permanent startup configuration file <code>/mnt/fastpath/startup-config</code> to a specified destination <code>&lt;destfile&gt;</code> . The specified destination filename can be a relative name related to the configuration directory or an absolute filename.               |

Table 9: Copy Parameters (Continued)

| Source                                            | Destination                                 | Description                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>nvrām:all-config</code>                     | <code>url</code>                            | Uploads all relevant config files to a server. Contains a collection of different configuration files. This file is a "tar.gz" file and is generated with all files in the directories "/mnt/fastpath" and "/mnt/os" and important bootloader settings.                                                                   |
| <code>nvrām:oslog</code>                          | <code>url</code>                            | Copies the OS system log file to a server                                                                                                                                                                                                                                                                                 |
| <code>nvrām:operational-log [unit unit id]</code> | <code>url</code>                            | Copies the operational log file to a server.                                                                                                                                                                                                                                                                              |
| <code>nvrām:script scriptname</code>              | <code>url</code>                            | Copies a specified configuration script file to a server.                                                                                                                                                                                                                                                                 |
| <code>nvrām:startup-config</code>                 | <code>nvrām:backup-config</code>            | Copies the startup configuration to the backup configuration.                                                                                                                                                                                                                                                             |
| <code>nvrām:startup-config</code>                 | <code>url</code>                            | Copies the startup configuration to a server.                                                                                                                                                                                                                                                                             |
| <code>nvrām:startup-log [unit unit id]</code>     | <code>url</code>                            | Uploads the startup log file.                                                                                                                                                                                                                                                                                             |
| <code>nvrām:tech-support [unit unit id]</code>    | <code>url</code>                            | Uploads the system and configuration information for technical support.                                                                                                                                                                                                                                                   |
| <code>nvrām:traplog</code>                        | <code>url</code>                            | Copies the trap log file to a server.                                                                                                                                                                                                                                                                                     |
| <code>system:running-config</code>                | <code>url</code>                            | Accepts the url for upload operation.<br>Uploads running-config using {xmodem   ymodem   zmodem  <br>tftp://<ipaddress hostname>/<filepath>/<filename> <br>ftp://<user>@<ipaddr hostname>/<path>/<filename>  <br>scp://<user>@<ipaddr hostname>/<path>/<filename>  <br>sftp://<user>@<ipaddr hostname>/<path>/<filename>} |
| <code>system:running-config</code>                | <code>nvrām:startup-config</code>           | Saves the running configuration to NVRAM.                                                                                                                                                                                                                                                                                 |
| <code>system:running-config</code>                | <code>nvrām:factory-defaults</code>         | Saves the running configuration to NVRAM to the factory-defaults file.                                                                                                                                                                                                                                                    |
| <code>nvrām:startup-config</code>                 | <code>nvrām:file &lt;filename&gt;</code>    | This command copies the permanent startup configuration file /mnt/fastpath/startup-config to a specified destination <filename>. The specified destination filename can be a relative name related to the configuration directory or an absolute filename                                                                 |
| <code>url</code>                                  | <code>nvrām:application destfilename</code> | Destination file name for the application file.                                                                                                                                                                                                                                                                           |
| <code>url</code>                                  | <code>nvrām:ca-root index</code>            | Downloads the CA certificate file to the /mnt/fastpath directory and uses the index number name the downloaded file to CAindex.pem.                                                                                                                                                                                       |
| <code>url</code>                                  | <code>nvrām:ca-root-certs</code>            | Downloads root CA certificate files to the /mnt/fastpath/root-certificates directory. The root CA certificates can be used by the native wget utility for HTTPS server certificate validation during the file download operation using HTTPS from the copy command.                                                       |
| <code>url</code>                                  | <code>nvrām:clibanner</code>                | Downloads the CLI banner to the system.                                                                                                                                                                                                                                                                                   |
| <code>url</code>                                  | <code>nvrām:client-key index</code>         | Downloads the client key file to the /mnt/fastpath directory and uses the index number name the downloaded file to CAindex.key.                                                                                                                                                                                           |

Table 9: Copy Parameters (Continued)

| Source     | Destination                                      | Description                                                                                                                                                                                                                                                                                                   |
|------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>url</i> | <code>nvrām:client-ssl-cert 1-8</code>           | Downloads the client certificate to the <code>/mnt/fast-path</code> directory and uses the index number to name the downloaded file to <code>CAindex.pem</code> .                                                                                                                                             |
| <i>url</i> | <code>nvrām:publickey-config</code>              | Downloads the Public Key for Configuration Script validation.                                                                                                                                                                                                                                                 |
| <i>url</i> | <code>nvrām:publickey-image</code>               | Downloads Public Key for Image validation.                                                                                                                                                                                                                                                                    |
| <i>url</i> | <code>nvrām:script<br/>destfilename</code>       | Downloads a configuration script file to the system. During the download of a configuration script, the <code>copy</code> command validates the script. In case of any error, the command lists all the lines at the end of the validation process and prompts you to confirm before copying the script file. |
| <i>url</i> | <code>nvrām:script<br/>destfilename noval</code> | When you use this option, the <code>copy</code> command will not validate the downloaded script file. An example of the CLI command follows:<br>(Routing) <code>#copy tftp://1.1.1.1/file.scr<br/>nvrām:script file.scr noval</code>                                                                          |
| <i>url</i> | <code>nvrām:sshkey-dsa</code>                    | Downloads an SSH key file. For more information, see .                                                                                                                                                                                                                                                        |
| <i>url</i> | <code>nvrām:sshkey-rsa1</code>                   | Downloads an SSH key file.                                                                                                                                                                                                                                                                                    |
| <i>url</i> | <code>nvrām:sshkey-rsa2</code>                   | Downloads an SSH key file.                                                                                                                                                                                                                                                                                    |
| <i>url</i> | <code>nvrām:sslpem-dhweak</code>                 | Downloads an HTTP secure-server certificate.                                                                                                                                                                                                                                                                  |
| <i>url</i> | <code>nvrām:sslpem-dhstrong</code>               | Downloads an HTTP secure-server certificate.                                                                                                                                                                                                                                                                  |
| <i>url</i> | <code>nvrām:sslpem-root</code>                   | Downloads an HTTP secure-server certificate. For more information, see .                                                                                                                                                                                                                                      |
| <i>url</i> | <code>nvrām:sslpem-server</code>                 | Downloads an HTTP secure-server certificate.                                                                                                                                                                                                                                                                  |
| <i>url</i> | <code>nvrām:startup-config</code>                | Downloads the startup configuration file to the system.                                                                                                                                                                                                                                                       |
| <i>url</i> | <code>ias-users</code>                           | Downloads an IAS users database file to the system. When the IAS users file is downloaded, the switch IAS user's database is replaced with the users and their attributes available in the downloaded file.                                                                                                   |
| <i>url</i> | <code>nvrām:file &lt;filename&gt;</code>         | This command copies (downloads) a file from a specified URL to a specified destination <code>&lt;filename&gt;</code> . The specified destination filename can be a relative name related to the configuration directory or an absolute filename.                                                              |
| <i>url</i> | <code>nvrām:all-config</code>                    | Downloads all relevant config files.                                                                                                                                                                                                                                                                          |
| <i>url</i> | <code>nvrām:oem-data</code>                      | Downloads and updates OEM data.                                                                                                                                                                                                                                                                               |
| <i>url</i> | <code>ipmi</code>                                | Downloads and updates IPMI (HPM) firmware.                                                                                                                                                                                                                                                                    |
| <i>url</i> | <code>nvrām:tech-support-cmds</code>             | Downloads the file containing list of commands to be displayed using the <code>show tech-support</code> command.                                                                                                                                                                                              |
| <i>url</i> | <code>{image1   image2}</code>                   | Download an image from the remote server to either image. In a stacking environment, the downloaded image is distributed to the stack nodes.                                                                                                                                                                  |



**Example:** The following shows an example of downloading and applying the ias users file.

```
(Routing) #copy tftp://10.131.17.104/aaa_users.txt ias-users
```

```
Mode..... TFTP
Set Server IP..... 10.131.17.104
Path..... ./
Filename..... aaa_users.txt
Data Type..... IAS Users
```

```
Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y
```

File transfer operation completed successfully.

Validating and updating the users to the IAS users database.

Updated IAS users database successfully.

```
(Routing) #
```

**Example:** The following shows an example of the command to copy running config to a remote system URL for upload operation.

```
(Routing) #copy system:running-config tftp://10.89.105.143/run-cfg
```

```
Mode..... TFTP
Set Server IP..... 10.89.105.143
Path..... ./
Filename..... run-cfg
Data Type..... Text Configuration
Source Filename..... running-config
```

```
Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y
```

File transfer in progress. Management access will be blocked for the duration of the transfer. Please wait...

File transfer operation completed successfully.

```
(Routing)#
```

### 3.8.19 copy (SSL Diffie Hellman)

The copy command supports downloading SSL Diffie Hellman 1024 and 2048 pem filetypes (dh2048). The downloaded pem files are stored in the /mnt/fastpath/ folder.

**Format**            copy sourceURL destinationURL

**Mode**             Privileged EXEC

The source and destination parameters are shown in the following table.

| Source         | Destination      |
|----------------|------------------|
| sourceURL      | {<download url>} |
| destinationURL | {<upload url>}   |

**Example:** The following are examples of the CLI command.

```
copy scp://user@< ipaddr|hostname >/<path>/<filename> nvram:sslpem-dh2048
copy scp://admin@10.85.234.2/home/sk019490/dh2048.pem nvram:sslpem-dh2048
copy scp://user@< ipaddr|hostname >/<path>/<filename> nvram:sslpem-dh1024
copy scp://admin@10.85.234.2/home/sk019490/dh2048.pem nvram:sslpem-dh1024
```

### 3.8.20 file verify

This command enables digital signature verification while an image and/or configuration file is downloaded to the switch.

---

This command is available only when the image/configuration verify options feature is enabled.

---

#### NOTICE

**Default** none  
**Format** file verify {all | image | none | config}  
**Mode** Global Config

| Parameter | Description                                                                      |
|-----------|----------------------------------------------------------------------------------|
| All       | Verifies the digital signature of both image and configuration files.            |
| Image     | Verifies the digital signature of image files only.                              |
| None      | Disables digital signature verification for both images and configuration files. |
| Config    | Verifies the digital signature of configuration files.                           |

#### 3.8.20.1 no file verify

Resets the configured digital signature verification value to the factory default value.

**Format** no file verify  
**Mode** Global Config

### 3.8.21 image verify

Use this command to validate an image file. The [file verify](#) command validates an image during download, whereas the `image verify xxx` command validates images in active and backup partitions. A digest of the image being validated is calculated and compared with a digest from the digital signature that was extracted (during download) of the same image. A match indicates a valid image.

**Format** image verify {active|backup}  
**Mode** Privileged EXEC

| Parameter | Description                                             |
|-----------|---------------------------------------------------------|
| active    | Specifies an active image file that needs verification. |
| backup    | Specifies an backup image file that needs verification. |

### 3.8.22 ip scp server enable

This command enables SCP server functionality for SCP push operations on the FASTPATH switch, which allows files to be transferred from the host device to the switch using the SCP protocol. During an SCP file transfer operation, the management operations on the switch are blocked. After the completion of file download to the FASTPATH switch, the switch performs file validations similar to other download operations executed using the `copy` command.

To allow the SCP file transfers from the host system to the FASTPATH switch, the SCP server must be enabled on the switch.

**Default** Disabled  
**Format** ip scp server enable  
**Mode** Privileged EXEC

The transfer is initiated using the CLI on the host system, and not from the FASTPATH CLI. The following examples show the syntax for SCP push commands executed on a PC host for configuration and firmware images.

- `scp <config file> user@<scp server IP>:startup-config`
- `scp <config file> user@<scp server IP>:backup-config`
- `scp <config file> user@<scp server IP>:factory-defaults`
- `scp <config file> user@<scp server IP>:<scriptfile.scr>`
- `scp <image file> user@<scp server IP>:active`
- `scp <image file> user@<scp server IP>:backup`

### 3.8.22.1 no ip scp server enable

This command resets the SCP server functionality for SCP push operations on the FASTPATH switch to the default value (disabled).

**Format**            `no ip scp server enable`  
**Mode**             Privileged EXEC

### 3.8.23 write memory

Use this command to save running configuration changes to NVRAM so that the changes you make will persist across a reboot. This command is the same as `copy system:running-config nvram:startup-config`. Use the `confirm` keyword to directly save the configuration to NVRAM without prompting for a confirmation.

**Format**            `write memory [confirm]`  
**Mode**             Privileged EXEC

### 3.8.24 set bootstopkey

This command enables/disables the bootstop key. With this key the booting process can be stopped. Additionally with parameter 'keyname' a new key name can be selected. The key will be stored in the bootloader environment as hash value.

The information is stored in the bootloader environment in "bootstopkeysha256" and "bootdelay" (enabled > 0, disabled = 0).

Because the information is stored in the bootloader, there is no "show" CLI command provided and the command is not stored in "running-config".

**Default**           Enabled with key name = "stop" and boot delay = 3  
**Format**            `set bootstopkey [keyname <name>]`  
**Mode**             Privileged EXEC  
**Access**            High Privileged User only

#### 3.8.24.1 no set bootstopkey

This command resets the bootstop key. The boot process can not be interrupted.

**Format**            `no set bootstopkey`  
**Mode**             Privileged EXEC

### 3.8.25 set board root-password

This command changes the current LINUX root password. The user will be asked by a prompt to specify the password and to reconfirm it a second time. An empty password can be specified by simply type <CR>. Then any password may be specified for the login. The factory password can be reconfigured (parameter 'factory').

**Format**            **set board root-password [factory]**

**Mode**             Privileged EXEC

### 3.8.26    **show board port-map descr**

The command displays the description for all physical ports related to the currently selected port-map.

**Format**            **show board port-map descr**

**Mode**             Privileged EXEC

### 3.8.27    **show board address**

This command displays the global address info of the board.

**Format**            **show board address**

**Mode**             Privileged EXEC

### 3.8.28    **show board cpu-load**

This command displays the CPU load. It shows the total time, the user time, the system time and the idle time in current interval, 30 seconds interval and 5 minutes interval. All times are reported in percent.

**Format**            **show board cpu-load**

**Mode**             Privileged EXEC

### 3.8.29    **show board memory-usage**

This command displays the Memory Usage. It shows malloc and kernel statistics.

**Format**            **show board memory-usage**

**Mode**             Privileged EXEC

### 3.8.30    **show board post-status**

This command displays the power on self test status of the board. It checks the status of the system selftest and the IPMC selftest.

**Format**            **show board post-status [system | ipmi]**

**Mode**             Privileged EXEC

### 3.8.31    **show board license**

This command displays the license information. It exists an overview information, indicating the used software with their licenses, and a textual information, indicating all relevant license texts. Note that the textual information is very voluminous. You may select the <overview> or the <text> information or (without an argument) both.

**Format**            **show board license [overview | text]**

**Mode**             Privileged EXEC

### 3.8.32 show board version

This command displays hardware and software revision information. This includes serial-numbers, software and hardware revisions as applicable.

**Format**            **show board version [hardware | product | release | fru | rtm | all]**

**Mode**             • Privileged EXEC  
                     • User exec

Product Information („**show board version**“/ „**show boards version product**“)

- System description
- Product: name, serial number, part number and manufacturer
- Board: name, serial number, part number and manufacturer
- FASTPATH version

Hardware Information („**show boards version hardware**“)

- Broadcom silicon
- Processor CPU type
- Processor clock
- Jumper settings (optional)
- DIP switch (optional)
- PCB revision (optional)
- LEDuP version (optional)

Updatable firmware components („**show boards version release**“)

- System (FASTPATH) release
- IPMC release
- ... more information , reported by Linux

FRU Information („**show boards version FRU**“)

- Product: name, serial number, part number
- Board: name, serial number, part number

RTM Information („**show boards version rtm**“)

- board specific information related to RTM

.Using the command "show board version all", all information is displayed.

### 3.8.33 clear board event-log

This command deletes all event-log records.

**Format**            **clear board event-log**

**Mode**             Privileged EXEC

### 3.8.34 show logging errcounter

This command displays the trace of the error counters.

**Format**            **show logging errcounter**

**Mode**             Privileged EXEC

### 3.8.35 clear errcounter

This command clears the error counters trace.

**Format**            `clear errcounter`

**Mode**             Privileged EXEC

### 3.8.36 show logging backtrace

This command displays the backtrace file last created. A backtrace file is created when the application stops unexpectedly.

**Format**            `show logging backtrace`

**Mode**             Privileged EXEC

### 3.8.37 set board sensor threshold

This command sets a new threshold value for a sensor. The 'sensor-number' for a specific sensor is described (and displayed) in the "show" command. The value type is 'float'.

The command sets the minimal or maximal threshold.

Note, that if a maximal hysteresis is supported by the sensor and the maximal threshold value is set, then the hysteresis value is set with the same amount the new value is incremented/decremented.

**Format**            `set board sensor threshold <sensor-number> [minimal | maximal] <value>`

**Mode**             Privileged EXEC

#### 3.8.37.1 no set board sensor threshold

With the 'no' command, the default value is set.

**Format**            `no set board sensor threshold <sensor-number> [minimal | maximal]`

**Mode**             Privileged EXEC

### 3.8.38 show board sensors

This command displays the current sensor readings.

Different sensors may be available (related to specified macro):

- <ID>=1: IPMI sensors (handling via IPMI)
- <ID>=2: Internal chip sensors (handling internally)
- <ID>=3: Internal PHY sensors
- <ID>=4: ISFP/QSFP sensors

With parameter 'all' a common list of all sensors is displayed. Fields are ID, sensor name, current value, unit and status (ok, not-healthy, n/a or failed if not readable). The ID consist of a unit number (only for stacking), a slot identifier and an internal sensor number (for IPMI sensors the record-ID of the SDR, for all other types an incremented number) delimited by a '/' character. The slot identifier is an incremented number for all existing sensor types listed above.

With parameter 'slot' slot related information is displayed. Without argument a list of available slots and the related type of the source (IPMI, Board, chip, ...) is displayed. If a '<slot-number>' or related slot token is specified a list of all sensors related to this slot is displayed. The fields are the same as for 'all' parameter (see above).

With specifying an <id> (see above) detailed infos for this sensor related to the source are indicated. This includes the threshold settings if supported by the sensor type.

**Format**            `show board[info] sensors {all | <ID>}`  
 `show board[info] sensors slot [<slot-number> | {ipmi|chip|phy|sfp}]`

**Mode**             Privileged EXEC

### 3.8.39 set board user-timer

This command sets a user-timer in seconds. If this timer expires a reset of the system is executed.

An example for usage is to set this timer before a configuration and stop it at the end. This effects that a board, not longer accessible because of a incorrect configuration, is automatically reset after a time.

The value range is not indicated here because it may be board dependent. The 'help' for the command indicates the correct range.

**Format**            **set board user-timer <1..n>**

**Mode**             Priviledged EXEC

#### 3.8.39.1 no set board user-timer

The 'no' command stops the timer.

**Format**            **no set board user-timer**

**Mode**             Priviledged EXEC

### 3.8.40 set board event-log system-time

This command synchronize the IPMI SEL timestamp to the LINUX time.

**Format**            **set board event-log system-time**

**Mode**             Priviledged EXEC

### 3.8.41 set board port-map

The command selects a specific port-map. It is used for boards where more than one port configuration is available related e.g. the chassis or the RTM the board is used. Various port configurations are pre-defined and can be selected via a number or a name (related to FASTPATH version). The number '0' is used to load the default port-map,

Note, that you have to save the specified configuration and reboot the system if the new configuration should become active!

Note, that the FRU data must consistent to the selected port-map!

**Format**            **set board port-map <name>**

**Mode**             Priviledged EXEC

#### 3.8.41.1 no set board port-map

The "no" command is used to specify the default configuration.

**Format**            **no set board port-map**

**Mode**             Priviledged EXEC

## 3.9 File Integrity Commands

The file integrity feature checks that specified files are not modified. Therefore a hash value is provided for the files. For the hash value the SHA256 algorithm is used.

The following procedures are provided:

- Files can be added and deleted to/from an internal file list. The files are stored with a hash value over their content. For the hash value the SHA256 algorithm is used.
- The specified files can be monitored. If the check detects that stored and calculated hash value are different, a trap is generated and a related log message (with severity 'notice' as for all traps) is sent.
- You may also handle this list in your application. A command is provided to get the current hash of a file.
- The specified files are checked automatically at startup and can be checked later manually too. For mismatch a trap/log message is generated (as for monitoring above).

- Additionally to specified files also the running configuration can be checked for integrity. The handling is as described above for files. For the hash value calculation comments and empty lines are skipped.

Note that a "clear config" does not delete the stored hash file list.

### 3.9.1 set hash nvram:file

This command stores a file in the list of controlled files. The file and the calculated hash are stored in an internal file. This list of controlled files can be checked automatically (temporarily) or manually (show command).

**Format** set hash nvram:file <filename>

**Mode** Privileged Exec

#### 3.9.1.1 no set hash nvram:file <filename>

This command deletes a file in the list of controlled files.

**Format** o set hash nvram:file <filename>

**Mode** Privileged Exec

### 3.9.2 set hash files check

This command enables a periodical check of the integrity of all files and/or running configuration in the list of controlled files. The interval must be specified in seconds (1..86400). In case of incorrect hash a log message (with severity=notice as for all traps) is generated and a SNMP trap is generated.

**Format** set hash files check <interval>

**Mode** Privileged Exec

#### 3.9.2.1 no set hash files check

This command disables the periodical check of the integrity of all files in the list of controlled files.

**Format** no set hash files check

**Mode** Privileged Exec

### 3.9.3 set hash running-config

This command enables the control of the running configuration. An internal identifier and the calculated hash are stored in an internal file.

**Format** set hash running-config

**Mode** Privileged Exec

#### 3.9.3.1 no set hash running-config

This command disables the control of the running configuration.

**Format** no set hash running-config

**Mode** Privileged Exec

### 3.9.4 show hash running-config

This command displays or checks the hash value of the running configuration. If a hash value is specified, this value is compared with the calculated one and the result is displayed, otherwise the hash value of the running configuration is displayed. The hash value must be specified as a string containing hexadecimal digits.



**Format**            `show hash running-config <hash>`

**Mode**             Privileged Exec

### 3.9.5        `show hash files check`

This command checks the integrity of all files and/or running configuration in the controlled file list and displays the files with the result.

**Format**            `show hash files check`

**Mode**             Privileged Exec

### 3.9.6        `show hash nvram:file`

This command displays or checks the hash of a file. If a hash is specified, this sum is compared with the calculated one and the result is displayed, otherwise the hash of the file is displayed. The hash must be specified as string containing hexadecimal digits.

**Format**            `show hash nvram:file <filename> [<hash>]`

**Mode**             Privileged Exec

## 3.10 SFP handling Commands

A new transceiver handling is implemented. The transceiver present state is periodically polled and if changed the transceiver is enabled or disabled. If the transceiver present state has changed a SNMP trap (and logging message) is generated.

The feature transceiver auto-isolate disables a transceiver port as long as no transceiver is present.

The feature transceiver auto-config reads the ethernet compliance in the EEPROM. If existing and applicable the transceiver is configured related to the Ethernet protocol and then enabled, otherwise the transceiver keeps disabled. Both features can be overridden and the transceiver is then enabled even it is not present (auto-isolate) or the mode is not applicable (auto-config).

### 3.10.1       `sfp auto-isolate`

This command is deprecated, see "transceiver auto-isolate".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

### 3.10.2       `transceiver auto-isolate`

This command enables the feature auto-isolate.

**Default**            enabled

**Format**            `transceiver auto-isolate`

**Mode**             Interface Config

#### 3.10.2.1     `no sfp auto-isolate`

This command is deprecated, see "no transceiver auto-isolate".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

#### 3.10.2.2     `no transceiver auto-isolate`

This command disables the feature auto-isolate. If the feature is disabled a port is enabled although no transceiver is present.

**Format**            `no transceiver auto-isolate`

**Mode**             Interface Config

### 3.10.3 sfp auto-configure

This command is deprecated, see "transceiver auto-configure".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

### 3.10.4 transceiver auto-configure

This command enables the feature auto-configure.

**Format**            **transceiver auto-configure**

**Mode**             Interface Config

#### 3.10.4.1 no sfp auto-configure

This command is deprecated, see "no transceiver auto-configure".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

#### 3.10.4.2 no transceiver auto-configure

This command disables the feature auto-configure. If the feature is disabled a port is enabled although the ethernet compliance mode is not applicable.

**Format**            **no transceiver auto-configure**

**Mode**             Interface Config

### 3.10.5 sfp protocol

This command is deprecated, see "transceiver protocol".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

### 3.10.6 transceiver protocol

This command applies the specified ethernet <protocol> for the transceiver. It overrides the protocol read from the EEPROM of the transceiver and provides the possibility to set an ethernet protocol manually if no valid ethernet compatibility code is indicated in the EEPROM. The port-state is administratively enabled, if a valid protocol is set.

Following protocols <protocol> are available:

| Speed      | Protocol Options                                                                                                    |
|------------|---------------------------------------------------------------------------------------------------------------------|
| Speed 100  | 100BASE-FX, 100BASE-LX                                                                                              |
| Speed 1000 | 1000BASE-CX, 1000BASE-LX, 1000BASE-SX, 1000BASE-T                                                                   |
| Speed 2,5G | 2500BASE-T, 2500BASE-X                                                                                              |
| Speed 5G   | 5GBASE-T                                                                                                            |
| Speed 10G  | 10GBASE-CR, 10GBASE-ER, 10GBASE-KR, 10GBASE-LR, 10GBASE-LRM, 10GBASE-SR, 10GBASE-T, 10GBASE-ACTIVE, 10GBASE-PASSIVE |
| Speed 25G  | 25GBASE-CR, 25GBASE-ER, 25GBASE-LR, 25GBASE-SR                                                                      |
| Speed 40G  | 40GBASE-CR4, 40GBASE-ER4, 40GBASE-LR4, 40GBASE-SR4                                                                  |
| Speed 50G  | 50GBASE-CR, 50GBASE-CR2, 50GBASE-ER2, 50GBASE-FR, 50GBASE-LR, 50GBASE-LR2, 50GBASE-SR, 50GBASE-SR2                  |
| Speed 100G | 100GBASE-CR4, 100GBASE-ER4, 100GBASE-LR4, 100GBASE-SR4, 100GBASE-DR                                                 |
| Adapter    | CVR-QSFP-SFP1G                                                                                                      |

Note that the supported protocols depend on the interface.

**Format**            **transceiver protocol <protocol>**

**Mode**             Interface Config

### 3.10.6.1 no sfp protocol

This command is deprecated, see "no transceiver protocol".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

### 3.10.6.2 no transceiver protocol

This command disables the SFP.

**Format**            **no transceiver protocol**

**Mode**             Interface Config

### 3.10.7 sfp override-los

This command is deprecated, see "transceiver override-los".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

### 3.10.8 transceiver override-los

This command overrides the Loss-of-Signal status of a SFP/SFP+/QSFP. If overridden no Loss-of-Signal is indicated to the driver.

**Format**            **transceiver override-los**

**Mode**             Interface Config

#### 3.10.8.1 no sfp override-los

This command is deprecated, see "no transceiver override-los".

Note that if using this "sfp" command in "running-config" the "transceiver" command is indicated.

#### 3.10.8.2 no transceiver override-los

This command disables override-LOS settings

**Format**            **no transceiver override-los**

**Mode**             Interface Config

### 3.10.9 snmp-server enable traps sfp

This command enables the sending of a trap if the SFP present status has changed.

The command 'snmp-server enable traps' is a standard FASTPATH command, the parameter 'sfp' has been added by Kontron. The 'show trapflags' command is the standard FASTPATH command to show the trap settings, the SFP trap indication has been added by Kontron.

**Default**            enabled

**Format**            **snmp-server enable traps sfp**

**Mode**             Global Config

### 3.10.10 no snmp-server enable traps sfp

This command disables the sending of a trap if the SFP present status has changed.

The command 'snmp-server enable traps' is a standard FASTPATH command, the parameter 'sfp' has been added by Kontron. The 'show trapflags' command is the standard FASTPATH command to show the trap settings, the SFP trap indication has been added by Kontron.

**Format**            **no snmp-server enable traps sfp**

**Mode**             Global Config

### 3.10.11 show sfp

This command is deprecated, see "show interfaces transceiver". The parameters for both commands are the same

### 3.10.12 show interfaces transceiver

This command displays information for a specified (<slot/port>), all existing ("all") or all present ("present") SFP ports.

For "all" or "present" ports a table with following information is indicated:

- interface (<slot/port>)
- port-map type of pluggable transceiver (SFP/SFP+/QSFP/FFLY)
- present state (Yes/No)
- administrative port status (Enable/Disable)
- link status (Up/Down)
- auto-isolate mode (Enable/Disable)
- auto-configure mode (Enable/Disable/Force)
- "Force" is indicated if an ethernet protocol is configured manually.
- type of pluggable transceiver, read in EEPROM data (empty if transceiver is not present/EEPROM not readable) (only if auto-configure mode is enabled)
- ethernet protocol, read in EEPROM data. "Unknown" if transceiver is not present or EEPROM not readable or auto-configure mode is disabled.

For a specified interface (without parameters) two further fields are indicated additional to the above information:

- loss-of-signal (Yes/No/Overridden). The status "Overridden" indicates, that the LOS status has been administratively overridden.
- Transmitter Fault (Yes/No)

If the parameter "detail" is specified, the EEPROM data is indicated in a readable and analysed format or (with parameter "raw") as hexadecimal bytes. The analysed format contains for SFP/SFP+ the basic and diagnostic page (if existing), for QSFP page 0 and page 3 (if existing) and for Firefly QSFP page 0, page 3 and page 11. For the "raw" command for QSFP only page 0 is indicated. With the additional parameter "page" other pages can be indicated as "raw" data. This parameter is only applicable for QSFPs.

**Format**            **show interfaces transceiver slot/port {detail [raw [page <page>]]}**  
**show interfaces transceiver {all | present**

**Mode**             Privileged EXEC

### 3.10.13 hardware profile portmode copper-sfp

This command configures the specified interfaces for a copper-SFP (SGMII mode). It is applicable only to interfaces connected to a 1G SFP that support both 1000BASE-X and 1000BASE-T operations. If enabled, it will operate the MAC in SGMII mode and will switch the externally plugged SFP into SGMII mode using the SFP integrated I2C interface.

As operating a SFP in SGMII mode is not standardized, this will work only with a selected number of SFP modules that support the needed, proprietary command set.

---

This command will only take effect after a restart of the switch.

#### **NOTICE**

---

When a non-compatible SFP is inserted, the interface will not work correctly. Other Copper SFP modules may work, but this depends on the internal architecture and actual PHY used within the module.

The mode is indicated in the standard FASTPATH command 'show port'.

**Format**            **hardware profile portmode copper-sfp**

**Mode**             Interface Config

### 3.10.13.1 no hardware profile portmode copper-sfp

This command disables the specified interfaces as a copper-SFP (SGMII mode9).

**Format**            **no hardware profile portmode copper-sfp**  
**Mode**             Interface Config

### 3.10.14 hardware profile portmode expand

This command is used to configure expandable ports (e.g. set either 1x40G or 4x10G). An expandable port consists of 4 interfaces defined in the port-map. The configuration must be done on the first interface in the group. If the port is set 'expandable' ("no"-command) the first port is configured (e.g. to 40G), the 3 following ports are set to detached (not valid). If the port is set 'expanded' (parameter "expand") all 4 ports are configured (e.g. to 10G).

The default setting is 'expandable' but may be different defined related to the port-map. The parameter "default" can be used to reset the interfaces to default configuration.

To become effective you must store the configuration and reboot the system.

**Format**            **hardware profile portmode expand [default]**  
**Mode**             Interface Config

#### 3.10.14.1 no hardware profile portmode expand

This command is used to configure expandable ports in mode „expandable“.

**Format**            **no hardware profile portmode expand**  
**Mode**             Interface Config

### 3.10.15 show interfaces hardware profile

This command displays different portmode settings for one specified or all physical interfaces. Also the copper-SFP settings (configured and currently active) are indicated.

**Format**            **show interfaces hardware profile [<slot/port>]**  
**Mode**             Priviledged EXEC

## 3.11 Commands to configure startup services

This feature activates support for listing and configuring startup services. Services are board specific and defined by the BSP.

The commands invoke the /opt/kontron/bin/chkconfig utility directly.

### 3.11.1 set chkconfig

This command configures a BSP startup service.

**Format**            **set chkconfig <service>**  
**Mode**             Priviledged EXEC

#### 3.11.1.1 no set chkconfig

This command disables a BSP startup service.

**Format**            **no set chkconfig <service>**  
**Mode**             Priviledged EXEC

Note that disabling basic services may make the system unusable, e.g. disabling syslogd or FASTPATH may make the system inaccessible.

### 3.11.2 show chkconfig

This command displays all currently installed services. Services are board specific and defined by the BSP.

**Format**            `show chkconfig`

**Mode**             Privileged EXEC

## 3.12 Network Time Protocol Commands

Network Time Protocol (NTP) is used for synchronization of the system time. FASTPATH SMB supports only the client-side configurations of NTP.

### 3.12.1 ntp authenticate

Use this command to enable NTP authentication.

**Default**            disabled

**Format**            `ntp authenticate`

**Mode**             Global Config

**Example:** The following is an example of the command.

```
(Routing) #configure
```

```
(Routing)(Config)#ntp authenticate
```

#### 3.12.1.1 no ntp authenticate

Use the `no` form of the command to restore NTP authentication to the default.

**Default**            disabled

**Format**            `no ntp authenticate`

**Mode**             Global Config

**Example:** The following is an example of the `no` form of the command.

```
(Routing) #configure
```

```
(Routing)(Config)#no ntp authenticate
```

### 3.12.2 ntp authentication-key

Use this command to configure the authentication key, along with the algorithm MD5/SHA1/SHA256, for a trusted NTP time source. The NTP authentication key number must be unique across the system.

**Default**            none

**Format**            `ntp authentication-key <key-number> <msg-auth-algorithm> [encrypted <key-name>]`

**Mode**             Global Config

| Parameter                       | Description                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------|
| <code>key-number</code>         | The number for identifying an authentication key. The range is 1 to 4,294,967,295.                 |
| <code>msg-auth-algorithm</code> | A selection of hashing algorithm for message authentication (MD5/SHA1/SHA256). The default is MD5. |
| <code>key-name</code>           | The encrypted key-value.                                                                           |

**Example:** The following is an example of the command.

```
(Routing) #configure
(Routing)(Config)#ntp authentication-key 81 md5
Enter new password:*****
Confirm new password:*****
(Routing)(Config)#
```

### 3.12.2.1 no ntp authentication-key

Use the `no` form of the command to delete the configured authentication key.

**Default** none  
**Format** no ntp authentication-key <key-number>  
**Mode** Global Config

**Example:** The following is an example of the `no` form of the command.

```
(Routing) #configure
(Routing)(Config)#no ntp authentication-key 81
```

### 3.12.3 ntp trusted-key

Use this command to designate one or more authentication keys from the configured list as the trusted key for client-server communication.

**Default** none  
**Format** ntp trusted-key <key-number> [,<key-number-list>]  
**Mode** Global Config

| Parameter              | Description                                                                        |
|------------------------|------------------------------------------------------------------------------------|
| <i>key-number</i>      | The number for identifying an authentication key. The range is 1 to 4,294,967,295. |
| <i>key-number-list</i> | The comma-separated list of authentication keys. The range is 1 to 4,294,967,295.  |

**Example:** The following is an example of the command designating one trusted key.

```
(Routing) #configure
(Routing)(Config)#ntp trusted-key 81
```

**Example:** The following is an example of the command designating multiple trusted keys.

```
(Routing) #configure
(Routing)(Config)#ntp trusted-key 1,5
```

#### 3.12.3.1 no ntp trusted-key

Use the `no` form of the command to remove the trusted key configured for NTP.

**Default** none  
**Format** no ntp trusted-key <key-number> [,<key-number-list>]  
**Mode** Global Config

**Example:** The following is an example of the command removing one trusted key.

```
(Routing) #configure
(Routing)(Config)#no ntp trusted-key 81
```

**Example:** The following is an example of the command removing multiple trusted keys.

```
(Routing) #configure
(Routing)(Config)#no ntp trusted-key 1,5
```

### 3.12.4 ntp broadcast client

Use this command to configure the NTP client to run as a broadcast client allowing the client to receive broadcast packets.

**Default** none  
**Format** ntp broadcast client  
**Mode** Global Config

**Example:** The following is an example of the command

```
(Routing) #configure
(Routing)(Config)#ntp broadcast client
```

#### 3.12.4.1 no ntp broadcast client

Use the `no` form of the command to disable the broadcast client mode.

**Default** none  
**Format** no ntp broadcast client  
**Mode** Global Config

**Example:** The following is an example of the `no` command.

```
(Routing) #configure
(Routing)(Config)#no ntp broadcast client
```

### 3.12.5 ntp broadcastdelay

Use this command to set the estimated round-trip delay in microseconds between an NTP client and an NTP broadcast server. The delay is applicable only when the client is configured in broadcast mode. See the [ntp broadcast client](#) command.

**Default** 3000 microseconds  
**Format** ntp broadcastdelay <microseconds>  
**Mode** Global Config

| Parameter           | Description                                           |
|---------------------|-------------------------------------------------------|
| <i>microseconds</i> | The delay in microseconds. The range is 1 to 999,999. |

**Example:** The following is an example of the command.

```
(Routing) #configure
(Routing)(Config)#ntp broadcastdelay 10000
```

#### 3.12.5.1 no ntp broadcastdelay

Use the `no` form of the command to restore the NTP broadcastdelay to the default.

**Default** 3000 microseconds  
**Format** no ntp broadcastdelay  
**Mode** Global Config

**Example:** The following is an example of the `no` command.

```
(Routing) #configure
(Routing)(Config)#no ntp broadcastdelay
```



### 3.12.6 ntp server

Use this command to configure the NTP server to allow the system clock to be synchronized by a time server. You can configure multiple NTP servers. The server selection algorithm picks the server for time synchronization. Configuring preferred status overrides the algorithm and the configured server is used time synchronization. Configuring a preferred server reduces switching back and forth among servers. Preferred status indicates whether this NTP server is the preferred server if two servers show different times. This argument is meaningful only when you configure two servers; if you configure three or more, the NTP function automatically finds the most reliable server.

|                |                                                                                                                                   |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | none                                                                                                                              |
| <b>Format</b>  | ntp server <server-address> [version <number>] [key <key-id>] [minpoll <interval>] [maxpoll <interval>] [prefer] [burst] [iburst] |
| <b>Mode</b>    | Global Config                                                                                                                     |

| Parameter             | Description                                                                                                                                                |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>server-address</i> | Server address (IPv4 or IPv6), or hostname of the server, for this client to synchronize time. The hostname range is 1 to 256 characters.                  |
| version number        | The protocol version. The default is 4. The range is 1 to 4.                                                                                               |
| key key-id            | Authentication key. The <i>key-id</i> range is 1 to 4,294,967,295.                                                                                         |
| minpoll interval      | Minimum polling interval in seconds as a power of 2. The range is 4 to 17, which in seconds is 16 seconds to 131,072 seconds. The default is 64 seconds.   |
| maxpoll interval      | Maximum polling interval in seconds as a power of 2. The range is 4 to 17, which in seconds is 16 seconds to 131,072 seconds. The default is 1024 seconds. |
| prefer                | Preference status for this server. A value of true indicates this server is preferred in server selection.                                                 |
| burst                 | Sends a series of packets instead of a single packet within each synchronization interval to achieve faster synchronization.                               |
| iburst                | Same as burst but applicable during initial synchronization.                                                                                               |

**Example:** Following is an example of the command.

```
(Routing) #configure
(Routing)(Config)#ntp server 1.1.1.1
```

#### 3.12.6.1 no ntp server

Use the `no` form of the command to delete the NTP server configuration.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | none                           |
| <b>Format</b>  | no ntp server <server-address> |
| <b>Mode</b>    | Global Config                  |

**Example:** Following is an example of the `no` command.

```
(Routing) #configure
(Routing)(Config)#no ntp server 1.1.1.1
```

### 3.12.7 ntp source-interface

Use this command to configure the NTP source interface.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | none                                  |
| <b>Format</b>  | ntp source-interface <interface-name> |
| <b>Mode</b>    | Global Config                         |

**Example:** Following is an example of the command.

```
(Routing) #configure
(Routing)(Config)#ntp source-interface 0/1
```

### 3.12.7.1 no ntp source-interface

Use the `no` form of the command to delete the NTP source-interface configuration.

**Default** none  
**Format** ntp source-interface  
**Mode** Global Config

**Example:** Following is an example of the `no` command.

```
(Routing) #configure
(Routing)(Config)#no ntp source-interface
```

### 3.12.8 show ntp

Use this command to display all the global NTP configuration parameters.

**Default** none  
**Format** show ntp  
**Mode** User EXEC

The following fields are displayed for the NTP client.

| Parameter           | Description                                                                           |
|---------------------|---------------------------------------------------------------------------------------|
| Admin Mode          | The client mode: disabled, unicast, or broadcast.                                     |
| Authentication Mode | NTP authentication is enabled or disabled.                                            |
| Broadcast Delay     | The delay in microseconds (the delay in receiving broadcast packets from the server). |
| Source Interface    | Source interface used in NTP client communication with the server.                    |
| Source IPv4 Address | IPv4 address when not null.                                                           |
| Source IPv6 Address | IPv6 address when not null.                                                           |

**Example:** The following shows example display output for the command.

```
(Routing) #show ntp

Admin Mode Disabled
Authentication Mode..... Disabled
Broadcast Delay..... 3000
Source Interface..... 0/1
Source IPv4 Address..... 1.1.1.1 -> Display this only when source interface is
a non zero value
Source IPv6 Address..... :: -> Display this only when source interface is
a non zero value
```

```
(Routing) #
```

### 3.12.9 show ntp authentication-keys

Use this command to display information about all the configured NTP authentication-keys.

**Default** none  
**Format** show ntp authentication-keys  
**Mode** User EXEC

The following table describes the significant fields shown in the display.

| Parameter                        | Description                           |
|----------------------------------|---------------------------------------|
| Key Id                           | The specified authentication key.     |
| Key Value                        | The configured key value (encrypted). |
| Message Authentication Algorithm | MD5, SHA1, or SHA2.                   |
| Trusted                          | Yes or No.                            |

**Example:** The following shows example display output for the command.

```
(Routing) #show ntp authentication-keys
```

```
Key Id 1
Key Value 66f7e003db45a5f4688fd3a7ee7112df
Message Authentication Algorithm md5
Trusted Yes

Key Id 2
Key Value 66f7e003db45a5f4688fd3a7ee7112df
Message Authentication Algorithm md5
Trusted No
```

### 3.12.10 show ntp servers

Use this command to display information about all the configured NTP servers.

**Default** none  
**Format** show ntp servers  
**Mode** User EXEC

The following table describes the significant fields shown in the display.

| Parameter             | Description                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------|
| Address               | Server IP address.                                                                               |
| Version               | Protocol version.                                                                                |
| Key Id                | Authentication key.                                                                              |
| Minimum Poll Interval | Minimum polling interval in seconds as a power of 2.                                             |
| Maximum Poll Interval | Maximum polling interval in seconds as a power of 2.                                             |
| Prefer                | The preference status for this server in the selection algorithm.                                |
| Burst                 | If true, a series of packets are sent instead of a single packet.                                |
| Iburst                | If true, a series of packets are sent instead of a single packet during initial synchronization. |

**Example:** The following shows example display output for the command.

```
(Routing) #show ntp servers
Address 1.1.1.1
Version 4
Key Id NA
Minimum Poll Interval 6
Maximum Poll Interval 6
Prefer No
Burst No
Iburst No

Address 2.2.2.2
Version 4
```

```

Key Id NA
Minimum Poll Interval 6
Maximum Poll Interval 6
Prefer No
Burst No
Iburst No

```

### 3.12.11 show ntp status

Use this command to display the NTP synchronization status.

**Default** not running  
**Format** show ntp status  
**Mode** User EXEC

The following table describes the significant fields shown in the display.

| Parameter       | Description                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------|
| associd         | The association identifier.                                                                                            |
| status          | Status string with client protocol status.                                                                             |
| leap indicator  | A 2-bit integer warning of an impending leap second to be inserted or deleted in the last minute of the current month. |
| stratum         | An 8-bit integer indicating the stratum level of the local clock.                                                      |
| log2 precision  | The precision of the local clock, in seconds to the nearest power of two.                                              |
| root delay      | The round trip delay to the reference clock.                                                                           |
| root dispersion | The dispersion to the reference clock.                                                                                 |
| reference ID    | The code identifying the particular server or reference clock.                                                         |

**Example:** The following shows example display output for the command.

```

(Routing) #show ntp status
associd=0 status=c016 leap_alarm, sync_unspec, 1 event, restart,
system peer: 0.0.0.0:0
system peer mode: unspec
leap indicator: 11
stratum: 16
log2 precision: -22
root delay: 0.000
root dispersion: 2.835
reference ID

```

### 3.12.12 show ntp packets

Use this command to display the global statistics for the NTP packets.

**Default** none  
**Format** show ntp packets  
**Mode** User EXEC

The following table describes the significant fields shown in the display.

| Parameter              | Description                                                                  |
|------------------------|------------------------------------------------------------------------------|
| In packets             | The number of packets received by the client.                                |
| Out packets            | The number of packets transmitted by the client.                             |
| old version packets    | The number of packets that do not match the running version of the protocol. |
| protocol error packets | The number of packets received that fail protocol validation checks.         |

**Example:** The following shows example display output for the command.

```
(Routing) #show ntp packets
Ntp In packets 0
Ntp Out packets 0
Ntp old version packets 0
Ntp protocol error packets 0
```

### 3.12.13 show ntp associations

Use this command to display the NTP associations, per association details and per association statistics.

**Default** none  
**Format** show ntp associations [details|statistics]  
**Mode** User EXEC

The following table describes the significant fields shown in the display.

| Parameter       | Description                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------|
| Assoc ID        | The association identifier.                                                                                            |
| Status          | Status string with client protocol status.                                                                             |
| Leap indicator  | A 2-bit integer warning of an impending leap second to be inserted or deleted in the last minute of the current month. |
| Stratum         | An 8-bit integer indicating the stratum level of the local clock.                                                      |
| Precision       | The precision of the local clock, in seconds to the nearest power of two.                                              |
| Root delay      | The round trip delay to the reference clock.                                                                           |
| Root dispersion | The dispersion to the reference clock.                                                                                 |
| Reference ID    | The code identifying the particular server or reference clock.                                                         |

**Example:** The following shows example display output for the command.

```
(Routing)(Config)#show ntp associations
remote refid st t when poll reach delay offset jitter
=====
10.52.146.147 .INIT. 16 u - 64 0 0.000 +0.000 0.000
```

**Example:** The following shows example display output for the command per association details.

```
(Routing)(Config)#show ntp associations details

associd=21000 status=8011 conf, sel_reject, 1 event, mobilize,
srcadr=10.52.146.147, srcport=123, dstadr=10.52.143.20, dstport=123,
leap=11, stratum=16, precision=-22, rootdelay=0.000, rootdisp=0.000,
refid=INIT, reftime=(no time), rec=(no time), reach=000
```

**Example:** The following shows example display output for the command per association statistics.

```
(Routing)(Config)#show ntp associations statistics

Association 21000
Ntp In packets 0
Ntp Out packets 0
Ntp protocol error packets 0
```

### 3.12.14 show ntp information

Use this command to display the NTP software information.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | none                 |
| <b>Format</b>  | show ntp information |
| <b>Mode</b>    | User EXEC            |

**Example:** The following shows example display output for the command.

```
(Routing) #show ntp information
Ntp Software Name : ntpd
Ntp Software Version : ntpd 4.2.8p15@1.3728-o
Ntp Software Vendor : FASTPATH
Ntp System Type : Linux/4.15.18-d60bb35b
```

```
(Routing) #
```

### 3.12.15 feature ntp

This command enables the NTP feature.

|               |               |
|---------------|---------------|
| <b>Format</b> | feature ntp   |
| <b>Mode</b>   | Global Config |

#### 3.12.15.1 no feature ntp

This command disables the NTP feature.

|               |                |
|---------------|----------------|
| <b>Format</b> | no feature ntp |
| <b>Mode</b>   | Global Config  |

### 3.12.16 ntp enable

This command enables the NTP feature. It is an older version of command "feature ntp". For the running-config "feature ntp" is used.

|               |               |
|---------------|---------------|
| <b>Format</b> | ntp enable    |
| <b>Mode</b>   | Global Config |

#### 3.12.16.1 no ntp enable

This command disables the NTP feature.

|               |               |
|---------------|---------------|
| <b>Format</b> | no ntp enable |
| <b>Mode</b>   | Global Config |

### 3.12.17 ntp server

This command adds a NTP server. The <server > may be an IPv4 or IPv6 address or a DNS name.

Following parameters can be set

- <minpoll>: minimal poll interval.
- <maxpoll>: maximal poll interval.
- prefer: preferred server.

The poll interval of NTP messages are in seconds as a power of two. Default for <maxpoll> is 10 (1024 sec) but can be increased to 17 (36 h),the default value of <minpoll> is 6 (64 sec) but can be decreased to 3 (8 sec) (see "ntp.conf(5)"). The allowed range for both is therefore 3-17.

**Format**            `ntp server <server> [minpoll <minpoll>] [maxpoll <maxpoll>] [prefer]`  
**Mode**             Global Config

### 3.12.17.1 no ntp server <server>

This command deletes a NTP server. The <server > may be an IPv4 or IPv6 address or a DNS name.

**Format**            `no ntp server <server>`  
**Mode**             Global Config

### 3.12.18 ntp source-interface

This command adds or deletes an interface NTP is listening. Allowed interfaces are the serviceport, the networkport or a VLAN (routing) interface.

**Format**            `ntp source-interface {service-port | network-port | vlan <vid>}`  
**Mode**             Global Config

### 3.12.18.1 no ntp source-interface

This command deletes an interface NTP is listening.

**Format**            `no ntp source-interface {service-port | network-port | vlan <vid>}`  
**Mode**             Global Config

### 3.12.19 ntp logging

This command enables NTP logging. If enabled, the logging is written to the Fastpath log with severity "notice".

**Format**            `ntp logging`  
**Mode**             Global Config

### 3.12.19.1 no ntp logging

This command disables NTP logging.

**Format**            `no ntp logging`  
**Mode**             Global Config

### 3.12.20 clear ntp

This command clears all NTP configuration and disables NTP.

**Format**            `clear ntp`  
**Mode**             Privileged Exec

### 3.12.21 show ntp status

This command displays the NTP status (enabled/disabled).

**Format**            `show ntp status`  
**Mode**             Privileged Exec

### 3.12.22 show ntp server

This command displays all configured NTP servers and their parameters. The field is empty if the related parameter is not set.6 (64)

**Format**            `show ntp server`

**Mode**             Privileged Exec

### 3.12.23 show ntp peers

This command lists all remote connected peers. Displays the output as provided by "ntpq".

**Format**            `show ntp peers`

**Mode**             Privileged Exec

### 3.12.24 show ntp source-interface

This command displays all configured interfaces the NTP is listening.

**Format**            `show ntp source-interface`

**Mode**             Privileged Exec

### 3.12.25 show ntp interface-status

This command lists all interfaces (with IP addresses) NTP is currently listening. Displays the output as provided by "ntpq".

**Format**            `show ntp interface-status`

**Mode**             Privileged Exec

### 3.12.26 show ntp logging-status

This command displays the NTP logging status (enabled/disabled).

**Format**            `show ntp logging-status`

**Mode**             Privileged Exec

## 3.13 Time Zone Commands

Use the Time Zone commands to configure system time and date, Time Zone and Summer Time (that is, Daylight Saving Time). Summer time can be recurring or non-recurring.

### 3.13.1 clock set

This command sets the system time and date.

**Format**            `clock set hh:mm:ss`  
                      `clock set mm/dd/yyyy`

**Mode**             Global Config

| Parameter  | Description                                                                                                                                                                   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| hh:mm:ss   | Enter the current system time in 24-hour format in hours, minutes, and seconds. The range is hours: 0 to 23, minutes: 0 to 59, seconds: 0 to 59.                              |
| mm/dd/yyyy | Enter the current system date the format month, day, year. The range for month is 1 to 12. The range for the day of the month is 1 to 31. The range for year is 2010 to 2079. |



**Example:** The following shows examples of the command.

```
(Routing) (Config)# clock set 03:17:00
```

```
(Routing) (Config)# clock set 11/01/2011
```

### 3.13.2 clock summer-time date

Use the clock summer-time date command to set the summer-time offset to Coordinated Universal Time (UTC). If the optional parameters are not specified, they are read as either 0 or \0, as appropriate.

**Format**            clock summer-time date {date month year hh:mm date month year hh:mm}[offset offset]  
                         [zone acronym]

**Mode**                Global Config

| Parameter | Description                                                                                                                   |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|
| date      | Day of the month. Range is 1 to 31.                                                                                           |
| month     | Month. The range is the first three letters by name (for example, Jan).                                                       |
| year      | Year. The range is 2000 to 2097.                                                                                              |
| hh:mm     | Time in 24-hour format in hours and minutes. The range is hours: 0 to 23, minutes: 0 to 59.                                   |
| offset    | The number of minutes to add during the summertime. The range is 1 to 1440.                                                   |
| acronym   | The acronym for the summer-time to be displayed when summertime is in effect. The range is up to four characters are allowed. |

**Example:** The following shows examples of the command.

```
(Routing) (Config)# clock summer-time date 1 nov 2011 3:18 2 nov 2011 3:18
```

```
(Routing) (Config)# clock summer-time date 1 nov 2011 3:18 2 nov 2011 3:18 offset 120 zone INDA
```

### 3.13.3 clock summer-time recurring

This command sets the summer-time recurring parameters.

**Format**            clock summer-time recurring {week day month hh:mm week day month hh:mm}  
                         [offset offset] [zone acronym]

**Mode**                Global Config

| Parameter | Description                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| EU        | The system clock uses the standard recurring summer time settings used in countries in the European Union.      |
| USA       | The system clock uses the standard recurring daylight saving time settings used in the United States.           |
| week      | Week of the month. The range is 1 to 5, first, last.)                                                           |
| day       | Day of the week. The range is the first three letters by name; sun, for example.                                |
| month     | Month. The range is the first three letters by name; jan, for example.                                          |
| hh:mm     | Time in 24-hour format in hours and minutes. The range is hours: 0 to 23, minutes: 0 to 59.                     |
| offset    | The number of minutes to add during the summertime. The range is 1 to 1440.                                     |
| acronym   | The acronym for the summertime to be displayed when summertime is in effect. Up to four characters are allowed. |

**Example:** The following shows examples of the command.

```
(Routing) (Config)# clock summer-time recurring 2 sun nov 3:18 2 mon nov 3:18
```

```
(Routing) (Config)# clock summer-time recurring 2 sun nov 3:18 2 mon nov 3:18 offset 120 zone INDA
```

### 3.13.3.1 no clock summer-time

This command disables the summer-time settings.

**Format**           no clock summer-time

**Mode**             Global Config

**Example:** The following shows an example of the command.

```
(Routing) (Config)# no clock summer-time
```

### 3.13.4 clock timezone

Use this command to set the offset to Coordinated Universal Time (UTC). If the optional parameters are not specified, they will be read as either 0 or \0 as appropriate.

**Format**           clock timezone {hours} [minutes minutes] [zone acronym]

**Mode**             Global Config

| Parameter | Description                                                        |
|-----------|--------------------------------------------------------------------|
| hours     | Hours difference from UTC. The range is -12 to +14.                |
| minutes   | Minutes difference from UTC. The range is 0 to 59.                 |
| acronym   | The acronym for the time zone. The range is up to four characters. |

**Example:** The following shows an example of the command.

```
(Routing) (Config)# clock timezone 5 minutes 30 zone INDA
```

#### 3.13.4.1 no clock timezone

Use this command to reset the time zone settings.

**Format**           no clock timezone

**Mode**             Global Config

**Example:** The following shows an example of the command.

```
(Routing) (Config)# no clock timezone
```

### 3.13.5 show clock

Use this command to display the time and date from the system clock.

**Format**           show clock

**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) # show clock
```

```
15:02:09 (UTC+0:00) Nov 1 2011
```

```
No time source
```

**Example:** The following shows example CLI display output for the command.

With the above configuration the output appears as follows:

```
(Routing) # show clock
```

```
10:55:40 INDA(UTC+7:30) Nov 1 2011
```

```
No time source
```

### 3.13.6 show clock detail

Use this command to display the detailed system time along with the time zone and the summertime configuration.

**Format** show clock detail  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) # show clock detail
```

```
15:05:24 (UTC+0:00) Nov 1 2011
No time source
```

```
Time zone:
Acronym not configured
Offset is UTC+0:00
```

```
Summertime:
Summer-time is disabled
```

**Example:** The following shows example CLI display output for the command.

With the above configuration the output appears as follows:

```
(Routing) # show clock detail
```

```
10:57:57 INDA(UTC+7:30) Nov 1 2011
No time source
```

```
Time zone:
Acronym is INDA
Offset is UTC+5:30
```

```
Summertime:
Acronym is INDA
Recurring every year
Begins on second Sunday of Nov at 03:18
Ends on second Monday of Nov at 03:18
Offset is 120 minutes
Summer-time is in effect.
```

## 3.14 DHCP Server Commands

This section describes the commands you to configure the DHCP server settings for the switch. DHCP uses UDP as its transport protocol and supports a number of features that facilitate in administration address allocations.

### 3.14.1 ip dhcp pool

This command configures a DHCP address pool name on a DHCP server and enters DHCP pool configuration mode.

**Default** none  
**Format** ip dhcp pool *name*  
**Mode** Global Config

#### 3.14.1.1 no ip dhcp pool

This command removes the DHCP address pool. The name should be previously configured pool name.

**Format** no ip dhcp pool *name*  
**Mode** Global Config

### 3.14.2 client-identifier

This command specifies the unique identifier for a DHCP client. Unique-identifier is a valid notation in hexadecimal format. In some systems, such as Microsoft DHCP clients, the client identifier is required instead of hardware addresses. The unique-identifier is a concatenation of the media type and the MAC address. For example, the Microsoft client identifier for Ethernet address c819.2488.f177 is 01c8.1924.88f1.77 where 01 represents the Ethernet media type. For more information, refer to the Address Resolution Protocol Parameters section of RFC 1700, Assigned Numbers for a list of media type codes.

**Default** none  
**Format** client-identifier *uniqueidentifier*  
**Mode** DHCP Pool Config

#### 3.14.2.1 no client-identifier

This command deletes the client identifier.

**Format** no client-identifier  
**Mode** DHCP Pool Config

### 3.14.3 client-name

This command specifies the name for a DHCP client. Name is a string consisting of standard ASCII characters.

**Default** none  
**Format** client-name *name*  
**Mode** DHCP Pool Config

#### 3.14.3.1 no client-name

This command removes the client name.

**Format** no client-name  
**Mode** DHCP Pool Config

### 3.14.4 default-router

This command specifies the default router list for a DHCP client. {*address1*, *address2*... *address8*} are valid IP addresses, each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

**Default** none  
**Format** default-router *address1* [*address2*...*address8*]  
**Mode** DHCP Pool Config

#### 3.14.4.1 no default-router

This command removes the default router list.

**Format** no default-router  
**Mode** DHCP Pool Config

### 3.14.5 dns-server

This command specifies the IP servers available to a DHCP client. Address parameters are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

**Default** none  
**Format** `dns-server address1 [address2....address8]`  
**Mode** DHCP Pool Config

### 3.14.5.1 no dns-server

This command removes the DNS Server list.

**Format** `no dns-server`  
**Mode** DHCP Pool Config

### 3.14.6 hardware-address

This command specifies the hardware address of a DHCP client. Hardware-address is the MAC address of the hardware platform of the client consisting of 6 bytes in dotted hexadecimal format. Type indicates the protocol of the hardware platform. It is 1 for 10 MB Ethernet and 6 for IEEE 802.

**Default** ethernet  
**Format** `hardware-address hardwareaddress type`  
**Mode** DHCP Pool Config

#### 3.14.6.1 no hardware-address

This command removes the hardware address of the DHCP client.

**Format** `no hardware-address`  
**Mode** DHCP Pool Config

### 3.14.7 host

This command specifies the IP address and network mask for a manual binding to a DHCP client. Address and Mask are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid. The `prefix-length` is an integer from 0 to 32.

**Default** none  
**Format** `host address [{mask | prefix-length}]`  
**Mode** DHCP Pool Config

#### 3.14.7.1 no host

This command removes the IP address of the DHCP client.

**Format** `no host`  
**Mode** DHCP Pool Config

### 3.14.8 deny lease

Use this command to configure the deny lease mode for a DHCP server to deny the lease to a client based on a DHCP class and its configuration within a pool.

**Default** disable  
**Format** `deny lease`  
**Mode** Pool Class Config

**Example:** The following is an example of the command.

```
(localhost)(Config)#ip dhcp pool pool1
(localhost)(Config-dhcp-pool)#network 192.168.10.0 24
(localhost)(Config-dhcp-pool)#class c1
(localhost)(Config-dhcp-pool-class)#deny lease
```

### 3.14.9 lease

This command configures the duration of the lease for an IP address that is assigned from a DHCP server to a DHCP client. The overall lease time should be between 1-86400 minutes. If you specify *infinite*, the lease is set for 60 days. You can also specify a lease duration. *Days* is an integer from 0 to 59. *Hours* is an integer from 0 to 23. *Minutes* is an integer from 0 to 59.

**Default** 1 (day)  
**Format** lease [{*days* [*hours*] [*minutes*] | *infinite*}]  
**Mode** DHCP Pool Config

#### 3.14.9.1 no lease

This command restores the default value of the lease time for DHCP Server.

**Format** no lease  
**Mode** DHCP Pool Config

### 3.14.10 network (DHCP Pool Config)

Use this command to configure the subnet number and mask for a DHCP address pool on the server. *Networknumber* is a valid IP address, made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid. *Mask* is the IP subnet mask for the specified address pool. The *prefixlength* is an integer from 0 to 32.

**Default** none  
**Format** network *networknumber* [{*mask* | *prefixlength*}]  
**Mode** DHCP Pool Config

#### 3.14.10.1 no network

This command removes the subnet number and mask.

**Format** no network  
**Mode** DHCP Pool Config

### 3.14.11 ntp

Use this command to configure two NTP servers in a DHCP pool in the boot process of a DHCP client. The argument specifies the IP addresses of the Network Time Protocol Server.

**Default** none  
**Format** ntp <*ip-address1*> <*ip-address2*>  
**Mode** DHCP Pool Config

| Parameter   | Description  |
|-------------|--------------|
| ip-address1 | NTP Server 1 |
| ip-address2 | NTP Server 2 |

**Example:** The following shows an example of the command.

```
(localhost)(Config)#ip dhcp pool test
(localhost)(Config-dhcp-pool)#ntp 192.168.99.9
```

```
(localhost)(Config-dhcp-pool)#no ntp
```

**Example:** The following example configures the NTP servers.

```
(localhost) (Config)#ip dhcp pool Pool1
(localhost) (Config-dhcp-pool)#ntp 10.10.1.1 10.10.1.2
```

### 3.14.11.1 no ntp

Use the `no` form of the command to unconfigure the NTP server address.

**Format**           no ntp  
**Mode**             DHCP Pool Config

### 3.14.12 bootfile (DHCP Pool Config)

The command specifies the name of the default boot image for a DHCP client. The *filename* specifies the boot image file.

**Format**           bootfile *filename*  
**Mode**             DHCP Pool Config

#### 3.14.12.1 no bootfile

This command deletes the boot image name.

**Format**           no bootfile  
**Mode**             DHCP Pool Config

### 3.14.13 bootfile (Pool Class Config)

Use this command to configure the bootfile for DHCP server to support the bootfile option for a DHCP class within a pool.

**Default**           none  
**Format**           bootfile *filename*  
**Mode**             Pool Class Config

| Parameter | Description                                                     |
|-----------|-----------------------------------------------------------------|
| filename  | The boot filename for the class to be associated with the pool. |

**Example:** The following is an example of the command.

```
(localhost)(Config)#ip dhcp pool pool1
(localhost)(Config-dhcp-pool)#network 192.168.10.0 24
(localhost)(Config-dhcp-pool)#class c1
```

```
(localhost)(Config-dhcp-pool-class)#bootfile COACH_R1.cfg
```

### 3.14.13.1 no bootfile

Use the `no` form of the command to unconfigure the bootfile for DHCP server to support the bootfile option for a DHCP class within a pool.

**Format**            `no bootfile filename`  
**Mode**             Pool Class Config

### 3.14.14 domain-name

This command specifies the domain name for a DHCP client. The *domain* specifies the domain name string of the client.

**Default**          none  
**Format**          `domain-name domain`  
**Mode**            DHCP Pool Config

#### 3.14.14.1 no domain-name

This command removes the domain name.

**Format**          `no domain-name`  
**Mode**            DHCP Pool Config

### 3.14.15 domain-name enable

This command enables the domain name functionality in FASTPATH.

**Format**          `domain-name enable [name name]`  
**Mode**            Global Config

**Example:** The following shows an example of the command.

```
(Switching) (Config)#domain-name enable
(Switching) (Config)#exit
```

#### 3.14.15.1 no domain-name enable

This command disables the domain name functionality in FASTPATH.

**Format**          `no domain-name enable`  
**Mode**            Global Config

### 3.14.16 netbios-name-server

This command configures NetBIOS Windows Internet Naming Service (WINS) name servers that are available to DHCP clients.

One IP address is required, although one can specify up to eight addresses in one command line. Servers are listed in order of preference (*address* is the most preferred server, *address2* is the next most preferred server, and so on).

**Default**          none  
**Format**          `netbios-name-server address [address2...address8]`  
**Mode**            DHCP Pool Config



### 3.14.16.1 no netbios-name-server

This command removes the NetBIOS name server list.

**Format** no netbios-name-server  
**Mode** DHCP Pool Config

### 3.14.17 netbios-node-type

The command configures the NetBIOS node type for Microsoft Dynamic Host Configuration Protocol (DHCP) clients. *Type* specifies the NetBIOS node type. Valid types are:

- b-node—Broadcast
- p-node—Peer-to-peer
- m-node—Mixed
- h-node—Hybrid (recommended)

**Default** none  
**Format** netbios-node-type *type*  
**Mode** DHCP Pool Config

#### 3.14.17.1 no netbios-node-type

This command removes the NetBIOS node type.

**Format** no netbios-node-type  
**Mode** DHCP Pool Config

### 3.14.18 next-server

This command configures the next server in the boot process of a DHCP client. The *address* parameter is the IP address of the next server in the boot process, which is typically a TFTP server.

**Default** inbound interface helper addresses  
**Format** next-server *address*  
**Mode** DHCP Pool Config

#### 3.14.18.1 no next-server

This command removes the boot server list.

**Format** no next-server  
**Mode** DHCP Pool Config

### 3.14.19 option

The *option* command configures DHCP Server options. The *code* parameter specifies the DHCP option code and ranges from 1-254. The *ascii string* parameter specifies an NVT ASCII character string. ASCII character strings that contain white space must be delimited by quotation marks. The *hex string* parameter specifies hexadecimal data. In hexadecimal, character strings are two hexadecimal digits. You can separate each byte by a period (for example, a3.4f.22.0c), colon (for example, a3:4f:22:0c), or white space (for example, a3 4f 22 0c).

**Default** none  
**Format** option code {*ascii string* | *hex string1* [*string2...string8*] | ip *address1* [*address2...address8*]}  
**Mode** DHCP Pool Config

### 3.14.19.1 no option

This command removes the DHCP Server options. The *code* parameter specifies the DHCP option code.

**Format**           no option *code*  
**Mode**             DHCP Pool Config

### 3.14.20 ip dhcp ping packets

Use this command to specify the number, in a range from 2 to 10, of packets a DHCP server sends to a pool address as part of a ping operation. By default the number of packets sent to a pool address is 2, which is the smallest allowed number when sending packets. Setting the number of packets to 0 disables this command.

**Default**          2  
**Format**           ip dhcp ping packets *0,2-10*  
**Mode**             Global Config

#### 3.14.20.1 no ip dhcp ping packets

This command restores the number of ping packets to the default value.

**Format**           no ip dhcp ping packets  
**Mode**             Global Config

### 3.14.21 service dhcp

This command enables the DHCP server.

**Default**          disabled  
**Format**           service dhcp  
**Mode**             Global Config

#### 3.14.21.1 no service dhcp

This command disables the DHCP server.

**Format**           no service dhcp  
**Mode**             Global Config

### 3.14.22 ip dhcp bootp automatic

This command enables the allocation of the addresses to the bootp client. The addresses are from the automatic address pool.

**Default**          disabled  
**Format**           ip dhcp bootp automatic  
**Mode**             Global Config

#### 3.14.22.1 no ip dhcp bootp automatic

This command disables the allocation of the addresses to the bootp client. The address are from the automatic address pool.

**Format**           no ip dhcp bootp automatic  
**Mode**             Global Config

### 3.14.23 ip dhcp class

Use this command to define DHCP classes with Option-82 through Circuit-ID and Remote-ID sub-options. Configuring the DHCP classes using Global Config mode allows these DHCP classes to be available to bind under multiple DHCP pools.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | none                 |
| <b>Format</b>  | ip dhcp class <name> |
| <b>Mode</b>    | Global Config        |

| Parameter | Description          |
|-----------|----------------------|
| name      | The DHCP class name. |

**Example:** The following example configures the DHCP class.

```
(Routing)(Config)#ip dhcp class Class1
(Routing)(Config-dhcp-class)#
```

#### 3.14.23.1 no ip dhcp class

Use this command to return the DHCP class to the default.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no ip dhcp class |
| <b>Mode</b>   | Global Config    |

### 3.14.24 relay agent information remote-id circuit-id

Use this command to define DHCP classes with Option-82 through Circuit-ID and Remote-ID sub-options. Each DHCP Server class is configured with Option-82 (both Remote-ID and Circuit-ID). The Circuit-ID configuration is optional.

|                |                                                                                             |
|----------------|---------------------------------------------------------------------------------------------|
| <b>Default</b> | none                                                                                        |
| <b>Format</b>  | relay agent information remote-id <i>remote-string</i> [ <i>circuit-id circuit-string</i> ] |
| <b>Mode</b>    | DHCP Class Config                                                                           |

| Parameter      | Description                                                                   |
|----------------|-------------------------------------------------------------------------------|
| remote-string  | The remote ID configured in DHCP L2 Relay where the DHCP client is connected. |
| circuit-string | The circuit ID is the interface number where the DHCP client is connected.    |

**Example:** The following example configures the DHCP class Option-82 parameters.

```
(Routing)#configure
(Routing)(Config)#ip dhcp class Class1
(Routing)(Config-dhcp-class)#relay agent information remote-id COACH1 circuit-id 1/0/13
(Routing)(Config-dhcp-class)#
```

#### 3.14.24.1 no relay agent information remote-id circuit-id

Use the no form of the command to remove the relay agent information in the DHCP class.

|               |                                                 |
|---------------|-------------------------------------------------|
| <b>Format</b> | no relay agent information remote-id circuit-id |
| <b>Mode</b>   | DHCP Class Config                               |

### 3.14.25 class (DHCP Pool Config)

Use this command to bind the DHCP class to the DHCP pool. This command in DHCP Pool Config mode changes the mode to Pool Class Config mode. An IP address can be defined as part of this class, under this pool, at this Pool Class Config mode.

|                |                  |
|----------------|------------------|
| <b>Default</b> | none             |
| <b>Format</b>  | class <name>     |
| <b>Mode</b>    | DHCP Pool Config |

| Parameter | Description                                    |
|-----------|------------------------------------------------|
| name      | The class to be associated with the DHCP pool. |

**Example:** The following example associates the DHCP class to the pool.

```
(Routing)(Config)#ip dhcp pool Pool1
(Routing)(Config-dhcp-pool)#class Class1
(Routing)(Config-dhcp-pool-class)#
```

### 3.14.26 address range

Use this command to configure the address range for a DHCP class. The address range of individual classes must be from the same subnet as the DHCP pool part of which the classes are defined.

#### NOTICE

All DHCP classes under a pool must have a unique IP address range. This ensures that every DHCP client gets a unique IP address from a pool.

You can also configure only the start address (and not the end address). It implies a single IP address where the start and the end addresses are the same.

|                |                                                     |
|----------------|-----------------------------------------------------|
| <b>Default</b> | none                                                |
| <b>Format</b>  | address range <ip-address-start> [<ip-address-end>] |
| <b>Mode</b>    | Pool Class Config                                   |

| Parameter        | Description                          |
|------------------|--------------------------------------|
| ip-address-start | The start address in the DHCP class. |
| ip-address-end   | The end address in the DHCP class.   |

**Example:** The following example associates the DHCP class to the pool.

```
(localhost) (Config)#ip dhcp pool Pool1
(localhost) (Config-dhcp-pool)#network 1.2.3.0 24
(localhost) (Config-dhcp-pool)#class Class1
(localhost) (Config-dhcp-pool-class)#address range 1.2.3.4 1.2.3.10
```

### 3.14.27 ip dhcp conflict logging

This command enables conflict logging on DHCP server.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | enabled                  |
| <b>Format</b>  | ip dhcp conflict logging |
| <b>Mode</b>    | Global Config            |

#### 3.14.27.1 no ip dhcp conflict logging

This command disables conflict logging on DHCP server.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | no ip dhcp conflict logging |
| <b>Mode</b>   | Global Config               |

### 3.14.28 show ip dhcp binding all

Use this command to display the binding entries for all VRF instances.

**Format** show ip dhcp binding all

**Mode** Privileged EXEC

| Syntax | Description                                                                                                                                |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------|
| all    | This keyword is used as part of the command to convey that all bindings in all VRF instances (including default VRF) have to be displayed. |

| Parameter        | Description                                                         |
|------------------|---------------------------------------------------------------------|
| IP address       | The IP address (in dotted decimal notation) for each binding entry. |
| Hardware Address | The MAC address or the client identifier.                           |
| Lease Expiry     | The lease expiration time of the IP address assigned to the client. |
| Type             | The manner in which IP address was assigned to the client.          |
| Pool Name        | The associated pool-name information for each binding entry.        |

**Example:** The following example shows the DHCP binding entries for all VRF instances. Assume there is one non-default VRF instance red, and assume that both default and non-default VRFs have two DHCP pools configured in each VRF instance.

```
(dhcp-10-130-187-64)#show ip dhcp binding all
```

| IP address | Hardware Address  | Lease Expiry | Type    | Pool Name     |
|------------|-------------------|--------------|---------|---------------|
| 4.4.4.1    | a5:56:d7:f4:13:12 | 00:31:44     | DYNAMIC | pooldefault01 |
| 4.4.4.2    | 01:89:22:c6:2d:7f | 00:34:16     | DYNAMIC | pooldefault01 |
| 5.5.5.1    | b3:d8:34:72:c5:f4 | 00:47:22     | DYNAMIC | pooldefault02 |
| 5.5.5.2    | 00:f3:c9:63:20:34 | 00:51:37     | DYNAMIC | pooldefault02 |
| 9.9.9.10   | 12:45:78:01:34:67 | 00:04:15     | DYNAMIC | poolred01     |
| 9.9.9.11   | 34:7b:45:06:34:22 | 00:07:42     | DYNAMIC | poolred01     |
| 6.6.6.1    | 06:41:c8:01:d5:14 | 00:20:31     | DYNAMIC | poolred02     |
| 6.6.6.2    | 18:57:26:30:a1:b5 | 00:16:22     | DYNAMIC | poolred02     |

### 3.14.29 show ip dhcp global configuration

This command displays address bindings for the specific IP address on the DHCP server. If no IP address is specified, the bindings corresponding to all the addresses are displayed.

**Format** show ip dhcp global configuration

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter              | Description                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------|
| Service DHCP           | The field to display the status of dhcp protocol.                                                          |
| Number of Ping Packets | The maximum number of Ping Packets that will be sent to verify that an ip address id not already assigned. |
| Conflict Logging       | Shows whether conflict logging is enabled or disabled.                                                     |
| BootP Automatic        | Shows whether BootP for dynamic pools is enabled or disabled.                                              |

### 3.14.30 show ip dhcp pool configuration

This command displays pool configuration. If `all` is specified, configuration for all the pools is displayed. The command also displays information about the configured class and NTP servers.

**Format**            `show ip dhcp pool configuration {pool-name | all}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------|
| pool-name       | The name of the configured DHCP pool for which the DHCP pool configuration details are to be displayed. |
| Pool Type       | The pool type.                                                                                          |
| Lease Time      | The lease expiration time of the IP address assigned to the client.                                     |
| NTP Server      | The configured NTP server.                                                                              |
| DNS Servers     | The list of DNS servers available to the DHCP client.                                                   |
| Default Routers | The list of the default routers available to the DHCP client                                            |
| Class           | DHCP classes associated with a DHCP pool.                                                               |
| IP Range From   | The start address for a DHCP class that is associated with a DHCP pool.                                 |
| IP Range To     | The end address for a DHCP class that is associated with a DHCP pool.                                   |

The following additional field is displayed for Dynamic pool type:

| Parameter | Description                                                |
|-----------|------------------------------------------------------------|
| Network   | The network number and the mask for the DHCP address pool. |

The following additional fields are displayed for Manual pool type:

| Parameter             | Description                                                        |
|-----------------------|--------------------------------------------------------------------|
| Client Name           | The name of a DHCP client.                                         |
| Client Identifier     | The unique identifier of a DHCP client.                            |
| Hardware Address      | The hardware address of a DHCP client.                             |
| Hardware Address Type | The protocol of the hardware platform.                             |
| Host                  | The IP address and the mask for a manual binding to a DHCP client. |

**Example:** The following example shows the DHCP pool configuration for all the pools configured. Assume there are three DHCP pools configured with the names `poolRed`, `poolBlue`, and `poolGreen`.

```
(dhcp-10-130-187-64)#show ip dhcp pool configuration all
```

```
Pool: poolGreen
Pool Type..... Dynamic
Network..... 9.9.9.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
VRF Name..... Default
```

```
Pool: poolRed
Pool Type..... Dynamic
Network..... 8.8.8.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
VRF Name..... VrfRed
```

```
Pool: poolBlue
Pool Type..... Dynamic
```

```

Network..... 7.7.7.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
VRF Name..... VrfBlue

```

**Example:** The following example shows the DHCP pool configuration for the poolVrfBlue.

```
(dhcp-10-130-187-64)#show ip dhcp pool configuration poolBlue
```

```

Pool: poolBlue
Pool Type..... Dynamic
Network..... 7.7.7.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
VRF Name..... VrfBlue

```

**Example:** The following examples show the DHCP pool configuration for all the pools configured or a specific pool. See [Section 3.14.8: "deny lease"](#) for information about configuring the deny lease mode for a DHCP server. See [Section 3.14.13: "bootfile \(Pool Class Config\)"](#) for information about configuring the bootfile for DHCP server.

```
(localhost) #show ip dhcp pool configuration all
```

```

Pool: Pool1
Pool Type..... Dynamic
Network..... 1.2.3.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
NTP Server..... 10.10.1.1
 10.10.1.2

```

```

Class Binding:
Class: Class1
 IP Range From..... 1.2.3.4
 IP Range To..... 1.2.3.10
 Deny Lease..... True
 Bootfile..... COACH_R1.cfg

```

```

Pool: Pool2
Pool Type..... Dynamic
Network..... 2.3.4.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
NTP Server..... 20.20.20.1
 20.20.20.2

```

```

Class Binding:
Class: Class2
 IP Range From..... 2.3.4.2
 IP Range To..... 2.3.4.20

```

```
(localhost) (Config)#show ip dhcp pool configuration Pool1
```

```

Pool: Pool1
Pool Type..... Dynamic
Network..... 1.2.3.0 255.255.255.0
Lease Time..... 1 days 0 hrs 0 mins
NTP Server..... 10.10.1.1
 10.10.1.2

```

```

Class Binding:
Class: Class1
 IP Range From..... 1.2.3.4
 IP Range To..... 1.2.3.10

```

### 3.14.31 show ip dhcp server statistics

This command displays DHCP server statistics. The DHCP DISCOVER packets denied lease field is added to display the number of denied leases for a DHCP class.

- Format**            `show ip dhcp server statistics`
- Modes**            • Privileged EXEC
- User EXEC

| Parameter          | Description                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Automatic Bindings | The number of IP addresses that have been automatically mapped to the MAC addresses of hosts that are found in the DHCP database. |
| Expired Bindings   | The number of expired leases.                                                                                                     |
| Malformed Bindings | The number of truncated or corrupted messages that were received by the DHCP server.                                              |

Message Received:

| Message       | Description                                                  |
|---------------|--------------------------------------------------------------|
| DHCP DISCOVER | The number of DHCPDISCOVER messages the server has received. |
| DHCP REQUEST  | The number of DHCPREQUEST messages the server has received.  |
| DHCP DECLINE  | The number of DHCPDECLINE messages the server has received.  |
| DHCP RELEASE  | The number of DHCPRELEASE messages the server has received.  |
| DHCP INFORM   | The number of DHCPINFORM messages the server has received.   |

Message Sent:

| Message    | Description                                        |
|------------|----------------------------------------------------|
| DHCP OFFER | The number of DHCP OFFER messages the server sent. |
| DHCP ACK   | The number of DHCPACK messages the server sent.    |
| DHCP NACK  | The number of DHCPNACK messages the server sent.   |

**Example:** The following shows example command output.

```
(localhost) #show ip dhcp server statistics

Automatic Bindings..... 0
Expired Bindings..... 0
Malformed Bindings..... 0
DHCP DISCOVER packets discarded..... 0
DHCP DISCOVER packets denied lease..... 0

Messages Received
----- -
DHCP DISCOVER..... 0
DHCP REQUEST..... 0
DHCP DECLINE..... 0
DHCP RELEASE..... 0
DHCP INFORM..... 0

Messages Sent
----- -
DHCP OFFER..... 0
DHCP ACK..... 0
DHCP NACK..... 0
```



### 3.14.32 show ip dhcp class configuration

Use this command to display the DHCP class configuration.

|                |                                               |
|----------------|-----------------------------------------------|
| <b>Default</b> | none                                          |
| <b>Format</b>  | show ip dhcp class configuration {all <name>} |
| <b>Mode</b>    | Privileged EXEC                               |

| Parameter  | Description                                           |
|------------|-------------------------------------------------------|
| name       | The DHCP class name.                                  |
| Class Name | Displays the class name configured.                   |
| Remote ID  | Displays the remote ID configured in the DHCP class.  |
| Circuit ID | Displays the circuit ID configured in the DHCP class. |

**Example:** The following example displays the DHCP class configuration.

```
Class: Class1
Remote ID Circuit ID

COACH1 1/0/13
(localhost) #

(localhost) #show ip dhcp class configuration Class1

Class: Class1
Remote ID Circuit ID

COACH1 1/0/13
```

### 3.14.33 show ip dhcp conflict

This command displays address conflicts logged by the DHCP Server. If no IP address is specified, all the conflicting addresses are displayed.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| <b>Format</b> | show ip dhcp conflict [ <i>ip-address</i> ]                                              |
| <b>Modes</b>  | <ul style="list-style-type: none"> <li>• Privileged EXEC</li> <li>• User EXEC</li> </ul> |

| Parameter        | Description                                                                    |
|------------------|--------------------------------------------------------------------------------|
| IP address       | The IP address of the host as recorded on the DHCP server.                     |
| Detection Method | The manner in which the IP address of the hosts were found on the DHCP Server. |
| Detection time   | The time when the conflict was found.                                          |

## 3.15 DNS Client Commands

These commands are used in the Domain Name System (DNS), an Internet directory service. DNS is how domain names are translated into IP addresses. When enabled, the DNS client provides a hostname lookup service to other components of FASTPATH.

### 3.15.1 ip domain lookup

Use this command to enable the DNS client.

|                |                  |
|----------------|------------------|
| <b>Default</b> | enabled          |
| <b>Format</b>  | ip domain lookup |
| <b>Mode</b>    | Global Config    |

### 3.15.1.1 no ip domain lookup

Use this command to disable the DNS client.

**Format**           no ip domain lookup  
**Mode**             Global Config

### 3.15.2 ip domain name

Use this command to define a default domain name that FASTPATH software uses to complete unqualified host names (names with a domain name). By default, no default domain name is configured in the system. *name* may not be longer than 255 characters and should not include an initial period. This *name* should be used only when the default domain name list, configured using the `ip domain list` command, is empty.

**Default**           none  
**Format**           ip domain name *name*  
**Mode**             Global Config

**Example:** The CLI command `ip domain name yahoo.com` will configure yahoo.com as a default domain name. For an unqualified hostname xxx, a DNS query is made to find the IP address corresponding to xxx.yahoo.com.

#### 3.15.2.1 no ip domain name

Use this command to remove the default domain name configured using the `ip domain name` command.

**Format**           no ip domain name  
**Mode**             Global Config

### 3.15.3 ip domain list

Use this command to define a list of default domain names to complete unqualified names. By default, the list is empty. Each name must be no more than 256 characters, and should not include an initial period. The default domain name, configured using the `ip domain name` command, is used only when the default domain name list is empty. A maximum of 32 names can be entered in to this list.

**Default**           none  
**Format**           ip domain list *name*  
**Mode**             Global Config

#### 3.15.3.1 no ip domain list

Use this command to delete a name from a list.

**Format**           no ip domain list *name*  
**Mode**             Global Config

### 3.15.4 ip name-server

Use this command to configure the available name servers. Up to eight servers can be defined in one command or by using multiple commands. The parameter `server-address` is a valid IPv4 or IPv6 address of the server. The preference of the servers is determined by the order they were entered.

**Format**           ip name-server *server-address1* [*server-address2*...*server-address8*]  
**Mode**             Global Config

### 3.15.4.1 no ip name server

Use this command to remove a name server.

**Format**           no ip name-server *[[server-address1...server-address8]*  
**Mode**             Global Config

### 3.15.5 ip name source-interface

Use this command to specify the physical or logical interface to use as the DNS client (IP name) source interface (source IP address) for the DNS client management application. If configured, the address of source Interface is used for all DNS communications between the DNS server and the DNS client. The selected source-interface IP address is used for filling the IP header of management protocol packets. This allows security devices (firewalls) to identify the source packets coming from the specific switch. If a source-interface is not specified, the primary IP address of the originating (out-bound) interface is used as the source address. If the configured interface is down, the DNS client falls back to its default behavior.

**Format**           ip name source-interface {*unit/slot/port* | *loopback loopback-id* | *tunnel tunnel-id*  
                       | *vlan vlan-id*}  
**Mode**             Global Config

#### 3.15.5.1 no ip name source-interface

Use this command to reset the DNS source interface to the default settings.

**Format**           no ip name source-interface  
**Mode**             Global Config

### 3.15.6 ip host

Use this command to define static host name-to-address mapping in the host cache. The parameter *name* is host name and *ip address* is the IP address of the host. The hostname can include 1–255 alphanumeric characters, periods, hyphens, underscores, and non-consecutive spaces. Hostnames that include one or more space must be enclosed in quotation marks, for example "lab-pc 45".

**Default**          none  
**Format**           ip host *name ipaddress*  
**Mode**             Global Config

#### 3.15.6.1 no ip host

Use this command to remove the name-to-address mapping.

**Format**           no ip host *name*  
**Mode**             Global Config

### 3.15.7 ipv6 host

Use this command to define static host name-to-IPv6 address mapping in the host cache. The parameter *name* is host name and *v6 address* is the IPv6 address of the host. The hostname can include 1–255 alphanumeric characters, periods, hyphens, and spaces. Hostnames that include one or more space must be enclosed in quotation marks, for example "lab-pc 45".

**Default**          none  
**Format**           ipv6 host *name v6 address*  
**Mode**             Global Config

### 3.15.7.1 no ipv6 host

Use this command to remove the static host name-to-IPv6 address mapping in the host cache.

**Format**           no ipv6 host *name*  
**Mode**             Global Config

### 3.15.8 ip domain retry

Use this command to specify the number of times to retry sending Domain Name System (DNS) queries. The parameter *number* indicates the number of times to retry sending a DNS query to the DNS server. This number ranges from 0 to 100.

**Default**           2  
**Format**           ip domain retry *number*  
**Mode**             Global Config

#### 3.15.8.1 no ip domain retry

Use this command to return to the default.

**Format**           no ip domain retry *number*  
**Mode**             Global Config

### 3.15.9 ip domain timeout

Use this command to specify the amount of time to wait for a response to a DNS query. The parameter *seconds* specifies the time, in seconds, to wait for a response to a DNS query. The parameter *seconds* ranges from 0 to 3600.

**Default**           3  
**Format**           ip domain timeout *seconds*  
**Mode**             Global Config

#### 3.15.9.1 no ip domain timeout

Use this command to return to the default setting.

**Format**           no ip domain timeout *seconds*  
**Mode**             Global Config

### 3.15.10 clear host

Use this command to delete entries from the host name-to-address cache. This command clears the entries from the DNS cache maintained by the software. This command clears both IPv4 and IPv6 entries.

**Format**           clear host {*name* | all}  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                |
|-----------|--------------------------------------------------------------------------------------------|
| name      | A particular host entry to remove. The parameter <i>name</i> ranges from 1-255 characters. |
| all       | Removes all entries.                                                                       |

### 3.15.11 show hosts

Use this command to display the default domain name, a list of name server hosts, the static and the cached list of host names and addresses. The parameter `name` ranges from 1-255 characters. This command displays both IPv4 and IPv6 entries. To display resolution for a given hostname, the optional `hostname` argument can be specified.

**Format**            `show hosts [hostname]`

**Mode**             Privileged EXEC  
                      User EXEC

| Parameter                   | Description                                                                                                                                                                            |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Host Name                   | Domain host name.                                                                                                                                                                      |
| Default Domain              | Default domain name.                                                                                                                                                                   |
| Default Domain List         | Default domain list.                                                                                                                                                                   |
| Domain Name Lookup          | DNS client enabled/disabled.                                                                                                                                                           |
| Number of Retries           | Number of time to retry sending Domain Name System (DNS) queries.                                                                                                                      |
| Retry Timeout Period        | Amount of time to wait for a response to a DNS query.                                                                                                                                  |
| Name Servers                | Configured name servers.                                                                                                                                                               |
| DNS Client Source Interface | Shows the configured source interface (source IP address) used for a DNS client. The IP address of the selected interface is used as source IP for all communications with the server. |

**Example:** The following shows example CLI display output for the command.

(Switching) `show hosts`

```
Host name..... Device
Default domain..... gm.com
Default domain list..... yahoo.com, Stanford.edu, rediff.com
Domain Name lookup..... Enabled
Number of retries..... 5
Retry timeout period..... 1500
Name servers (Preference order)... 176.16.1.18 176.16.1.19
DNS Client Source Interface..... (not configured)
```

Configured host name-to-address mapping:

```
Host Addresses

accounting.gm.com 176.16.8.8

Host Total Elapsed Type Addresses

www.stanford.edu 72 3 IP 171.64.14.203
```

### 3.15.12 show ip name source-interface

Use this command to display the configured source interface details used for a DNS client. The IP address of the selected interface is used as source IP for all communications with the server.

**Format**            `show ip name source-interface`

**Mode**             Privileged EXEC

## 3.16 IP Address Conflict Commands

The commands in this section help troubleshoot IP address conflicts.

### 3.16.1 ip address-conflict-detect run

This command triggers the switch to run active address conflict detection by sending gratuitous ARP packets for IPv4 addresses on the switch.

**Format** ip address-conflict-detect run

**Mode**

- Global Config

### 3.16.2 show ip address-conflict

This command displays the status information corresponding to the last detected address conflict.

**Format** show ip address-conflict

**Modes** Privileged EXEC

| Parameter                         | Description                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------|
| Address Conflict Detection Status | Identifies whether the switch has detected an address conflict on any IP address.          |
| Last Conflicting IP Address       | The IP Address that was last detected as conflicting on any interface.                     |
| Last Conflicting MAC Address      | The MAC Address of the conflicting host that was last detected on any interface.           |
| Time Since Conflict Detected      | The time in days, hours, minutes and seconds since the last address conflict was detected. |

### 3.16.3 clear ip address-conflict-detect

This command clears the detected address conflict status information for the specified virtual router. If no router is specified, the command is executed for the default router.

**Format** clear ip address-conflict-detect

**Modes** Privileged EXEC

## 3.17 Serviceability Packet Tracing Commands

These commands improve the capability of network engineers to diagnose conditions affecting their FASTPATH product.

**CAUTION!** The output of "debug" commands can be long and may adversely affect system performance.

### 3.17.1 capture start

Use the command `capture start` to manually start capturing CPU packets for packet trace.

The packet capture operates in three modes:

- capture file
- remote capture
- capture line

The command is not persistent across a reboot cycle.

**Format** capture start [{all | receive | transmit}]

**Mode** Privileged EXEC

| Parameter | Description                       |
|-----------|-----------------------------------|
| all       | Capture all traffic.              |
| receive   | Capture only received traffic.    |
| transmit  | Capture only transmitted traffic. |

### 3.17.2 capture stop

Use the command `capture stop` to manually stop capturing CPU packets for packet trace.

**Format**            `capture stop`  
**Mode**             Privileged EXEC

### 3.17.3 capture file | remote | line

Use this command to configure file capture options. The command is persistent across a reboot cycle.

**Format**            `capture {file|remote|line}`  
**Mode**             Global Config

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| file      | <p>In the capture file mode, the captured packets are stored in a file on NVRAM. The maximum file size defaults to 524288 bytes. The switch can transfer the file to a TFTP server using TFTP, SFTP, SCP using CLI, and SNMP.</p> <p>The file is formatted in pcap format, is named <code>cpuPktCapture.pcap</code>, and can be examined using network analyzer tools such as Wireshark or Ethereal. Starting a file capture automatically terminates any remote capture sessions and line capturing. After the packet capture is activated, the capture proceeds until the capture file reaches its maximum size, or until the capture is stopped manually using the CLI command <code>capture stop</code>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| remote    | <p>In the remote capture mode, the captured packets are redirected in real time to an external PC running the Wireshark tool for Microsoft Windows. A packet capture server runs on the switch side and sends the captured packets using a TCP connection to the Wireshark tool.</p> <p>The remote capture can be enabled or disabled using the CLI. There should be a Windows PC with the Wireshark tool to display the captured file. When using the remote capture mode, the switch does not store any captured data locally on its file system.</p> <p>You can configure the IP port number for connecting Wireshark to the switch. The default port number is 2002. If a firewall is installed between the Wireshark PC and the switch, then these ports must be allowed to pass through the firewall. You must configure the firewall to allow the Wireshark PC to initiate TCP connections to the switch.</p> <p>If the client successfully connects to the switch, the CPU packets are sent to the client PC, then Wireshark receives the packets and displays them. This continues until the session is terminated by either end.</p> <p>Starting a remote capture session automatically terminates the file capture and line capturing.</p> |
| line      | <p>In the capture line mode, the captured packets are saved into the RAM and can be displayed on the CLI. Starting a line capture automatically terminates any remote capture session and capturing into a file. There is a maximum 128 packets of maximum 128 bytes that can be captured and displayed in line mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 3.17.4 capture remote port

Use this command to configure file capture options. The command is persistent across a reboot cycle. The `id` parameter is a TCP port number from 1024 to 49151.

**Format**            `capture remote port id`  
**Mode**             Global Config

### 3.17.5 capture file size

Use this command to configure file capture options. The command is persistent across a reboot cycle. The `max-file-size` parameter is the maximum size the pcap file can reach, which is 2 to 512 KB.

**Format** capture file size *max-file-size*  
**Mode** Global Config

### 3.17.6 capture line wrap

This command enables wrapping of captured packets in line mode when the captured packets reaches full capacity.

**Format** capture line wrap  
**Mode** Global Config

#### 3.17.6.1 no capture line wrap

This command disables wrapping of captured packets and configures capture packet to stop when the captured packet capacity is full.

**Format** no capture line wrap  
**Mode** Global Config

### 3.17.7 show capture packets

Use this command to display packets captured and saved to RAM. It is possible to capture and save into RAM, packets that are received or transmitted through the CPU. A maximum 128 packets can be saved into RAM per capturing session. A maximum 128 bytes per packet can be saved into the RAM. If a packet holds more than 128 bytes, only the first 128 bytes are saved; data more than 128 bytes is skipped and cannot be displayed in the CLI.

Capturing packets is stopped automatically when 128 packets are captured and have not yet been displayed during a capture session. Captured packets are not retained after a reload cycle.

**Format** show capture packets  
**Mode** Privileged EXEC

### 3.17.8 cpu-traffic direction interface

Use this command to associate CPU filters to an interface or list of interfaces. The interfaces can be a physical or logical LAG. The statistics counters are updated only for the configured interfaces. The traces can also be obtained for the configured interfaces.

---

#### **NOTICE**

The offset should consider the VLAN tag headers as the packet to the CPU is always a tagged packet.

---

**Default** None  
**Format** cpu-traffic direction {tx|rx|both} interface *interface-range*  
**Mode** Global Config

#### 3.17.8.1 no cpu-traffic direction interface

Use this command to remove all interfaces from the CPU filters.

**Format** no cpu-traffic direction {tx|rx|both} interface *interface-range*  
**Mode** Global Config



### 3.17.9 cpu-traffic direction match cust-filter

Use this command to configure a custom filter. The statistics and/or traces for configured filters are obtained for the packet matching configured data at the specific offset. If the mask is not specified then the default mask is 0xFF. There can be three different offsets specified as match conditions. Each time a custom filter is configured, the switch overrides the previous configuration.

---

**NOTICE**

The offset should consider the VLAN tag headers as the packet to the CPU is always a tagged packet.

---

**Default** None  
**Format** `cpu-traffic direction {tx|rx|both} match cust-filter offset1 data1 [mask1 mask1] offset2 data2 [mask2 mask2] offset3 data3 [mask3 mask3]`  
**Mode** Global Config

#### 3.17.9.1 no cpu-traffic direction match cust-filter

Use this command to remove the configured custom filter.

**Format** `no cpu-traffic direction {tx|rx|both} match cust-filter offset1 data1 [mask1 mask1] offset2 data2 [mask2 mask2] offset3 data3 [mask3 mask3]`  
**Mode** Global Config

### 3.17.10 cpu-traffic direction match srcip

Use this command to configure the source IP address-specific filter. The statistics and/or the traces for configured filters are obtained for the packet matching configured source IP/mask.

**Default** None  
**Format** `cpu-traffic direction {tx|rx|both} match srcip ipaddress [mask mask]`  
**Mode** Global Config

#### 3.17.10.1 no cpu-traffic direction match srcip

Use this command to disable the configured source IP address filter.

**Format** `no cpu-traffic direction {tx|rx|both} match srcip ipaddress [mask mask]`  
**Mode** Global Config

### 3.17.11 cpu-traffic direction match dstip

Use this command to configure the destination IP address-specific filter. The statistics and/or the traces for configured filters are obtained for the packet matching configured destination IP/mask.

**Default** None  
**Format** `cpu-traffic direction {tx|rx|both} match dstip ipaddress [mask mask]`  
**Mode** Global Config

#### 3.17.11.1 no cpu-traffic direction match dstip

Use this command to disable the configured destination IP address filter.

**Format** `no cpu-traffic direction {tx|rx|both} match dstip ipaddress [mask mask]`  
**Mode** Global Config

### 3.17.12 `cpu-traffic direction match tcp`

Use this command to configure the source or destination TCP port-specific filter. The statistics and/or traces for configured filters are obtained for the packet matching configured source/destination TCP port.

**Default**           None  
**Format**           `cpu-traffic direction {tx|rx|both} match {srctcp|dsttcp} port [mask mask]`  
**Mode**             Global Config

#### 3.17.12.1 `no cpu-traffic direction match tcp`

Use this command to remove the configured source/destination TCP port filter.

**Format**           `no cpu-traffic direction {tx|rx|both} match {srctcp|dsttcp} port [mask mask]`  
**Mode**             Global Config

### 3.17.13 `cpu-traffic direction match udp`

Use this command to configure the source or destination UDP port-specific filter. The statistics and/or traces for configured filters are obtained for the packet matching configured source/destination UDP port.

**Default**           None  
**Format**           `cpu-traffic direction {tx|rx|both} match {srcudp|dstudp} port [mask mask]`  
**Mode**             Global Config

#### 3.17.13.1 `no cpu-traffic direction match udp`

Use this command to remove the configured source/destination UDP port filter.

**Format**           `no cpu-traffic direction {tx|rx|both} match {srcudp|dstudp} port [mask mask]`  
**Mode**             Global Config

### 3.17.14 `cpu-traffic mode`

Use this command to configure CPU-traffic mode. The packets in the RX/TX direction are matched when the mode is enabled.

**Default**           Disabled  
**Format**           `cpu-traffic mode`  
**Mode**             Global Config

#### 3.17.14.1 `no cpu-traffic mode`

Use this command to disable CPU-traffic mode.

**Format**           `no cpu-traffic mode`  
**Mode**             Global Config

### 3.17.15 `cpu-traffic trace`

Use this command to configure CPU packet tracing. The packet can be received by multiple components. If the feature is enabled and tracing configured, the packets are traced per the defined filter. If dump-pkt is enabled, the first 64 bytes of the packet are displayed along with the trace statistics.

**Default** Disabled  
**Format** cpu-traffic trace {dump-pkt}  
**Mode** Global Config

### 3.17.15.1 no cpu-traffic trace

Use this command to disable CPU packet tracing and dump-pkt (if configured).

**Format** no cpu-traffic trace {dump-pkt}  
**Mode** Global Config

### 3.17.16 show cpu-traffic

Use this command to display the current configuration parameters.

**Default** None  
**Format** show cpu-traffic  
**Mode** Privileged EXEC

**Example:** The following shows example command output.

(Routing) #show cpu-traffic

```
Admin Mode..... Disable
Packet Trace..... Disable
Packet Dump..... Disable

Direction TX:
Filter Options..... N/A
Interface..... N/A
Src TCP parameters..... 0 0
Dst TCP parameters..... 0 0
Src UDP parameters..... 0 0
Dst UDP parameters..... 0 0
Src IP parameters..... 0.0.0.0 0.0.0.0
Dst IP parameters..... 0.0.0.0 0.0.0.0
Src MAC parameters..... 00:00:00:00:00:00 00:00:00:00:00:00
Dst MAC parameters..... 00:00:00:00:00:00 00:00:00:00:00:00
Custom filter parameters1..... Offset=0x0 Value=0x0 Mask=0x0
Custom filter parameters2..... Offset=0x0 Value=0x0 Mask=0x0
Custom filter parameters3..... Offset=0x0 Value=0x0 Mask=0x0

Direction RX:
Filter Options..... N/A
Interface..... N/A
Src TCP parameters..... 0 0
Dst TCP parameters..... 0 0
Src UDP parameters..... 0 0
Dst UDP parameters..... 0 0
Src IP parameters..... 0.0.0.0 0.0.0.0
Dst IP parameters..... 0.0.0.0 0.0.0.0
Src MAC parameters..... 00:00:00:00:00:00 00:00:00:00:00:00
Dst MAC parameters..... 00:00:00:00:00:00 00:00:00:00:00:00
Custom filter parameters1..... Offset=0x0 Value=0x0 Mask=0x0
Custom filter parameters2..... Offset=0x0 Value=0x0 Mask=0x0
Custom filter parameters3..... Offset=0x0 Value=0x0 Mask=0x0
```

### 3.17.17 show cpu-traffic interface

Use this command to display per interface statistics for configured filters. The statistics can be displayed for a specific filter (for example, stp, udld, arp, and so on). If no filter is specified, statistics are displayed for all configured filters. Similarly, source/destination IP, TCP, UDP or MAC along with custom filter can be used as command option to get statistics.

**Default** None  
**Format** show cpu-traffic interface {all | slot/port | cpu } filter  
**Mode** Privileged EXEC

### 3.17.18 show cpu-traffic summary

Use this command to display summary statistics for configured filters for all interfaces.

**Default** None  
**Format** show cpu-traffic summary  
**Mode** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) #show cpu-traffic summary
Filter Received Transmitted

STP 4294967296 4294967296
LACPDU 0 0
GMRP 4294967296 4294967296
ARP 0 0
GVRP 4294967296 4294967296
UDLD 0 0
BCAST 4294967296 4294967296
MCAST 0 0
UCAST 4294967296 4294967296
SRCIP 0 0
DSTIP 4294967296 4294967296
SRCMAC 0 0
DSTMAC 4294967296 4294967296
SRCPORT 0 0
```

### 3.17.19 show cpu-traffic trace

Use this command to display traced information. The trace information can be displayed either for all available packets or for specific filter (for example, stp, udld, arp etc). Similarly, source/destination IP or MAC along with custom filter can be used as command option to get specific traces from history. If enabled, packet dump information is displayed along with packet trace statistics. By default, packet dump buffer size is set to store first 64 bytes of packet.

**Default** None  
**Format** show cpu-traffic trace filter  
**Mode** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) #show cpu-traffic summary
Packet #1: IP; DHCP; UCAST; SRCMAC=00:10:10:10:10:10;
<08:06:10> Sysnet received in sysNetNotifyPduReceive()
<08:06:10> Packet delivered to IP using ipMapRecvIP()
<08:06:10> Freed
0000 00 10 18 82 18 b3 00 10 10 10 10 81 00 00 01
0010 08 00 45 10 01 21 00 00 00 40 11 79 bd 00 00 ..E..!....@.y...
0020 00 00 ff ff ff ff 00 44 00 43 01 0d 48 10 03 01 D.C..H...
```



### 3.17.23 debug arp

Use this command to enable ARP debug protocol messages.

|                |                 |
|----------------|-----------------|
| <b>Default</b> | disabled        |
| <b>Format</b>  | debug arp       |
| <b>Mode</b>    | Privileged EXEC |

#### 3.17.23.1 no debug arp

Use this command to disable ARP debug protocol messages.

|               |                 |
|---------------|-----------------|
| <b>Format</b> | no debug arp    |
| <b>Mode</b>   | Privileged EXEC |

### 3.17.24 debug authentication

This command displays either the debug trace for either a single event or all events for an interface.

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Default</b> | none                                                       |
| <b>Format</b>  | debug authentication packet {all   event} <i>interface</i> |
| <b>Mode</b>    | Privileged EXEC                                            |

### 3.17.25 debug auto-voip

Use this command to enable Auto VOIP debug messages. Use the optional parameters to trace H323, SCCP, or SIP packets respectively.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | disabled                            |
| <b>Format</b>  | debug auto-voip [H323 SCCP SIP oui] |
| <b>Mode</b>    | Privileged EXEC                     |

#### 3.17.25.1 no debug auto-voip

Use this command to disable Auto VOIP debug messages.

|               |                    |
|---------------|--------------------|
| <b>Format</b> | no debug auto-voip |
| <b>Mode</b>   | Privileged EXEC    |

### 3.17.26 debug bonjour

Use this command to enable Bonjour tracing.

|                |                                   |
|----------------|-----------------------------------|
| <b>Default</b> | disabled                          |
| <b>Format</b>  | debug bonjour [{level1   level2}] |
| <b>Mode</b>    | Privileged EXEC                   |

#### 3.17.26.1 no debug bonjour

Use this command to disable Bonjour tracing.

|               |                                      |
|---------------|--------------------------------------|
| <b>Format</b> | no debug bonjour [{level1   level2}] |
| <b>Mode</b>   | Privileged EXEC                      |

### 3.17.27 debug clear

This command disables all previously enabled "debug" traces.

|                |                 |
|----------------|-----------------|
| <b>Default</b> | disabled        |
| <b>Format</b>  | debug clear     |
| <b>Mode</b>    | Privileged EXEC |

### 3.17.28 debug console

This command enables the display of "debug" trace output on the login session in which it is executed. Debug console display must be enabled to view any trace output. The output of debug trace commands will appear on all login sessions for which debug console has been enabled. The configuration of this command remains in effect for the life of the login session. The effect of this command is not persistent across resets.

|                |                 |
|----------------|-----------------|
| <b>Default</b> | disabled        |
| <b>Format</b>  | debug console   |
| <b>Mode</b>    | Privileged EXEC |

#### 3.17.28.1 no debug console

This command disables the display of "debug" trace output on the login session in which it is executed.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no debug console |
| <b>Mode</b>   | Privileged EXEC  |

### 3.17.29 debug crashlog

Use this command to view information contained in the crash log file that the system maintains when it experiences an unexpected reset. The crash log file contains the following information:

- Call stack information in both primitive and verbose forms
- Log Status
- Buffered logging
- Event logging
- Persistent logging
- System Information (output of sysapiMbufDump)
- Message Queue Debug Information
- Memory Debug Information
- Memory Debug Status
- OS Information (output of osapiShowTasks)
- proc information (meminfo, cpuinfo, interrupts, version and net/sockstat)

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                            |
| <b>Format</b>  | debug crashlog {[kernel] crashLog-number [upload url]   proc   verbose   deleteall} |
| <b>Mode</b>    | Privileged EXEC                                                                     |

| Parameter       | Description                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| kernel          | View the crash log file for the kernel                                                                                                          |
| crashlog-number | Specifies the file number to view. The system maintains up to four copies, and the valid range is 1 to 4.                                       |
| upload url      | To upload the crash log (or crash dump) to a TFTP server, use the <code>upload</code> keyword and specify the required TFTP server information. |
| proc            | View the application process crashlog.                                                                                                          |

| Parameter            | Description                                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| verbose              | Enable the verbose crashlog.                                                                                                    |
| deleteall            | Delete all crash log files on the system.                                                                                       |
| data                 | Crash log data recorder.                                                                                                        |
| crashdump-number     | Specifies the crash dump number to view. The valid range is 0 to 2.                                                             |
| download url         | To download a crash dump to the switch, use the <code>download</code> keyword and specify the required TFTP server information. |
| component-id         | The ID of the component that caused the crash.                                                                                  |
| item-number          | The item number.                                                                                                                |
| additional-parameter | Additional parameters to include.                                                                                               |

### 3.17.30 debug dcbx packet

Use this command to enable debug tracing for DCBX packets that are transmitted or received.

|                |                                                     |
|----------------|-----------------------------------------------------|
| <b>Default</b> | disabled                                            |
| <b>Format</b>  | <code>debug dcbx packet {receive   transmit}</code> |
| <b>Mode</b>    | Privileged EXEC                                     |

### 3.17.31 debug debug-config

Use this command to download or upload the `debug-config.ini` file. The `debug-config.ini` file executes CLI commands (including the `devshell` and `drivshell` commands) on specific predefined events. The debug config file is created manually and downloaded to the switch.

|                |                                                                             |
|----------------|-----------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                    |
| <b>Format</b>  | <code>debug debug-config {download &lt;url&gt;   upload &lt;url&gt;}</code> |
| <b>Mode</b>    | Privileged EXEC                                                             |

### 3.17.32 debug dhcp packet

This command displays "debug" information about DHCPv4 client activities and traces DHCPv4 packets to and from the local DHCPv4 client.

|                |                                                     |
|----------------|-----------------------------------------------------|
| <b>Default</b> | disabled                                            |
| <b>Format</b>  | <code>debug dhcp packet [transmit   receive]</code> |
| <b>Mode</b>    | Privileged EXEC                                     |

#### 3.17.32.1 no debug dhcp

This command disables the display of "debug" trace output for DHCPv4 client activity.

|               |                                                        |
|---------------|--------------------------------------------------------|
| <b>Format</b> | <code>no debug dhcp packet [transmit   receive]</code> |
| <b>Mode</b>   | Privileged EXEC                                        |

### 3.17.33 debug dot1ag

Use this command to enable debugging of the messages sent between MPs and MEPs.

|                |                                                                              |
|----------------|------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                     |
| <b>Format</b>  | <code>debug dot1ag {all   ccm   events   lbm   lbr   ltm   ltr   pdu}</code> |
| <b>Mode</b>    | Privileged EXEC                                                              |



| Parameter | Description                                                                                                                                                                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| all       | Debug all dot1ag message types.                                                                                                                                                                                                                                                                             |
| CCM       | Configure debug flags for Continuity Check Message information. A multicast CFM PDU transmitted periodically by an MEP to ensure continuity over the MA to which the transmitting MEP belongs. No reply is sent by any MP in response to receiving a CCM.                                                   |
| LTM       | Configure debug flags for Linktrace Message information. A CFM PDU initiated by a MEP to trace a path to a target MAC address, forwarded from MIP to MIP, up to the point at which the LTM reaches its target, a MEP, or can no longer be forwarded. Each MP along the path to the target generates an LTR. |
| LTR       | Configure debug flags for Linktrace Reply information. A unicast CFM PDU sent by an MP to a MEP, in response to receiving an LTM from that MEP.                                                                                                                                                             |
| LBM       | Configure debug flags for Loopback Message information. A unicast CFM PDU transmitted by a MEP, addressed to a specific MP, in the expectation of receiving an LBR.                                                                                                                                         |
| LBR       | Configure debug flags for Loopback Reply information. A unicast CFM PDU transmitted by an MP to a MEP, in response to an LBM received from that MEP.                                                                                                                                                        |
| PDU       | Configure debug flags for CFM PDU information.                                                                                                                                                                                                                                                              |

### 3.17.34 debug dot1x packet

Use this command to enable dot1x packet debug trace.

|                |                 |
|----------------|-----------------|
| <b>Default</b> | disabled        |
| <b>Format</b>  | debug dot1x     |
| <b>Mode</b>    | Privileged EXEC |

#### 3.17.34.1 no debug dot1x packet

Use this command to disable dot1x packet debug trace.

|               |                 |
|---------------|-----------------|
| <b>Format</b> | no debug dot1x  |
| <b>Mode</b>   | Privileged EXEC |

### 3.17.35 debug dynamic ports

Use this command to enable dynamic port debug messages.

|                |                     |
|----------------|---------------------|
| <b>Default</b> | disabled            |
| <b>Format</b>  | debug dynamic ports |
| <b>Mode</b>    | Privileged EXEC     |

#### 3.17.35.1 no debug dynamic port

Use this command to disable dynamic port debug messages.

|               |                        |
|---------------|------------------------|
| <b>Format</b> | no debug dynamic ports |
| <b>Mode</b>   | Privileged EXEC        |

### 3.17.36 debug fip-snooping packet

Use the debug `fip-snooping packet` command in Privileged EXEC mode to enable FIP packet debug trace on transmit or receive path with different filter options configured.

|                |                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                                                                                  |
| <b>Format</b>  | <code>debug fip-snooping packet [{transmit   receive   filter {dst-mac <i>mac-addr</i>   fip-proto-code 1-15   src-intf <i>slot/port</i>   src-mac <i>mac-addr</i>   vlan 1-4093}]</code> |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• User EXEC</li> <li>• Privileged EXEC</li> </ul>                                                                                                  |

| Parameter      | Description                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------|
| dst-mac        | If the dst-mac filter option is given, trace output is filtered on matching the given Destination MAC Address. |
| fip-proto-code | If the fip-proto-code filter option is given, trace output is filtered on matching the supported types.        |
| src-intf       | If the src-intf filter option is given, trace output is filtered on matching the incoming source interface.    |
| src-mac        | If the src-mac filter option is given, trace output is filtered on matching the given Source MAC Address.      |
| vlan           | If the vlan filter option is given, trace output is filtered on matching the given VLAN ID.                    |

### 3.17.36.1 no debug fip-snooping packet

Use the `no debug fip-snooping packet` command in Privileged EXEC mode to disable FIP packet debug trace on transmit or receive path with different filter options configured.

|               |                                                                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no debug fip-snooping packet [{transmit   receive   filter {dst-mac <i>mac-addr</i>   fip-proto-code 1-15   src-intf <i>slot/port</i>   src-mac <i>mac-addr</i>   vlan 1-4093}]</code> |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• User EXEC</li> <li>• Privileged EXEC</li> </ul>                                                                                                     |

### 3.17.37 debug igmpsnooping packet

This command enables tracing of IGMP Snooping packets received and transmitted by the switch.

|                |                                        |
|----------------|----------------------------------------|
| <b>Default</b> | disabled                               |
| <b>Format</b>  | <code>debug igmpsnooping packet</code> |
| <b>Mode</b>    | Privileged EXEC                        |

### 3.17.37.1 no debug igmpsnooping packet

This command disables tracing of IGMP Snooping packets.

|               |                                           |
|---------------|-------------------------------------------|
| <b>Format</b> | <code>no debug igmpsnooping packet</code> |
| <b>Mode</b>   | Privileged EXEC                           |

### 3.17.38 debug igmpsnooping packet transmit

This command enables tracing of IGMP Snooping packets transmitted by the switch. Snooping should be enabled on the device and the interface to monitor packets for a particular interface.

|                |                                                 |
|----------------|-------------------------------------------------|
| <b>Default</b> | disabled                                        |
| <b>Format</b>  | <code>debug igmpsnooping packet transmit</code> |
| <b>Mode</b>    | Privileged EXEC                                 |

The following shows a sample output of the trace message.

```
<15> JAN 01 02:45:06 192.168.17.29-1 IGMP Snooping[185429992]: igmp_snooping_debug.c(116) 908 % Pkt TX
- Intf: 1/0/20(20), Vlan_Id:1 Src_Mac: 00:03:0e:00:00:00 Dest_Mac: 01:00:5e:00:00:01 Src_IP: 9.1.1.1
Dest_IP: 225.0.0.1 Type: V2_Membership_Report Group: 225.0.0.1
```

The following parameters are displayed in the trace message.

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TX        | A packet transmitted by the device.                                                                                                                                                                                                                                                                                                                                                                           |
| Intf      | The interface that the packet went out on. Format used is unit/slot/port (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device.                                                                                                                                                                                                                                      |
| Src_Mac   | Source MAC address of the packet.                                                                                                                                                                                                                                                                                                                                                                             |
| Dest_Mac  | Destination multicast MAC address of the packet.                                                                                                                                                                                                                                                                                                                                                              |
| Src_IP    | The source IP address in the IP header in the packet.                                                                                                                                                                                                                                                                                                                                                         |
| Dest_IP   | The destination multicast IP address in the packet.                                                                                                                                                                                                                                                                                                                                                           |
| Type      | The type of IGMP packet. Type can be one of the following: <ul style="list-style-type: none"> <li>Membership Query – IGMP Membership Query</li> <li>V1_Membership_Report – IGMP Version 1 Membership Report</li> <li>V2_Membership_Report – IGMP Version 2 Membership Report</li> <li>V3_Membership_Report – IGMP Version 3 Membership Report</li> <li>V2_Leave_Group – IGMP Version 2 Leave Group</li> </ul> |
| Group     | Multicast group address in the IGMP header.                                                                                                                                                                                                                                                                                                                                                                   |

### 3.17.38.1 no debug igmpsnooping transmit

This command disables tracing of transmitted IGMP snooping packets.

**Format** no debug igmpsnooping transmit

**Mode** Privileged EXEC

### 3.17.39 debug igmpsnooping packet receive

This command enables tracing of IGMP Snooping packets received by the switch. Snooping should be enabled on the device and the interface to monitor packets for a particular interface.

**Default** disabled

**Format** debug igmpsnooping packet receive

**Mode** Privileged EXEC

The following shows a sample output of the trace message.

```
<15> JAN 01 02:45:06 192.168.17.29-1 IGMP Snooping[185429992]: igmp_snooping_debug.c(116) 908 % Pkt RX
- Intf: 1/0/20(20), Vlan_Id:1 Src_Mac: 00:03:0e:00:00:10 Dest_Mac: 01:00:5e:00:00:05 Src_IP:
11.1.1.1 Dest_IP: 225.0.0.5 Type: Membership_Query Group: 225.0.0.5
```

The following parameters are displayed in the trace message:

| Parameter | Description                                                                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RX        | A packet received by the device.                                                                                                                                         |
| Intf      | The interface that the packet went out on. Format used is unit/slot/port (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device. |
| Src_Mac   | Source MAC address of the packet.                                                                                                                                        |
| Dest_Mac  | Destination multicast MAC address of the packet.                                                                                                                         |
| Src_IP    | The source IP address in the ip header in the packet.                                                                                                                    |
| Dest_IP   | The destination multicast ip address in the packet.                                                                                                                      |

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type      | The type of IGMP packet. Type can be one of the following: <ul style="list-style-type: none"> <li>Membership_Query – IGMP Membership Query</li> <li>V1_Membership_Report – IGMP Version 1 Membership Report</li> <li>V2_Membership_Report – IGMP Version 2 Membership Report</li> <li>V3_Membership_Report – IGMP Version 3 Membership Report</li> <li>V2_Leave_Group – IGMP Version 2 Leave Group</li> </ul> |
| Group     | Multicast group address in the IGMP header.                                                                                                                                                                                                                                                                                                                                                                   |

### 3.17.39.1 no debug igmpsnooping receive

This command disables tracing of received IGMP Snooping packets.

**Format** no debug igmpsnooping receive  
**Mode** Privileged EXEC

### 3.17.40 debug ip acl

Use this command to enable debug of IP Protocol packets matching the ACL criteria.

**Default** disabled  
**Format** debug ip acl *acl Number*  
**Mode** Privileged EXEC

#### 3.17.40.1 no debug ip acl

Use this command to disable debug of IP Protocol packets matching the ACL criteria.

**Format** no debug ip acl *acl Number*  
**Mode** Privileged EXEC

### 3.17.41 debug ip dvmrp packet

Use this command to trace DVMRP packet reception and transmission. *receive* traces only received DVMRP packets and *transmit* traces only transmitted DVMRP packets. When neither keyword is used in the command, then all DVMRP packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console

**Default** disabled  
**Format** debug ip dvmrp packet [*receive | transmit*]  
**Mode** Privileged EXEC

#### 3.17.41.1 no debug ip dvmrp packet

Use this command to disable debug tracing of DVMRP packet reception and transmission.

**Format** no debug ip dvmrp packet [*receive | transmit*]  
**Mode** Privileged EXEC

### 3.17.42 debug ip igmp packet

Use this command to trace IGMP packet reception and transmission. `receive` traces only received IGMP packets and `transmit` traces only transmitted IGMP packets. When neither keyword is used in the command, then all IGMP packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ip igmp packet [receive | transmit]  
**Mode** Privileged EXEC

#### 3.17.42.1 no debug ip igmp packet

Use this command to disable debug tracing of IGMP packet reception and transmission.

**Format** no debug ip igmp packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.43 debug ip mcache packet

Use this command for tracing MDATA packet reception and transmission. `receive` traces only received data packets and `transmit` traces only transmitted data packets. When neither keyword is used in the command, then all data packet traces are dumped. Vital information such as source address, destination address, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ip mcache packet [receive | transmit]  
**Mode** Privileged EXEC

#### 3.17.43.1 no debug ip mcache packet

Use this command to disable debug tracing of MDATA packet reception and transmission.

**Format** no debug ip mcache packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.44 debug ip pimdm packet

Use this command to trace PIMDM packet reception and transmission. `receive` traces only received PIMDM packets and `transmit` traces only transmitted PIMDM packets. When neither keyword is used in the command, then all PIMDM packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ip pimdm packet [receive | transmit]  
**Mode** Privileged EXEC

#### 3.17.44.1 no debug ip pimdm packet

Use this command to disable debug tracing of PIMDM packet reception and transmission.

**Format** no debug ip pimdm packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.45 debug ip pimsm packet

Use this command to trace PIMSM packet reception and transmission. `receive` traces only received PIMSM packets and `transmit` traces only transmitted PIMSM packets. When neither keyword is used in the command, then all PIMSM packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ip pimsm packet [receive | transmit]  
**Mode** Privileged EXEC

#### 3.17.45.1 no debug ip pimsm packet

Use this command to disable debug tracing of PIMSM packet reception and transmission.

**Format** no debug ip pimsm packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.46 debug ipv6 dhcp

This command displays "debug" information about DHCPv6 client activities and traces DHCPv6 packets to and from the local DHCPv6 client.

**Default** disabled  
**Format** debug ipv6 dhcp  
**Mode** Privileged EXEC

#### 3.17.46.1 no debug ipv6 dhcp

This command disables the display of "debug" trace output for DHCPv6 client activity.

**Format** no debug ipv6 dhcp  
**Mode** Privileged EXEC

### 3.17.47 debug ipv6 dhcp packet

Use this command to display information about DHCPv6 client activities and to trace DHCPv6 packets to and from the local DHCPv6 client. The FASTPATH DHCPv6 server already has packet tracing. This command turns the packet tracing on.

**Format** debug ipv6 dhcp packet [transmit | receive]  
**Mode** Privileged EXEC

| Parameter | Description                                                               |
|-----------|---------------------------------------------------------------------------|
| transmit  | (Optional) Enables debug tracing for only the transmitted DHCPv6 packets. |
| receive   | (Optional) Enables debug tracing for only the received DHCPv6 packets.    |

**Example:** The following shows an example of the command for transmit and receive flows for the default router.

```
(Routing) #debug ipv6 dhcp packet
```

**Example:** The following shows an example of the command for the transmit flow for the default router.

```
(Routing) #debug ipv6 dhcp packet transmit
```

**Example:** The following shows an example of the command for the receive flow for the default router.

```
(Routing) #debug ipv6 dhcp packet receive
```

**Example:** The following shows an example of the command for transmit and receive flows for the RED virtual router.

### 3.17.47.1 no debug ipv6 dhcp packet

Use the `no` form of the command to disable debugging.

**Format**            `no debug ipv6 dhcp packet [vrf <vrf-name>] [transmit | receive]`  
**Mode**             Privileged EXEC

### 3.17.48 debug ipv6 dhcp server packet

Use this command to display debug information about DHCPv6 server activities and to trace DHCPv6 packets to and from the local DHCPv6 server. The FASTPATH DHCPv6 server already has packet tracing. This command turns the packet tracing on.

**Format**            `debug ipv6 dhcp server packet [vrf <vrf-name>] [transmit | receive]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vrf       | (Optional) Specify the VRF name for which the DHCPv6 debug needs to be enabled. If the VRF argument is not used, the debug is enabled for the default router. |
| transmit  | (Optional) Enables debug tracing for only the transmitted DHCPv6 packets.                                                                                     |
| receive   | (Optional) Enables debug tracing for only the received DHCPv6 packets.                                                                                        |

**Example:** The following shows an example of the command for transmit and receive flows for the default router.

```
(Routing) #debug ipv6 dhcp server packet
```

**Example:** The following shows an example of the command for the transmit flow for the default router.

```
(Routing) #debug ipv6 dhcp server packet transmit
```

**Example:** The following shows an example of the command for the receive flow for the default router.

```
(Routing) #debug ipv6 dhcp server packet receive
```

**Example:** The following shows an example of the command for transmit and receive flows for the RED virtual router.

```
(Routing) #debug ipv6 dhcp server packet vrf red
```

**Example:** The following shows an example of the command for the transmit flow for the RED virtual router.

```
(Routing) #debug ipv6 dhcp server packet transmit vrf red
```

**Example:** The following shows an example of the command for the receive flow for the RED virtual router.

```
(Routing) #debug ipv6 dhcp server packet receive vrf red
```

### 3.17.48.1 no debug ipv6 dhcp server packet

Use the `no` form of the command to disable debugging.

**Format**            `no debug ipv6 dhcp server packet [vrf <vrf-name>] [transmit | receive]`  
**Mode**             Privileged EXEC

### 3.17.49 debug ipv6 dhcp relay packet

Use this command to display debug information about DHCPv6 relay activities and to trace DHCPv6 packets to and from the local DHCPv6 server. The FASTPATH DHCPv6 relay already has packet tracing. This command turns the packet tracing on.

**Format**            `debug ipv6 dhcp relay packet [vrf <vrf-name>] [transmit | receive]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vrf       | (Optional) Specify the VRF name for which the DHCPv6 debug needs to be enabled. If the VRF argument is not used, the debug is enabled for the default router. |
| transmit  | (Optional) Enables debug tracing for only the transmitted DHCPv6 packets.                                                                                     |
| receive   | (Optional) Enables debug tracing for only the received DHCPv6 packets.                                                                                        |

**Example:** The following shows an example of the command for transmit and receive flows for the default router.

```
(Routing) #debug ipv6 dhcp relay packet
```

**Example:** The following shows an example of the command for the transmit flow for the default router.

```
(Routing) #debug ipv6 dhcp relay packet transmit
```

**Example:** The following shows an example of the command for the receive flow for the default router.

```
(Routing) #debug ipv6 dhcp relay packet receive
```

**Example:** The following shows an example of the command for transmit and receive flows for the RED virtual router.

```
(Routing) #debug ipv6 dhcp relay packet vrf red
```

**Example:** The following shows an example of the command for the transmit flow for the RED virtual router.

```
(Routing) #debug ipv6 dhcp relay packet transmit vrf red
```

**Example:** The following shows an example of the command for the receive flow for the RED virtual router.

```
(Routing) #debug ipv6 dhcp relay packet receive vrf red
```

### 3.17.49.1 no debug ipv6 dhcp relay packet

Use the `no` form of the command to disable debugging.

**Format**           no debug ipv6 dhcp relay packet [vrf <vrf-name>] [transmit | receive]

**Mode**             Privileged EXEC

### 3.17.50 debug ipv6 mcache packet

Use this command for tracing MDATAv6 packet reception and transmission. `receive` traces only received data packets and `transmit` traces only transmitted data packets. When neither keyword is used in the command, then all data packet traces are dumped. Vital information such as source address, destination address, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default**           disabled

**Format**           debug ipv6 mcache packet [receive | transmit]

**Mode**             Privileged EXEC

### 3.17.50.1 no debug ipv6 mcache packet

Use this command to disable debug tracing of MDATAv6 packet reception and transmission.

**Format**           no debug ipv6 mcache packet [receive | transmit]

**Mode**             Privileged EXEC

### 3.17.51 debug ipv6 mld packet

Use this command to trace MLDv6 packet reception and transmission. `receive` traces only received MLDv6 packets and `transmit` traces only transmitted MLDv6 packets. When neither keyword is used in the command, then all MLDv6 packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default**           disabled

**Format**           debug ipv6 mld packet [receive | transmit]

**Mode**             Privileged EXEC



### 3.17.51.1 no debug ipv6 mld packet

Use this command to disable debug tracing of MLDv6 packet reception and transmission.

**Format** no debug ipv6 mld packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.52 debug ipv6 ospfv3 packet

Use this command to enable IPv6 OSPFv3 packet debug trace. Use the `vrf` argument to enable tracing of OSPFv3 packets received and transmitted in the specified virtual router instance.

**Default** disabled  
**Format** debug ipv6 ospfv3 packet [vrf *vrf-name*]  
**Mode** Privileged EXEC

### 3.17.52.1 no debug ipv6 ospfv3 packet

Use this command to disable tracing of IPv6 OSPFv3 packets.

**Format** no debug ipv6 ospfv3 packet  
**Mode** Privileged EXEC

### 3.17.53 debug ipv6 pimdm packet

Use this command to trace PIMDMv6 packet reception and transmission. `receive` traces only received PIMDMv6 packets and `transmit` traces only transmitted PIMDMv6 packets. When neither keyword is used in the command, then all PIMDMv6 packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ipv6 pimdm packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.53.1 no debug ipv6 pimdm packet

Use this command to disable debug tracing of PIMDMv6 packet reception and transmission.

### 3.17.54 debug ipv6 pimsm packet

Use this command to trace PIMSMv6 packet reception and transmission. `receive` traces only received PIMSMv6 packets and `transmit` traces only transmitted PIMSMv6 packets. When neither keyword is used in the command, then all PIMSMv6 packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

**Default** disabled  
**Format** debug ipv6 pimsm packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.54.1 no debug ipv6 pimsm packet

Use this command to disable debug tracing of PIMSMv6 packet reception and transmission.

**Format** no debug ipv6 pimsm packet [receive | transmit]  
**Mode** Privileged EXEC

### 3.17.55 debug ipv6 ping packet

Use this command to enable tracing of the ICMPv6 Echo request and response packets transmitted and received. Specifying the `vrf` argument enables tracing of the packets in the virtual router instance.

|                |                                                    |
|----------------|----------------------------------------------------|
| <b>Default</b> | disabled                                           |
| <b>Format</b>  | <code>debug ipv6 ping packet [vrf vrf-name]</code> |
| <b>Mode</b>    | Privileged EXEC                                    |

#### 3.17.55.1 no debug ipv6 ping packet

Use this command to disable tracing of the ICMPv6 Echo request and response packets.

|               |                                                       |
|---------------|-------------------------------------------------------|
| <b>Format</b> | <code>no debug ipv6 ping packet [vrf vrf-name]</code> |
| <b>Mode</b>   | Privileged EXEC                                       |

### 3.17.56 debug ip vrrp

Use this command to enable debug tracing of VRRP events. Debug messages are sent to the system log at the DEBUG severity level. To print them on the console, enable console logging at the DEBUG level (`logging console debug`).

The debug options enabled for a specific peer are the union of the options enabled globally and the options enabled specifically for the peer. Enabling one of the packet type options enables packet tracing in both the inbound and outbound directions.

|                |                            |
|----------------|----------------------------|
| <b>Default</b> | Enabled                    |
| <b>Format</b>  | <code>debug ip vrrp</code> |
| <b>Mode</b>    | Privileged Exec            |

#### 3.17.56.1 no debug ip vrrp

Use this command to disable debug tracing of VRRP events.

|               |                               |
|---------------|-------------------------------|
| <b>Format</b> | <code>no debug ip vrrp</code> |
| <b>Mode</b>   | Privileged Exec               |

### 3.17.57 debug lacp packet

This command enables tracing of LACP packets received and transmitted by the switch.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | disabled                       |
| <b>Format</b>  | <code>debug lacp packet</code> |
| <b>Mode</b>    | Privileged EXEC                |

A sample output of the trace message is shown below.

```
<15> JAN 01 14:04:51 10.254.24.31-1 DOT3AD[183697744]: dot3ad_debug.c(385) 58 %
 Pkt TX - Intf: 1/0/1(1), Type: LACP, Sys: 00:11:88:14:62:e1, State: 0x47, Key:
 0x36
```

#### 3.17.57.1 no debug lacp packet

This command disables tracing of LACP packets.

|               |                                   |
|---------------|-----------------------------------|
| <b>Format</b> | <code>no debug lacp packet</code> |
| <b>Mode</b>   | Privileged EXEC                   |

### 3.17.58 debug mldsnoothing packet

Use this command to trace MLD snooping packet reception and transmission. `receive` traces only received MLD snooping packets and `transmit` traces only transmitted MLD snooping packets. When neither keyword is used in the command, then all MLD snooping packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

|                |                                                |
|----------------|------------------------------------------------|
| <b>Default</b> | disabled                                       |
| <b>Format</b>  | debug mldsnoothing packet [receive   transmit] |
| <b>Mode</b>    | Privileged EXEC                                |

#### 3.17.58.1 no debug mldsnoothing packet

Use this command to disable debug tracing of MLD snooping packet reception and transmission.

### 3.17.59 debug ospf packet

This command enables tracing of OSPF packets received and transmitted by the switch or, optionally, a virtual router can be specified.

|                |                                  |
|----------------|----------------------------------|
| <b>Default</b> | disabled                         |
| <b>Format</b>  | debug ospf packet [vrf vrf-name] |
| <b>Mode</b>    | Privileged EXEC                  |

Sample outputs of the trace messages follow.

```
<15> JAN 02 11:03:31 10.50.50.1-2 OSPF[46300472]: ospf_debug.c(297) 25430 % Pkt RX - Intf:2/0/48 Src
Ip:192.168.50.2 DestIp:224.0.0.5 AreaId:0.0.0.0 Type:HELLO NetMask:255.255.255.0 D
esigRouter:0.0.0.0 Backup:0.0.0.0
```

```
<15> JAN 02 11:03:35 10.50.50.1-2 OSPF[46300472]: ospf_debug.c(293) 25431 % Pkt TX - Intf:2/0/48 Src
Ip:10.50.50.1 DestIp:192.168.50.2 AreaId:0.0.0.0 Type:DB_DSCR Mtu:1500 Options:E
Flags: I/M/MS Seq:126166
```

```
<15> JAN 02 11:03:36 10.50.50.1-2 OSPF[46300472]: ospf_debug.c(297) 25434 % Pkt RX - Intf:2/0/48 Src
Ip:192.168.50.2 DestIp:192.168.50.1 AreaId:0.0.0.0 Type:LS_REQ Length: 1500
```

```
<15> JAN 02 11:03:36 10.50.50.1-2 OSPF[46300472]: ospf_debug.c(293) 25435 % Pkt TX - Intf:2/0/48 Src
Ip:10.50.50.1 DestIp:192.168.50.2 AreaId:0.0.0.0 Type:LS_UPD Length: 1500
```

```
<15> JAN 02 11:03:37 10.50.50.1-2 OSPF[46300472]: ospf_debug.c(293) 25441 % Pkt TX - Intf:2/0/48 Src
Ip:10.50.50.1 DestIp:224.0.0.6 AreaId:0.0.0.0 Type:LS_ACK Length: 1500
```

The following parameters are displayed in the trace message.

| Parameter | Description                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TX/RX     | TX refers to a packet transmitted by the device. RX refers to packets received by the device.                                                                   |
| Intf      | The interface that the packet came in or went out on. Format used is unit/slot/port (internal interface number).                                                |
| SrcIp     | The source IP address in the IP header of the packet.                                                                                                           |
| DestIp    | The destination IP address in the IP header of the packet.                                                                                                      |
| AreaId    | The area ID in the OSPF header of the packet.                                                                                                                   |
| Type      | Could be one of the following:<br>HELLO – Hello packet<br>DB_DSCR – Database descriptor<br>LS_REQ – LS Request<br>LS_UPD – LS Update<br>LS_ACK – LS Acknowledge |

The remaining fields in the trace are specific to the type of OSPF Packet.  
HELLO packet field definitions.

| Parameter    | Description                      |
|--------------|----------------------------------|
| Netmask      | The netmask in the hello packet. |
| DesignRouter | Designated Router IP address.    |
| Backup       | Backup router IP address.        |

DB\_DSCR packet field definitions.

| Parameter | Description                                                                                                                                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTU       | MTU                                                                                                                                                  |
| Options   | Options in the OSPF packet.                                                                                                                          |
| Flags     | Could be one or more of the following: <ul style="list-style-type: none"> <li>• I – Init</li> <li>• M – More</li> <li>• MS – Master/Slave</li> </ul> |
| Seq       | Sequence Number of the DD packet.                                                                                                                    |

LS\_REQ packet field definitions.

| Parameter | Description      |
|-----------|------------------|
| Length    | Length of packet |

LS\_UPD packet field definitions.

| Parameter | Description      |
|-----------|------------------|
| Length    | Length of packet |

LS\_ACK packet field definitions.

| Parameter | Description      |
|-----------|------------------|
| Length    | Length of packet |

### 3.17.59.1 no debug ospf packet

This command disables tracing of OSPF packets.

**Format** no debug ospf packet

**Mode** Privileged EXEC

### 3.17.60 debug ospfv3 packet

Use this command to enable OSPFv3 packet debug trace.

**Default** disabled

**Format** debug ospfv3 packet

**Mode** Privileged EXEC

### 3.17.60.1 no debug ospfv3 packet

Use this command to disable tracing of OSPFv3 packets.

**Format** no debug ospfv3 packet  
**Mode** Privileged EXEC

### 3.17.61 debug ping packet

This command enables tracing of ICMP echo requests and responses. The command traces pings on the network port/service port for switching packages. For routing packages, pings are traced on the routing ports as well. If specified, pings can be traced on the virtual router.

**Default** disabled  
**Format** debug ping packet [*vrf vrf-name*]  
**Mode** Privileged EXEC

**Example:** A sample output of the trace message follows.

```
<15> JAN 01 00:21:22 192.168.17.29-1 SIM[181040176]: sim_debug.c(128) 20 % Pkt TX - Intf: 1/0/1(1), SRC_IP:10.50.50.2, DEST_IP:10.50.50.1, Type:ECHO_REQUEST
```

```
<15> JAN 01 00:21:22 192.168.17.29-1 SIM[182813968]: sim_debug.c(82) 21 % Pkt RX - Intf: 1/0/1(1), SRC_IP:10.50.50.1, DEST_IP:10.50.50.2, Type:ECHO_REPLY
```

The following parameters are displayed in the trace message.

| Parameter | Description                                                                                                                                                                         |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TX/RX     | TX refers to a packet transmitted by the device. RX refers to packets received by the device.                                                                                       |
| Intf      | The interface that the packet came in or went out on. Format used is unit/slot/port (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device. |
| SRC_IP    | The source IP address in the IP header in the packet.                                                                                                                               |
| DEST_IP   | The destination IP address in the IP header in the packet.                                                                                                                          |
| Type      | Type determines whether or not the ICMP message is a REQUEST or a RESPONSE.                                                                                                         |

### 3.17.61.1 no debug ping packet

This command disables tracing of ICMP echo requests and responses.

**Format** no debug ping packet  
**Mode** Privileged EXEC

### 3.17.62 debug rip packet

This command turns on tracing of RIP requests and responses. This command takes no options. The output is directed to the log file.

**Default** disabled  
**Format** debug rip packet  
**Mode** Privileged EXEC

A sample output of the trace message is shown below.

```
<15> JAN 01 00:35:15 192.168.17.29-1 RIP[181783160]: rip_map_debug.c(96) 775 %
Pkt RX on Intf: 1/0/1(1), Src_IP:43.1.1.1 Dest_IP:43.1.1.2
Rip_Version: RIPv2 Packet_Type:RIP_RESPONSE
ROUTE 1): Network: 10.1.1.0 Mask: 255.255.255.0 Metric: 1
ROUTE 2): Network: 40.1.0.0 Mask: 255.255.0.0 Metric: 1
ROUTE 3): Network: 10.50.50.0 Mask: 255.255.255.0 Metric: 1
ROUTE 4): Network: 41.1.0.0 Mask: 255.255.0.0 Metric: 1
ROUTE 5): Network:42.0.0.0 Mask:255.0.0.0 Metric:1
Another 6 routes present in packet not displayed.
```

The following parameters are displayed in the trace message:

| Parameter                    | Description                                                                                                                                                                                                                                     |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TX/RX                        | TX refers to a packet transmitted by the device. RX refers to packets received by the device.                                                                                                                                                   |
| Intf                         | The interface that the packet came in or went out on. Format used is unit/slot/port (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device.                                                             |
| Src_IP                       | The source IP address in the IP header of the packet.                                                                                                                                                                                           |
| Dest_IP                      | The destination IP address in the IP header of the packet.                                                                                                                                                                                      |
| Rip_Version                  | RIP version used: RIPv1 or RIPv2.                                                                                                                                                                                                               |
| Packet_Type                  | Type of RIP packet: RIP_REQUEST or RIP_RESPONSE.                                                                                                                                                                                                |
| Routes                       | Up to 5 routes in the packet are displayed in the following format:<br>Network: a.b.c.d Mask a.b.c.d Next_Hop a.b.c.d Metric a<br>The next hop is only displayed if it is different from 0.0.0.0.<br>For RIPv1 packets, Mask is always 0.0.0.0. |
| Number of routes not printed | Only the first five routes present in the packet are included in the trace. There is another notification of the number of additional routes present in the packet that were not included in the trace.                                         |

### 3.17.62.1 no debug rip packet

This command disables tracing of RIP requests and responses.

**Format** no debug rip packet

**Mode** Privileged EXEC

### 3.17.63 debug sflow packet

Use this command to enable sFlow debug packet trace.

**Default** disabled

**Format** debug sflow packet

**Mode** Privileged EXEC

### 3.17.63.1 no debug sflow packet

Use this command to disable sFlow debug packet trace.

**Format** no debug sflow packet

**Mode** Privileged EXEC

### 3.17.64 debug spanning-tree bpdu

This command enables tracing of spanning tree BPDUs received and transmitted by the switch.

**Default** disabled  
**Format** debug spanning-tree bpdu  
**Mode** Privileged EXEC

### 3.17.64.1 no debug spanning-tree bpdu

This command disables tracing of spanning tree BPDUs.

**Format** no debug spanning-tree bpdu  
**Mode** Privileged EXEC

### 3.17.65 debug spanning-tree bpdu receive

This command enables tracing of spanning tree BPDUs received by the switch. Spanning tree should be enabled on the device and on the interface to monitor packets for a particular interface.

**Default** disabled  
**Format** debug spanning-tree bpdu receive  
**Mode** Privileged EXEC

A sample output of the trace message is shown below.

```
<15> JAN 01 01:02:04 192.168.17.29-1 DOT1S[191096896]: dot1s_debug.c(1249) 101 % Pkt RX - Intf: 1/0/9(9), Source_Mac: 00:11:88:4e:c2:10 Version: 3, Root Mac: 00:11:88:4e:c2:00, Root Priority: 0x8000 Path Cost: 0
```

The following parameters are displayed in the trace message:

| Parameter     | Description                                                                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RX            | A packet received by the device.                                                                                                                                        |
| Intf          | The interface that the packet came in on. Format used is unit/port/slot (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device. |
| Source_Mac    | Source MAC address of the packet.                                                                                                                                       |
| Version       | Spanning tree protocol version (0-3). 0 refers to STP, 2 RSTP and 3 MSTP.                                                                                               |
| Root_Mac      | MAC address of the CIST root bridge.                                                                                                                                    |
| Root_Priority | Priority of the CIST root bridge. The value is between 0 and 61440. It is displayed in hex in multiples of 4096.                                                        |
| Path_Cost     | External root path cost component of the BPDU.                                                                                                                          |

### 3.17.65.1 no debug spanning-tree bpdu receive

This command disables tracing of received spanning tree BPDUs.

**Format** no debug spanning-tree bpdu receive  
**Mode** Privileged EXEC

### 3.17.66 debug spanning-tree bpdu transmit

This command enables tracing of spanning tree BPDUs transmitted by the switch. Spanning tree should be enabled on the device and on the interface to monitor packets on a particular interface.

**Default** disabled  
**Format** debug spanning-tree bpdu transmit  
**Mode** Privileged EXEC

A sample output of the trace message is shown below.

```
<15> JAN 01 01:02:04 192.168.17.29-1 DOT1S[191096896]: dot1s_debug.c(1249) 101 % Pkt TX - Intf: 1/0/7(7), Source_Mac: 00:11:88:4e:c2:00 Version: 3, Root_Mac: 00:11:88:4e:c2:00, Root_Priority: 0x8000 Path_Cost: 0
```

The following parameters are displayed in the trace message:

| Parameter     | Description                                                                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TX            | A packet transmitted by the device.                                                                                                                                      |
| Intf          | The interface that the packet went out on. Format used is unit/port/slot (internal interface number). Unit is always shown as 1 for interfaces on a non-stacking device. |
| Source_Mac    | Source MAC address of the packet.                                                                                                                                        |
| Version       | Spanning tree protocol version (0-3). 0 refers to STP, 2 RSTP and 3 MSTP.                                                                                                |
| Root_Mac      | MAC address of the CIST root bridge.                                                                                                                                     |
| Root_Priority | Priority of the CIST root bridge. The value is between 0 and 61440. It is displayed in hex in multiples of 4096.                                                         |
| Path_Cost     | External root path cost component of the BPDU.                                                                                                                           |

### 3.17.66.1 no debug spanning-tree bpdu transmit

This command disables tracing of transmitted spanning tree BPDUs.

**Format** no debug spanning-tree bpdu transmit

**Mode** Privileged EXEC

### 3.17.67 debug tacacs

Use the debug tacacs packet command to turn on TACACS+ debugging.

**Format** debug tacacs {packet [receive | transmit] | accounting | authentication}

**Mode** Global Config

| Parameter       | Description                               |
|-----------------|-------------------------------------------|
| packet receive  | Turn on TACACS+ receive packet debugs.    |
| packet transmit | Turn on TACACS+ transmit packet debugs.   |
| accounting      | Turn on TACACS+ authentication debugging. |
| authentication  | Turn on TACACS+ authorization debugging.  |

### 3.17.68 debug telnetd start

Use this command to start the debug telnet daemon. The debug telnet daemon gives access to a Linux shell prompt. The telnet user ID is "root". If the telnet daemon is already running when this command is issued, the command stops and restarts the telnet daemon.

**Format** debug telnetd start [*password*][*port*]

**Mode** Privileged EXEC

| Parameter | Description                                                                                      |
|-----------|--------------------------------------------------------------------------------------------------|
| password  | The optional telnet password. If no password is specified, the default password lvl7dbg is used. |
| port      | The optional telnet port number. If no telnet port is specified, the default port 2323 is used.  |



### 3.17.69 debug telnetd stop

Use this command to stop the telnet daemon previously started by the [debug telnetd start](#) command. If the daemon is not running when this command is issued, the command has no effect.

**Format**            debug telnetd stop  
**Mode**             Privileged EXEC

### 3.17.70 debug transfer

This command enables debugging for file transfers.

**Format**            debug transfer  
**Mode**             Privileged EXEC

#### 3.17.70.1 no debug transfer

This command disables debugging for file transfers.

**Format**            no debug transfer  
**Mode**             Privileged EXEC

### 3.17.71 debug udld events

This command enables debugging for the UDLD events.

**Default**          Disabled  
**Format**            debug udld events  
**Mode**             Privileged EXEC

### 3.17.72 debug udld packet receive

This command enables debugging on the received UDLD PDUs.

**Default**          Disabled  
**Format**            debug udld packet receive  
**Mode**             Privileged EXEC

### 3.17.73 debug udld packet transmit

This command enables debugging on the transmitted UDLD PDUs.

**Default**          Disabled  
**Format**            debug udld packet transmit  
**Mode**             Privileged EXEC

### 3.17.74 show debugging

Use the `show debugging` command to display enabled packet tracing configurations.

**Format**            show debugging  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
console# debug arp
Arp packet tracing enabled.
```

```
console# show debugging
Arp packet tracing enabled.
```

### 3.17.74.1 no show debugging

Use the `no show debugging` command to disable packet tracing configurations.

**Format**            `no show debugging`  
**Mode**             Privileged EXEC

### 3.17.75 logging persistent

Use this command to configure the Persistent logging for the switch. The severity level of logging messages is specified at severity level. Possible values for severity level are (emergency|0, alert|1, critical|2, error|3, warning|4, notice|5, info|6, debug|7).

**Default**            Disable  
**Format**            `logging persistent severity Level`  
**Mode**             Global Config

#### 3.17.75.1 no logging persistent

Use this command to disable the persistent logging in the switch.

**Format**            `no logging persistent`  
**Mode**             Global Config

### 3.17.76 mbuf

Use this command to configure memory buffer (MBUF) threshold limits and generate notifications when MBUF limits have been reached.

**Format**            `mbuf {falling-threshold | rising threshold | severity}`  
**Mode**             Global Config

| Parameter         | Description                                                                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rising Threshold  | The percentage of the memory buffer resources that, when exceeded for the configured rising interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled).          |
| Falling Threshold | The percentage of memory buffer resources that, when usage falls below this level for the configured interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled). |
| Severity          | The severity level at which Mbuf logs messages. The range is 1 to 7. The default is 5 (L7_LOG_SEVERITY_NOTICE).                                                                             |

### 3.17.77 show mbuf

Use this command to display the memory buffer (MBUF) Utilization Monitoring parameters.

**Format**            `show mbuf`  
**Mode**             Privileged EXEC

| Parameter         | Description                                                                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rising Threshold  | The percentage of the memory buffer resources that, when exceeded for the configured rising interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled).          |
| Falling Threshold | The percentage of memory buffer resources that, when usage falls below this level for the configured interval, triggers a notification. The range is 1 to 100. The default is 0 (disabled). |
| Severity          | The severity level.                                                                                                                                                                         |

### 3.17.78 show mbuf total

Use this command to display memory buffer (MBUF) information.

**Format**            show mbuf total

**Mode**             Privileged EXEC

| Parameter                    | Description                                                                                |
|------------------------------|--------------------------------------------------------------------------------------------|
| Mbufs Total                  | Total number of message buffers in the system.                                             |
| Mbufs Free                   | Number of message buffers currently available.                                             |
| Mbufs Rx Used                | Number of message buffers currently in use.                                                |
| Total Rx Norm Alloc Attempts | Number of times the system tried to allocate a message buffer allocation of class RX Norm. |
| Total Rx Mid2 Alloc Attempts | Number of times the system tried to allocate a message buffer allocation of class RX Mid2. |
| Total Rx Mid1 Alloc Attempts | Number of times the system tried to allocate a message buffer allocation of class RX Mid1. |
| Total Rx Mid0 Alloc Attempts | Number of times the system tried to allocate a message buffer allocation of class RX Mid0. |
| Total Rx High Alloc Attempts | Number of times the system tried to allocate a message buffer allocation of class RX High. |
| Total Tx Alloc Attempts      | Number of times the system tried to allocate a message buffer allocation of class TX.      |
| Total Rx Norm Alloc Failures | Number of message buffer allocation failures for RX Norm class of message buffer.          |
| Total Rx Mid2 Alloc Failures | Number of message buffer allocation failures for RX Mid2 class of message buffer.          |
| Total Rx Mid1 Alloc Failures | Number of message buffer allocation failures for RX Mid1 class of message buffer.          |
| Total Rx Mid0 Alloc Failures | Number of message buffer allocation failures for RX Mid0 class of message buffer.          |
| Total Rx High Alloc Failures | Number of message buffer allocation failures for RX High class of message buffer.          |
| Total Tx Alloc Failures      | Number of message buffer allocation failures for TX class of message buffer.               |

### 3.17.79 clear mbuf stats

Use this command to delete the MBUF stats.

**Default**           none

**Format**            clear mbuf stats

**Mode**             Privileged EXEC

**Example:** The following shows an example of the command.

```
(Routing)#clear mbuf stats
Are you sure you want to clear mbuf statistics (y/n) y

mbuf stats cleared.
```

### 3.17.80 show msg-queue

Use this command to display the message queues.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | None                 |
| <b>Format</b>  | show msg-queue       |
| <b>Mode</b>    | Privileged EXEC mode |

### 3.17.81 debug packet-trace

Use this command to enable traces for the packet trace feature.

|                |                    |
|----------------|--------------------|
| <b>Default</b> | None               |
| <b>Format</b>  | debug packet-trace |
| <b>Mode</b>    | Privileged Exec    |

### 3.17.82 set watchdog disable

This command disables watchdog services. Watchdog is automatically changed (that is, no reboot is required).

|                |                      |
|----------------|----------------------|
| <b>Default</b> | Disabled             |
| <b>Format</b>  | set watchdog disable |
| <b>Mode</b>    | Privileged EXEC      |

### 3.17.83 set watchdog enable

This command enables watchdog services. Watchdog services give FASTPATH the ability to recover when it is no longer executing properly. When a recovery is attempted, debug information is saved and the switch is reset.

|                |                     |
|----------------|---------------------|
| <b>Default</b> | Disabled            |
| <b>Format</b>  | set watchdog enable |
| <b>Mode</b>    | Privileged EXEC     |

## 3.18 System Debug Command

The debug commands are commands which should normally not be used by the user. They are used mostly for testing and are not self-explanatory.

### 3.18.1 set board debug log-critical

This command generates a critical logging entry.

**Format**            set board debug log-critical  
**Mode**             Privileged EXEC  
**Access**           High Privileged User only

### 3.18.2 set board debug pld

This command writes a value to a register in the PLD.

**Format**            set board debug pld <offset> <value>  
**Mode**             Privileged EXEC  
**Access**           High Privileged User only

### 3.18.3 set board debug jumper-override

This command overrides all set jumpers.

**Format**            set board debug jumper-override  
**Mode**             Privileged EXEC  
**Access**           High Privileged User only

### 3.18.4 show board debug cli-tree

This command writes all commands with possible parameters for each configuration mode to a file ("cli.txt"). Not all optional parameters may be displayed because it needs too long time. For omitted optional parameters '.' is appended to the command.

---

#### **NOTICE**

This command needs some time. If finished a message is indicated. The command additionally writes a short summary to the console.  
 To upload the file you can use command 'copy nvram:file cli.txt <url>'

---

**Format**            show board debug cli-tree  
**Mode**             Privileged EXEC  
**Access**           High Privileged User only

### 3.18.5 show board debug pld

This command reads a value from a register in the PLD.

**Format**            set board debug pld <offset>  
**Mode**             Privileged EXEC  
**Access**           High Privileged User only

### 3.18.6 show board debug led-code

This command displays the LED mapping code. For parameter "all" additionally the LED processor code is displayed too. For parameter "all" all bytes are written in one (long) line to be able to parse the information easily.

**Format**            show board debug led-code [all]  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.7 show board debug component

This command displays all FASTPATH components/tasks with the internal number or with the memory usage if parameter "memory-usage" is specified.

**Format**            show board debug component [memory-usage]  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.8 show board debug bcm-port

This command indicates the mapping of interfaces (internal interface number, slot/port and interface type) to the BCM port number.

**Format**            show board debug port-map  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.9 show board debug port-config

This command displays the information specified in the port-configuration for all ports (broad\_cards.c).

**Format**            show board debug port-config  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.10 set board debug port-map

This command sets a port-map even if it does not fit. The port-map can be specified with the name or number.

**Format**            set board debug port-map <port-map>  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.11 show board debug port-map static

This command displays the static port-map information. The SAL and HAL settings are only printed if "complete" is specified. The static table is displayed for the current active port-map or a specified port-map. If "check" is specified the tables are checked for consistency.

**Format**            show board debug port-map static [check | complete]  
                     show board debug port-map static port-map <port-map> [check | complete]  
**Mode**               Privileged EXEC  
**Access**             High Privileged User only

### 3.18.12 show board debug port-map dynamic

This command displays the dynamic port-map information. The information is automatically generated using the static port-map tables related to the current port-map. The SAL and HAL settings are only printed if "complete" is specified.

**Format**            show board debug port-map dynamic [complete]  
**Mode**               Privileged EXEC  
**Access**            High Privileged User only

### 3.18.13    set board debug firmware-map

This command generates a new firmware-mapping. Related to the bootorder of the firmware the mapping is done (bootorder = 1 is mapped to image1/active DIM image). If parameter "reverse" is set, the image with the second bootorder is set as first image.

**Format**            set board debug firmware-map [reverse]  
**Mode**               Privileged EXEC  
**Access**            High Privileged User only

### 3.18.14    show board debug firmware-images

This command displays the firmware images with related ID's, their bootorder and the mapping of the firmware-images to the FASTPATH DIM images.

**Format**            show board debug firmware-images  
**Mode**               Privileged EXEC  
**Access**            High Privileged User only

## 3.19    Support Mode Commands

Support mode is hidden and available when the `techsupport enable` command is executed. techsupport mode is disabled by default. Configurations related to support mode are shown in the `show tech-support` command. They can be persisted by using the command `save` in support mode. Support configurations are stored in a separate binary config file, which cannot be uploaded or downloaded.

### 3.19.1    techsupport enable

Use this command to allow access to Support mode.

**Default**            Disabled  
**Format**            techsupport enable  
**Mode**               Privileged EXEC

### 3.19.2    console

Use this command to enable the display of support debug for this session.

**Default**            Disabled  
**Format**            console  
**Mode**               Support

### 3.19.3    save

Use this command to save the trace configuration to nonvolatile storage.

**Format**            save  
**Mode**               Support

### 3.19.4 snapshot ospf

Use this command in Support mode to dump a set of OSPF debug information to capture the current state of OSPF. The output is written to the console and can be extensive

**Format**            `snapshot ospf`

**Mode**             Support mode

### 3.19.5 snapshot routing

Use this command in Support mode to dump a set of routing debug information to capture the current state of routing on the switch. The output is written to the console and can be extensive.

**Format**            `snapshot routing`

**Mode**             Support

### 3.19.6 snapshot multicast

Use this command in Support mode to dump a set of IP multicast debug information to capture the current state of multicast on the switch. The output is written to the console and can be extensive.

**Format**            `snapshot multicast`

**Mode**             Support

### 3.19.7 snapshot system

Use this command in Support mode to dump a set of system debug information to capture the current state of the device. The output is written to the console and can be extensive.

**Format**            `snapshot multicast`

**Mode**             Support

### 3.19.8 snapshot vpc

Use this command to dump a set of MLAG debug information to capture the current state of MLAG. The output is written to the console and can be extensive.

**Format**            `snapshot vpc`

**Mode**             Support

### 3.19.9 telnetd

Use this command in Support mode to start or stop the Telnet daemon on the switch.

**Format**            `telnetd {start | stop}`

**Mode**             Support



## 3.20 BCM Shell Command

The BCM (SDK) shell is mainly used for debugging the Broadcom SDK. BCM shell commands can be executed directly from the CLI without entering the BCM shell itself by using the keyword `drivshell` before the BCM command. However, you can also enter the BCM shell to directly execute any of the BCM commands on the shell using the `bcmsh` command.

### 3.20.1 bcmsh

The `bcmsh` command is used to enter into the BCM shells from Privileged EXEC mode. Only users with Level 15 permissions can execute this command. Management is blocked during this mode; the user is notified and asked whether to continue. This command is only supported on the serial console and not using telnet/ssh.

**Format**            `bcmsh`  
**Mode**             Privileged EXEC

---

To exit the shell and return to the CLI, enter `exit`.

#### NOTICE

## 3.21 Cable Test Command

The cable test feature enables you to determine the cable connection status on a selected port.

#### NOTICE

- The cable test feature is supported only for copper cable. It is not supported for optical fiber cable.
- If the port has an active link while the cable test is run, the link can go down for the duration of the test.

### 3.21.1 cablestatus

This command returns the status of the specified port.

**Format**            `cablestatus unit/slot/port`  
**Mode**             Privileged EXEC

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable Status | <p>One of the following statuses is returned:</p> <ul style="list-style-type: none"> <li>• <code>Normal</code>: The cable is working correctly.</li> <li>• <code>Open</code>: The cable is disconnected or there is a faulty connector.</li> <li>• <code>Short</code>: There is an electrical short in the cable.</li> <li>• <code>Cable Test Failed</code>: The cable status could not be determined. The cable may in fact be working.</li> <li>• <code>Crosstalk</code>: There is crosstalk present on the cable.</li> <li>• <code>No Cable</code>: There is no cable present.</li> </ul> |
| Cable Length | <p>If this feature is supported by the PHY for the current link, the cable length is displayed as a range between the shortest estimated length and the longest estimated length. Note that if the link is down and a cable is attached to a 10/100 Ethernet adapter, then the cable status may display as <code>Open</code> or <code>Short</code> because some Ethernet adapters leave unused wire pairs unterminated or grounded. <code>Unknown</code> is displayed if the cable length could not be determined.</p>                                                                       |

## 3.22 Link Debounce Commands

In network deployments where the switch detects random spurious link flaps, network performance is affected due to the frequent unwanted re-convergence of topology for protocols like spanning tree, OSPF, and link aggregation.

The link debounce feature tries to solve this problem by delaying the link-down event notification to applications by waiting for a configurable duration of time known as the debounce time. During this time, the link may cycle through down-and-up states several times before it finally settles down. If the link goes down (and stays down), applications are notified after the debounce time period expires; otherwise, it is ignored.

### 3.22.1 link debounce time

This command sets the duration of the link debounce timer. The link debounce timer starts when a link-down event occurs on an interface and runs for the configured amount of milliseconds. While the timer is running, any link flaps (up and down cycles) are ignored, and no link-down notifications are sent to higher-layer applications. After the debounce timer expires, if the link is still down, notifications are sent. The value for `milliseconds` is from 100 to 5000 in a multiple of 100 milliseconds.

**Default** 0 (No timer)  
**Format** link debounce time *milliseconds*  
**Mode** Interface Config

#### 3.22.1.1 no link debounce time

This command resets the duration of the link debounce timer to the default value, effectively disabling the timer.

**Format** no link debounce time  
**Mode** Interface Config

### 3.22.2 show interface debounce

This command displays the configured debounce time and occurrences of link flaps for all interfaces.

**Format** show interface debounce  
**Mode** Privileged EXEC

| Parameter     | Description                                                                                                                                                                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface     | The physical port, LAG, or CPU interface associated with the rest of the data in the row.                                                                                                                                                                                                                                                                            |
| Debounce Time | The time, in milliseconds, to delay a link-down event notification to applications after a link-down event occurs on the interface. If the link goes down (and stays down), applications are notified after the debounce time period expires; otherwise it is ignored. While the debounce timer is running, link flaps (up and down cycles) are counted but ignored. |
| Flaps         | The number of link flaps (up and down cycles) the interface experienced while the debounce time was running.                                                                                                                                                                                                                                                         |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show interface debounce
```

```
Interface Debounce Time (ms) Flaps

0/1 0 0
0/2 0 0
0/3 0 0
0/4 0 0
0/5 0 0
0/6 0 0
0/7 0 0
```

```
0/8 0 0
0/9 0 0
0/10 0 0
0/11 0 0
0/12 0 0
--More-- or (q)uit
```

## 3.23 sFlow Commands

sFlow is the standard for monitoring high-speed switched and routed networks. sFlow technology is built into network equipment and gives complete visibility into network activity, enabling effective management and control of network resources.

### 3.23.1 sflow poller

A data source configured to collect counter samples is called a poller. Use this command to enable a new sFlow poller instance on an interface or range of interfaces for this data source if *rcvr\_idx* is valid.

**Format**            *sflow poller {rcvr-idx | interval poll-interval}*  
**Mode**             Interface Config

| Parameter      | Description                                                                                                                                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receiver Index | Enter the sFlow Receiver associated with the sampler/poller. A value of zero (0) means that no receiver is configured. The range is 1 to 8. The default is 0.                                                                                                                                                  |
| Poll Interval  | Enter the sFlow instance polling interval. A poll interval of zero (0) disables counter sampling. When set to zero (0), all the poller parameters are set to their corresponding default value. The range is 0 to 86400. The default is 0. A value of N means once in N seconds a counter sample is generated. |

#### NOTICE

The sFlow task is heavily loaded when the sFlow polling interval is configured at the minimum value (that is, one second for all the sFlow supported interfaces). In this case, the sFlow task is always busy collecting the counters on all the configured interfaces. This can cause the device to stop responding for some time when the user tries to configure or issue show sFlow commands. To overcome this situation, sFlow polling interval configuration on an interface or range of interfaces is controlled as mentioned below:

- The maximum number of allowed interfaces for the polling intervals max (1, (interval - 10)) to min ((interval + 10), 86400) is interval \ 5.
- For every one second increment in the polling interval that is configured, the number of allowed interfaces that can be configured increases by 5

#### 3.23.1.1 no sflow poller

Use this command to reset the sFlow poller instance to the default settings.

**Format**            *no sflow poller [interval]*  
**Mode**             Interface Config

#### 3.23.2 sflow receiver

Use this command to configure the sFlow collector parameters (owner string, receiver timeout, max datagram size, IP address, and port).

**Format**            *sflow receiver rcvr\_idx {owner owner-string timeout rcvr\_timeout | max datagram size | ip ip | port port}*  
**Mode**             Global Config

| Parameter                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receiver Owner             | The identity string for the receiver, the entity making use of this sFlowRcvrTable entry. The range is 127 characters. The default is a null string. The empty string indicates that the entry is currently unclaimed and the receiver configuration is reset to the default values. An entity wanting to claim an sFlowRcvrTable entry must ensure that the entry is unclaimed before trying to claim it. The entry is claimed by setting the owner string to a non-null value. The entry must be claimed before assigning a receiver to a sampler or poller. |
| Receiver Timeout           | The time, in seconds, remaining before the sampler or poller is released and stops sending samples to receiver. A management entity wanting to maintain control of the sampler is responsible for setting a new value before the old one expires. The allowed range is 0 to 2147483647 seconds. The default is zero (0).                                                                                                                                                                                                                                       |
| No Timeout                 | The configured entry will be in the config until you explicitly removes the entry.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Receiver Max Datagram Size | The maximum number of data bytes that can be sent in a single sample datagram. The management entity should set this value to avoid fragmentation of the sFlow datagrams. The allowed range is 200 to 9116). The default is 1400.                                                                                                                                                                                                                                                                                                                              |
| Receiver IP                | The sFlow receiver IP address. If set to 0.0.0.0, no sFlow datagrams will be sent. The default is 0.0.0.0.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Receiver Port              | The destination Layer4 UDP port for sFlow datagrams. The range is 1 to 65535. The default is 6343.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 3.23.2.1 no sflow receiver

Use this command to set the sFlow collector parameters back to the defaults.

**Format**            `no sflow receiver indx {ip ip-address | maxdatagram size | owner string timeout interval | port 14-port}`

**Mode**             Global Config

### 3.23.3 sflow receiver owner timeout

Use this command to configure a receiver as a timeout entry. As the sFlow receiver is configured as a timeout entry, information related to sampler and pollers are also shown in the running-config and are retained after reboot.

If a receiver is configured with a specific value, these configurations will not be shown in running-config. Samplers and pollers information related to this receiver will also not be shown in running-config.

**Format**            `sflow receiver index owner owner-string timeout`

**Mode**             Global Config

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| index          | Receiver index identifier. The range is 1 to 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Receiver Owner | The owner name corresponds to the receiver name. The identity string for the receiver, the entity making use of this sFlowRcvrTable entry. The range is 127 characters. The default is a null string. The empty string indicates that the entry is currently unclaimed and the receiver configuration is reset to the default values. An entity wanting to claim an sFlowRcvrTable entry must ensure that the entry is unclaimed before trying to claim it. The entry is claimed by setting the owner string to a non-null value. The entry must be claimed before assigning a receiver to a sampler or poller. |

### 3.23.4 sflow receiver owner no timeout

Use this command to configure a receiver as a non-timeout entry. Unlike entries configured with a specific timeout value, this command will be shown in show running-config and retained after reboot. As the sFlow receiver is configured as a non-timeout entry, information related to sampler and pollers will also be shown in the running-config and will be retained after reboot.

If a receiver is configured with a specific value, these configurations will not be shown in running-config. Samplers and pollers information related to this receiver will also not be shown in running-config.

**Format** sflow receiver *index* owner *owner-string* no timeout

**Mode** Global Config

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| index          | Receiver index identifier. The range is 1 to 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Receiver Owner | The owner name corresponds to the receiver name. The identity string for the receiver, the entity making use of this sFlowRcvrTable entry. The range is 127 characters. The default is a null string. The empty string indicates that the entry is currently unclaimed and the receiver configuration is reset to the default values. An entity wanting to claim an sFlowRcvrTable entry must ensure that the entry is unclaimed before trying to claim it. The entry is claimed by setting the owner string to a non-null value. The entry must be claimed before assigning a receiver to a sampler or poller. |

### 3.23.5 sflow remote-agent ip

Use this command to assign an IPv4 address to a remote agent. When sFlow hardware sampling is enabled, the switch/hardware sends sampled packets encapsulated in sFlow custom packet to this IP address.

**Default** 0.0.0.0

**Format** sflow remote-agent *index* ip *ipv4-address*

**Mode** Global Config

#### 3.23.5.1 no sflow remote-agent ip

Use this command to remove the remote agent IPv4 address.

**Format** no sflow remote-agent *index* ip

**Mode** Global Config

### 3.23.6 sflow remote-agent monitor-session

Use this command to assign the monitor ID (MTP) for the remote agent session. The destination port is an outgoing interface for sFlow sampled packets. The sflow sampled packets are sent to all the configured destination ports, irrespective of monitor session index.

**Default** 0 for both monitor session and destination port

**Format** sflow remote-agent *index* monitor-session *session id range 1-4* destination interface *slot/port*

**Mode** Global Config

#### 3.23.6.1 no sflow remote-agent monitor-session

This command removes the remote-agent configuration.

**Format** no sflow remote-agent *index* monitor-session

**Mode** Global Config

### 3.23.7 sflow remote-agent port

This command configures the destination UDP port for the remote-agent.

**Default** 16343  
**Format** sflow remote-agent *index* port *value*  
**Mode** Global Config

#### 3.23.7.1 no sflow remote-agent port

This command removes remote agent port configuration.

**Format** no sflow remote-agent *index* port  
**Mode** Global Config

### 3.23.8 sflow remote-agent source-interface

Use this command to specify the physical or logical interface to use as the sFlow client source interface for the remote-agent. If configured, the address of source interface is used for all sFlow communications between the sFlow receiver and the sFlow client. Otherwise, there is no change in behavior. If the configured interface is down, the sFlow client falls back to normal behavior.

**Format** sflow remote-agent source-interface {*slot/port* | *Loopback Loopback-id* | *tunnel tunnel-id* | *vlan vlan-id*}  
**Mode** Global Config

#### 3.23.8.1 no sflow remote-agent source-interface

Use this command to reset the sFlow source interface for the remote-agent to the default settings.

**Format** no sflow remote-agent *source-interface*  
**Mode** Global Config

### 3.23.9 sflow sampler

A data source configured to collect flow samples is called a poller. Use this command to configure a new sFlow sampler instance on an interface or range of interfaces for this data source if *rcvr\_idx* is valid.

**Format** sflow sampler {*rcvr-idx* | *rate sampling-rate* | *maxheadersize size*}  
**Mode** Interface Config

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                   |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receiver Index | The sFlow Receiver for this sFlow sampler to which flow samples are to be sent. A value of zero (0) means that no receiver is configured, no packets will be sampled. Only active receivers can be set. If a receiver expires, then all samplers associated with the receiver will also expire. Possible values are 1 to 8. The default is 0. |
| Maxheadersize  | The maximum number of bytes that should be copied from the sampler packet. The range is 20 to 256. The default is 128. When set to zero (0), all the sampler parameters are set to their corresponding default value.                                                                                                                         |
| Sampling Rate  | The statistical sampling rate for packet sampling from this source. A sampling rate of 1 counts all packets. A value of zero (0) disables sampling. A value of N means that out of N incoming packets, 1 packet will be sampled. The range is 1024 to 65536 and 0. The default is 0.                                                          |

### 3.23.9.1 no sflow sampler

Use this command to reset the sFlow sampler instance to the default settings.

**Format**           no sflow sampler {rcvr-idx | rate *sampling-rate* | maxheadersize *size*}

**Mode**             Interface Config

### 3.23.10 sflow sampler rate

Use this command to set the sampling rate for ingress/egress/flow-based sampling on this interface. The option both is used to configure the sampling type as ingress and egress.

**Default**           0 for the ingress sampling rate.

**Format**           sflow sampler rate *value* {ingress | egress | flow-based | both}

**Mode**             Interface Config

#### 3.23.10.1 no sflow sample rate

Use this command to remove the sampling rate for ingress/egress/flow-based sampling on this interface.

**Format**           no sflow sampler rate *value* {ingress | egress | flow-based | both}

**Mode**             Interface Config

### 3.23.11 sflow sampler remote-agent

Use this command to enable a new sFlow sampler remote agent instance for this data source.

**Default**           None

**Format**           sflow sampler remote-agent *index*

**Mode**             Interface Config

#### 3.23.11.1 no sflow sampler remote-agent

Use this command to disable an sFlow sampler remote agent instance for this data source.

**Format**           no sflow sampler remote-agent

**Mode**             Interface Config

### 3.23.12 sflow source-interface

Use this command to specify the physical or logical interface to use as the sFlow client source interface. If configured, the address of source interface is used for all sFlow communications between the sFlow receiver and the sFlow client. Otherwise there is no change in behavior. If the configured interface is down, the sFlow client falls back to normal behavior.

**Format**           sflow source-interface {{slot/port}} | {loopback <loopback-id>} | {tunnel <tunnel-id>}  
                  | {vlan <vlan-id>} | {serviceport} | {network}}

**Mode**             Global Config

| Parameter   | Description                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------|
| slot/port   | VLAN or port-based routing interface.                                                                      |
| loopback-id | Configures the loopback interface to use as the source IP address. The range of the loopback ID is 0 to 7. |
| tunnel-id   | Configures the tunnel interface to use as the source IP address. The range of the tunnel ID is 0 to 7.     |

| Parameter | Description                                                                                           |
|-----------|-------------------------------------------------------------------------------------------------------|
| vlan-id   | Configures the VLAN interface to use as the source IP address. The range of the VLAN ID is 1 to 4093. |

### 3.23.12.1 no sflow source-interface

Use this command to reset the sFlow source interface to the default settings.

**Format** no sflow source-interface

**Mode** Global Config

### 3.23.13 show sflow agent

The sFlow agent collects time-based sampling of network interface statistics and flow-based samples. These are sent to the configured sFlow receivers. Use this command to display the sFlow agent information.

**Format** show sflow agent

**Mode** Privileged EXEC

| Parameter     | Description                                                                                                                                                                                                                                                                                                                               |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sFlow Version | Uniquely identifies the version and implementation of this MIB. The version string must have the following structure: MIB Version; Organization; Software Revision where: <ul style="list-style-type: none"> <li>• MIB Version: 1.3, the version of this MIB.</li> <li>• Organization: Broadcom Corp.</li> <li>• Revision: 1.0</li> </ul> |
| IP Address    | The IP address associated with this agent.                                                                                                                                                                                                                                                                                                |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show sflow agent
```

```
sFlow Version..... 1.3;Broadcom Corp;1.0
IP Address..... 10.131.12.66
```

### 3.23.14 show sflow pollers

Use this command to display the sFlow polling instances created on the switch. Use "-" for range.

**Format** show sflow pollers

**Mode** Privileged EXEC

| Parameter          | Description                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------|
| Poller Data Source | The sFlowDataSource (slot/port) for this sFlow sampler. This agent will support Physical ports only. |
| Receiver Index     | The sFlowReceiver associated with this sFlow counter poller.                                         |
| Poller Interval    | The number of seconds between successive samples of the counters associated with this data source.   |

### 3.23.15 show sflow receivers

Use this command to display configuration information related to the sFlow receivers.

**Format** show sflow receivers [*index*]

**Mode** Privileged EXEC



| Parameter         | Description                                                                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receiver Index    | The sFlow Receiver associated with the sampler/poller.                                                                                                                                                                  |
| Owner String      | The identity string for receiver, the entity making use of this sFlowRcvrTable entry.                                                                                                                                   |
| Time Out          | The time (in seconds) remaining before the receiver is released and stops sending samples to sFlow receiver. The no timeout value of this parameter means that the sFlow receiver is configured as a non-timeout entry. |
| Max Datagram Size | The maximum number of bytes that can be sent in a single sFlow datagram.                                                                                                                                                |
| Port              | The destination Layer4 UDP port for sFlow datagrams.                                                                                                                                                                    |
| IP Address        | The sFlow receiver IP address.                                                                                                                                                                                          |
| Address Type      | The sFlow receiver IP address type. For an IPv4 address, the value is 1 and for an IPv6 address, the value is 2.                                                                                                        |
| Datagram Version  | The sFlow protocol version to be used while sending samples to sFlow receiver.                                                                                                                                          |

**Example:** The following shows example CLI display output for the `show sflow receivers` command.

```
(switch) #show sflow receivers 1
Receiver Index..... 1
Owner String..... tulasi
Time out..... 0
IP Address:..... 0.0.0.0
Address Type..... 1
Port..... 6343
Datagram Version..... 5
Maximum Datagram Size..... 1400
```

**Example:** The following examples show CLI display output for the command when a receiver is configured as a non-timeout entry.

```
(Routing) #show sflow receivers
```

| Rcvr Indx | Owner String | Timeout    | Max Dgram Size | Port | IP Address |
|-----------|--------------|------------|----------------|------|------------|
| 1         | tulasi       | No Timeout | 1400           | 6343 | 0.0.0.0    |
| 2         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 3         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 4         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 5         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 6         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 7         |              | 0          | 1400           | 6343 | 0.0.0.0    |
| 8         |              | 0          | 1400           | 6343 | 0.0.0.0    |

```
(Routing) #show sflow receivers 1
```

```
Receiver Index..... 1
Owner String..... tulasi
Time out..... No Timeout
IP Address:..... 0.0.0.0
Address Type..... 1
Port..... 6343
Datagram Version..... 5
Maximum Datagram Size..... 1400
```

### 3.23.16 show sflow remote-agents

Use this command to display the details for configured sFlow remote agents.

**Format**            `show sflow remote-agents`

**Mode**             Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) (Config)#show sflow remote-agents
```

| Rem Agent Index | Port  | IP Address | Monitor Session | Dest. Port |
|-----------------|-------|------------|-----------------|------------|
| 1               | 16343 | 1.1.1.1    | 1               | 0/4        |
| 2               | 26343 | 2.2.1.1    | 2               | 0/8        |
| 3               | 16343 | 0.0.0.0    |                 |            |
| 4               | 16343 | 0.0.0.0    |                 |            |

### 3.23.17 show sflow remote-agents source-interface

Use this command to display the source interface configured on the switch for the sFlow remote agent.

**Format** show sflow remote-agents source-interface

**Mode** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) #show sflow remote-agents source-interface
```

```
sFlow Remote Agent Source Interface..... serviceport
sFlow Remote Agent Client Source IPv4 Address.. 10.130.86.191 [Up]
```

### 3.23.18 show sflow samplers

Use this command to display the details of configured sFlow samplers.

**Format** show sflow samplers

**Mode** Privileged EXEC

| Parameter             | Description                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------|
| Sampler Data Source   | The sFlowDataSource (slot/port) for this sFlow sampler. This agent will support Physical ports only. |
| Receiver Index        | The sFlowReceiver configured for this sFlow sampler.                                                 |
| Remote Agent          | The remote agent instance index number.                                                              |
| Ingress Sampling Rate | The sampling rate for the ingress.                                                                   |
| Flow Sampling Rate    | The statistical sampling rate for packet sampling from this source.                                  |
| Egress Sampling Rate  | The sampling rate for the egress.                                                                    |
| Max Header Size       | The maximum number of bytes that should be copied from a sampled packet to form a flow sample.       |

**Example:** The following shows example command output.

```
(Routing) (Config)#show sflow samplers
```

| Sampler Data Source | Receiver Index | Packet Sampling Type | Packet Sampling Rate | Max Header Size |
|---------------------|----------------|----------------------|----------------------|-----------------|
| 0/12                | 1              | Ingress              | 0                    | 128             |

**Example:** The following shows example command output using the both option.

```
(Routing) (Interface 0/12)#show sflow sampler rate 1234 both
```

```
(Routing) (Config)#show sflow samplers
```

| Sampler Data Source | Receiver Index | Packet Sampling Type | Packet Sampling Rate | Max Header Size |
|---------------------|----------------|----------------------|----------------------|-----------------|
|                     |                |                      |                      |                 |

```

0/12 1 Both 1234 128

```

### 3.23.19 show sflow source-interface

Use this command to display the sFlow source interface configured on the switch.

**Format**            show sflow source-interface

**Mode**             Privileged EXEC

| Parameter                        | Description                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------|
| sFlow Client Source Interface    | The interface ID of the physical or logical interface configured as the sFlow client source interface. |
| sFlow Client Source IPv4 Address | The IP address of the interface configured as the sFlow client source interface.                       |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show sflow source-interface
```

```
sFlow Client Source Interface..... serviceport
sFlow Client Source IPv4 Address..... 10.27.22.131 [Up]
```

## 3.24 Switch Database Management Template Commands

A Switch Database Management (SDM) template is a description of the maximum resources a switch or router can use for various features. Different SDM templates allow different combinations of scaling factors, enabling different allocations of resources depending on how the device is used. In other words, SDM templates enable you to reallocate system resources to support a different mix of features based on your network requirements.

### NOTICE

If you attach a unit to a stack and its template does not match the stack's template, the new unit will automatically reboot using the template used by other stack members. To avoid the automatic reboot, you may first set the template to the template used by existing members of the stack. Then power off the new unit, attach it to the stack, and power it on.

### 3.24.1 sdm prefer

Use this command to change the template that will be active after the next reboot. The keywords are as follows:

- `dual-ipv4-and-ipv6`—Filters subsequent template choices to those that support both IPv4 and IPv6. The `default` template maximizes the number of IPv4 and IPv6 unicast routes, while limiting the number of ECMP next hops in each route to 4. The `data-center` template support increases the number of ECMP next hops to 32. The `alpm` and `alpm-mpls-data-center` templates accommodate larger routes. The values for the `alpm` and `alpm-mpls-data-center` templates follow.

```
dual-ipv4-and-ipv6 alpm:
```

```
ARP Entries..... 2560
IPv4 Unicast Routes..... 32768
IPv6 NDP Entries..... 2560
IPv6 Unicast Routes..... 24576
ECMP Next Hops..... 48
IPv4 Multicast Routes..... 0
IPv6 Multicast Routes..... 0
```

```
dual-ipv4-and-ipv6 alpm-mpls-data-center:
```

```
ARP Entries..... 2560
IPv4 Unicast Routes..... 32768
```

```

IPv6 NDP Entries..... 2560
IPv6 Unicast Routes..... 24576
ECMP Next Hops..... 16
IPv4 Multicast Routes..... 0
IPv6 Multicast Routes..... 0

```

- `ipv4-routing`—Filters subsequent template choices to those that support IPv4, and not IPv6. The `ipv4-routing default` template maximizes the number of IPv4 unicast routes, while limiting the number of ECMP next hops in each route to 4. The `data-center default` template supports increases the number of ECMP next hops to 32 and reduces the number of routes. The `data-center plus` template increases the number of ECMP next hops to 32 while keeping the maximum IPv4 routes.

---

After setting the template, you must reboot for the configuration change to take effect.

---

## NOTICE

**Default**            `ipv4-routing data-center plus`

**Format**            `sdm prefer {dual-ipv4-and-ipv6 {default | data-center | alpm | alpm-mpls-data-center} | ipv4-routing {default | {data-center {default | plus}}}}`

**Mode**              Global Config

### 3.24.1.1 no sdm prefer

Use this command to revert to the default template after the next reboot.

**Format**            `no sdm prefer`

**Mode**              Global Config

### 3.24.2 show sdm prefer

Use this command to view the currently active SDM template and its scaling parameters, or to view the scaling parameters for an inactive template. When invoked with no optional keywords, this command lists the currently active template and the template that will become active on the next reboot, if it is different from the currently active template. If the system boots with a non-default template, and you clear the template configuration, either using `no sdm prefer` or by deleting the startup configuration, `show sdm prefer` lists the default template as the next active template. To list the scaling parameters of a specific template, use that template's keyword as an argument to the command.

Use the optional keywords to list the scaling parameters of a specific template.

**Format**            `show sdm prefer [dual-ipv4-and-ipv6 {default | data-center | alpm | alpm-mpls-data-center} | ipv4-routing {default | data-center {default | plus}} ]`

**Mode**              Privileged EXEC

| Syntax                                                | Description                                                                                                |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <code>dual-ipv4-and-ipv6 default</code>               | (Optional) List the scaling parameters for the template supporting IPv4 and IPv6.                          |
| <code>dual-ipv4-and-ipv6 data-center</code>           | (Optional) List the scaling parameters for the Dual IPv4 and IPv6 template supporting more ECMP next hops. |
| <code>dual-ipv4-and-ipv6 alpm</code>                  | (Optional) Lists the scaling parameters for the alpm template.                                             |
| <code>dual-ipv4-and-ipv6 alpm-mpls-data-center</code> | (Optional) Lists the scaling parameters for the alpm-mpls-data-center template.                            |
| <code>ipv4-routing default</code>                     | (Optional) List the scaling parameters for the IPv4-only template maximizing the number of unicast routes. |
| <code>ipv4-routing data-center default</code>         | (Optional) List the scaling parameters for the IPv4-only template supporting more ECMP next hops.          |

| Syntax                        | Description                                                                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| ipv4-routing data-center plus | (Optional) List the scaling parameters for the IPv4-only template maximizing the number of unicast routes and also supporting more ECMP next hops. |

| Parameter           | Description                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------------------|
| ARP Entries         | The maximum number of entries in the IPv4 Address Resolution Protocol (ARP) cache for routing interfaces. |
| IPv4 Unicast Routes | The maximum number of IPv4 unicast forwarding table entries.                                              |
| IPv6 NDP Entries    | The maximum number of IPv6 Neighbor Discovery Protocol (NDP) cache entries.                               |
| IPv6 Unicast Routes | The maximum number of IPv6 unicast forwarding table entries.                                              |
| ECMP Next Hops      | The maximum number of next hops that can be installed in the IPv4 and IPv6 unicast forwarding tables.     |

**Example:** This example shows the current SDM template. The user has not changed the next active SDM template.

```
(router)#show sdm prefer
```

The current template is the Dual IPv4 and IPv6 template.

```
ARP Entries..... 4096
IPv4 Unicast Routes..... 8160
IPv6 NDP Entries..... 1024
IPv6 Unicast Routes..... 4096
ECMP Next Hops..... 4
```

Now the user sets the next active SDM template.

```
(router) # configure
```

```
(router) (Config) # sdm prefer ipv4-only data-center
```

Changes to the running SDM preferences have been stored, but cannot take effect until the next reload. Use 'show sdm prefer' to see what SDM preference is currently active.

```
(router) # show sdm prefer
```

The current template is the dual IPv4 and IPv6 template.

```
ARP Entries.....4096
IPv4 Unicast Routes.....8160
IPv6 NDP Entries.....1024
IPv6 Unicast Routes.....4096
ECMP Next Hops.....4
```

On the next reload, the template will be the IPv4 data center template.

To list the scaling parameters for the data center template, invoke the command with the `ipv4-only data-center` keywords.

```
(router) # show sdm prefer ipv4-only data-center
```

Scaling parameters for the IPv4 data center template:

```
ARP Entries.....4096
IPv4 Unicast Routes.....8160
IPv6 NDP Entries.....0
IPv6 Unicast Routes.....0
ECMP Next Hops.....32
```

## 3.25 Remote Monitoring Commands

Remote Monitoring (RMON) is a method of collecting a variety of data about network traffic. RMON supports 64-bit counters (RFC 3273) and High Capacity Alarm Table (RFC 3434).

### NOTICE

There is no configuration command for ether stats and high capacity ether stats. The data source for ether stats and high capacity ether stats are configured during initialization.

### 3.25.1 rmon alarm

This command sets the RMON alarm entry in the RMON alarm MIB group.

**Format** `rmon alarm alarm number variable sample interval {absolute|delta} rising-threshold value [rising-event-index] falling-threshold value [falling-event-index] [startup {rising|falling|rising-falling}] [owner string]`

**Mode** Global Config

| Parameter                 | Description                                                                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Index               | An index that uniquely identifies an entry in the alarm table. Each entry defines a diagnostic sample at a particular interval for an object on the device. The range is 1 to 65535. |
| Alarm Variable            | The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of integer.                                                   |
| Alarm Interval            | The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. The range is 1 to 2,147,483,647. The default is 1.                       |
| Alarm Absolute Value      | The value of the statistic during the last sampling period. This object is a read-only, 32-bit signed value.                                                                         |
| Alarm Rising Threshold    | The rising threshold for the sample statistics. The range is 2,147,483,648 to 2,147,483,647. The default is 1.                                                                       |
| Alarm Rising Event Index  | The index of the eventEntry that is used when a rising threshold is crossed. The range is 1 to 65535. The default is 1.                                                              |
| Alarm Falling Threshold   | The falling threshold for the sample statistics. The range is 2147483648 to 2147483647. The default is 1.                                                                            |
| Alarm Falling Event Index | The index of the eventEntry that is used when a falling threshold is crossed. The range is 1 to 65535. The default is 2.                                                             |
| Alarm Startup Alarm       | The alarm that may be sent. Possible values are <i>rising</i> , <i>falling</i> or both <i>rising-falling</i> . The default is <i>rising-falling</i> .                                |
| Alarm Owner               | The owner string associated with the alarm entry. The default is <i>monitorAlarm</i> .                                                                                               |

**Example:** The following shows an example of the command.

```
(Routing) (Config)# rmon alarm 1 ifInErrors.2 30 absolute rising-threshold 100 1 falling-threshold 10 2 startup rising owner myOwner
```

#### 3.25.1.1 no rmon alarm

This command deletes the RMON alarm entry.

**Format** `no rmon alarm alarm number`

**Mode** Global Config

**Example:** The following shows an example of the command.

```
(Routing) (Config)# no rmon alarm 1
```

### 3.25.2 rmon hcalarm

This command sets the RMON hcalarm entry in the High Capacity RMON alarm MIB group.

**Format**            `rmon hcalarm alarm number variable sample interval {absolute|delta} rising-threshold high value low value status {positive|negative} [rising-event-index] falling-threshold high value low value status {positive|negative} [falling-event-index] [startup {rising|falling|rising-falling}] [owner string]`

**Mode**             Global Config

| Parameter                                                 | Description                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Capacity Alarm Index                                 | An arbitrary integer index value used to uniquely identify the high capacity alarm entry. The range is 1 to 65535.                                                                                                                                                            |
| High Capacity Alarm Variable                              | The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of integer.                                                                                                                                            |
| High Capacity Alarm Interval                              | The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. The range is 1 to 2147483647. The default is 1.                                                                                                                   |
| High Capacity Alarm Sample Type                           | The method of sampling the selected variable and calculating the value to be compared against the thresholds. Possible types are Absolute Value or Delta Value. The default is Absolute Value.                                                                                |
| High Capacity Alarm Absolute Value                        | The absolute value (that is, the unsigned value) of the hcAlarmVariable statistic during the last sampling period. The value during the current sampling period is not made available until the period is complete. This object is a 64-bit unsigned value that is Read-Only. |
| High Capacity Alarm Absolute Alarm Status                 | This object indicates the validity and sign of the data for the high capacity alarm absolute value object (hcAlarmAbsValueobject). Possible status types are valueNotAvailable, valuePositive, or valueNegative. The default is valueNotAvailable.                            |
| High Capacity Alarm Startup Alarm                         | High capacity alarm startup alarm that may be sent. Possible values are rising, falling, or rising-falling. The default is rising-falling.                                                                                                                                    |
| High Capacity Alarm Rising-Threshold Absolute Value Low   | The lower 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 1.                                                                                                                                              |
| High Capacity Alarm Rising-Threshold Absolute Value High  | The upper 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 0.                                                                                                                                              |
| High Capacity Alarm Rising-Threshold Value Status         | This object indicates the sign of the data for the rising threshold, as defined by the objects hcAlarmRisingThresAbsValueLow and hcAlarmRisingThresAbsValueHigh. Possible values are valueNotAvailable, valuePositive, or valueNegative. The default is valuePositive.        |
| High Capacity Alarm Falling-Threshold Absolute Value Low  | The lower 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 1.                                                                                                                                              |
| High Capacity Alarm Falling-Threshold Absolute Value High | The upper 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 0.                                                                                                                                              |
| High Capacity Alarm Falling-Threshold Value Status        | This object indicates the sign of the data for the falling threshold, as defined by the objects hcAlarmFallingThresAbsValueLow and hcAlarmFallingThresAbsValueHigh. Possible values are valueNotAvailable, valuePositive, or valueNegative. The default is valuePositive.     |
| High Capacity Alarm Rising Event Index                    | The index of the eventEntry that is used when a rising threshold is crossed. The range is 1 to 65535. The default is 1.                                                                                                                                                       |
| High Capacity Alarm Falling Event Index                   | The index of the eventEntry that is used when a falling threshold is crossed. The range is 1 to 65535. The default is 2.                                                                                                                                                      |
| High Capacity Alarm Failed Attempts                       | The number of times the associated hcAlarmVariable instance was polled on behalf of the hcAlarmEntry (while in the active state) and the value was not available. This object is a 32-bit counter value that is read-only.                                                    |
| High Capacity Alarm Owner                                 | The owner string associated with the alarm entry. The default is monitorHCAAlarm.                                                                                                                                                                                             |

| Parameter                        | Description                                                                                                                  |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| High Capacity Alarm Storage Type | The type of non-volatile storage configured for this entry. This object is read-only. The default is <code>volatile</code> . |

**Example:** The following shows an example of the command.

```
(Routing) (Config)# rmon hcalarm 1 ifInOctets.1 30 absolute rising-threshold high 1 low 100 status positive 1 falling-threshold high 1 low 10 status positive startup rising owner myOwner
```

### 3.25.2.1 no rmon hcalarm

This command deletes the rmon hcalarm entry.

**Format**            `no rmon hcalarm alarm number`

**Mode**             Global Config

**Example:** The following shows an example of the command.

```
(Routing) (Config)# no rmon hcalarm 1
```

### 3.25.3 rmon event

This command sets the RMON event entry in the RMON event MIB group.

**Format**            `rmon event event number [description string|log|owner string|trap community]`

**Mode**             Global Config

| Parameter         | Description                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event Index       | An index that uniquely identifies an entry in the event table. Each such entry defines one event that is to be generated when the appropriate conditions occur. The range is 1 to 65535.                               |
| Event Description | A comment describing the event entry. The default is <code>alarmEvent</code> .                                                                                                                                         |
| Event Type        | The type of notification that the probe makes about the event. Possible values are <code>None</code> , <code>Log</code> , <code>SNMP Trap</code> , <code>Log and SNMP Trap</code> . The default is <code>None</code> . |
| Event Owner       | Owner string associated with the entry. The default is <code>monitorEvent</code> .                                                                                                                                     |
| Event Community   | The SNMP community specific by this octet string which is used to send an SNMP trap. The default is <code>public</code> .                                                                                              |

**Example:** The following shows an example of the command.

```
(Routing) (Config)# rmon event 1 log description test
```

#### 3.25.3.1 no rmon event

This command deletes the rmon event entry.

**Format**            `no rmon event event number`

**Mode**             Global Config

**Example:** The following shows an example of the command.

```
(Routing) (Config)# no rmon event 1
```

### 3.25.4 rmon collection history

This command sets the history control parameters of the RMON historyControl MIB group.



**NOTICE**

This command is not supported on interface range. Each RMON history control collection entry can be configured on only one interface. If you try to configure on multiple interfaces, DUT displays an error.

**Format** `rmon collection history index number [buckets number|interval interval in sec|owner string]`

**Mode** Interface Config

| Parameter                         | Description                                                                                                                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| History Control Index             | An index that uniquely identifies an entry in the historyControl table. Each such entry defines a set of samples at a particular interval for an interface on the device. The range is 1 to 65535. |
| History Control Data Source       | The source interface for which historical data is collected.                                                                                                                                       |
| History Control Buckets Requested | The requested number of discrete time intervals over which data is to be saved. The range is 1 to 65535. The default is 50.                                                                        |
| History Control Buckets Granted   | The number of discrete sampling intervals over which data shall be saved. This object is read-only. The default is 10.                                                                             |
| History Control Interval          | The interval in seconds over which the data is sampled. The range is 1 to 3600. The default is 1800.                                                                                               |
| History Control Owner             | The owner string associated with the history control entry. The default is monitorHistoryControl.                                                                                                  |

**Example:** The following shows an example of the command.

```
(Routing) (Interface 1/0/1)# rmon collection history 1 buckets 10 interval 30 owner myOwner
```

**Example:** The following shows an example of the command.

```
(Routing) (Interface 1/0/1-1/0/10)#rmon collection history 1 buckets 10 interval 30 owner myOwner
```

Error: 'rmon collection history' is not supported on range of interfaces.

### 3.25.4.1 no rmon collection history

This command will delete the history control group entry with the specified index number.

**Format** `no rmon collection history index number`

**Mode** Interface Config

**Example:** The following shows an example of the command.

```
(Routing) (Interface 1/0/1-1/0/10)# no rmon collection history 1
```

### 3.25.5 show rmon

This command displays the entries in the RMON alarm table.

**Format** `show rmon {alarms | alarm alarm-index}`

**Mode** Privileged EXEC

| Parameter      | Description                                                                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Index    | An index that uniquely identifies an entry in the alarm table. Each entry defines a diagnostic sample at a particular interval for an object on the device. The range is 1 to 65535. |
| Alarm Variable | The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of integer.                                                   |

| Parameter                 | Description                                                                                                                                                                   |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Interval            | The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. The range is 1 to 2147483647. The default is 1.                   |
| Alarm Absolute Value      | The value of the statistic during the last sampling period. This object is a read-only, 32-bit signed value.                                                                  |
| Alarm Rising Threshold    | The rising threshold for the sample statistics. The range is 2147483648 to 2147483647. The default is 1.                                                                      |
| Alarm Rising Event Index  | The index of the eventEntry that is used when a rising threshold is crossed. The range is 1 to 65535. The default is 1.                                                       |
| Alarm Falling Threshold   | The falling threshold for the sample statistics. The range is 2147483648 to 2147483647. The default is 1.                                                                     |
| Alarm Falling Event Index | The index of the eventEntry that is used when a falling threshold is crossed. The range is 1 to 65535. The default is 2.                                                      |
| Alarm Startup Alarm       | The alarm that may be sent. Possible values are <code>rising</code> , <code>falling</code> or both <code>rising-falling</code> . The default is <code>rising-falling</code> . |
| Alarm Owner               | The owner string associated with the alarm entry. The default is <code>monitorAlarm</code> .                                                                                  |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon alarms
```

```

Index OID Owner

1 alarmInterval.1 MibBrowser
2 alarmInterval.1 MibBrowser

```

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon alarm 1
```

```

Alarm 1

OID: alarmInterval.1
Last Sample Value: 1
Interval: 1
Sample Type: absolute
Startup Alarm: rising-falling
Rising Threshold: 1
Falling Threshold: 1
Rising Event: 1
Falling Event: 2
Owner: MibBrowser

```

### 3.25.6 show rmon collection history

This command displays the entries in the RMON history control table.

**Format**            `show rmon collection history [interfaces slot/port]`

**Mode**              Privileged EXEC

| Parameter                         | Description                                                                                                                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| History Control Index             | An index that uniquely identifies an entry in the historyControl table. Each such entry defines a set of samples at a particular interval for an interface on the device. The range is 1 to 65535. |
| History Control Data Source       | The source interface for which historical data is collected.                                                                                                                                       |
| History Control Buckets Requested | The requested number of discrete time intervals over which data is to be saved. The range is 1 to 65535. The default is 50.                                                                        |

| Parameter                       | Description                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------|
| History Control Buckets Granted | The number of discrete sampling intervals over which data shall be saved. This object is read-only. The default is 10. |
| History Control Interval        | The interval in seconds over which the data is sampled. The range is 1 to 3600. The default is 1800.                   |
| History Control Owner           | The owner string associated with the history control entry. The default is monitorHistoryControl.                      |

**Example:** The following shows example CLI display output for the command.

(Routing) #show rmon collection history

| Index | Interface | Interval | Requested Samples | Granted Samples | Owner                 |
|-------|-----------|----------|-------------------|-----------------|-----------------------|
| 1     | 1/0/1     | 30       | 10                | 10              | myowner               |
| 2     | 1/0/1     | 1800     | 50                | 10              | monitorHistoryControl |
| 3     | 1/0/2     | 30       | 50                | 10              | monitorHistoryControl |
| 4     | 1/0/2     | 1800     | 50                | 10              | monitorHistoryControl |
| 5     | 1/0/3     | 30       | 50                | 10              | monitorHistoryControl |
| 6     | 1/0/3     | 1800     | 50                | 10              | monitorHistoryControl |
| 7     | 1/0/4     | 30       | 50                | 10              | monitorHistoryControl |
| 8     | 1/0/4     | 1800     | 50                | 10              | monitorHistoryControl |
| 9     | 1/0/5     | 30       | 50                | 10              | monitorHistoryControl |
| 10    | 1/0/5     | 1800     | 50                | 10              | monitorHistoryControl |
| 11    | 1/0/6     | 30       | 50                | 10              | monitorHistoryControl |
| 12    | 1/0/6     | 1800     | 50                | 10              | monitorHistoryControl |
| 13    | 1/0/7     | 30       | 50                | 10              | monitorHistoryControl |
| 14    | 1/0/7     | 1800     | 50                | 10              | monitorHistoryControl |
| 15    | 1/0/8     | 30       | 50                | 10              | monitorHistoryControl |
| 16    | 1/0/8     | 1800     | 50                | 10              | monitorHistoryControl |
| 17    | 1/0/9     | 30       | 50                | 10              | monitorHistoryControl |
| 18    | 1/0/9     | 1800     | 50                | 10              | monitorHistoryControl |
| 19    | 1/0/10    | 30       | 50                | 10              | monitorHistoryControl |

--More-- or (q)uit

**Example:** The following shows example CLI display output for the command.

(Routing) #show rmon collection history interfaces 1/0/1

| Index | Interface | Interval | Requested Samples | Granted Samples | Owner                 |
|-------|-----------|----------|-------------------|-----------------|-----------------------|
| 1     | 1/0/1     | 30       | 10                | 10              | myowner               |
| 2     | 1/0/1     | 1800     | 50                | 10              | monitorHistoryControl |

### 3.25.7 show rmon events

This command displays the entries in the RMON event table.

**Format** show rmon events

**Mode** Privileged EXEC

| Parameter         | Description                                                                                                                                                                              |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event Index       | An index that uniquely identifies an entry in the event table. Each such entry defines one event that is to be generated when the appropriate conditions occur. The range is 1 to 65535. |
| Event Description | A comment describing the event entry. The default is alarmEvent.                                                                                                                         |
| Event Type        | The type of notification that the probe makes about the event. Possible values are None, Log, SNMP Trap, Log and SNMP Trap. The default is None.                                         |

| Parameter       | Description                                                                                                               |
|-----------------|---------------------------------------------------------------------------------------------------------------------------|
| Event Owner     | Owner string associated with the entry. The default is <code>monitorEvent</code> .                                        |
| Event Community | The SNMP community specific by this octet string which is used to send an SNMP trap. The default is <code>public</code> . |
| Owner           | Event owner. The owner string associated with the entry.                                                                  |
| Last time sent  | The last time over which a log or a SNMP trap message is generated.                                                       |

**Example:** The following shows example CLI display output for the command.

(Routing) # show rmon events

| Index | Description | Type | Community | Owner | Last time sent     |
|-------|-------------|------|-----------|-------|--------------------|
| 1     | test        | log  | public    | MIB   | 0 days 0 h:0 m:0 s |

### 3.25.8 show rmon history

This command displays the specified entry in the RMON history table.

**Format** `show rmon history index {errors | other | throughput | high-capacity}[period seconds]`

**Mode** Privileged EXEC

| Parameter          | Description                                                                                                                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample set         | The index (identifier) for the RMON history entry within the RMON history group. Each such entry defines a set of samples at a particular interval for an interface on the device.                                      |
| Owner              | The owner string associated with the history control entry. The default is <code>monitorHistoryControl</code> .                                                                                                         |
| Interface          | The interface that was sampled.                                                                                                                                                                                         |
| Interval           | The time between samples, in seconds.                                                                                                                                                                                   |
| Requested Samples  | The number of samples (intervals) requested for the RMON history entry.                                                                                                                                                 |
| Granted Samples    | The number of samples granted for the RMON history entry.                                                                                                                                                               |
| Maximum Table Size | The maximum number of entries that the history table can hold.                                                                                                                                                          |
| Time               | Time at which the sample is collected, displayed as period seconds.                                                                                                                                                     |
| CRC Align          | Number of CRC align errors.                                                                                                                                                                                             |
| Undersize Packets  | Total number of undersize packets. Packets are less than 64 octets long (excluding framing bits, including FCS octets).                                                                                                 |
| Oversize Packets   | Total number of oversize packets. Packets are longer than 1518 octets (excluding framing bits, including FCS octets).                                                                                                   |
| Fragments          | Total number of fragment packets. Packets are not an integral number of octets in length or had a bad Frame Check Sequence (FCS), and are less than 64 octets in length (excluding framing bits, including FCS octets). |
| Jabbers            | Total number of jabber packets. Packets are longer than 1518 octets (excluding framing bits, including FCS octets), and are not an integral number of octets in length or had a bad Frame Check Sequence (FCS).         |
| Time               | Time at which the sample is collected, displayed as period seconds.                                                                                                                                                     |
| Dropped Collisions | Total number of dropped collisions.                                                                                                                                                                                     |
| Time               | Time at which the sample is collected, displayed as period seconds.                                                                                                                                                     |
| Octets             | Total number of octets received on the interface.                                                                                                                                                                       |
| Packets            | Total number of packets received (including error packets) on the interface.                                                                                                                                            |
| Broadcast          | Total number of good broadcast packets received on the interface.                                                                                                                                                       |

| Parameter       | Description                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Multicast       | Total number of good multicast packets received on the interface.                                                                              |
| Util            | Port utilization of the interface associated with the history index specified.                                                                 |
| Time            | Time at which the sample is collected, displayed as period seconds.                                                                            |
| Overflow Pkts   | The number of times the associated packet counter has overflowed.                                                                              |
| Pkts            | The total number of packets (including bad packets, broadcast packets, and multicast packets) received.                                        |
| Overflow Octets | The number of times the associated octet counter has overflowed.                                                                               |
| Octets          | The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon history 1 errors
```

```
Sample set: 1 Owner: myowner
Interface: 1/0/1 Interval: 30
Requested Samples: 10 Granted Samples: 10
Maximum table size: 1758
```

| Time                 | CRC | Align | Undersize | Oversize | Fragments | Jabbers |
|----------------------|-----|-------|-----------|----------|-----------|---------|
| Jan 01 1970 21:41:43 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:42:14 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:42:44 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:43:14 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:43:44 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:44:14 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:44:45 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:45:15 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:45:45 | 0   | 0     | 0         | 0        | 0         | 0       |
| Jan 01 1970 21:46:15 | 0   | 0     | 0         | 0        | 0         | 0       |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon history 1 throughput
```

```
Sample set: 1 Owner: myowner
Interface: 1/0/1 Interval: 30
Requested Samples: 10 Granted Samples: 10
Maximum table size: 1758
```

| Time                 | Octets | Packets | Broadcast | Multicast | Util |
|----------------------|--------|---------|-----------|-----------|------|
| Jan 01 1970 21:41:43 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:42:14 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:42:44 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:43:14 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:43:44 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:44:14 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:44:45 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:45:15 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:45:45 | 0      | 0       | 0         | 0         | 1    |
| Jan 01 1970 21:46:15 | 0      | 0       | 0         | 0         | 1    |

```
(Routing) #show rmon history 1 other
```

```
Sample set: 1 Owner: myowner
Interface: 1/0/1 Interval: 30
Requested Samples: 10 Granted Samples: 10
Maximum table size: 1758
```

```

Time Dropped Collisions

Jan 01 1970 21:41:43 0 0
Jan 01 1970 21:42:14 0 0
Jan 01 1970 21:42:44 0 0
Jan 01 1970 21:43:14 0 0
Jan 01 1970 21:43:44 0 0
Jan 01 1970 21:44:14 0 0
Jan 01 1970 21:44:45 0 0
Jan 01 1970 21:45:15 0 0
Jan 01 1970 21:45:45 0 0
Jan 01 1970 21:46:15 0 0

```

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon history 1 high-capacity
```

```

Sample set: 1 Owner: monitorHistoryControl
Interface: 0/1 Interval: 30
Requested Samples: 50 Granted Samples: 10
Maximum table size: 414

```

```

Time OverFlow Pkts Pkts Overflow Octets Octets

Jan 17 2017 09:12:56 0 0 0 0
Jan 17 2017 09:13:27 0 0 0 0
Jan 17 2017 09:13:57 0 0 0 0
Jan 17 2017 09:14:27 0 0 0 0
Jan 17 2017 09:14:57 0 0 0 0
Jan 17 2017 09:15:28 0 0 0 0
Jan 17 2017 09:15:58 0 0 0 0
Jan 17 2017 09:16:28 0 0 0 0
Jan 17 2017 09:16:58 0 0 0 0
Jan 17 2017 09:17:29 0 0 0 0

```

### 3.25.9 show rmon log

This command displays the entries in the RMON log table.

**Format** show rmon log [*event-index*]

**Mode** Privileged EXEC

| Parameter          | Description                                                          |
|--------------------|----------------------------------------------------------------------|
| Maximum table size | The maximum number of entries that the log table can hold.           |
| Event              | Event index for which the log is generated.                          |
| Description        | A comment describing the event entry for which the log is generated. |
| Time               | Time at which the event is generated.                                |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon log
```

```

Event Description Time

```

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon log 1
```

Maximum table size: 10

```
Event Description Time

```

### 3.25.10 show rmon statistics interfaces

This command displays the RMON statistics for the given interfaces.

**Format**            `show rmon statistics interfaces slot/port`

**Mode**             Privileged EXEC

| Parameter                         | Description                                                                                                                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                              | slot/port                                                                                                                                                                                                               |
| Dropped                           | Total number of dropped events on the interface.                                                                                                                                                                        |
| Octets                            | Total number of octets received on the interface.                                                                                                                                                                       |
| Packets                           | Total number of packets received (including error packets) on the interface.                                                                                                                                            |
| Broadcast                         | Total number of good broadcast packets received on the interface.                                                                                                                                                       |
| Multicast                         | Total number of good multicast packets received on the interface.                                                                                                                                                       |
| CRC Align Errors                  | Total number of packets received have a length (excluding framing bits, including FCS octets) of between 64 and 1518 octets inclusive.                                                                                  |
| Collisions                        | Total number of collisions on the interface.                                                                                                                                                                            |
| Undersize Pkts                    | Total number of undersize packets. Packets are less than 64 octets long (excluding framing bits, including FCS octets).                                                                                                 |
| Oversize Pkts                     | Total number of oversize packets. Packets are longer than 1518 octets (excluding framing bits, including FCS octets).                                                                                                   |
| Fragments                         | Total number of fragment packets. Packets are not an integral number of octets in length or had a bad Frame Check Sequence (FCS), and are less than 64 octets in length (excluding framing bits, including FCS octets). |
| Jabbers                           | Total number of jabber packets. Packets are longer than 1518 octets (excluding framing bits, including FCS octets), and are not an integral number of octets in length or had a bad Frame Check Sequence (FCS).         |
| 64 Octets                         | Total number of packets that are 64 octets in length (excluding framing bits, including FCS octets).                                                                                                                    |
| 65-127 Octets                     | Total number of packets that are between 65 and 127 octets in length (excluding framing bits, including FCS octets).                                                                                                    |
| 128-255 Octets                    | Total number of packets that are between 128 and 255 octets in length (excluding framing bits, including FCS octets).                                                                                                   |
| 256-511 Octets                    | Total number of packets that are between 256 and 511 octets in length (excluding framing bits, including FCS octets).                                                                                                   |
| 512-1023 Octets                   | Total number of packets that are between 512 and 1023 octets in length (excluding framing bits, including FCS octets).                                                                                                  |
| 1024-1518 Octets                  | Total number of packets that are between 1024 and 1518 octets in length (excluding framing bits, including FCS octets).                                                                                                 |
| HC Overflow Pkts                  | Total number of times the packet counter has overflowed.                                                                                                                                                                |
| HC Overflow Octets                | Total number of times the octet counter has overflowed.                                                                                                                                                                 |
| HC Overflow Pkts 64 Octets        | The number of times the associated 64-octet counter has overflowed.                                                                                                                                                     |
| HC Overflow Pkts 65 - 127 Octets  | The number of times the associated 65-to-127 octet counter has overflowed.                                                                                                                                              |
| HC Overflow Pkts 128 - 255 Octets | The number of times the associated 128-to-255 octet counter has overflowed.                                                                                                                                             |
| HC Overflow Pkts 256 - 511 Octets | The number of times the associated 256-to-511 octet counter has overflowed.                                                                                                                                             |

| Parameter                           | Description                                                                   |
|-------------------------------------|-------------------------------------------------------------------------------|
| HC Overflow Pkts 512 - 1023 Octets  | The number of times the associated 512-to-1023 octet counter has overflowed.  |
| HC Overflow Pkts 1024 - 1518 Octets | The number of times the associated 1024-to-1518 octet counter has overflowed. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) # show rmon statistics interfaces 1/0/1
Port: 1/0/1
Dropped: 0
Octets: 0 Packets: 0
Broadcast: 0 Multicast: 0
CRC Align Errors: 0 Collisions: 0
Undersize Pkts: 0 Oversize Pkts: 0
Fragments: 0 Jabbers: 0
64 Octets: 0 65 - 127 Octets: 0
128 - 255 Octets: 0 256 - 511 Octets: 0
512 - 1023 Octets: 0 1024 - 1518 Octets: 0
HC Overflow Pkts: 0 HC Pkts: 0
HC Overflow Octets: 0 HC Octets: 0
HC Overflow Pkts 64 Octets: 0 HC Pkts 64 Octets: 0
HC Overflow Pkts 65 - 127 Octets: 0 HC Pkts 65 - 127 Octets: 0
HC Overflow Pkts 128 - 255 Octets: 0 HC Pkts 128 - 255 Octets: 0
HC Overflow Pkts 256 - 511 Octets: 0 HC Pkts 256 - 511 Octets: 0
HC Overflow Pkts 512 - 1023 Octets: 0 HC Pkts 512 - 1023 Octets: 0
HC Overflow Pkts 1024 - 1518 Octets: 0 HC Pkts 1024 - 1518 Octets: 0
```

### 3.25.11 show rmon hcalarms

This command displays the entries in the RMON high-capacity alarm table.

**Format** show rmon {hcalarms|hcalarm *alarm index*}

**Mode** Privileged EXEC

| Parameter                                               | Description                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Capacity Alarm Index                               | An arbitrary integer index value used to uniquely identify the high capacity alarm entry. The range is 1 to 65535.                                                                                                                                                                                                        |
| High Capacity Alarm Variable                            | The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of integer.                                                                                                                                                                                        |
| High Capacity Alarm Interval                            | The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. The range is 1 to 2147483647. The default is 1.                                                                                                                                                               |
| High Capacity Alarm Sample Type                         | The method of sampling the selected variable and calculating the value to be compared against the thresholds. Possible types are <code>Absolute Value</code> or <code>Delta Value</code> . The default is <code>Absolute Value</code> .                                                                                   |
| High Capacity Alarm Absolute Value                      | The absolute value (that is, the unsigned value) of the <code>hcAlarmVariable</code> statistic during the last sampling period. The value during the current sampling period is not made available until the period is complete. This object is a 64-bit unsigned value that is Read-Only.                                |
| High Capacity Alarm Absolute Alarm Status               | This object indicates the validity and sign of the data for the high capacity alarm absolute value object ( <code>hcAlarmAbsValueobject</code> ). Possible status types are <code>valueNotAvailable</code> , <code>valuePositive</code> , or <code>valueNegative</code> . The default is <code>valueNotAvailable</code> . |
| High Capacity Alarm Startup Alarm                       | High capacity alarm startup alarm that may be sent. Possible values are <code>rising</code> , <code>falling</code> , or <code>rising-falling</code> . The default is <code>rising-falling</code> .                                                                                                                        |
| High Capacity Alarm Rising-Threshold Absolute Value Low | The lower 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 1.                                                                                                                                                                                          |



| Parameter                                                 | Description                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Capacity Alarm Rising-Threshold Absolute Value High  | The upper 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 0.                                                                                                                                          |
| High Capacity Alarm Rising-Threshold Value Status         | This object indicates the sign of the data for the rising threshold, as defined by the objects hcAlarmRisingThresAbsValueLow and hcAlarmRisingThresAbsValueHigh. Possible values are valueNotAvailable, valuePositive, or valueNegative. The default is valuePositive.    |
| High Capacity Alarm Falling-Threshold Absolute Value Low  | The lower 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 1.                                                                                                                                          |
| High Capacity Alarm Falling-Threshold Absolute Value High | The upper 32 bits of the absolute value for threshold for the sampled statistic. The range is 0 to 4294967295. The default is 0.                                                                                                                                          |
| High Capacity Alarm Falling-Threshold Value Status        | This object indicates the sign of the data for the falling threshold, as defined by the objects hcAlarmFallingThresAbsValueLow and hcAlarmFallingThresAbsValueHigh. Possible values are valueNotAvailable, valuePositive, or valueNegative. The default is valuePositive. |
| High Capacity Alarm Rising Event Index                    | The index of the eventEntry that is used when a rising threshold is crossed. The range is 1 to 65535. The default is 1.                                                                                                                                                   |
| High Capacity Alarm Falling Event Index                   | The index of the eventEntry that is used when a falling threshold is crossed. The range is 1 to 65535. The default is 2.                                                                                                                                                  |
| High Capacity Alarm Failed Attempts                       | The number of times the associated hcAlarmVariable instance was polled on behalf of the hcAlarmEntry (while in the active state) and the value was not available. This object is a 32-bit counter value that is read-only.                                                |
| High Capacity Alarm Owner                                 | The owner string associated with the alarm entry. The default is monitorHCAAlarm.                                                                                                                                                                                         |
| High Capacity Alarm Storage Type                          | The type of non-volatile storage configured for this entry. This object is read-only. The default is volatile.                                                                                                                                                            |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show rmon hcalarms
```

```

Index OID Owner

1 alarmInterval.1 MibBrowser
2 alarmInterval.1 MibBrowser

```

```
(Routing) #show rmon hcalarm 1
```

```

Alarm 1

OID: alarmInterval.1
Last Sample Value: 1
Interval: 1
Sample Type: absolute
Startup Alarm: rising-falling
Rising Threshold High: 0
Rising Threshold Low: 1
Rising Threshold Status: Positive
Falling Threshold High: 0
Falling Threshold Low: 1
Falling Threshold Status: Positive
Rising Event: 1
Falling Event: 2
Startup Alarm: Rising-Falling
Owner: MibBrowser

```

## 3.26 Statistics Application Commands

The statistics application gives you the ability to query for statistics on port utilization, flow-based and packet reception on programmable time slots. The statistics application collects the statistics at a configurable time range. You can specify the port numbers or a range of ports for statistics to be displayed. The configured time range applies to all ports. Detailed statistics are collected between a specified time range in date and time format. You can define the time range as having an absolute time entry and/or a periodic time. For example, you can specify the statistics to be collected and displayed between 9:00 12 NOV 2011 (START) and 21:00 12 NOV 2012 (END) or schedule it on every Mon, Wed, and Fri 9:00 (START) to 21:00 (END).

You can receive the statistics in the following ways:

- User requests through the CLI for a set of counters.
- Configuring the device to display statistics using syslog or email alert. The syslog or email alert messages are sent by the statistics application at END time.

You can configure the device to display statistics on the console. The collected statistics are presented on the console at END time.

### 3.26.1 stats group

This command creates a new group with the specified id or name and configures the time range and the reporting mechanism for that group.

**Format**            `stats group group id|name timerange time range name reporting list of reporting methods`

**Mode**             Global Config

| Parameter                 | Description                                                                                                                                                                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| group ID, name            | Name of the group of statistics or its identifier to apply on the interface. The range is:<br>1 received<br>2 received-errors<br>3 transmitted<br>4 transmitted-errors<br>5 received-transmitted<br>6 port-utilization<br>7 congestion<br>The default is None. |
| time range name           | Name of the time range for the group or the flow-based rule. The range is 1 to 31 alphanumeric characters. The default is None.                                                                                                                                |
| list of reporting methods | Report the statistics to the configured method. The range is:<br>0. none<br>1 console<br>2 syslog<br>3 e-mail<br>The default is None.                                                                                                                          |

**Example:** The following shows examples of the command.

```
(Routing) (Config)# stats group received timerange test reporting console email syslog
(Routing) (Config)# stats group received-errors timerange test reporting email syslog
(Routing) (Config)# stats group received- transmitted timerange test reporting none
```

#### 3.26.1.1 no stats group

This command deletes the configured group.

**Format**            `no stats group group id|name`

**Mode**             Global Config

**Example:** The following shows examples of the command.

```
(Routing) (Config)# no stats group received
(Routing) (Config)# no stats group received-errors
(Routing) (Config)# no stats group received-transmitted
```

### 3.26.2 stats flow-based

This command configures flow based statistics rules for the given parameters over the specified time range. Only an IPv4 address is allowed as source and destination IP address.

**Format**            `stats flow-based rule-id timerange time range name [{srcip ip-address} {dstip ip-address} {srcmac mac-address} {dstmac mac-address} {srctcpport portid} {dsttcpport portid} {srcudpport portid} {dstudpport portid}]`

**Mode**             Global Config

| Parameter          | Description                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------|
| rule ID            | The flow-based rule ID. The range is 1 to 16. The default is None.                                                              |
| time range name    | Name of the time range for the group or the flow-based rule. The range is 1 to 31 alphanumeric characters. The default is None. |
| srcip ip-address   | The source IP address.                                                                                                          |
| dstip ip-address   | The destination IP address.                                                                                                     |
| srcmac mac-address | The source MAC address.                                                                                                         |
| dstmac mac-address | The destination MAC address.                                                                                                    |
| srctcpport portid  | The source TCP port number.                                                                                                     |
| dsttcpport portid  | The destination TCP port number.                                                                                                |
| srcudpport portid  | The source UDP port number.                                                                                                     |
| dstudpport portid  | The destination UDP port number.                                                                                                |

**Example:** The following shows examples of the command.

```
(Routing) (Config)#stats flow-based 1 timerange test srcip 1.1.1.1 dstip 2.2.2.2 srcmac 1234 dstmac 1234 srctcpport 123 dsttcpport 123 srcudpport 123 dstudpport 123
```

```
(Routing) (Config)#stats flow-based 2 timerange test srcip 1.1.1.1 dstip 2.2.2.2 srctcpport 123 dsttcpport 123 srcudpport 123 dstudpport 123
```

#### 3.26.2.1 no stats flow-based

This command deletes flow-based statistics.

**Format**            `stats flow-based rule-id`

**Mode**             Global Config

**Example:** The following shows examples of the command.

```
(Routing) (Config)# no stats flow-based 1
(Routing) (Config)# no stats flow-based 2
```

### 3.26.3 stats flow-based reporting

This command configures the reporting mechanism for all the flow-based rules configured on the system. There is no per flow-based rule reporting mechanism. Setting the reporting method as `none` resets all the reporting methods.

**Format**            `stats flow-based reporting List of reporting methods`

**Mode**             Global Config

**Example:** The following shows examples of the command.

```
(Routing) (Config)# stats flow-based reporting console email syslog
(Routing) (Config)# stats flow-based reporting email syslog
(Routing) (Config)# stats flow-based reporting none
```

### 3.26.4 stats group

This command applies the group specified on an interface or interface-range.

**Format** stats group <group id | name>

**Mode** Interface Config

| Parameter | Description                          |
|-----------|--------------------------------------|
| group id  | The unique identifier for the group. |
| name      | The name of the group.               |

**Example:** The following shows examples of the command.

```
(Routing) (Interface 1/0/1-1/0/10)# stats group 1
(Routing) (Interface 1/0/1-1/0/10)# stats group 2
```

#### 3.26.4.1 no stats group

This command deletes the interface or interface-range from the group specified.

**Format** no stats group <group id | name>

**Mode** Interface Config

**Example:** The following shows examples of the command.

```
(Routing) (Interface 1/0/1-1/0/10)# no stats group 1
(Routing) (Interface 1/0/1-1/0/10)# no stats group 2
```

### 3.26.5 stats flow-based

This command applies the flow-based rule specified by the ID on an interface or interface-range.

**Format** stats flow-based <rule-id>

**Mode** Interface Config

| Parameter | Description                                    |
|-----------|------------------------------------------------|
| rule-id   | The unique identifier for the flow-based rule. |

**Example:** The following shows examples of the command.

```
(Routing) (Interface 1/0/1-1/0/10)# stats flow-based 1
(Routing) (Interface 1/0/1-1/0/10)# stats flow-based 2
```

#### 3.26.5.1 no stats flow-based

This command deletes the interface or interface-range from the flow-based rule specified.

**Format** no stats flow-based <rule-id>

**Mode** Interface Config

**Example:** The following shows examples of the command.

```
(Routing) (Interface 1/0/1-1/0/10)# no stats flow-based 1
(Routing) (Interface 1/0/1-1/0/10)# no stats flow-based 2
```

### 3.26.6 show stats group

This command displays the configured time range and the interface list for the group specified and shows collected statistics for the specified time-range name on the interface list after the time-range expiry.

**Format** show stats group <group id | name>

**Mode** Privileged EXEC

| Parameter | Description                          |
|-----------|--------------------------------------|
| group id  | The unique identifier for the group. |
| name      | The name of the group.               |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show stats group received
```

```
Group: received
Time Range: test
Interface List

1/0/2, 1/0/4, lag 1
```

| Counter ID  | Interface | Counter Value |
|-------------|-----------|---------------|
| Rx Total    | 1/0/2     | 951600        |
| Rx Total    | 1/0/4     | 304512        |
| Rx Total    | lag 1     | 0             |
| Rx 64       | 1/0/2     | 0             |
| Rx 64       | 1/0/4     | 4758          |
| Rx 64       | lag 1     | 0             |
| Rx 65to128  | 1/0/2     | 0             |
| Rx 65to128  | 1/0/4     | 0             |
| Rx 65to128  | lag 1     | 0             |
| Rx 128to255 | 1/0/2     | 4758          |
| Rx 128to255 | 1/0/4     | 0             |
| Rx 128to255 | lag 1     | 0             |
| Rx 256to511 | 1/0/2     | 0             |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show stats group port-utilization
```

```
Group: port-utilization
Time Range: test
Interface List

1/0/2, 1/0/4, lag 1
Interface Utilization (%)

1/0/2 0
1/0/4 0
lag 1 0
```

### 3.26.7 show stats flow-based

This command displays the configured time range, flow-based rule parameters, and the interface list for the flow specified.

**Format** show stats flow-based *rule-id*|all

**Mode** Privileged EXEC

| Parameter | Description                                    |
|-----------|------------------------------------------------|
| rule-id   | The unique identifier for the flow-based rule. |

**Example:** The following shows example CLI display output for the command.

(Routing) #show stats flow-based all

```
Flow based rule Id..... 1
Time Range..... test
Source IP..... 1.1.1.1
Source MAC..... 1234
Source TCP Port..... 123
Source UDP Port..... 123
Destination IP..... 2.2.2.2
Destination MAC..... 1234
Destination TCP Port..... 123
Destination UDP Port..... 123
```

Interface List

```

1/0/1 - 1/0/2
```

```
Interface Hit Count
```

```

1/0/1 100
1/0/2 0
```

```
Flow based rule Id..... 2
Time Range..... test
Source IP..... 1.1.1.1
Source TCP Port..... 123
Source UDP Port..... 123
Destination IP..... 2.2.2.2
Destination TCP Port..... 123
Destination UDP Port..... 123
```

Interface List

```

1/0/1 - 1/0/2
```

```
Interface Hit Count
```

```

1/0/1 100
1/0/2 0
```

**Example:** The following shows example CLI display output for the command.

(Routing) #show stats flow-based 2

```
Flow based rule Id..... 2
Time Range..... test
Source IP..... 1.1.1.1
Source TCP Port..... 123
Source UDP Port..... 123
Destination IP..... 2.2.2.2
Destination TCP Port..... 123
Destination UDP Port..... 123
```

Interface List

```

1/0/1 - 1/0/2
```

```
Interface Hit Count
```

```

1/0/1 100
1/0/2 0
```

## 3.27 Precision Time Protocol End-to-End Transparent Clock Commands

This section describes precision time protocol (PTP) end-to-end (E2E) transparent clock (TC) commands with single-step time stamping on supported devices.

Transparent clocks are PTP nodes that do not process PTP packets but only modifies them to account for residence time correction (latency incurred while transit through the device). Transparent clocks measure the variable delay as the PTP packets pass through the switch or router. The measured delay is accounted for by adding the residence time into the correction field of the PTP packet.

Transparent clocks can be E2E or P2P. E2E transparent clock update the correction field of the PTP packet with the residence time alone while P2P clocks can update the correction field with the residence time of packet + path delay.

### 3.27.1 ptp clock e2e-transparent (Global Config)

Use this command to configure the system as a PTP E2E transparent clock.

|                |                           |
|----------------|---------------------------|
| <b>Default</b> | Disabled                  |
| <b>Format</b>  | ptp clock e2e-transparent |
| <b>Mode</b>    | Global Config             |

#### 3.27.1.1 no ptp clock e2e-transparent

Use this command to disable the PTP E2E transparent clock functionality.

|               |                              |
|---------------|------------------------------|
| <b>Format</b> | no ptp clock e2e-transparent |
| <b>Mode</b>   | Global Config                |

### 3.27.2 ptp clock e2e-transparent (Interface Config)

Use this command to enable the PTP E2E transparent clock functionality on an interface.

|                |                           |
|----------------|---------------------------|
| <b>Default</b> | Disabled                  |
| <b>Format</b>  | ptp clock e2e-transparent |
| <b>Mode</b>    | Interface Config          |

#### 3.27.2.1 no ptp clock e2e-transparent

Use the no form of the command to disable the PTP E2E transparent clock functionality on an interface.

|               |                              |
|---------------|------------------------------|
| <b>Format</b> | no ptp clock e2e-transparent |
| <b>Mode</b>   | Interface Config             |

### 3.27.3 show ptp clock e2e-transparent

Use this command to display the current global admin mode, interface admin mode configurations, and operational mode of the PTP E2E transparent clock.

|               |                                |
|---------------|--------------------------------|
| <b>Format</b> | show ptp clock e2e-transparent |
| <b>Mode</b>   | Privileged Exec                |

| Parameter        | Description                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------|
| PTP TC Mode      | The global admin mode of E2E TC configuration. Possible values are Enabled or Disabled.          |
| Configured Mode  | The interface admin mode of E2E TC configuration. Possible values are Enabled or Disabled.       |
| Operational Mode | The interface operational mode of E2E TC configuration. Possible values are Enabled or Disabled. |

**Example:** The following shows example CLI display output for the command.

```
(localhost)#show ptp clock e2e-transparent
```

```
PTP TC mode..... Disabled
```

| Interface | Configured Mode | Operational Mode |
|-----------|-----------------|------------------|
| 0/1       | Disabled        | Disabled         |
| 0/2       | Disabled        | Disabled         |
| 0/3       | Disabled        | Disabled         |
| 0/4       | Disabled        | Disabled         |
| 0/5       | Disabled        | Disabled         |
| 0/6       | Disabled        | Disabled         |
| 0/7       | Disabled        | Disabled         |
| 0/8       | Disabled        | Disabled         |
| 0/9       | Disabled        | Disabled         |
| 0/10      | Disabled        | Disabled         |
| 0/11      | Disabled        | Disabled         |
| 0/12      | Disabled        | Disabled         |
| 0/13      | Disabled        | Disabled         |
| 0/14      | Disabled        | Disabled         |
| lag 1     | Disabled        | Disabled         |
| lag 2     | Disabled        | Disabled         |



## 4/ Switching Commands

This chapter describes the switching commands available in the FASTPATH CLI.

### 4.1 Port Configuration Commands

This section describes the commands you use to view and configure port settings.

#### 4.1.1 interface

This command gives you access to the Interface Config mode, which allows you to enable or modify the operation of an interface (port). You can also specify a range of ports to configure at the same time by specifying the starting *slot/port* and ending *slot/port*, separated by a hyphen.

**Format**            `interface {slot/port | slot/port(startrange)-slot/port(endrange)}`  
**Mode**             Global Config

**Example:** The following example enters Interface Config mode for port 1/0/1.

```
(switch) #configure
(switch) (config)#interface 1/0/1
(switch) (interface 1/0/1)#
```

**Example:** The following example enters Interface Config mode for ports 1/0/1 through 1/0/4.

```
(switch) #configure
(switch) (config)#interface 1/0/1-1/0/4
(switch) (interface 1/0/1-1/0/4)#
```

#### 4.1.2 auto-negotiate

This command enables automatic negotiation on a port or range of ports.

---

#### **NOTICE**

This command has been deprecated. The Auto-negotiation enable/disable option is no longer available using `auto-negotiate`. Instead, different variants of the `speed` command (that is, `speed` and `speed auto` are used to disable and enable auto-negotiation, respectively). However, backward compatibility will be maintained for the `auto-negotiate` command, so a configuration script that has the `auto-negotiate` command is still supported. Both, text-based as well as binary-based configuration migration will be handled to keep this command backward compatible.

---

**Default**            enabled  
**Format**            `auto-negotiate`  
**Mode**             Interface Config

##### 4.1.2.1 no auto-negotiate

This command disables automatic negotiation on a port.

---

#### **NOTICE**

Automatic sensing is disabled when automatic negotiation is disabled.

---

**Format**            `no auto-negotiate`  
**Mode**             Interface Config

### 4.1.3 auto-negotiate all

This command enables automatic negotiation on all ports.

|                |                    |
|----------------|--------------------|
| <b>Default</b> | enabled            |
| <b>Format</b>  | auto-negotiate all |
| <b>Mode</b>    | Global Config      |

#### 4.1.3.1 no auto-negotiate all

This command disables automatic negotiation on all ports.

|               |                       |
|---------------|-----------------------|
| <b>Format</b> | no auto-negotiate all |
| <b>Mode</b>   | Global Config         |

### 4.1.4 description (Interface Config)

Use this command to create an alpha-numeric description of an interface or range of interfaces.

|               |                                |
|---------------|--------------------------------|
| <b>Format</b> | description <i>description</i> |
| <b>Mode</b>   | Interface Config               |

### 4.1.5 mtu

Use the `mtu` command to set the maximum transmission unit (MTU) size, in bytes, for frames that ingress or egress the interface. You can use the `mtu` command to configure jumbo frame support for physical and port-channel (LAG) interfaces. For the standard FASTPATH implementation, the MTU size is a valid integer between 1504–12270 for tagged packets and a valid integer between 1500–12270 for untagged packets.

---

#### **NOTICE**

To receive and process packets, the Ethernet MTU must include any extra bytes that Layer-2 headers might require. To configure the IP MTU size, which is the maximum size of the IP packet (IP Header + IP payload), see the [ip mtu](#) command.

---

|                |                       |
|----------------|-----------------------|
| <b>Default</b> | 1500 (untagged)       |
| <b>Format</b>  | mtu <i>1518-12270</i> |
| <b>Mode</b>    | Interface Config      |

#### 4.1.5.1 no mtu

This command sets the default MTU size (in bytes) for the interface.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no mtu           |
| <b>Mode</b>   | Interface Config |

### 4.1.6 shutdown

This command disables a port or range of ports.

---

#### **NOTICE**

You can use the `shutdown` command on physical and port-channel (LAG) interfaces, but not on VLAN routing interfaces.

---

|                |                  |
|----------------|------------------|
| <b>Default</b> | enabled          |
| <b>Format</b>  | shutdown         |
| <b>Mode</b>    | Interface Config |

#### 4.1.6.1 no shutdown

This command enables a port.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no shutdown      |
| <b>Mode</b>   | Interface Config |

#### 4.1.7 shutdown all

This command disables all ports.

### NOTICE

You can use the `shutdown all` command on physical and port-channel (LAG) interfaces, but not on VLAN routing interfaces.

|                |               |
|----------------|---------------|
| <b>Default</b> | enabled       |
| <b>Format</b>  | shutdown all  |
| <b>Mode</b>    | Global Config |

#### 4.1.7.1 no shutdown all

This command enables all ports.

|               |                 |
|---------------|-----------------|
| <b>Format</b> | no shutdown all |
| <b>Mode</b>   | Global Config   |

#### 4.1.8 speed

Use this command to enable or disable auto-negotiation and set the speed that will be advertised by that port. The duplex parameter allows you to set the advertised speed for both half as well as full duplex mode.

Use the `auto` keyword to enable auto-negotiation on the port. Use the command without the `auto` keyword to ensure auto-negotiation is disabled and to set the port speed and mode according to the command values. If auto-negotiation is disabled, the speed and duplex mode must be set.

|                |                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | Auto-negotiation is enabled.                                                                                                                                                                                       |
| <b>Format</b>  | speed auto {10 100 1000 2.5G 10G 20G 25G 40G 50G 100G}<br>[10 100 1000 2.5G 10G 20G 25G 40G 50G 100G] [half-duplex full-duplex]<br><br>speed {10 100 1000 2.5G 10G 20G 25G 40G 50G 100G} {half-duplex full-duplex} |
| <b>Mode</b>    | Interface Config                                                                                                                                                                                                   |

#### 4.1.9 speed all

This command sets the speed and duplex setting for all interfaces if auto-negotiation is disabled. If auto-negotiation is enabled, an error message is returned. Use the `no auto-negotiate` command to disable.

|                |                                                                   |
|----------------|-------------------------------------------------------------------|
| <b>Default</b> | Auto-negotiation is enabled. Adv. is 10h, 10f, 100h, 100f, 1000f. |
| <b>Format</b>  | speed all {100   10} {half-duplex   full-duplex}                  |
| <b>Mode</b>    | Global Config                                                     |

### 4.1.10 show interface media-type

Use this command to display the media-type configuration of the interface.

**Format** show interface media-type

**Mode** Privileged EXEC

The following information is displayed for the command.

| Parameter             | Description                                                                                                                                                                                                          |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                  | Interface in unit/slot/port format.                                                                                                                                                                                  |
| Configured Media Type | The media type for the interface.<br>auto-select – The media type is automatically selected. The preferred media type is displayed. <ul style="list-style-type: none"> <li>RJ45 – RJ45</li> <li>SFP – SFP</li> </ul> |
| Active                | Displays the current operational state of the combo port.                                                                                                                                                            |

**Example:** The following command shows the command output.

(Routing) #show interface media-type

```

Port Configured Media Type Active

0/21 SFP RJ45
0/22 auto-select, SFP preferred Down
0/23 auto-select, SFP preferred RJ45
0/24 auto-select, SFP preferred Down

```

### 4.1.11 show interface fec

Use this command to display the FEC status for the specified interface or for all interfaces, if no interface is specified.

**Format** show interface [*slot/port*] fec

**Mode** Privileged EXEC

The following information is displayed for the command.

| Parameter             | Description                                                           |
|-----------------------|-----------------------------------------------------------------------|
| Interface             | The interface associated with the rest of the information in the row. |
| Configured FEC Status | The FEC status for the interface.                                     |

**Example:** The following command shows the command output.

(Switching) (Config)#show interface 0/85 fec

```

Interface Configured FEC Status

0/85 fec 100G

```

(Switching) (Config)#show interface fec

```

Interface Configured FEC Status

0/65 fec 25G
0/66 fec 25G
0/67 fec 25G
0/68 fec 25G
0/69 fec 25G

```

## 4.1.12 show port

This command displays port information.

**Format**            show port {*intf-range* | all}

**Mode**             Privileged EXEC

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface       | slot/port                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Type            | If not blank, this field indicates that this port is a special type of port. The possible values are: <ul style="list-style-type: none"> <li><code>Mirror</code> – This port is a monitoring port. For more information, see <a href="#">Section 4.26: "Port Mirroring Commands"</a>.</li> <li><code>PC Mbr</code> – This port is a member of a port-channel (LAG).</li> <li><code>Probe</code> – This port is a probe port.</li> </ul> |
| Admin Mode      | The Port control administration state. The port must be enabled for it to be allowed into the network. May be enabled or disabled. The factory default is enabled. The Admin Mode column displays <code>D-Disable</code> when the port is locked due to the insertion of an unsupported transceiver.                                                                                                                                    |
| Physical Mode   | The desired port speed and duplex mode. If auto-negotiation support is selected, then the duplex mode and speed is set from the auto-negotiation process. Note that the maximum capability of the port (full duplex -100M) is advertised. Otherwise, this object determines the port's duplex mode and transmission rate. The factory default is Auto.                                                                                  |
| Physical Status | The port speed and duplex mode.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Link Status     | The Link is up or down.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Link Trap       | This object determines whether or not to send a trap when link status changes. The factory default is enabled.                                                                                                                                                                                                                                                                                                                          |
| LACP Mode       | LACP is enabled or disabled on this port.                                                                                                                                                                                                                                                                                                                                                                                               |
| Admin Status    | This column shows the reason the Admin Mode column displays <code>D-Disable</code> state. Admin Status displays: <ul style="list-style-type: none"> <li><code>XCEIVER</code> when the port is diag-disabled due to the insertion of an unsupported transceiver.</li> <li><code>STP</code> for an STP protocol violation.</li> <li><code>UDLD</code> for a UDLD protocol violation.</li> </ul>                                           |

**Example:** The following command shows an example of the command output for all ports.

(Routing) #show port all

| Intf | Type | Admin Mode | Physical Mode | Physical Status | Link Status | Link Trap | LACP Mode | Actor Timeout |
|------|------|------------|---------------|-----------------|-------------|-----------|-----------|---------------|
| 0/1  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/2  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/3  |      | Enable     | Auto          |                 | Down        | Enable    | Enable    | long          |
| 0/4  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/5  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/6  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/7  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/8  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 1/1  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/2  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/3  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/4  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/5  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/6  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |

**Example:** The following command shows an example of the command output for a range of ports.

```
(Routing) #show port 0/1-1/6
```

| Intf | Type | Admin Mode | Physical Mode | Physical Status | Link Status | Link Trap | LACP Mode | Actor Timeout |
|------|------|------------|---------------|-----------------|-------------|-----------|-----------|---------------|
| 0/1  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/2  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/3  |      | Enable     | Auto          |                 | Down        | Enable    | Enable    | long          |
| 0/4  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/5  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/6  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/7  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 0/8  |      | Enable     | Auto          | 100 Full        | Up          | Enable    | Enable    | long          |
| 1/1  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/2  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/3  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/4  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/5  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |
| 1/6  |      | Enable     |               |                 | Down        | Disable   | N/A       | N/A           |

### 4.1.13 show port advertise

Use this command to display the local administrative link advertisement configuration, local operational link advertisement, and the link partner advertisement for an interface. It also displays priority Resolution for speed and duplex as per IEEE 802.3 Annex 28B.3. It displays the Auto negotiation state, PHY Master/Slave Clock configuration, and Link state of the port.

If the link is down, the Clock is displayed as No Link, and a dash is displayed against the Oper Peer advertisement, and Priority Resolution. If Auto negotiation is disabled, then the admin Local Link advertisement, operational local link advertisement, operational peer advertisement, and Priority resolution fields are not displayed.

If this command is executed without the optional *slot/port* parameter, then it displays the Auto-negotiation state and operational Local link advertisement for all the ports. Operational link advertisement will display speed only if it is supported by both local as well as link partner. If auto-negotiation is disabled, then operational local link advertisement is not displayed.

**Format** show port advertise [*slot/port*]

**Mode** Privileged EXEC

**Example:** The following commands show the command output with and without the optional parameter.

```
(Switching)#show port advertise 0/1
```

```
Port: 0/1
```

```
Type: Gigabit - Level
```

```
Link State: Down
```

```
Auto Negotiation: Enabled
```

```
Clock: Auto
```

|                                | 1000f | 1000h | 100f | 100h | 10f | 10h |
|--------------------------------|-------|-------|------|------|-----|-----|
| Admin Local Link Advertisement | no    | no    | yes  | no   | yes | no  |
| Oper Local Link Advertisement  | no    | no    | yes  | no   | yes | no  |
| Oper Peer Advertisement        | no    | no    | yes  | yes  | yes | yes |
| Priority Resolution            | -     | -     | yes  | -    | -   | -   |

```
(Switching)#show port advertise
```

| Port | Type            | Neg     | Operational Link Advertisement |
|------|-----------------|---------|--------------------------------|
| 0/1  | Gigabit - Level | Enabled | 1000f, 100f, 100h, 10f, 10h    |
| 0/2  | Gigabit - Level | Enabled | 1000f, 100f, 100h, 10f, 10h    |
| 0/3  | Gigabit - Level | Enabled | 1000f, 100f, 100h, 10f, 10h    |

### 4.1.14 show port description

This command displays the interface description. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port description slot/port`

**Mode**             Privileged EXEC

| Parameter      | Description                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Interface      | slot/port                                                                                                                               |
| ifIndex        | The interface index number associated with the port.                                                                                    |
| Description    | The alpha-numeric description of the interface created by the command. See the <a href="#">description (Interface Config)</a> command.  |
| MAC address    | The MAC address of the port. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Bit Offset Val | The bit offset value.                                                                                                                   |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show port description 0/1
```

```
Interface.....0/1
ifIndex.....1
Description.....
MAC address.....00:10:18:82:0C:10
Bit Offset Val.....1
```

### 4.1.15 block

This command sets an interface or a range of interfaces in blocking mode. A blocking ports will not receive or forward data frames. The command is only allowed if no spanning tree is enabled because the spanning tree is setting the port states itself. If the ports are currently disabled, the state is not changed until they will become enabled. The state of the ports can be listed (spanning tree) by `show spanning-tree mst port summary 0 all`.

**Format**            `block`

**Mode**             Interface Config

#### 4.1.15.1 no block

This command resets an interface or a range of interfaces in non-blocking mode.

**Format**            `no block`

**Mode**             Interface Config

### 4.1.16 show block

This command displays the blocking mode for all or a specified port. Additionally other administrative port information (e.g. general admin mode) is displayed.

**Format**            `show block`

**Mode**             Privileged Exec

### 4.1.17 mac-learn

This command sets the HW learning for an interface. For default the HW learning mode is enabled.

**Format**            `mac-learn`  
**Mode**             Interface Config

#### 4.1.17.1 no mac-learn

If the "no"-command is set the interface will not learn any MAC address.

**Format**            `no mac-learn`  
**Mode**             Interface Config

### 4.1.18 show mac-learn

This command displays the HW learning mode for all or a specified port. Additionally other administrative port information (e.g. general admin mode) is displayed.

**Format**            `show mac-learn`  
**Mode**             Privileged Exec

## 4.2 Spanning Tree Protocol Commands

This section describes the commands you use to configure Spanning Tree Protocol (STP). STP helps prevent network loops, duplicate messages, and network instability.

---

### NOTICE

- STP is enabled on the switch and on all ports and LAGs by default.
  - If STP is disabled, the system does not forward BPDU messages.
- 

### 4.2.1 spanning-tree

This command sets the spanning-tree operational mode to enabled.

**Default**            enabled  
**Format**            `spanning-tree`  
**Mode**             Global Config

#### 4.2.1.1 no spanning-tree

This command sets the spanning-tree operational mode to disabled. While disabled, the spanning-tree configuration is retained and can be changed, but is not activated.

**Format**            `no spanning-tree`  
**Mode**             Global Config

### 4.2.2 spanning-tree auto-edge

Use this command to allow the interface to become an edge port if it does not receive any BPDUs within a given amount of time.

**Default**            Enabled  
**Format**            `spanning-tree auto-edge`  
**Mode**             Interface Config



### 4.2.2.1 no spanning-tree auto-edge

This command resets the auto-edge status of the port to the default value.

**Format**           no spanning-tree auto-edge  
**Mode**             Interface Config

### 4.2.3 spanning-tree backbonefast

Use this command to enable the detection of indirect link failures and accelerate spanning tree convergence on PVSTP configured switches.

Backbonefast accelerates finding an alternate path when an indirect link to the root port goes down.

Backbonefast can be configured even if the switch is configured for MST(RSTP) or PVST mode. It only has an effect when the switch is configured for the PVST mode.

If a backbonefast-enabled switch receives an inferior BPDU from its designated switch on a root or blocked port, it sets the maximum aging time on the interfaces on which it received the inferior BPDU if there are alternate paths to the designated switch. This allows a blocked port to immediately move to the listening state where the port can be transitioned to the forwarding state in the normal manner.

On receipt of an inferior BPDU from a designated bridge, backbonefast enabled switches send a Root Link Query (RLQ) request to all non-designated ports except the port from which it received the inferior BPDU. This check validates that the switch can receive packets from the root on ports where it expects to receive BPDUs. The port from which the original inferior BPDU was received is excluded because it has already encountered a failure. Designated ports are excluded as they do not lead to the root.

On receipt of an RLQ response, if the answer is negative, the receiving port has lost connection to the root and its BPDU is immediately aged out. If all nondesignated ports have already received a negative answer, the whole bridge has lost the root and can start the STP calculation from scratch.

If the answer confirms the switch can access the root bridge on a port, it can immediately age out the port on which it initially received the inferior BPDU.

A bridge that sends an RLQ puts its bridge ID in the PDU. This ensures that it does not flood the response on designated ports.

A bridge that receives an RLQ and has connectivity to the root forwards the query toward the root through its root port.

A bridge that receives a RLQ request and does not have connectivity to the root (switch bridge ID is different from the root bridge ID in the query) or is the root bridge immediately answers the query with its root bridge ID.

RLQ responses are flooded on designated ports.

**Default**           NA  
**Format**           spanning-tree backbonefast  
**Mode**             Global Config

#### 4.2.3.1 no spanning-tree backbonefast

This command disables backbonefast.

---

#### **NOTICE**

PVRSTP embeds support for FastBackbone and FastUplink. Even if FastUplink and FastBackbone are configured, they are effective only in PVSTP mode.

---

**Format**           no spanning-tree backbonefast  
**Mode**             Global Config

## 4.2.4 spanning-tree bpdufilter

Use this command to enable BPDU Filter on an interface or range of interfaces.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | disabled                 |
| <b>Format</b>  | spanning-tree bpdufilter |
| <b>Mode</b>    | Interface Config         |

### 4.2.4.1 no spanning-tree bpdufilter

Use this command to disable BPDU Filter on the interface or range of interfaces.

|                |                             |
|----------------|-----------------------------|
| <b>Default</b> | disabled                    |
| <b>Format</b>  | no spanning-tree bpdufilter |
| <b>Mode</b>    | Interface Config            |

## 4.2.5 spanning-tree bpdufilter default

Use this command to enable BPDU Filter on all the edge port interfaces.

|                |                                  |
|----------------|----------------------------------|
| <b>Default</b> | disabled                         |
| <b>Format</b>  | spanning-tree bpdufilter default |
| <b>Mode</b>    | Global Config                    |

### 4.2.5.1 no spanning-tree bpdufilter default

Use this command to disable BPDU Filter on all the edge port interfaces.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | disabled                            |
| <b>Format</b>  | no spanning-tree bpdufilter default |
| <b>Mode</b>    | Global Config                       |

## 4.2.6 spanning-tree bpduflood

Use this command to enable BPDU Flood on an interface or range of interfaces.

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | disabled                |
| <b>Format</b>  | spanning-tree bpduflood |
| <b>Mode</b>    | Interface Config        |

### 4.2.6.1 no spanning-tree bpduflood

Use this command to disable BPDU Flood on the interface or range of interfaces.

|                |                            |
|----------------|----------------------------|
| <b>Default</b> | disabled                   |
| <b>Format</b>  | no spanning-tree bpduflood |
| <b>Mode</b>    | Interface Config           |

## 4.2.7 spanning-tree bpduguard

Use this command to enable BPDU Guard on the switch.

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | disabled                |
| <b>Format</b>  | spanning-tree bpduguard |
| <b>Mode</b>    | Global Config           |

### 4.2.7.1 no spanning-tree bpduguard

Use this command to disable BPDU Guard on the switch.

|                |                            |
|----------------|----------------------------|
| <b>Default</b> | disabled                   |
| <b>Format</b>  | no spanning-tree bpduguard |
| <b>Mode</b>    | Global Config              |

## 4.2.8 spanning-tree bpdumigrationcheck

Use this command to force a transmission of rapid spanning tree (RSTP) and multiple spanning tree (MSTP) BPDUs. Use the *slot/port* parameter to transmit a BPDU from a specified interface, or use the *all* keyword to transmit RST or MST BPDUs from all interfaces. This command forces the BPDU transmission when you execute it, so the command does not change the system configuration or have a no version.

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| <b>Format</b> | spanning-tree bpdumigrationcheck { <i>slot/port</i>   <i>all</i> } |
| <b>Mode</b>   | Global Config                                                      |

## 4.2.9 spanning-tree configuration name

This command sets the Configuration Identifier Name for use in identifying the configuration that this switch is currently using. The *name* is a string of up to 32 characters.

|                |                                              |
|----------------|----------------------------------------------|
| <b>Default</b> | base MAC address in hexadecimal notation     |
| <b>Format</b>  | spanning-tree configuration name <i>name</i> |
| <b>Mode</b>    | Global Config                                |

### 4.2.9.1 no spanning-tree configuration name

This command resets the Configuration Identifier Name to its default.

|               |                                     |
|---------------|-------------------------------------|
| <b>Format</b> | no spanning-tree configuration name |
| <b>Mode</b>   | Global Config                       |

## 4.2.10 spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using. The Configuration Identifier Revision Level is a number in the range of 0 to 65535.

|                |                                                     |
|----------------|-----------------------------------------------------|
| <b>Default</b> | 0                                                   |
| <b>Format</b>  | spanning-tree configuration revision <i>0-65535</i> |
| <b>Mode</b>    | Global Config                                       |

### 4.2.10.1 no spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using to the default value.

**Format** no spanning-tree configuration revision  
**Mode** Global Config

### 4.2.11 spanning-tree cost

Use this command to configure the external path cost for port used by a MST instance. When the `auto` keyword is used, the path cost from the port to the root bridge is automatically determined by the speed of the interface. To configure the cost manually, specify a `cost` value from 1 to 200000000.

**Default** auto  
**Format** spanning-tree cost {cost | auto}  
**Mode** Interface Config

#### 4.2.11.1 no spanning-tree cost

This command resets the auto-edge status of the port to the default value.

**Format** no spanning-tree cost  
**Mode** Interface Config

### 4.2.12 spanning-tree edgeport

This command specifies that an interface (or range of interfaces) is an Edge Port within the common and internal spanning tree. This allows this port to transition to Forwarding State without delay.

**Format** spanning-tree edgeport  
**Mode** Interface Config

#### 4.2.12.1 no spanning-tree edgeport

This command specifies that this port is not an Edge Port within the common and internal spanning tree.

**Format** no spanning-tree edgeport  
**Mode** Interface Config

### 4.2.13 spanning-tree forward-time

This command sets the Bridge Forward Delay parameter to a new value for the common and internal spanning tree. The forward-time value is in seconds within a range of 4 to 30, with the value being greater than or equal to "(Bridge Max Age / 2) + 1".

**Default** 15  
**Format** spanning-tree forward-time 4-30  
**Mode** Global Config

#### 4.2.13.1 no spanning-tree forward-time

This command sets the Bridge Forward Delay parameter for the common and internal spanning tree to the default value.

**Format** no spanning-tree forward-time  
**Mode** Global Config

## 4.2.14 spanning-tree guard

This command selects whether loop guard or root guard is enabled on an interface or range of interfaces. If neither is enabled, then the port operates in accordance with the multiple spanning tree protocol.

**Default** none  
**Format** spanning-tree guard {none | root | loop}  
**Mode** Interface Config

### 4.2.14.1 no spanning-tree guard

This command disables loop guard or root guard on the interface.

**Format** no spanning-tree guard  
**Mode** Interface Config

## 4.2.15 spanning-tree max-age

This command sets the Bridge Max Age parameter to a new value for the common and internal spanning tree. The max-age value is in seconds within a range of 6 to 40, with the value being less than or equal to 2 x (Bridge Forward Delay - 1).

**Default** 20  
**Format** spanning-tree max-age 6-40  
**Mode** Global Config

### 4.2.15.1 no spanning-tree max-age

This command sets the Bridge Max Age parameter for the common and internal spanning tree to the default value.

**Format** no spanning-tree max-age  
**Mode** Global Config

## 4.2.16 spanning-tree max-hops

This command sets the Bridge Max Hops parameter to a new value for the common and internal spanning tree. The max-hops value is a range from 6 to 40.

**Default** 20  
**Format** spanning-tree max-hops 6-40  
**Mode** Global Config

### 4.2.16.1 no spanning-tree max-hops

This command sets the Bridge Max Hops parameter for the common and internal spanning tree to the default value.

**Format** no spanning-tree max-hops  
**Mode** Global Config

## 4.2.17 spanning-tree mode

This command configures global spanning tree mode per VLAN spanning tree, Rapid-PVST, MST, RSTP or STP. Only one of MSTP (RSTP), PVST or RPVST can be enabled on a switch.

When PVSTP or rapid PVSTP (PVRSTP) is enabled, MSTP/RSTP/STP is operationally disabled. To reenable MSTP/RSTP/STP, disable PVSTP/PVRSTP. By default, FASTPATH has MSTP enabled. In PVSTP or PVRSTP mode, BPDUs contain per-VLAN information instead of the common spanning-tree information (MST/RSTP).

PVSTP maintains independent spanning tree information about each configured VLAN. PVSTP uses IEEE 802.1q trunking and allows a trunked VLAN to maintain blocked or forwarding state per port on a per-VLAN basis. This allows a trunk port to be forwarded on some VLANs and blocked on other VLANs.

PVRSTP is based on the IEEE 8012.1w standard. It supports fast convergence IEEE 802.1d. PVRSTP is compatible with IEEE 802.1d spanning tree. PVRSTP sends BPDUs on all ports, instead of only the root bridge sending BPDUs, and supports the discarding, learning, and forwarding states.

When the mode is changed to PVRSTP, version 0 STP BPDUs are no longer transmitted and version 2 PVRSTP BPDUs that carry per-VLAN information are transmitted on the VLANs enabled for spanning-tree. If a version 0 BPDU is seen, PVRSTP reverts to sending version 0 BPDUs.

Per VLAN Rapid Spanning Tree Protocol (PVRSTP) embeds support for PVSTP FastBackbone and FastUplink. There is no provision to enable or disable these features in PVRSTP.

|                |                                                                         |
|----------------|-------------------------------------------------------------------------|
| <b>Default</b> | Disabled                                                                |
| <b>Format</b>  | <code>spanning-tree mode {mst   pvst   rapid-pvst   stp   rstp }</code> |
| <b>Mode</b>    | Global Config                                                           |

### 4.2.17.1 no spanning-tree mode

This command globally configures the switch to the default FASTPATH spanning-tree mode, MSTP.

|               |                                                          |
|---------------|----------------------------------------------------------|
| <b>Format</b> | <code>no spanning-tree mode { pvst   rapid-pvst }</code> |
| <b>Mode</b>   | Global Configuration                                     |

## 4.2.18 spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance or in the common and internal spanning tree. If you specify an *mstid* parameter that corresponds to an existing multiple spanning tree instance, the configurations are done for that multiple spanning tree instance. If you specify 0 (defined as the default CIST ID) as the *mstid*, the configurations are done for the common and internal spanning tree instance.

If you specify the *cost* option, the command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the *mstid* parameter. You can set the path cost as a number in the range of 1 to 200000000 or *auto*. If you select *auto* the path cost value is set based on Link Speed.

If you specify the *port-priority* option, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the *mstid* parameter. The port-priority value is a number in the range of 0 to 240 in increments of 16.

|                |                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | <ul style="list-style-type: none"> <li><code>cost—auto</code></li> <li><code>port-priority—128</code></li> </ul> |
| <b>Format</b>  | <code>spanning-tree mst mstid {{cost 1-200000000   auto}   port-priority 0-240}</code>                           |
| <b>Mode</b>    | Interface Config                                                                                                 |

### 4.2.18.1 no spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance, or in the common and internal spanning tree to the respective default values. If you specify an *mstid* parameter that corresponds to an existing multiple spanning tree instance, you are configuring that multiple spanning tree instance. If you specify 0 (defined as the default CIST ID) as the *mstid*, you are configuring the common and internal spanning tree instance.

If the you specify *cost*, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the *mstid* parameter, to the default value, that is, a path cost value based on the Link Speed.

If you specify *port-priority*, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the *mstid* parameter, to the default value.

**Format**            `no spanning-tree mst mstid {cost | port-priority}`

**Mode**             Interface Config

### 4.2.19 spanning-tree mst instance

This command adds a multiple spanning tree instance to the switch. The parameter *mstid* is a number within a range of 1 to 4094, that corresponds to the new instance ID to be added. The maximum number of multiple instances supported by the switch is 4.

**Default**            none

**Format**            `spanning-tree mst instance mstid`

**Mode**             Global Config

#### 4.2.19.1 no spanning-tree mst instance

This command removes a multiple spanning tree instance from the switch and reallocates all VLANs allocated to the deleted instance to the common and internal spanning tree. The parameter *mstid* is a number that corresponds to the desired existing multiple spanning tree instance to be removed.

**Format**            `no spanning-tree mst instance mstid`

**Mode**             Global Config

### 4.2.20 spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance. The parameter *mstid* is a number that corresponds to the desired existing multiple spanning tree instance. The priority value is a number within a range of 0 to 4094.

If you specify 0 (defined as the default CIST ID) as the *mstid*, this command sets the Bridge Priority parameter to a new value for the common and internal spanning tree. The bridge priority value is a number within a range of 0 to 4094. The twelve least significant bits are masked according to the IEEE 802.1s specification. This causes the priority to be rounded down to the next lower valid priority.

**Default**            32768

**Format**            `spanning-tree mst priority mstid 0-4094`

**Mode**             Global Config

#### 4.2.20.1 no spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance to the default value. The parameter *mstid* is a number that corresponds to the desired existing multiple spanning tree instance.

If 0 (defined as the default CIST ID) is passed as the *mstid*, this command sets the Bridge Priority parameter for the common and internal spanning tree to the default value.

**Format**            `no spanning-tree mst priority mstid`

**Mode**             Global Config

## 4.2.21 spanning-tree mst vlan

This command adds an association between a multiple spanning tree instance and one or more VLANs so that the VLANs are no longer associated with the common and internal spanning tree. The parameter *mstid* is a multiple spanning tree instance identifier, in the range of 0 to 4094, that corresponds to the desired existing multiple spanning tree instance. The *vlanid* can be specified as a single VLAN, a list, or a range of values. To specify a list of VLANs, enter a list of VLAN IDs in the range 1 to 4093, each separated by a comma with no spaces in between. To specify a range of VLANs, separate the beginning and ending VLAN ID with a dash (-). Spaces and zeros are not permitted. The VLAN IDs may or may not exist in the system.

**Format** spanning-tree mst vlan *mstid* *vlanid*  
**Mode** Global Config

### 4.2.21.1 no spanning-tree mst vlan

This command removes an association between a multiple spanning tree instance and one or more VLANs so that the VLANs are again associated with the common and internal spanning tree.

**Format** no spanning-tree mst vlan *mstid* *vlanid*  
**Mode** Global Config

## 4.2.22 spanning-tree port mode

This command sets the Administrative Switch Port State for this port to enabled for use by spanning tree.

**Default** enabled  
**Format** spanning-tree port mode  
**Mode** Interface Config

### 4.2.22.1 no spanning-tree port mode

This command sets the Administrative Switch Port State for this port to disabled, disabling the port for use by spanning tree.

**Format** no spanning-tree port mode  
**Mode** Interface Config

## 4.2.23 spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to enabled.

**Default** enabled  
**Format** spanning-tree port mode all  
**Mode** Global Config

### 4.2.23.1 no spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to disabled.

**Format** no spanning-tree port mode all  
**Mode** Global Config



#### 4.2.24 spanning-tree port-priority

Use this command to change the priority value of the port to allow the operator to select the relative importance of the port in the forwarding process. Set this value to a lower number to prefer a port for forwarding of frames.

All LAN ports have 128 as priority value by default. PVSTP/PVRSTP puts the LAN port with the lowest LAN port number in the forwarding state and blocks other LAN ports.

The application uses the port priority value when the LAN port is configured as an edge port.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | enabled                                  |
| <b>Format</b>  | spanning-tree port-priority <i>0-240</i> |
| <b>Mode</b>    | Interface Config                         |

#### 4.2.25 spanning-tree tcnguard

Use this command to enable TCN guard on the interface. When enabled, TCN Guard restricts the interface from propagating any topology change information received through that interface.

|                |                        |
|----------------|------------------------|
| <b>Default</b> | Enabled                |
| <b>Format</b>  | spanning-tree tcnguard |
| <b>Mode</b>    | Interface Config       |

##### 4.2.25.1 no spanning-tree tcnguard

This command resets the TCN guard status of the port to the default value.

|               |                           |
|---------------|---------------------------|
| <b>Format</b> | no spanning-tree tcnguard |
| <b>Mode</b>   | Interface Config          |

#### 4.2.26 spanning-tree transmit

This command sets the Bridge Transmit Hold Count parameter.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | 6                                        |
| <b>Format</b>  | spanning-tree transmit <i>hold-count</i> |
| <b>Mode</b>    | Global Config                            |

| Parameter  | Description                                                                   |
|------------|-------------------------------------------------------------------------------|
| hold-count | The Bridge Tx hold-count parameter. The value is an integer between 1 and 10. |

#### 4.2.27 spanning-tree uplinkfast

Use this command to configure the rate at which gratuitous frames are sent (in packets per second) after switchover to an alternate port on PVSTP configured switches and enables uplinkfast on PVSTP switches. The range is 0 to 32000; the default is 150. This command has the effect of accelerating spanning-tree convergence after switchover to an alternate port.

Uplinkfast can be configured even if the switch is configured for MST(RSTP) mode, but it only has an effect when the switch is configured for PVST mode. Enabling FastUplink increases the priority by 3000. Path costs less than 3000 have an additional 3000 added when uplinkfast is enabled. This reduces the probability that the switch will become the root switch.

Uplinkfast immediately changes to an alternate root port on detecting a root port failure and changes the new root port directly to the forwarding state. A TCN is sent for this event.

After a switchover to an alternate port (new root port), uplinkfast multicasts a gratuitous frame on the new root port on behalf of each attached machine so that the rest of the network knows to use the secondary link to reach that machine.

PVRSTP embeds support for backbonefast and uplinkfast. There is no provision to enable or disable these features in PVRSTP configured switches.

**Default** 150  
**Format** spanning-tree uplinkfast [max-update-rate *packets*]  
**Mode** Global Config

#### 4.2.27.1 no spanning-tree uplinkfast

This command disables uplinkfast on PVSTP configured switches. All switch priorities and path costs that have not been modified from their default values are set to their default values.

**Format** no spanning-tree uplinkfast [max-update-rate]  
**Mode** Global Config

#### 4.2.28 spanning-tree vlan

Use this command to enable/disable spanning tree on a VLAN.

**Default** None  
**Format** spanning-tree vlan *vlan-list*  
**Mode** Global Config

| Parameter | Description                               |
|-----------|-------------------------------------------|
| vlan-list | The VLANs to which to apply this command. |

#### 4.2.29 spanning-tree vlan cost

Use this command to set the path cost for a port in a VLAN. The valid values are in the range of 1 to 200000000 or auto. If auto is selected, the path cost value is set based on the link speed.

**Default** None  
**Format** spanning-tree vlan *vlan-id* cost {auto |1-200000000}  
**Mode** Interface Config

#### 4.2.30 spanning-tree vlan forward-time

Use this command to configure the spanning tree forward delay time for a VLAN or a set of VLANs. The default is 15 seconds.

Set this value to a lower number to accelerate the transition to forwarding. The network operator should take into account the end-to-end BPDU propagation delay, the maximum frame lifetime, the maximum transmission halt delay, and the message age overestimate values specific to their network when configuring this parameter.

**Default** 15 seconds  
**Format** spanning-tree vlan *vlan-list* forward-time *4-30*  
**Mode** Global Config

| Parameter    | Description                                                         |
|--------------|---------------------------------------------------------------------|
| vlan-list    | The VLANs to which to apply this command.                           |
| forward-time | The spanning tree forward delay time. The range is 4 to 30 seconds. |

### 4.2.31 spanning-tree vlan hello-time

Use this command to configure the spanning tree hello time for a specified VLAN or a range of VLANs. The default is 2 seconds. Set this value to a lower number to accelerate the discovery of topology changes.

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Default</b> | 2 seconds                                                  |
| <b>Format</b>  | spanning-tree vlan <i>vlan-list</i> hello-time <i>1-10</i> |
| <b>Mode</b>    | Global Config                                              |

| Parameter  | Description                                                         |
|------------|---------------------------------------------------------------------|
| vlan-list  | The VLANs to which to apply this command.                           |
| hello-time | The spanning tree forward hello time. The range is 1 to 10 seconds. |

### 4.2.32 spanning-tree vlan max-age

Use this command to configure the spanning tree maximum age time for a set of VLANs. The default is 20 seconds.

Set this value to a lower number to accelerate the discovery of topology changes. The network operator must take into account the end-to-end BPDU propagation delay and message age overestimate for their specific topology when configuring this value.

The default setting of 20 seconds is suitable for a network of diameter 7, lost message value of 3, transit delay of 1, hello interval of 2 seconds, overestimate per bridge of 1 second, and a BPDU delay of 1 second. For a network of diameter 4, a setting of 16 seconds is appropriate if all other timers remain at their default values.

|                |                                                         |
|----------------|---------------------------------------------------------|
| <b>Default</b> | 20 seconds                                              |
| <b>Format</b>  | spanning-tree vlan <i>vlan-list</i> max-age <i>6-40</i> |
| <b>Mode</b>    | Global Config                                           |

| Parameter  | Description                                                         |
|------------|---------------------------------------------------------------------|
| vlan-list  | The VLANs to which to apply this command.                           |
| hello-time | The spanning tree forward hello time. The range is 1 to 10 seconds. |

### 4.2.33 spanning-tree vlan root

Use this command to configure the switch to become the root bridge or standby root bridge by modifying the bridge priority from the default value of 32768 to a lower value calculated to ensure the bridge is the root (or standby) bridge.

The logic takes care of setting the bridge priority to a value lower (primary) or next lower (secondary) than the lowest bridge priority for the specified VLAN or a range of VLANs.

|                |                                                              |
|----------------|--------------------------------------------------------------|
| <b>Default</b> | 32768                                                        |
| <b>Format</b>  | spanning-tree vlan <i>vlan-list</i> root {primary secondary} |
| <b>Mode</b>    | Global Config                                                |

| Parameter | Description                               |
|-----------|-------------------------------------------|
| vlan-list | The VLANs to which to apply this command. |

### 4.2.34 spanning-tree vlan port-priority

Use this command to change the VLAN port priority value of the VLAN port to allow the operator to select the relative importance of the VLAN port in the forwarding selection process when the port is configured as a point-to-point link type. Set this value to a lower number to prefer a port for forwarding of frames.

|                |                                                                              |
|----------------|------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                         |
| <b>Format</b>  | <code>spanning-tree vlan <i>vlan-id</i> port-priority <i>priority</i></code> |
| <b>Mode</b>    | Interface Config                                                             |

| Parameter | Description                                    |
|-----------|------------------------------------------------|
| vlan-list | The VLANs to which to apply this command.      |
| priority  | The VLAN port priority. The range is 0 to 255. |

#### 4.2.35 spanning-tree vlan priority

Use this command to configure the bridge priority of a VLAN. The default value is 32768.

If the value configured is not among the specified values, it will be rounded off to the nearest valid value.

|                |                                                                           |
|----------------|---------------------------------------------------------------------------|
| <b>Default</b> | 32768                                                                     |
| <b>Format</b>  | <code>spanning-tree vlan <i>vlan-list</i> priority <i>priority</i></code> |
| <b>Mode</b>    | Global Config                                                             |

| Parameter | Description                                                                                                                                              |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | The VLANs to which to apply this command.                                                                                                                |
| priority  | The VLAN bridge priority. Valid values are 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344, and 61440. |

#### 4.2.36 show spanning-tree

This command displays spanning tree settings for the common and internal spanning tree. The following details are displayed.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show spanning-tree</code>                                                      |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter                      | Description                                                                                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Priority                | Specifies the bridge priority for the Common and Internal Spanning tree (CST). The value lies between 0 and 61440. It is displayed in multiples of 4096.                    |
| Bridge Identifier              | The bridge identifier for the CST. It is made up using the bridge priority and the base MAC address of the bridge.                                                          |
| Time Since Topology Change     | Time in seconds.                                                                                                                                                            |
| Topology Change Count          | Number of times changed.                                                                                                                                                    |
| Topology Change in Progress    | Boolean value of the Topology Change parameter for the switch indicating if a topology change is in progress on any port assigned to the common and internal spanning tree. |
| Designated Root                | The bridge identifier of the root bridge. It is made up from the bridge priority and the base MAC address of the bridge.                                                    |
| Root Path Cost                 | Value of the Root Path Cost parameter for the common and internal spanning tree.                                                                                            |
| Root Port Identifier           | Identifier of the port to access the Designated Root for the CST                                                                                                            |
| Bridge Max Age                 | Derived value.                                                                                                                                                              |
| Bridge Max Hops                | Bridge max-hops count for the device.                                                                                                                                       |
| Root Port Bridge Forward Delay | Derived value.                                                                                                                                                              |

| Parameter               | Description                                                                                                                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Hello Time              | Configured value of the parameter for the CST.                                                                              |
| Bridge Hold Time        | The minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs).                                  |
| CST Regional Root       | Bridge Identifier of the CST Regional Root. It is made up using the bridge priority and the base MAC address of the bridge. |
| Regional Root Path Cost | Path Cost to the CST Regional Root.                                                                                         |
| Associated FIDs         | List of forwarding database identifiers currently associated with this instance.                                            |
| Associated VLANs        | List of VLAN IDs currently associated with this instance.                                                                   |

**Example:** The following shows example CLI display output for the command.

(Routing) #show spanning-tree

```

Bridge Priority..... 32768
Bridge Identifier..... 80:00:00:10:18:48:FC:07
Time Since Topology Change..... 8 day 3 hr 22 min 37 sec
Topology Change Count..... 0
Topology Change in progress..... FALSE
Designated Root..... 80:00:00:10:18:48:FC:07
Root Path Cost..... 0
Root Port Identifier..... 00:00
Bridge Max Age..... 20
Bridge Max Hops..... 20
Bridge Tx Hold Count..... 6
Bridge Forwarding Delay..... 15
Hello Time..... 2
Bridge Hold Time..... 6
CST Regional Root..... 80:00:00:10:18:48:FC:07
Regional Root Path Cost..... 0

```

```

Associated FIDs Associated VLANs

```

(Routing) #

## 4.2.37 show spanning-tree active

Use this command to display the spanning tree values on active ports for the modes (x)STP and PV(R)STP.

**Format** show spanning-tree active

**Mode**

- Privileged EXEC
- User EXEC

**Example:**

(Routing)#show spanning-tree active

```

Spanning Tree: Enabled (BPDU Flooding: Disabled) Portfast BPDU Filtering: Disabled
Mode: rstp
CST Regional Root: 80:00:00:01:85:48:F0:F
Regional Root Path Cost: 0

```

```

MST 0 Vlan Mapped: 3

```

ROOT ID

```

Priority 32768
Address 00:00:EE:EE:EE:EE
This Switch is the Root.
Hello Time: 2s Max Age: 20s Forward Delay: 15s

```

## Interfaces

| Name | State   | Prio.Nbr | Cost | Sts        | Role | RestrictedPort |
|------|---------|----------|------|------------|------|----------------|
| 0/49 | Enabled | 128.49   | 2000 | Forwarding | Desg | No             |
| 3/1  | Enabled | 96.66    | 5000 | Forwarding | Desg | No             |
| 3/2  | Enabled | 96.67    | 5000 | Forwarding | Desg | No             |
| 3/10 | Enabled | 96.75    | 0    | Forwarding | Desg | No             |

**Example:**

```
(Routing)#show spanning-tree active
```

```
Spanning-tree enabled protocol rpvst
```

```
VLAN 1
 RootID Priority 32769
 Address 00:00:EE:EE:EE:EE
 Cost 0
 Port This switch is the root
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
 BridgeID Priority 32769 (priority 32768 sys-id-ext 1)
 Address 00:00:EE:EE:EE:EE
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
 Aging Time 300 sec
```

| Interface | State   | Prio.Nbr | Cost | Status     | Role       |
|-----------|---------|----------|------|------------|------------|
| 0/49      | Enabled | 128.49   | 2000 | Forwarding | Designated |
| 3/1       | Enabled | 128.66   | 5000 | Forwarding | Designated |
| 3/2       | Enabled | 128.67   | 5000 | Forwarding | Designated |
| 3/10      | Enabled | 128.75   | 0    | Forwarding | Designated |

```
VLAN 3
 RootID Priority 32771
 Address 00:00:EE:EE:EE:EE
 Cost 0
 Port This switch is the root
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
 BridgeID Priority 32771 (priority 32768 sys-id-ext 3)
 Address 00:00:EE:EE:EE:EE
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
 Aging Time 300 sec
```

| Interface | State   | Prio.Nbr | Cost | Status     | Role       |
|-----------|---------|----------|------|------------|------------|
| 3/1       | Enabled | 128.66   | 5000 | Forwarding | Designated |
| 3/2       | Enabled | 128.67   | 5000 | Forwarding | Designated |
| 3/10      | Enabled | 128.75   | 0    | Forwarding | Designated |

**Example:**

```
(Routing)#show spanning-tree active
```

```
Spanning-tree enabled protocol rpvst
```

```
VLAN 1
 RootID Priority 32769
 Address 00:00:EE:EE:EE:EE
 Cost 0
 Port 10(3/10)
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
 BridgeID Priority 32769 (priority 32768 sys-id-ext 1)
 Address 00:00:EE:EE:EE:EE
 Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
```

Aging Time 300 sec

| Interface | State   | Prio.Nbr | Cost | Status     | Role      |
|-----------|---------|----------|------|------------|-----------|
| 0/49      | Enabled | 128.49   | 2000 | Discarding | Alternate |
| 3/1       | Enabled | 128.66   | 5000 | Forwarding | Disabled  |
| 3/2       | Enabled | 128.67   | 5000 | Forwarding | Disabled  |
| 3/10      | Enabled | 128.75   | 0    | Forwarding | Root      |

VLAN 3

|          |               |                                     |
|----------|---------------|-------------------------------------|
| RootID   | Priority      | 32771                               |
|          | Address       | 00:00:EE:EE:EE:EE                   |
|          | Cost          | 0                                   |
|          | Port          | 10(3/10 )                           |
|          | Hello Time    | 2 Sec                               |
|          | Max Age       | 20 sec                              |
|          | Forward Delay | 15 sec                              |
| BridgeID | Priority      | 32771 (priority 32768 sys-id-ext 3) |
|          | Address       | 00:00:EE:EE:EE:EE                   |
|          | Hello Time    | 2 Sec                               |
|          | Max Age       | 20 sec                              |
|          | Forward Delay | 15 sec                              |
|          | Aging Time    | 300 sec                             |

| Interface | State   | Prio.Nbr | Cost | Status     | Role     |
|-----------|---------|----------|------|------------|----------|
| 3/1       | Enabled | 128.66   | 5000 | Forwarding | Disabled |
| 3/2       | Enabled | 128.67   | 5000 | Forwarding | Disabled |
| 3/10      | Enabled | 128.75   | 0    | Forwarding | Root     |

#### 4.2.38 show spanning-tree backbonefast

This command displays spanning tree information for backbonefast.

**Format** show spanning-tree backbonefast

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                              | Description                                                              |
|----------------------------------------|--------------------------------------------------------------------------|
| Transitions via Backbonefast           | The number of backbonefast transitions.                                  |
| Inferior BPDUs received (all VLANs)    | The number of inferior BPDUs received on all VLANs.                      |
| RLQ request PDUs received (all VLANs)  | The number of root link query (RLQ) requests PDUs received on all VLANs. |
| RLQ response PDUs received (all VLANs) | The number of RLQ response PDUs received on all VLANs.                   |
| RLQ request PDUs sent (all VLANs)      | The number of RLQ request PDUs sent on all VLANs.                        |
| RLQ response PDUs sent (all VLANs)     | The number of RLQ response PDUs sent on all VLANs.                       |

**Example:** The following shows example output from the command.

```
(Routing)#show spanning-tree backbonefast
```

Backbonefast Statistics

```

Transitions via Backbonefast (all VLANs) : 0
Inferior BPDUs received (all VLANs) : 0
RLQ request PDUs received (all VLANs) : 0
RLQ response PDUs received (all VLANs) : 0
RLQ request PDUs sent (all VLANs) : 0
RLQ response PDUs sent (all VLANs) : 0
```

## 4.2.39 show spanning-tree brief

This command displays spanning tree settings for the bridge. The following information appears.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show spanning-tree brief</code>                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter            | Description                                                                                                                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Priority      | Configured value.                                                                                                                    |
| Bridge Identifier    | The bridge identifier for the selected MST instance. It is made up using the bridge priority and the base MAC address of the bridge. |
| Bridge Max Age       | Configured value.                                                                                                                    |
| Bridge Max Hops      | Bridge max-hops count for the device.                                                                                                |
| Bridge Hello Time    | Configured value.                                                                                                                    |
| Bridge Forward Delay | Configured value.                                                                                                                    |
| Bridge Hold Time     | The minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs).                                           |

**Example:** The following shows example CLI display output for the command.

(Routing) #show spanning-tree brief

```

Bridge Priority..... 32768
Bridge Identifier..... 80:00:00:10:18:48:FC:07
Bridge Max Age..... 20
Bridge Max Hops..... 20
Bridge Hello Time..... 2
Bridge Forward Delay..... 15
Bridge Hold Time..... 6

```

(Routing) #

## 4.2.40 show spanning-tree interface

This command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The *slot/port* is the desired switch port. Instead of *slot/port*, *lag lag-intf-num* can be used as an alternate way to specify the LAG interface. *lag lag-intf-num* can also be used to specify the LAG interface where *lag-intf-num* is the LAG port number. The following details are displayed on execution of the command.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show spanning-tree interface slot/port/lag lag-intf-num</code>                 |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter         | Description                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hello Time        | Admin hello time for this port.                                                                                                                               |
| Port Mode         | Enabled or disabled.                                                                                                                                          |
| BPDU Guard Effect | Enabled or disabled.                                                                                                                                          |
| Root Guard        | Enabled or disabled.                                                                                                                                          |
| Loop Guard        | Enabled or disabled.                                                                                                                                          |
| TCN Guard         | Enable or disable the propagation of received topology change notifications and topology changes to other ports.                                              |
| BPDU Filter Mode  | Enabled or disabled.                                                                                                                                          |
| BPDU Flood Mode   | Enabled or disabled.                                                                                                                                          |
| Auto Edge         | To enable or disable the feature that causes a port that has not seen a BPDU for edge delay time, to become an edge port and transition to forwarding faster. |



| Parameter                                | Description                                                                |
|------------------------------------------|----------------------------------------------------------------------------|
| Port Up Time Since Counters Last Cleared | Time since port was reset, displayed in days, hours, minutes, and seconds. |
| STP BPDUs Transmitted                    | Spanning Tree Protocol Bridge Protocol Data Units sent.                    |
| STP BPDUs Received                       | Spanning Tree Protocol Bridge Protocol Data Units received.                |
| RSTP BPDUs Transmitted                   | Rapid Spanning Tree Protocol Bridge Protocol Data Units sent.              |
| RSTP BPDUs Received                      | Rapid Spanning Tree Protocol Bridge Protocol Data Units received.          |
| MSTP BPDUs Transmitted                   | Multiple Spanning Tree Protocol Bridge Protocol Data Units sent.           |
| MSTP BPDUs Received                      | Multiple Spanning Tree Protocol Bridge Protocol Data Units received.       |

**Example:** The following shows example CLI display output for the command.

```
(Routing) >show spanning-tree interface 0/1
```

```
Hello Time..... Not Configured
Port Mode..... Enabled
BPDU Guard Effect..... Disabled
Root Guard..... FALSE
Loop Guard..... FALSE
TCN Guard..... FALSE
BPDU Filter Mode..... Disabled
BPDU Flood Mode..... Disabled
Auto Edge..... TRUE
Port Up Time Since Counters Last Cleared..... 8 day 3 hr 39 min 58 sec
STP BPDUs Transmitted..... 0
STP BPDUs Received..... 0
RSTP BPDUs Transmitted..... 0
RSTP BPDUs Received..... 0
MSTP BPDUs Transmitted..... 0
MSTP BPDUs Received..... 0
```

```
(Routing) >
```

**Example:** The following shows example CLI display output for the command.

```
(Routing) >show spanning-tree interface lag 1
```

```
Hello Time..... Not Configured
Port Mode..... Enabled
BPDU Guard Effect..... Disabled
Root Guard..... FALSE
Loop Guard..... FALSE
TCN Guard..... FALSE
BPDU Filter Mode..... Disabled
BPDU Flood Mode..... Disabled
Auto Edge..... TRUE
Port Up Time Since Counters Last Cleared..... 8 day 3 hr 42 min 5 sec
STP BPDUs Transmitted..... 0
STP BPDUs Received..... 0
RSTP BPDUs Transmitted..... 0
RSTP BPDUs Received..... 0
MSTP BPDUs Transmitted..... 0
MSTP BPDUs Received..... 0
```

```
(Routing) >
```

#### 4.2.41 show spanning-tree mst detailed

This command displays the detailed settings for an MST instance.

- Format**            `show spanning-tree mst detailed mstid`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter          | Description                                                           |
|--------------------|-----------------------------------------------------------------------|
| <code>mstid</code> | A multiple spanning tree instance identifier. The value is 0 to 4094. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) >show spanning-tree mst detailed 0
```

```
MST Instance ID..... 0
MST Bridge Priority..... 32768
MST Bridge Identifier..... 80:00:00:10:18:48:FC:07
Time Since Topology Change..... 8 day 3 hr 47 min 7 sec
Topology Change Count..... 0
Topology Change in progress..... FALSE
Designated Root..... 80:00:00:10:18:48:FC:07
Root Path Cost..... 0
Root Port Identifier..... 00:00
```

```
Associated FIDs Associated VLANs

```

```
(Routing) >
```

#### 4.2.42 show spanning-tree mst port detailed

This command displays the detailed settings and parameters for a specific switch port within a particular multiple spanning tree instance. The parameter `mstid` is a number that corresponds to the desired existing multiple spanning tree instance. The `slot/port` is the desired switch port. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

- Format**            `show spanning-tree mst port detailed mstid slot/port/lag lag-intf-num`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                     | Description                                                                                                                                                                                                   |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MST Instance ID               | The ID of the existing multiple spanning tree (MST) instance identifier. The value is 0 to 4094.                                                                                                              |
| Port Identifier               | The port identifier for the specified port within the selected MST instance. It is made up from the port priority and the interface number of the port.                                                       |
| Port Priority                 | The priority for a particular port within the selected MST instance. The port priority is displayed in multiples of 16.                                                                                       |
| Port Forwarding State         | Current spanning tree state of this port.                                                                                                                                                                     |
| Port Role                     | Each enabled MST Bridge Port receives a Port Role for each spanning tree. The port role is one of the following values: Root Port, Designated Port, Alternate Port, Backup Port, Master Port or Disabled Port |
| Auto-Calculate Port Path Cost | Indicates whether auto calculation for port path cost is enabled.                                                                                                                                             |
| Port Path Cost                | Configured value of the Internal Port Path Cost parameter.                                                                                                                                                    |
| Designated Root               | The Identifier of the designated root for this port.                                                                                                                                                          |
| Root Path Cost                | The path cost to get to the root bridge for this instance. The root path cost is zero if the bridge is the root bridge for that instance.                                                                     |
| Designated Bridge             | Bridge Identifier of the bridge with the Designated Port.                                                                                                                                                     |

| Parameter                                  | Description                                                                                                                                                                                                                                                                                |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Designated Port Identifier                 | Port on the Designated Bridge that offers the lowest cost to the LAN.                                                                                                                                                                                                                      |
| Loop Inconsistent State                    | The current loop inconsistent state of this port in this MST instance. When in loop inconsistent state, the port has failed to receive BPDUs while configured with loop guard enabled. Loop inconsistent state maintains the port in a blocking state until a subsequent BPDU is received. |
| Transitions Into Loop Inconsistent State   | The number of times this interface has transitioned into loop inconsistent state.                                                                                                                                                                                                          |
| Transitions Out of Loop Inconsistent State | The number of times this interface has transitioned out of loop inconsistent state.                                                                                                                                                                                                        |

If you specify 0 (defined as the default CIST ID) as the *mstid*, this command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The *slot/port* is the desired switch port. In this case, the following are displayed.

| Parameter                                  | Description                                                                                                                                                                                                                                                                                |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port Identifier                            | The port identifier for this port within the CST.                                                                                                                                                                                                                                          |
| Port Priority                              | The priority of the port within the CST.                                                                                                                                                                                                                                                   |
| Port Forwarding State                      | The forwarding state of the port within the CST.                                                                                                                                                                                                                                           |
| Port Role                                  | The role of the specified interface within the CST.                                                                                                                                                                                                                                        |
| Auto-Calculate Port Path Cost              | Indicates whether auto calculation for port path cost is enabled or not (disabled).                                                                                                                                                                                                        |
| Port Path Cost                             | The configured path cost for the specified interface.                                                                                                                                                                                                                                      |
| Auto-Calculate External Port Path Cost     | Indicates whether auto calculation for external port path cost is enabled.                                                                                                                                                                                                                 |
| External Port Path Cost                    | The cost to get to the root bridge of the CIST across the boundary of the region. This means that if the port is a boundary port for an MSTP region, then the external path cost is used.                                                                                                  |
| Designated Root                            | Identifier of the designated root for this port within the CST.                                                                                                                                                                                                                            |
| Root Path Cost                             | The root path cost to the LAN by the port.                                                                                                                                                                                                                                                 |
| Designated Bridge                          | The bridge containing the designated port.                                                                                                                                                                                                                                                 |
| Designated Port Identifier                 | Port on the Designated Bridge that offers the lowest cost to the LAN.                                                                                                                                                                                                                      |
| Topology Change Acknowledgment             | Value of flag in next Configuration Bridge Protocol Data Unit (BPDU) transmission indicating if a topology change is in progress for this port.                                                                                                                                            |
| Hello Time                                 | The hello time in use for this port.                                                                                                                                                                                                                                                       |
| Edge Port                                  | The configured value indicating if this port is an edge port.                                                                                                                                                                                                                              |
| Edge Port Status                           | The derived value of the edge port status. True if operating as an edge port; false otherwise.                                                                                                                                                                                             |
| Point To Point MAC Status                  | Derived value indicating if this port is part of a point to point link.                                                                                                                                                                                                                    |
| CST Regional Root                          | The regional root identifier in use for this port.                                                                                                                                                                                                                                         |
| CST Internal Root Path Cost                | The internal root path cost to the LAN by the designated external port.                                                                                                                                                                                                                    |
| Loop Inconsistent State                    | The current loop inconsistent state of this port in this MST instance. When in loop inconsistent state, the port has failed to receive BPDUs while configured with loop guard enabled. Loop inconsistent state maintains the port in a blocking state until a subsequent BPDU is received. |
| Transitions Into Loop Inconsistent State   | The number of times this interface has transitioned into loop inconsistent state.                                                                                                                                                                                                          |
| Transitions Out of Loop Inconsistent State | The number of times this interface has transitioned out of loop inconsistent state.                                                                                                                                                                                                        |

**Example:** The following shows example CLI display output for the command in `slot/port` format.

```
(Routing) >show spanning-tree mst port detailed 0 0/1

Port Identifier..... 80:01
Port Priority..... 128
Port Forwarding State..... Disabled
Port Role..... Disabled
Auto-calculate Port Path Cost..... Enabled
Port Path Cost..... 0
Auto-Calculate External Port Path Cost..... Enabled
External Port Path Cost..... 0
Designated Root..... 80:00:00:10:18:48:FC:07
Root Path Cost..... 0
Designated Bridge..... 80:00:00:10:18:48:FC:07
Designated Port Identifier..... 00:00
Topology Change Acknowledge..... FALSE
Hello Time..... 2
Edge Port..... FALSE
Edge Port Status..... FALSE
Point to Point MAC Status..... TRUE
CST Regional Root..... 80:00:00:10:18:48:FC:07
CST Internal Root Path Cost..... 0
Loop Inconsistent State..... FALSE
Transitions Into Loop Inconsistent State..... 0
Transitions Out Of Loop Inconsistent State..... 0
```

**Example:** The following shows example CLI display output for the command using a LAG interface number.

```
(Routing) >show spanning-tree mst port detailed 0 lag 1

Port Identifier..... 60:42
Port Priority..... 96
Port Forwarding State..... Disabled
Port Role..... Disabled
Auto-calculate Port Path Cost..... Enabled
Port Path Cost..... 0
Auto-Calculate External Port Path Cost..... Enabled
External Port Path Cost..... 0
Designated Root..... 80:00:00:10:18:48:FC:07
Root Path Cost..... 0
Designated Bridge..... 80:00:00:10:18:48:FC:07
Designated Port Identifier..... 00:00
Topology Change Acknowledge..... FALSE
Hello Time..... 2
Edge Port..... FALSE
Edge Port Status..... FALSE
Point to Point MAC Status..... TRUE
CST Regional Root..... 80:00:00:10:18:48:FC:07
CST Internal Root Path Cost..... 0
Loop Inconsistent State..... FALSE
Transitions Into Loop Inconsistent State..... 0
Transitions Out Of Loop Inconsistent State..... 0
--More-- or (q)uit
```

```
(Routing) >
```

#### 4.2.43 show spanning-tree mst port summary

This command displays the settings of one or all ports within the specified multiple spanning tree instance. The parameter `mstid` indicates a particular MST instance. The parameter `{slot/port|all}` indicates the desired switch port or all ports. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

If you specify 0 (defined as the default CIST ID) as the `mstid`, the status summary displays for one or all ports within the common and internal spanning tree.

- Format**            `show spanning-tree mst port summary mstid {slot/port /lag lag-intf-num| all}`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
| MST Instance ID | The MST instance associated with this port.                                                                                      |
| Interface       | slot/port                                                                                                                        |
| STP Mode        | Indicates whether spanning tree is enabled or disabled on the port.                                                              |
| Type            | Currently not used.                                                                                                              |
| STP State       | The forwarding state of the port in the specified spanning tree instance.                                                        |
| Port Role       | The role of the specified port within the spanning tree.                                                                         |
| Desc            | Indicates whether the port is in loop inconsistent state or not. This field is blank if the loop guard feature is not available. |

**Example:** The following shows example CLI display output for the command in slot/port format.

```
(Routing) >show spanning-tree mst port summary 0 0/1
```

```
MST Instance ID..... CST
```

| Interface | STP Mode | Type | STP State | Port Role | Desc |
|-----------|----------|------|-----------|-----------|------|
| 0/1       | Enabled  |      | Disabled  | Disabled  |      |

**Example:** The following shows example CLI display output for the command using a LAG interface number.

```
(Routing) >show spanning-tree mst port summary 0 lag 1
```

```
MST Instance ID..... CST
```

| Interface | STP Mode | Type | STP State | Port Role | Desc |
|-----------|----------|------|-----------|-----------|------|
| 3/1       | Enabled  |      | Disabled  | Disabled  |      |

#### 4.2.44 show spanning-tree mst port summary active

This command displays settings for the ports within the specified multiple spanning tree instance that are active links.

- Format**            `show spanning-tree mst port summary mstid active`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
| MST Instance ID | The ID of the existing MST instance.                                                                                             |
| Interface       | slot/port                                                                                                                        |
| STP Mode        | Indicates whether spanning tree is enabled or disabled on the port.                                                              |
| Type            | Currently not used.                                                                                                              |
| STP State       | The forwarding state of the port in the specified spanning tree instance.                                                        |
| Port Role       | The role of the specified port within the spanning tree.                                                                         |
| Desc            | Indicates whether the port is in loop inconsistent state or not. This field is blank if the loop guard feature is not available. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) >show spanning-tree mst port summary 0 active
```

```

Interface STP STP Port
Mode Type State Role Desc

```

#### 4.2.45 show spanning-tree mst summary

This command displays summary information about all multiple spanning tree instances in the switch. On execution, the following details are displayed.

**Format** show spanning-tree mst summary

**Mode**

- Privileged EXEC
- User EXEC

| Parameter            | Description                                                                                                                |
|----------------------|----------------------------------------------------------------------------------------------------------------------------|
| MST Instance ID List | List of multiple spanning trees IDs currently configured.                                                                  |
| For each MSTID:      | <ul style="list-style-type: none"> <li>• List of forwarding database identifiers associated with this instance.</li> </ul> |
| • Associated FIDs    | • List of VLAN IDs associated with this instance.                                                                          |
| • Associated VLANs   |                                                                                                                            |

#### 4.2.46 show spanning-tree summary

This command displays spanning tree settings and parameters for the switch. The following details are displayed on execution of the command.

**Format** show spanning-tree summary

**Mode**

- Privileged EXEC
- User EXEC

| Parameter                     | Description                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Spanning Tree Admin-mode      | Enabled or disabled.                                                                                                                  |
| Spanning Tree Version         | Version of IEEE 802.1 currently supported (IEEE 802.1s, IEEE 802.1w, or IEEE 802.1d) based upon the Force Protocol Version parameter. |
| BPDU Guard Mode               | Enabled or disabled.                                                                                                                  |
| BPDU Filter Mode              | Enabled or disabled.                                                                                                                  |
| Configuration Name            | Identifier used to identify the configuration currently being used.                                                                   |
| Configuration Revision Level  | Identifier used to identify the configuration currently being used.                                                                   |
| Configuration Digest Key      | A generated Key used in the exchange of the BPDUs.                                                                                    |
| Configuration Format Selector | Specifies the version of the configuration format being used in the exchange of BPDUs. The default value is zero.                     |
| MST Instances                 | List of all multiple spanning tree instances configured on the switch.                                                                |

**Example:** The following shows example CLI display output for the command.

```
(Routing) >show spanning-tree summary
```

```

Spanning Tree Adminmode..... Enabled
Spanning Tree Version..... IEEE 802.1s
BPDU Guard Mode..... Disabled

```

```

BPDU Filter Mode..... Disabled
Configuration Name..... ****
Configuration Revision Level..... ****
Configuration Digest Key..... ****
Configuration Format Selector..... 0
No MST instances to display.

```

#### 4.2.47 show spanning-tree uplinkfast

This command displays spanning tree information for uplinkfast.

**Format** show spanning-tree uplinkfast

**Mode**

- Privileged EXEC
- User EXEC

| Parameter                                         | Description                                                       |
|---------------------------------------------------|-------------------------------------------------------------------|
| Uplinkfast transitions (all VLANs)                | The number of uplinkfast transitions on all VLANs.                |
| Proxy multicast addresses transmitted (all VLANs) | The number of proxy multicast addresses transmitted on all VLANs. |

**Example:** The following shows example output from the command.

```
(Routing) #show spanning-tree uplinkfast
```

```

Uplinkfast is enabled.
BPDU update rate : 150 packets/sec

```

```
Uplinkfast Statistics
```

```

Uplinkfast transitions (all VLANs)..... 0
Proxy multicast addresses transmitted (all VLANs).. 0

```

#### 4.2.48 show spanning-tree vlan

This command displays spanning tree information per VLAN and also lists out the port roles and states along with port cost. The `vlan-list` parameter is a list of VLANs or VLAN-ranges separated by commas and with no embedded blank spaces. VLAN ranges are of the form "X-Y" where X and Y are valid VLAN identifiers and X < Y. The `vlanid` corresponds to an existing VLAN ID.

**Format** show spanning-tree vlan {`vlanid` | `vlan-list`}

**Mode**

- Privileged EXEC
- User EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) show spanning-tree vlan 1
```

```

VLAN 1
 Spanning-tree enabled protocol rpvst
 RootID Priority 32769
 Address 00:0C:29:D3:80:EA
 Cost 0
 Port This switch is the root
 Hello Time 2 Sec Max Age 15 sec Forward Delay 15 sec
 BridgeID Priority 32769 (priority 32768 sys-id-ext 1)
 Address 00:0C:29:D3:80:EA
 Hello Time 2 Sec Max Age 15 sec Forward Delay 15 sec
 Aging Time 300

```

| Interface | Role       | Sts        | Cost | Prio.Nbr |
|-----------|------------|------------|------|----------|
| 1/0/1     | Designated | Forwarding | 3000 | 128.1    |
| 1/0/2     | Designated | Forwarding | 3000 | 128.2    |
| 1/0/3     | Disabled   | Disabled   | 3000 | 128.3    |
| 1/0/4     | Designated | Forwarding | 3000 | 128.4    |
| 1/0/5     | Designated | Forwarding | 3000 | 128.5    |
| 1/0/6     | Designated | Forwarding | 3000 | 128.6    |
| 1/0/7     | Designated | Forwarding | 3000 | 128.7    |
| 1/0/8     | Designated | Forwarding | 3000 | 128.8    |
| 0/1/1     | Disabled   | Disabled   | 3000 | 128.1026 |
| 0/1/2     | Disabled   | Disabled   | 3000 | 128.1027 |
| 0/1/3     | Disabled   | Disabled   | 3000 | 128.1028 |
| 0/1/4     | Disabled   | Disabled   | 3000 | 128.1029 |
| 0/1/5     | Disabled   | Disabled   | 3000 | 128.1030 |
| 0/1/6     | Disabled   | Disabled   | 3000 | 128.1031 |

#### 4.2.49 set bpdu forwarding

This command configures BPDU forwarding. The default behavior is that received BPDU is sent to the CPU and handled. The BPDU frame is not forwarded/switched. If this feature is enabled the BPDU frame is not longer sent to CPU but forwarded/switched on all ports.

**Format**            **set bpdu forwarding**

**Mode**             Privileged EXEC

##### 4.2.49.1 no set bpdu forwarding

This command disabled BPDU forwarding.

You have to save the configuration and reboot the system to activate a new setting.

**Format**            **no set bpdu forwarding**

**Mode**             Privileged EXEC

#### 4.2.50 show bpdu forwarding

This command displays the BPDU forwarding setting. The values for the current active setting and the value for the configured setting are indicated.

**Format**            **show bpdu forwarding**

**Mode**             Privileged EXEC

## 4.3 Loop Protection Commands

This section describes the commands used to configure loop protection. Loop protection detects physical and logical loops between Ethernet ports on a device. Loop protection must be enabled globally before it can be enabled at the interface level.

### 4.3.1 keepalive (Global Config)

This command enables loop protection for the system. The default `disable` shuts down the port.

**Default**            `disable`

**Format**            `keepalive [<transmit-interval: 1-10>] [<max-pdu: 1-10>]`  
`keepalive <disable-timer: 0-604800>`

**Mode**             Global Config



| Parameter         | Description                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <cr>              | Press Enter to execute the command.                                                                                                          |
| transmit-interval | Enter the transmit-interval value, range 1 to 10. The transmit interval is the time gap between each keep-alive PDU sent.                    |
| max-pdu           | Enter the max-pdu value, range 1 to 10. The max-pdu is the maximum number of PDUs looped and received before the configured action is taken. |
| disable-timer     | Configure the disable duration for an interface.                                                                                             |

#### 4.3.1.1 no keepalive

This command disables loop protection for the system. This command also sets the transmit interval and retry count to the default value.

**Format** no keepalive

**Mode** Global Config

#### 4.3.2 keepalive (Interface Config)

This command enables keepalive on a particular interface.

**Default** Disabled

**Format** keepalive

**Mode** Interface Config

#### 4.3.2.1 no keepalive

This command disables keepalive on a particular interface.

**Format** keepalive

**Mode** Interface Config

#### 4.3.3 keepalive action

This command configures the action to be taken on a port when a loop is detected.

**Default** Disabled.

**Format** keepalive action {log | disable | both}

**Mode** Interface Configuration

| Parameter | Description                                                                                                                                                                                                                 |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| log       | Only logs the message. The log mode only logs the message to buffer logs without bringing the port down. This option also generates an SNMP trap message that is sent to the trap receiver based on the trap configuration. |
| disable   | Shuts down the port. This is the default.                                                                                                                                                                                   |
| both      | Logs and disables the port. This option also generates an SNMP trap message that is sent to the trap receiver based on the trap configuration.                                                                              |

#### 4.3.3.1 no keepalive action

This command returns the command to the default action of disabling a port when a loop is detected.

**Format** no keepalive action {log|disable|both}

**Mode** Interface Configuration

### 4.3.4 keepalive tag

This command configures the VLAN to be used when generating the VLAN tag of the loop protection PDUs. The TPID used is based on the TPID type configured on that port.

|                |                                                       |
|----------------|-------------------------------------------------------|
| <b>Default</b> | None                                                  |
| <b>Format</b>  | <code>keepalive tag { dot1q   dot1ad } vlan-id</code> |
| <b>Mode</b>    | Interface Configuration                               |

| Parameter | Description                                        |
|-----------|----------------------------------------------------|
| dot1q     | Uses a TPID of 0x8100                              |
| dot1ad    | Uses a TPID of 0x88A8                              |
| vlan-id   | The ID of the VLAN to use when generating the VLAN |

#### 4.3.4.1 no keepalive tag

This command removes the VLAN-based loop protection and resets the port to port-based loop protection only.

|               |                               |
|---------------|-------------------------------|
| <b>Format</b> | <code>no keepalive tag</code> |
| <b>Mode</b>   | Global Configuration          |

### 4.3.5 keepalive disable-timer

This command configures the time, in seconds, for which a port is down if a loop is detected. The default time is 0 so that port needs to be reenabled manually to bring it up.

#### NOTICE

This command is available only on platforms that do not support the error disable auto-recovery feature.

|                |                                            |
|----------------|--------------------------------------------|
| <b>Default</b> | 0                                          |
| <b>Format</b>  | <code>keepalive disable-timer value</code> |
| <b>Mode</b>    | Global Configuration                       |

| Parameter | Description                                                             |
|-----------|-------------------------------------------------------------------------|
| value     | The time, in seconds, for which the port is down if a loop is detected. |

#### 4.3.5.1 no keepalive disable-timer

This command removes the disable-timer.

|               |                                         |
|---------------|-----------------------------------------|
| <b>Format</b> | <code>no keepalive disable-timer</code> |
| <b>Mode</b>   | Global Configuration                    |

### 4.3.6 keepalive retry

This command configures the time in seconds between transmission of keep-alive packets. `retry` is an optional parameter that configures the count of keepalive packets received by the switch after which the interface will be error disabled.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | 5                                  |
| <b>Format</b>  | <code>keepalive val [retry]</code> |
| <b>Mode</b>    | Global Configuration               |

| Parameter | Description                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| val       | The time in seconds between transmission of keep-alive packets.                                                 |
| retry     | Configures the count of keepalive packets received by the switch after which the switch will be error disabled. |

### 4.3.7 show keepalive

This command displays the global keepalive configuration.

|                |                 |
|----------------|-----------------|
| <b>Default</b> | None            |
| <b>Format</b>  | show keepalive  |
| <b>Mode</b>    | Privileged EXEC |

**Example:** The following shows example command output.

```
(Routing)(Config)#show keepalive
```

```
Keepalive..... Disabled
Transmit interval..... 5
Max PDU Receive..... 1
Disable timer..... 0
```

### 4.3.8 show keepalive statistics

This command displays the keep-alive statistics for each port or a specific port. Use the *port-num* parameter to display statistics for a specific interface or range of interfaces.

Statistics are displayed only for the ports on which keep-alive is enabled at the interface level.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | None                                        |
| <b>Format</b>  | show keepalive statistics {port-num   all } |
| <b>Mode</b>    | Privileged EXEC                             |

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| port-num  | The port number for which to show statistics. |
| all       | Show statistics for all ports.                |

**Example:** The following shows example command output.

```
(Routing) #show keepalive statistics all
```

| Port | Keep Alive | Loop Detected | Loop Count | Time Since Last Loop | Rx Action    | Port Status |
|------|------------|---------------|------------|----------------------|--------------|-------------|
| 0/1  | Yes        | Yes           | 1          | 85                   | shut-down    | D-Disable   |
| 0/3  | Yes        | No            |            |                      | log-shutdown | Enable      |

### 4.3.9 clear counters keepalive

This command clears keepalive statistics associated with ports (for example, number of transmitted packets, received packets, and loop packets).

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | None                     |
| <b>Format</b>  | clear counters keepalive |
| <b>Mode</b>    | Privileged EXEC          |

## 4.4 VLAN Commands

This section describes the commands you use to configure VLAN settings.

### 4.4.1 `vlan database`

This command gives you access to the VLAN Database mode, which allows you to configure VLAN characteristics

**Format**            `vlan database`  
**Mode**             Privileged EXEC

### 4.4.2 `network mgmt_vlan`

This command configures the Management VLAN ID.

**Default**            1  
**Format**            `network mgmt_vlan 1-4093`  
**Mode**             Privileged EXEC

#### 4.4.2.1 `no network mgmt_vlan`

This command sets the Management VLAN ID to the default.

**Format**            `no network mgmt_vlan`  
**Mode**             Privileged EXEC

### 4.4.3 `vlan`

This command creates a new VLAN and assigns it an ID. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). VLAN range is 2 to 4093.

**Format**            `vlan 2-4093`  
**Mode**             VLAN Database

#### 4.4.3.1 `no vlan`

This command deletes an existing VLAN. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). The VLAN range is 2 to 4093.

**Format**            `no vlan 2-4093`  
**Mode**             VLAN Database

### 4.4.4 `vlan acceptframe`

This command sets the frame acceptance mode on an interface or range of interfaces. For VLAN Only mode, untagged frames or priority frames received on this interface are discarded. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. For admituntaggedonly mode, only untagged frames are accepted on this interface; tagged frames are discarded. With any option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1q VLAN Specification.

**Default**            all  
**Format**            `vlan acceptframe {admituntaggedonly | vlanonly | all}`  
**Mode**             Interface Config

#### 4.4.4.1 no vlan acceptframe

This command resets the frame acceptance mode for the interface or range of interfaces to the default value.

**Format**           no vlan acceptframe  
**Mode**             Interface Config

#### 4.4.5 vlan ingressfilter

This command enables ingress filtering on an interface or range of interfaces. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

**Default**           disabled  
**Format**           vlan ingressfilter  
**Mode**             Interface Config

#### 4.4.5.1 no vlan ingressfilter

This command disables ingress filtering. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

**Format**           no vlan ingressfilter  
**Mode**             Interface Config

#### 4.4.6 vlan internal allocation

Use this command to configure which VLAN IDs to use for port-based routing interfaces. When a port-based routing interface is created, an unused VLAN ID is assigned internally.

**Format**           vlan internal allocation {base vlan-id | policy ascending | policy descending}  
**Mode**             Global Config

| Parameter         | Description                                                                                |
|-------------------|--------------------------------------------------------------------------------------------|
| base vlan-id      | The first VLAN ID to be assigned to a port-based routing interface.                        |
| policy ascending  | VLAN IDs assigned to port-based routing interfaces start at the base and increase in value |
| policy descending | VLAN IDs assigned to port-based routing interfaces start at the base and decrease in value |

#### 4.4.7 vlan makestatic

This command changes a dynamically created VLAN (created by GVRP registration) to a static VLAN (one that is permanently configured and defined). The ID is a valid VLAN identification number. VLAN range is 2 to 4093.

**Format**           vlan makestatic 2-4093  
**Mode**             VLAN Database

#### 4.4.8 vlan name

This command changes the name of a VLAN. The name is an alphanumeric string of up to 32 characters, and the ID is a valid VLAN identification number. ID range is 1 to 4093.

|                |                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------|
| <b>Default</b> | <ul style="list-style-type: none"> <li>VLAN ID 1 - Default</li> <li>Other VLANs - Blank string</li> </ul> |
| <b>Format</b>  | <code>vlan name 1-4093 name</code>                                                                        |
| <b>Mode</b>    | VLAN Database                                                                                             |

#### 4.4.8.1 no vlan name

This command sets the name of a VLAN to a blank string.

|               |                                  |
|---------------|----------------------------------|
| <b>Format</b> | <code>no vlan name 1-4093</code> |
| <b>Mode</b>   | VLAN Database                    |

#### 4.4.9 vlan participation

This command configures the degree of participation for a specific interface or range of interfaces in a VLAN. The ID is a valid VLAN identification number, and the interface is a valid interface number.

|               |                                                                   |
|---------------|-------------------------------------------------------------------|
| <b>Format</b> | <code>vlan participation {exclude   include   auto} 1-4093</code> |
| <b>Mode</b>   | Interface Config                                                  |

Participation options are:

| Parameter | Description                                                                                                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| include   | The interface is always a member of this VLAN. This is equivalent to registration fixed.                                                                                                           |
| exclude   | The interface is never a member of this VLAN. This is equivalent to registration forbidden.                                                                                                        |
| auto      | The interface is dynamically registered in this VLAN by GVRP and will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal. |

#### 4.4.10 vlan participation all

This command configures the degree of participation for all interfaces in a VLAN. The ID is a valid VLAN identification number.

|               |                                                                       |
|---------------|-----------------------------------------------------------------------|
| <b>Format</b> | <code>vlan participation all {exclude   include   auto} 1-4093</code> |
| <b>Mode</b>   | Global Config                                                         |

You can use the following participation options.

| Parameter | Description                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| include   | The interface is always a member of this VLAN. This is equivalent to registration fixed.                                                                                                                      |
| exclude   | The interface is never a member of this VLAN. This is equivalent to registration forbidden.                                                                                                                   |
| auto      | The interface is dynamically registered in this VLAN by GVRP. The interface will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal. |

#### 4.4.11 vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces.

|                |                                                                            |
|----------------|----------------------------------------------------------------------------|
| <b>Default</b> | all                                                                        |
| <b>Format</b>  | <code>vlan port acceptframe all {vlanonly   admituntaggedonly  all}</code> |
| <b>Mode</b>    | Global Config                                                              |

The modes are defined as follows.

| Parameter                | Description                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN Only mode           | Untagged frames or priority frames received on this interface are discarded.                                                              |
| Admit Untagged Only mode | VLAN-tagged and priority tagged frames received on this interface are discarded.                                                          |
| Admit All mode           | Untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. |

With either option, VLAN-tagged frames are forwarded in accordance with the IEEE 802.1q VLAN Specification.

#### 4.4.11.1 no vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces to Admit All. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1q VLAN Specification.

**Format** no vlan port acceptframe all

**Mode** Global Config

#### 4.4.12 vlan port ingressfilter all

This command enables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

**Default** disabled

**Format** vlan port ingressfilter all

**Mode** Global Config

#### 4.4.12.1 no vlan port ingressfilter all

This command disables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

**Format** no vlan port ingressfilter all

**Mode** Global Config

#### 4.4.13 vlan port pvid all

This command changes the VLAN ID for all interface.

**Default** 1

**Format** vlan port pvid all 1-4093

**Mode** Global Config

#### 4.4.13.1 no vlan port pvid all

This command sets the VLAN ID for all interfaces to 1.

**Format** no vlan port pvid all

**Mode** Global Config

#### 4.4.14 vlan port tagging all

This command configures the tagging behavior for all interfaces in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

**Format**            `vlan port tagging all 1-4093`  
**Mode**             Global Config

##### 4.4.14.1 no vlan port tagging all

This command configures the tagging behavior for all interfaces in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

**Format**            `no vlan port tagging all`  
**Mode**             Global Config

#### 4.4.15 vlan protocol group

This command adds protocol-based VLAN groups to the system. The *groupid* is a unique number from 1–128 that is used to identify the group in subsequent commands.

**Format**            `vlan protocol group groupid`  
**Mode**             Global Config

#### 4.4.16 vlan protocol group name

This command assigns a name to a protocol-based VLAN groups. The *groupname* variable can be a character string of 0 to 16 characters.

**Format**            `vlan protocol group name groupid groupname`  
**Mode**             Global Config

##### 4.4.16.1 no vlan protocol group name

This command removes the name from the group identified by *groupid*.

**Format**            `no vlan protocol group name groupid`  
**Mode**             Global Config

#### 4.4.17 vlan protocol group add protocol

This command adds the *protocol* to the protocol-based VLAN identified by *groupid*. A group may have more than one protocol associated with it. Each interface and protocol combination can only be associated with one group. If adding a protocol to a group causes any conflicts with interfaces currently associated with the group, this command fails and the protocol is not added to the group. The possible values for *protocol* are The possible values for *protocol-list* includes the keywords *ip*, *arp*, and *ipx* and hexadecimal or decimal values ranging from 0x0600 (1536) to 0xFFFF (65535). The protocol list can accept up to 16 protocols separated by a comma.

**Default**            none  
**Format**            `vlan protocol group add protocol groupid ethertype protocol-list`  
**Mode**             Global Config



#### 4.4.17.1 no vlan protocol group add protocol

This command removes the protocols specified in the *protocol-list* from this protocol-based VLAN group that is identified by this *groupid*.

**Format** no vlan protocol group add protocol *groupid* *ethertype* *protocol-list*  
**Mode** Global Config

#### 4.4.18 protocol group

This command attaches a *vlanid* to the protocol-based VLAN identified by *groupid*. A group may only be associated with one VLAN at a time, however the VLAN association can be changed.

**Default** none  
**Format** protocol group *groupid* *vlanid*  
**Mode** VLAN Database

#### 4.4.18.1 no protocol group

This command removes the *vlanid* from this protocol-based VLAN group that is identified by this *groupid*.

**Format** no protocol group *groupid* *vlanid*  
**Mode** VLAN Database

#### 4.4.19 protocol vlan group

This command adds a physical interface or a range of interfaces to the protocol-based VLAN identified by *groupid*. You can associate multiple interfaces with a group, but you can only associate each interface and protocol combination with one group. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command fails and the interfaces are not added to the group.

**Default** none  
**Format** protocol vlan group *groupid*  
**Mode** Interface Config

#### 4.4.19.1 no protocol vlan group

This command removes the interface from this protocol-based VLAN group that is identified by this *groupid*.

**Format** no protocol vlan group *groupid*  
**Mode** Interface Config

#### 4.4.20 protocol vlan group all

This command adds all physical interfaces to the protocol-based VLAN identified by *groupid*. You can associate multiple interfaces with a group, but you can only associate each interface and protocol combination with one group. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command will fail and the interfaces will not be added to the group.

**Default** none  
**Format** protocol vlan group all *groupid*  
**Mode** Global Config

#### 4.4.20.1 no protocol vlan group all

This command removes all interfaces from this protocol-based VLAN group that is identified by this *groupid*.

**Format**           no protocol vlan group all *groupid*  
**Mode**             Global Config

#### 4.4.21 show port protocol

This command displays the protocol-based VLAN information for either the entire system, or for the indicated group.

**Format**           show port protocol {*groupid* | all}  
**Mode**             Privileged EXEC

| Parameter  | Description                                                                         |
|------------|-------------------------------------------------------------------------------------|
| Group Name | The group name of an entry in the protocol-based VLAN table.                        |
| Group ID   | The group identifier of the protocol group.                                         |
| VLAN       | The VLAN associated with this Protocol Group.                                       |
| Protocols  | The type of protocols for this group.                                               |
| Interfaces | Lists the <i>slot/port</i> interfaces that are associated with this Protocol Group. |

#### 4.4.22 vlan pvid

This command changes the VLAN ID on an interface or range of interfaces.

**Default**          1  
**Format**           vlan pvid 1-4093  
**Mode**             Interface Config  
                   Interface Range Config

##### 4.4.22.1 no vlan pvid

This command sets the VLAN ID on an interface or range of interfaces to 1.

**Format**           no vlan pvid  
**Mode**             Interface Config

#### 4.4.23 vlan stats

This command enables statistics collection on the VLAN list specified if the specified VLANs are administratively created in the system.

**Default**          enable  
**Format**           vlan *vlan-list* stats  
**Mode**             VLAN Database

**Example:** To enable statistics on VLANs 10, 20, and 30.

(Switching) (Vlan)# vlan 10,20,30 stats

#### 4.4.23.1 no vlan stats

This command disables statistics collection on the VLAN list specified if the specified VLANs are administratively created in the system.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | enable                         |
| <b>Format</b>  | no vlan <i>vlan-list</i> stats |
| <b>Mode</b>    | VLAN Database                  |

**Example:** To disable statistics on VLANs 10, 20, and 30.

```
(Switching) (Vlan)# no vlan 10,20,30 stats
```

#### 4.4.24 vlan tagging

This command configures the tagging behavior for a specific interface or range of interfaces in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

|               |                            |
|---------------|----------------------------|
| <b>Format</b> | vlan tagging <i>1-4093</i> |
| <b>Mode</b>   | Interface Config           |

##### 4.4.24.1 no vlan tagging

This command configures the tagging behavior for a specific interface or range of interfaces in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

|               |                               |
|---------------|-------------------------------|
| <b>Format</b> | no vlan tagging <i>1-4093</i> |
| <b>Mode</b>   | Interface Config              |

#### 4.4.25 vlan association subnet

This command associates a VLAN to a specific IP-subnet.

|               |                                                      |
|---------------|------------------------------------------------------|
| <b>Format</b> | vlan association subnet <i>ipaddr netmask vlanid</i> |
| <b>Mode</b>   | VLAN Database                                        |

##### 4.4.25.1 no vlan association subnet

This command removes association of a specific IP-subnet to a VLAN.

|               |                                                  |
|---------------|--------------------------------------------------|
| <b>Format</b> | no vlan association subnet <i>ipaddr netmask</i> |
| <b>Mode</b>   | VLAN Database                                    |

#### 4.4.26 vlan association mac

This command associates a MAC address to a VLAN.

|               |                                            |
|---------------|--------------------------------------------|
| <b>Format</b> | vlan association mac <i>macaddr vlanid</i> |
| <b>Mode</b>   | VLAN Database                              |

##### 4.4.26.1 no vlan association mac

This command removes the association of a MAC address to a VLAN.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | no vlan association mac <i>macaddr</i> |
| <b>Mode</b>   | VLAN Database                          |

## 4.4.27 remote-span

This command identifies the VLAN as the RSPAN VLAN. It allows configuring up to L7\_MIRRORING\_MAX\_RSPAN\_VLANS RSPAN VLANs. To enter VLAN Config mode, use the `vlan vlan-id` from Global Config mode.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | None                     |
| <b>Format</b>  | <code>remote-span</code> |
| <b>Mode</b>    | VLAN Config              |

### 4.4.27.1 no remote-span

This command clears RSPAN information for the VLAN.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | <code>no remote-span</code> |
| <b>Mode</b>   | VLAN Config                 |

## 4.4.28 show vlan

This command displays information about the configured private VLANs, including primary and secondary VLAN IDs, type (community, isolated, or primary) and the ports which belong to a private VLAN.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show vlan {vlanid private-vlan [type]}</code>                                  |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primary   | Primary VLAN identifier. The range of the VLAN ID is 1 to 4093.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Secondary | Secondary VLAN identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Type      | Secondary VLAN type (community, isolated, or primary).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Ports     | Ports that are associated with a private VLAN.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| VLAN ID   | The VLAN identifier (VID) associated with each VLAN. The range of the VLAN ID is 1 to 4093.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| VLAN Name | A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of <code>Default</code> . This field is optional.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| VLAN Type | Type of VLAN, which can be Default (VLAN ID = 1) or static (one that is configured and permanently defined), or Dynamic. A dynamic VLAN can be created by GVRP registration or during the IEEE 802.1X authentication process (DOT1X) if a RADIUS-assigned VLAN does not exist on the switch.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Interface | slot/port. It is possible to set the parameters for all ports by using the selectors on the top line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Current   | The degree of participation of this port in this VLAN. The permissible values are: <ul style="list-style-type: none"> <li><code>Include</code> - This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1q standard.</li> <li><code>Exclude</code> - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1q standard.</li> <li><code>Autodetect</code> - To allow the port to be dynamically registered in this VLAN using GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1q standard.</li> </ul> |

| Parameter  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configured | The configured degree of participation of this port in this VLAN. The permissible values are: <ul style="list-style-type: none"> <li>• <code>Include</code> - This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1q standard.</li> <li>• <code>Exclude</code> - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1q standard.</li> <li>• <code>Autodetect</code> - To allow the port to be dynamically registered in this VLAN using GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1q standard.</li> </ul> |
| Tagging    | The tagging behavior for this port in this VLAN. <ul style="list-style-type: none"> <li>• <code>Tagged</code> - Transmit traffic for this VLAN as tagged frames.</li> <li>• <code>Untagged</code> - Transmit traffic for this VLAN as untagged frames.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

#### 4.4.29 show vlan stats

This command displays the supported per-VLAN statistics for the VLANs specified.

**Format**            `show vlan [vlan-id | vlan-list] stats`

**Mode**             Privileged EXEC

**Example:** To display statistics on VLAN 10.

```
(Switching) # show vlan 10 stats
VlanID..... 10
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0
```

**Example:** To display statistics on VLAN 10, 20, and 30.

```
(Switching) # show vlan 10,20,30 stats
VlanID..... 10
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

VlanID..... 20
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

VlanID..... 30
RxBytes..... 0
RxFrames..... 0
```

```

RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

```

**Example:** To display statistics on all available VLANs.

```
(Switching) # show vlan stats
```

```

VlanID..... 1
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

```

```

VlanID..... 10
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

```

```

VlanID..... 20
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

```

```

VlanID..... 30
RxBytes..... 0
RxFrames..... 0
RxDiscardBytes..... 0
RxDiscardFrames..... 0
TxBytes..... 0
TxFrames..... 0
TxDiscardBytes..... 0
TxDiscardFrames..... 0

```

#### 4.4.30 show vlan internal usage

This command displays information about the VLAN ID allocation on the switch.

**Format** show vlan internal usage

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter         | Description                                                                            |
|-------------------|----------------------------------------------------------------------------------------|
| Base VLAN ID      | Identifies the base VLAN ID for Internal allocation of VLANs to the routing interface. |
| Allocation policy | Identifies whether the system allocates VLAN IDs in ascending or descending order.     |

### 4.4.31 show vlan brief

This command displays a list of all configured VLANs.

- Format**            `show vlan brief`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter | Description                                                                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID   | There is a VLAN Identifier (vlanid) associated with each VLAN. The range of the VLAN ID is 1 to 4093.                                                                                                           |
| VLAN Name | A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of "Default." This field is optional. |
| VLAN Type | Type of VLAN, which can be Default (VLAN ID = 1) or static (one that is configured and permanently defined), or a Dynamic (one that is created by GVRP registration).                                           |

### 4.4.32 show vlan port

This command displays VLAN port information.

- Format**            `show vlan port {slot/port | all}`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                    | <i>slot/port</i> It is possible to set the parameters for all ports by using the selectors on the top line.                                                                                                                                                                                                                                                                                                                                                                           |
| Port VLAN ID Configured      | The VLAN ID that this port will assign to untagged frames or priority tagged frames received on this port. The value must be for an existing VLAN. The factory default is 1.                                                                                                                                                                                                                                                                                                          |
| Port VLAN ID Current         | The current VLAN ID that this port assigns to untagged frames or priority tagged frames received on this port. The factory default is 1.                                                                                                                                                                                                                                                                                                                                              |
| Acceptable Frame Types       | The types of frames that may be received on this port. The options are 'VLAN only' and 'Admit All'. When set to 'VLAN only', untagged frames or priority tagged frames received on this port are discarded. When set to 'Admit All', untagged frames or priority tagged frames received on this port are accepted and assigned the value of the Port VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance to the IEEE 802.1q VLAN specification. |
| Ingress Filtering Configured | May be enabled or disabled. When enabled, the frame is discarded if this port is not a member of the VLAN with which this frame is associated. In a tagged frame, the VLAN is identified by the VLAN ID in the tag. In an untagged frame, the VLAN is the Port VLAN ID specified for the port that received this frame. When disabled, all frames are forwarded in accordance with the IEEE 802.1q VLAN bridge specification. The factory default is disabled.                        |
| Ingress Filtering Current    | Shows the current ingress filtering configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GVRP                         | May be enabled or disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Default Priority             | The IEEE 802.1p priority assigned to tagged packets arriving on the port.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Protected Port               | Specifies if this is a protected port. If False, it is not a protected port; If true, it is.                                                                                                                                                                                                                                                                                                                                                                                          |
| Switchport mode              | The current switchport mode for the port.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Operating parameters         | The operating parameters for the port, including the VLAN, name, egress rule, and type.                                                                                                                                                                                                                                                                                                                                                                                               |
| Static configuration         | The static configuration for the port, including the VLAN, name, and egress rule.                                                                                                                                                                                                                                                                                                                                                                                                     |
| Forbidden VLANs              | The forbidden VLAN configuration for the port, including the VLAN and name.                                                                                                                                                                                                                                                                                                                                                                                                           |

### 4.4.33 show vlan association subnet

This command displays the VLAN associated with a specific configured IP-Address and net mask. If no IP address and net mask are specified, the VLAN associations of all the configured IP-subnets are displayed.

**Format** show vlan association subnet [*ipaddr netmask*]

**Mode** Privileged EXEC

| Parameter  | Description                                                 |
|------------|-------------------------------------------------------------|
| IP Address | The IP address assigned to each interface.                  |
| Net Mask   | The subnet mask.                                            |
| VLAN ID    | There is a VLAN Identifier (VID) associated with each VLAN. |

### 4.4.34 show vlan association mac

This command displays the VLAN associated with a specific configured MAC address. If no MAC address is specified, the VLAN associations of all the configured MAC addresses are displayed.

**Format** show vlan association mac [*macaddr*]

**Mode** Privileged EXEC

| Parameter   | Description                                                                                                                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mac Address | A MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes. |
| VLAN ID     | There is a VLAN Identifier (VID) associated with each VLAN.                                                                                                                                                                                                    |

## 4.5 Double VLAN Commands

This section describes the commands you use to configure double VLAN (DVLAN). Double VLAN tagging is a way to pass VLAN traffic from one customer domain to another through a Metro Core in a simple and cost effective manner. The additional tag on the traffic helps differentiate between customers in the MAN while preserving the VLAN identification of the individual customers when they enter their own IEEE 802.1q domain.

### 4.5.1 dvlan-tunnel ethertype (Interface Config)

---

This command is not available on all platforms.

#### **NOTICE**

---

This command configures the ethertype for the specified interface. The 2-byte hex ethertype is used as the first 16 bits of the DVLAN tag. The ethertype may have the values of 802.1q, vman, or custom. If the ethertype has an optional value of custom, then it is a custom tunnel value, and ethertype must be set to a value in the range of 1 to 65535.

**Default** 802.1Q

**Format** dvlan-tunnel ethertype {802.1Q | vman | custom 1-65535}

**Mode** Global Config

| Parameter | Description                                                        |
|-----------|--------------------------------------------------------------------|
| 802.1Q    | Configure the ethertype as 0x8100.                                 |
| custom    | Configure the value of the custom tag in the range from 1to 65535. |
| vman      | Represents the commonly used value of 0x88A8.                      |



### 4.5.1.1 no dvlan-tunnel etherstype (Interface Config)

This command is not available on all platforms.

#### NOTICE

This command removes the etherstype value for the interface.

**Format** no dvlan-tunnel etherstype

**Mode** Global Config

### 4.5.2 dvlan-tunnel etherstype primary-tpid

Use this command to create a new TPID and associate it with the next available TPID register. If no TPID registers are empty, the system returns an error to the user. Specifying the optional keyword [primary-tpid] forces the TPID value to be configured as the default TPID at index 0.

**Format** dvlan-tunnel etherstype {802.1Q | vman | custom 1-65535} [primary-tpid]

**Mode** Global Config

| Parameter | Description                                                         |
|-----------|---------------------------------------------------------------------|
| 802.1Q    | Configure the etherstype as 0x8100.                                 |
| custom    | Configure the value of the custom tag in the range from 1 to 65535. |
| vman      | Represents the commonly used value of 0x88A8.                       |

#### 4.5.2.1 no dvlan-tunnel etherstype primary-tpid

Use the no form of the command to reset the TPID register to 0. (At initialization, all TPID registers will be set to their default values.)

**Format** no dvlan-tunnel etherstype {802.1Q | vman | custom 1-65535} [primary-tpid]

**Mode** Global Config

### 4.5.3 mode dot1q-tunnel

This command is used to enable Double VLAN Tunneling on the specified interface.

**Default** disabled

**Format** mode dot1q-tunnel

**Mode** Interface Config

#### 4.5.3.1 no mode dot1q-tunnel

This command is used to disable Double VLAN Tunneling on the specified interface. By default, Double VLAN Tunneling is disabled.

**Format** no mode dot1q-tunnel

**Mode** Interface Config

## 4.5.4 mode dvlan-tunnel

Use this command to enable Double VLAN Tunneling on the specified interface.

### NOTICE

When you use the `mode dvlan-tunnel` command on an interface, it becomes a service provider port. Ports that do not have double VLAN tunneling enabled are customer ports.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | disabled                       |
| <b>Format</b>  | <code>mode dvlan-tunnel</code> |
| <b>Mode</b>    | Interface Config               |

### 4.5.4.1 no mode dvlan-tunnel

This command is used to disable Double VLAN Tunneling on the specified interface. By default, Double VLAN Tunneling is disabled.

|               |                                   |
|---------------|-----------------------------------|
| <b>Format</b> | <code>no mode dvlan-tunnel</code> |
| <b>Mode</b>   | Interface Config                  |

## 4.5.5 show dot1q-tunnel

Use this command without the optional parameters to display all interfaces enabled for Double VLAN Tunneling. Use the optional parameters to display detailed information about Double VLAN Tunneling for the specified interface or all interfaces.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show dot1q-tunnel [interface {slot/port   all}]</code>                         |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface | slot/port                                                                                                                                                                                                                                                                                                                                                                                                     |
| Mode      | The administrative mode through which Double VLAN Tunneling can be enabled or disabled. The default value for this field is disabled.                                                                                                                                                                                                                                                                         |
| EtherType | A 2-byte hex EtherType to be used as the first 16 bits of the DVLAN tunnel. There are three different EtherType tags. The first is IEEE 802.1q, which represents the commonly used value of 0x8100. The second is vMAN, which represents the commonly used value of 0x88A8. If EtherType is not one of these two values, then it is a custom tunnel value, representing any value in the range of 1 to 65535. |

## 4.5.6 show dvlan-tunnel

Use this command without the optional parameters to display all interfaces enabled for Double VLAN Tunneling. Use the optional parameters to display detailed information about Double VLAN Tunneling for the specified interface or all interfaces.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show dvlan-tunnel [interface {slot/port all lag lag-intf-num}]</code>          |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter | Description |
|-----------|-------------|
| Interface | slot/port   |

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LAG       | Instead of slot/port, <code>lag lag-intf-num</code> can be used as an alternate way to specify the LAG interface. <code>lag lag-intf-num</code> can also be used to specify the LAG interface where <code>lag-intf-num</code> is the LAG port number.                                                                                                                                                         |
| Mode      | The administrative mode through which Double VLAN Tunneling can be enabled or disabled. The default value for this field is disabled.                                                                                                                                                                                                                                                                         |
| EtherType | A 2-byte hex EtherType to be used as the first 16 bits of the DVLAN tunnel. There are three different EtherType tags. The first is IEEE 802.1q, which represents the commonly used value of 0x8100. The second is vMAN, which represents the commonly used value of 0x88A8. If EtherType is not one of these two values, then it is a custom tunnel value, representing any value in the range of 1 to 65535. |

**Example:** The following shows examples of the CLI display output for the commands.

```
(Routing) #show dvlan-tunnel
```

```
TPIDs Configured..... 0x88a8
Default TPID..... 0x88a8
Interfaces Enabled for DVLAN Tunneling..... None
```

```
(Routing) #
```

```
(switch)#show dvlan-tunnel interface 1/0/1
```

```
Interface Mode EtherType

1/0/1 Disable 0x88a8
```

## 4.6 Private VLAN Commands

This section describes the commands you use for private VLANs. Private VLANs provides Layer 2 isolation between ports that share the same broadcast domain. In other words, it allows a VLAN broadcast domain to be partitioned into smaller point-to-multipoint subdomains. The ports participating in a private VLAN can be located anywhere in the Layer 2 network.

### 4.6.1 switchport private-vlan

This command defines a private-VLAN association for an isolated or community port or a mapping for a promiscuous port.

**Format**            `switchport private-vlan {host-association primary-vlan-id secondary-vlan-id | mapping primary-vlan-id {add | remove} secondary-vlan-list | mapping trunk primary-vlan-id {secondary-vlan-list | add secondary-vlan-list | remove secondary-vlan-list} | trunk {native vlan vlan-id | allowed vlan vlan-list}} | association trunk primary-vlan-id secondary-vlan-id}`

**Mode**              Interface Config

| Parameter           | Description                                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------|
| host-association    | Defines the VLAN association for community or host ports.                                           |
| mapping             | Defines the private VLAN mapping for promiscuous ports.                                             |
| mapping trunk       | Maps the port to a primary VLAN and selected secondary VLANs.                                       |
| primary-vlan-id     | Primary VLAN ID of a private VLAN.                                                                  |
| secondary-vlan-id   | Secondary (isolated or community) VLAN ID of a private VLAN.                                        |
| add                 | Associates the secondary VLAN with the primary one.                                                 |
| remove              | Deletes the secondary VLANs from the primary VLAN association.                                      |
| secondary-vlan-list | A list of secondary VLANs to be mapped to a primary VLAN.                                           |
| trunk native vlan   | Defines the VLAN association for untagged packets. If not configured, untagged packets are dropped. |

| Parameter          | Description                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| trunk allowed vlan | Specifies the list of allowed normal VLANs on the trunk port.                                                                      |
| association trunk  | Associates a primary VLAN with a secondary (isolated only) VLAN. Multiple private VLAN pairs can be configured using this command. |

#### 4.6.1.1 no switchport private-vlan

This command removes the private-VLAN association or mapping from the port.

**Format**            `no switchport private-vlan {host-association | mapping | mapping trunk {primary-vlan id} | trunk allowed vlan-list | trunk native vlan vlan-id} association trunk primary-vlan-id secondary-vlan-id}`

**Mode**             Interface Config

#### 4.6.2 switchport mode private-vlan

This command configures a port as a promiscuous or host private VLAN port. Note that the properties of each mode can be configured even when the switch is not in that mode. However, they will only be applicable once the switch is in that particular mode.

**Default**            `general`

**Format**            `switchport mode private-vlan {host | promiscuous | trunk promiscuous | trunk secondary}`

**Mode**             Interface Config

| Parameter         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| host              | Configures an interface as a private VLAN host port. It can be either isolated or community port depending on the secondary VLAN it is associated with.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| promiscuous       | Configures an interface as a private VLAN promiscuous port. The promiscuous ports are members of the primary VLAN.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| trunk promiscuous | Configures an interface as a private VLAN promiscuous trunk port. These ports can carry traffic of several primary VLANs and normal VLANs.<br><br>An endpoint connected to a promiscuous trunk port is allowed to communicate with all the endpoints within the private VLAN and also with other ports participating in normal VLANs. These ports carry the traffic of multiple primary VLANs towards the upstream router and regular VLANs.<br><br>Promiscuous trunk ports are used when it is required to reduce the number of links connected to upstream devices while still being able to manage all the endpoints in a private VLAN—in addition to carrying traffic of normal VLANs. These ports are typically used where the switches are connected to upstream devices that do not understand private VLANs. |
| trunk secondary   | Configures an interface as a private VLAN isolated trunk port. These ports can carry traffic of several secondary VLANs and normal VLANs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

#### 4.6.2.1 no switchport mode private-vlan

This command removes the private-VLAN association or mapping from the port.

**Format**            `no switchport mode private-vlan`

**Mode**             Interface Config

#### 4.6.3 private-vlan

This command configures the private VLANs and configures the association between the primary private VLAN and secondary VLANs.

**Format**            `private-vlan {association [add | remove] secondary-vlan-list | community | isolated | primary}`

**Mode**             VLAN Config

| Parameter           | Description                                               |
|---------------------|-----------------------------------------------------------|
| association         | Associates the primary and secondary VLAN.                |
| secondary-vlan-list | A list of secondary VLANs to be mapped to a primary VLAN. |
| community           | Designates a VLAN as a community VLAN.                    |
| isolated            | Designates a VLAN as the isolated VLAN.                   |
| primary             | Designates a VLAN as the primary VLAN.                    |

#### 4.6.3.1 no private-vlan

This command restores normal VLAN configuration.

**Format**            `no private-vlan {association}`

**Mode**             VLAN Config

#### 4.6.4 show interface ethernet switchport

This command displays the private VLAN mapping information for the switch interfaces.

**Format**            `show interface ethernet interface-id switchport`

**Mode**             Privileged EXEC

| Parameter    | Description                  |
|--------------|------------------------------|
| interface-id | The slot/port of the switch. |

The command displays the following information. Note that the fields that display depend on the configured mode on the port.

| Parameter                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                          | The port number for which data is displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| VLAN Switchport Mode          | The private VLAN mode of the interface, which is one of the following: <ul style="list-style-type: none"> <li>General – The interface is in general mode and is not a member of a private VLAN.</li> <li>Private VLAN Promiscuous – The interface belongs to a primary VLAN and can communicate with all interfaces in the private VLAN, including other promiscuous ports, community ports, and isolated ports.</li> <li>Private VLAN Promiscuous Trunk – The interface belongs to a primary VLAN and can communicate with all interfaces in the private VLAN, including other promiscuous trunk ports, community ports, and isolated ports.</li> <li>Private VLAN Host – The interface belongs to a secondary VLAN and, depending upon the type of secondary VLAN, can either communicate with other ports in the same community (if the secondary VLAN is a community VLAN) and with the promiscuous ports or is able to communicate only with the promiscuous ports (if the secondary VLAN is an isolated VLAN).</li> <li>Private VLAN Isolated Trunk – The interface belongs to an isolated VLAN and can communicate with promiscuous, promiscuous trunk, and trunk ports.</li> </ul> |
| Private VLAN Host Association | The VLAN association for the private-VLAN host ports.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Private VLAN Mapping          | The VLAN mapping for the private-VLAN promiscuous ports.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Parameter                       | Description                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Private VLAN trunk native VLAN  | Displays the native VLAN for the promiscuous trunk ports. When the port is configured to operate in Promiscuous Trunk mode, the native VLAN defines VLAN association for untagged packets. If not configured, untagged packets are dropped. |
| Private VLAN trunk normal VLANs | The list of normal VLANs for the promiscuous trunk ports.                                                                                                                                                                                   |
| Private-VLAN trunk mappings     | The mappings of all the primary VLANs and their associated secondary VLANs of promiscuous trunk ports.                                                                                                                                      |
| Private-vlan trunk associations | The associations of all the primary VLANs and their associated isolated VLANs of isolated trunk ports.                                                                                                                                      |
| Operational Private VLANs       | The operational private VLANs on this interface.                                                                                                                                                                                            |

## 4.7 Switch Ports

This section describes the commands used for switch port mode.

### 4.7.1 switchport mode

Use this command to configure the mode of a switch port as access, trunk or general.

In Trunk mode, the port becomes a member of all VLANs on switch unless specified in the allowed list in the `switchport trunk allowed vlan` command. The PVID of the port is set to the Native VLAN as specified in the `switchport trunk native vlan` command. It means that trunk ports accept both tagged and untagged packets, where untagged packets are processed on the native VLAN and tagged packets are processed on the VLAN ID contained in the packet. MAC learning is performed on both tagged and untagged packets. Tagged packets received with a VLAN ID of which the port is not a member are discarded and MAC learning is not performed. The Trunk ports always transmit packets untagged on native VLAN.

In Access mode, the port becomes a member of only one VLAN. The port sends and receives untagged traffic. It can also receive tagged traffic. The ingress filtering is enabled on port. It means that when the VLAN ID of received packet is not identical to Access VLAN ID, the packet is discarded.

In General mode, the user can perform custom configuration of VLAN membership, PVID, tagging, ingress filtering etc. This is legacy FASTPATH behavior of switch port configuration. Legacy FASTPATH CLI commands are used to configure port in general mode.

|                |                                                         |
|----------------|---------------------------------------------------------|
| <b>Default</b> | General mode                                            |
| <b>Format</b>  | <code>switchport mode {access   trunk   general}</code> |
| <b>Mode</b>    | Interface Config                                        |

#### 4.7.1.1 no switchport mode

This command resets the switch port mode to its default value.

|               |                                 |
|---------------|---------------------------------|
| <b>Format</b> | <code>no switchport mode</code> |
| <b>Mode</b>   | Interface Config                |

### 4.7.2 switchport trunk allowed vlan

Use this command to configure the list of allowed VLANs that can receive and send traffic on this interface in tagged format when in trunking mode. The default is all.

The VLANs list can be modified using the `add` or `remove` options or replaced with another list using the `vlan-list`, `all`, or `except` options. If `all` is chosen, all VLANs are added to the list of allowed vlan. The `except` option provides an exclusion list.

Trunk ports accept tagged packets, where tagged packets are processed on the VLAN ID contained in the packet, if this VLAN is in the allowed VLAN list. Tagged packets received with a VLAN ID to which the port is not a member are discarded and MAC learning is not performed. If a VLAN is added to the system after a port is set to the Trunk mode and it is in the allowed VLAN list, this VLAN is assigned to this port automatically.

|                |                                                                                                                            |
|----------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | All                                                                                                                        |
| <b>Format</b>  | <code>switchport trunk allowed vlan {vlan-list   all   {add vlan-list}   {remove vlan-list}   {except vlan-list } }</code> |
| <b>Mode</b>    | Interface Config                                                                                                           |

| Parameter | Description                                                                                                                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| all       | Specifies all VLANs from 1 to 4093. This keyword is not allowed on commands that do not permit all VLANs in the list to be set at the same time.                                                    |
| add       | Adds the defined list of VLANs to those currently set instead of replacing the list.                                                                                                                |
| remove    | Removes the defined list of VLANs from those currently set instead of replacing the list. Valid IDs are from 1 to 4093; extended-range VLAN IDs of the form X-Y or X,Y,Z are valid in this command. |
| except    | Lists the VLANs that should be calculated by inverting the defined list of VLANs. (VLANs are added except the ones specified.)                                                                      |
| vlan-list | Either a single VLAN number from 1 to 4093 or a continuous range of VLANs described by two VLAN numbers, the lesser one first, separated by a hyphen.                                               |

#### 4.7.2.1 no switchport trunk allowed vlan

This command resets the list of allowed VLANs on the trunk port to its default value.

|               |                                               |
|---------------|-----------------------------------------------|
| <b>Format</b> | <code>no switchport trunk allowed vlan</code> |
| <b>Mode</b>   | Interface Config                              |

#### 4.7.3 switchport trunk native vlan

Use this command to configure the Trunk port Native VLAN (PVID) parameter. Any ingress untagged packets on the port are tagged with the value of Native VLAN. Native VLAN must be in the allowed VLAN list for tagging of received untagged packets. Otherwise, untagged packets are discarded. Packets marked with Native VLAN are transmitted untagged from Trunk port. The default is 1.

|                |                                                   |
|----------------|---------------------------------------------------|
| <b>Default</b> | 1 (Default VLAN)                                  |
| <b>Format</b>  | <code>switchport trunk native vlan vlan-id</code> |
| <b>Mode</b>    | Interface Config                                  |

#### 4.7.3.1 no switchport trunk native vlan

Use this command to reset the switch port trunk mode native VLAN to its default value.

|               |                                              |
|---------------|----------------------------------------------|
| <b>Format</b> | <code>no switchport trunk native vlan</code> |
| <b>Mode</b>   | Interface Config                             |

#### 4.7.4 switchport access vlan

Use this command to configure the VLAN on the Access port. Only one VLAN can be assigned to the Access port. Access ports are members of VLAN 1 by default. Access ports may be assigned to a VLAN other than VLAN 1. Removing the Access VLAN on the switch makes the Access port a member of VLAN 1. Configuring an Access port to be a member of a VLAN that does not exist results in an error and does not change the configuration.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | 1 (Default VLAN)                            |
| <b>Format</b>  | <code>switchport access vlan vlan-id</code> |
| <b>Mode</b>    | Interface Config                            |

#### 4.7.4.1 no switchport access vlan

This command resets the switch port access mode VLAN to its default value.

**Format** no switchport access vlan  
**Mode** Interface Config

#### 4.7.5 show interfaces switchport

Use this command to display the switchport status for all interfaces or a specified interface. The output contains information about configured switchport mode, VLAN membership, PVID/Native VLAN, acceptable frame type, and other options per switchport modes.

**Format** show interfaces switchport *slot/port*  
**Mode** Privileged EXEC

**Example:** The following shows examples of the command.

```
(Switching) # show interfaces switchport 1/0/20
Port: 1/0/20
Switchport Mode: Access Mode
Access Mode VLAN: 1 (default)
General Mode PVID: 1 (default)
General Mode Ingress Filtering: Enabled
General Mode Acceptable Frame Type: Admit All
General Mode Dynamically Added VLANs:
General Mode Untagged VLANs: 1
General Mode Tagged VLANs:
General Mode Forbidden VLANs:
Trunking Mode Native VLAN: 1 (default)
Trunking Mode Native VLAN Tagging: Disabled
Trunking Mode VLANs Enabled: All
Protected: False
```

```
(Routing) #show interfaces switchport

Port: 1/0/1
VLAN Membership Mode: General
Access Mode VLAN: 1 (default)
General Mode PVID: 1 (default)
General Mode Ingress Filtering: Disabled
General Mode Acceptable Frame Type: Admit all
General Mode Dynamically Added VLANs:
General Mode Untagged VLANs: 1
General Mode Tagged VLANs:
General Mode Forbidden VLANs:
Trunking Mode Native VLAN: 1 (default)
Trunking Mode Native VLAN tagging: Disable
Trunking Mode VLANs Enabled: All
Protected Port: False
```

#### 4.7.6 show interfaces switchport

Use this command to display the switchport configuration for a selected mode per interface. If the interface is not specified, the configuration for all interfaces is displayed.

**Format** show interfaces switchport {access | trunk | general} [*slot/port*]  
**Mode** Privileged EXEC



**Example:** The following shows example command output.

```
Switching) # show interfaces switchport access 1/0/1
```

```
Intf PVID

1/0/1 1
```

```
(Switching) # show interfaces switchport trunk 1/0/6
```

```
Intf PVID Allowed Vlans List

1/0/6 1 All
```

```
(Switching) # show interfaces switchport general 1/0/5
```

```
Intf PVID Ingress Acceptable Untagged Tagged Forbidden Dynamic
 PVID Filtering Frame Type Vlans Vlans Vlans Vlans

1/0/5 1 Enabled Admit All 7 10-50,55 9,100-200 88,96
```

```
(Switching) # show interfaces switchport general
```

```
Intf PVID Ingress Acceptable Untagged Tagged Forbidden Dynamic
 PVID Filtering Frame Type Vlans Vlans Vlans Vlans

1/0/1 1 Enabled Admit All 1,4-7 30-40,55 3,100-200 88,96
1/0/2 1 Disabled Admit All 1 30-40,55 none none
..
```

## 4.8 Voice VLAN Commands

This section describes the commands you use for Voice VLAN. Voice VLAN enables switch ports to carry voice traffic with defined priority so as to enable separation of voice and data traffic coming onto the port. The benefits of using Voice VLAN is to ensure that the sound quality of an IP phone could be safeguarded from deteriorating when the data traffic on the port is high.

Also the inherent isolation provided by VLANs ensures that inter-VLAN traffic is under management control and that network- attached clients cannot initiate a direct attack on voice components. QoS-based on IEEE 802.1p class of service (CoS) uses classification and scheduling to sent network traffic from the switch in a predictable manner. The system uses the source MAC of the traffic traveling through the port to identify the IP phone data flow.

### 4.8.1 voice vlan (Global Config)

Use this command to enable the Voice VLAN capability on the switch.

**Default** disabled  
**Format** voice vlan  
**Mode** Global Config

#### 4.8.1.1 no voice vlan (Global Config)

Use this command to disable the Voice VLAN capability on the switch.

**Format** no voice vlan  
**Mode** Global Config

## 4.8.2 voice vlan (Interface Config)

Use this command to enable the Voice VLAN capability on the interface or range of interfaces.

|                |                                                                         |
|----------------|-------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                |
| <b>Format</b>  | voice vlan {vlanid <i>id</i>   dot1p <i>priority</i>   none   untagged} |
| <b>Mode</b>    | Interface Config                                                        |

You can configure Voice VLAN in one of four different ways.

| Parameter | Description                                                                                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-id   | Configure the IP phone to forward all voice traffic through the specified VLAN. Valid VLAN ID's are from 1 to 4093 (the max supported by the platform).                               |
| dot1p     | Configure the IP phone to use IEEE 802.1p priority tagging for voice traffic and to use the default native VLAN (VLAN 0) to carry all traffic. Valid <i>priority</i> range is 0 to 7. |
| none      | Allow the IP phone to use its own configuration to send untagged voice traffic.                                                                                                       |
| untagged  | Configure the phone to send untagged voice traffic.                                                                                                                                   |

### 4.8.2.1 no voice vlan (Interface Config)

Use this command to disable the Voice VLAN capability on the interface.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no voice vlan    |
| <b>Mode</b>   | Interface Config |

## 4.8.3 voice vlan data priority

Use this command to either trust or untrust the data traffic arriving on the Voice VLAN interface or range of interfaces being configured.

|                |                                            |
|----------------|--------------------------------------------|
| <b>Default</b> | trust                                      |
| <b>Format</b>  | voice vlan data priority {untrust   trust} |
| <b>Mode</b>    | Interface Config                           |

## 4.8.4 show voice vlan

|               |                                                    |
|---------------|----------------------------------------------------|
| <b>Format</b> | show voice vlan [interface {unit/slot/port   all}] |
| <b>Mode</b>   | Privileged EXEC                                    |

When the `interface` parameter is not specified, only the global mode of the Voice VLAN is displayed.

| Parameter           | Description                 |
|---------------------|-----------------------------|
| Administrative Mode | The Global Voice VLAN mode. |

When the `interface` is specified.

| Parameter                      | Description                                                     |
|--------------------------------|-----------------------------------------------------------------|
| <b>Voice VLAN Mode</b>         | The admin mode of the Voice VLAN on the interface.              |
| <b>Voice VLAN ID</b>           | The Voice VLAN ID                                               |
| <b>Voice VLAN Priority</b>     | The dot1p priority for the Voice VLAN on the port.              |
| <b>Voice VLAN Untagged</b>     | The tagging option for the Voice VLAN traffic.                  |
| <b>Voice VLAN CoS Override</b> | The Override option for the voice traffic arriving on the port. |

| Parameter                | Description                                       |
|--------------------------|---------------------------------------------------|
| <b>Voice VLAN Status</b> | The operational status of Voice VLAN on the port. |

## 4.9 IEEE 802.1AS Timesync Commands

### 4.9.1 dot1as (Global Config)

Use the `dot1as` command in Global Configuration mode to set the IEEE 802.1AS operational mode to enabled.

|                |                     |
|----------------|---------------------|
| <b>Default</b> | enabled             |
| <b>Format</b>  | <code>dot1as</code> |
| <b>Mode</b>    | Global Config       |

#### 4.9.1.1 no dot1as

Use the `no dot1as` command in Global Configuration mode to set the IEEE 802.1AS operational mode to disabled. While disabled, the IEEE 802.1AS configuration is retained and can be changed, but is not activated.

|               |                        |
|---------------|------------------------|
| <b>Format</b> | <code>no dot1as</code> |
| <b>Mode</b>   | Global Config          |

### 4.9.2 dot1as (Interface Config)

Use the `dot1as` command in Interface Configuration mode to set the IEEE 802.1AS operational mode for this port to enabled.

|                |                     |
|----------------|---------------------|
| <b>Default</b> | enabled             |
| <b>Format</b>  | <code>dot1as</code> |
| <b>Mode</b>    | Interface Config    |

#### 4.9.2.1 no dot1as

Use the `no dot1as` command in Interface Configuration mode to set the IEEE 802.1AS operational mode for this port to disabled.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | <code>dot1as</code> |
| <b>Mode</b>   | Interface Config    |

### 4.9.3 dot1as priority

Use the `dot1as priority` command in Global Configuration mode to configure the IEEE 802.1AS priority1 or priority2 values.

|                |                                        |
|----------------|----------------------------------------|
| <b>Default</b> | 246/248                                |
| <b>Format</b>  | <code>dot1as priority 1-2 0-255</code> |
| <b>Mode</b>    | Global Config                          |

#### 4.9.3.1 no dot1as priority

Use the `no dot1as priority` command in Global Configuration mode to set the IEEE 802.1AS priority1 or priority2 value to the default.

|               |                                     |
|---------------|-------------------------------------|
| <b>Format</b> | <code>no dot1as priority 1-2</code> |
| <b>Mode</b>   | Global Config                       |

#### 4.9.4 dot1as interval announce

Use the `dot1as interval announce` command in Interface Configuration mode to configure the initial mean time interval between successive ANNOUNCE messages in logarithm to base 2 format.

**Default** 0  
**Format** `dot1as interval announce -5 to 5`  
**Mode** Interface Config

##### 4.9.4.1 no dot1as interval announce

Use the `no dot1as interval announce` command in Interface Configuration mode to set the initial mean time interval between successive ANNOUNCE messages to the default value.

**Format** `no dot1as interval announce`  
**Mode** Interface Config

#### 4.9.5 dot1as interval sync

Use the `dot1as interval sync` command in Interface Configuration mode to configure the initial mean time interval between successive SYNC messages in logarithm to base 2 format.

**Default** -3  
**Format** `dot1as interval sync -5 to 5`  
**Mode** Interface Config

##### 4.9.5.1 no dot1as interval sync

Use the `no dot1as interval sync` command in Interface Configuration mode to set the initial mean time interval between successive SYNC messages to the default value.

**Format** `no dot1as interval sync`  
**Mode** Interface Config

#### 4.9.6 dot1as interval pdelay

Use the `dot1as interval pdelay` command in Interface Configuration mode to configure the initial mean time interval between successive PDELAY messages in logarithm to base 2 format.

**Default** 0  
**Format** `dot1as interval pdelay -5 to 5`  
**Mode** Interface Config

##### 4.9.6.1 no dot1as interval pdelay

Use the `no dot1as interval pdelay` command in Interface Configuration mode to set the initial mean time interval between successive PDELAY messages to the default value.

**Format** `no dot1as interval pdelay`  
**Mode** Interface Config

#### 4.9.7 dot1as timeout announce

Use the `dot1as timeout announce` command in Interface Configuration mode to configure the number of ANNOUNCE intervals that have to pass without receipt of an ANNOUNCE message, before considering that the master is no longer transmitting.

**Default** 3  
**Format** dot1as timeout announce 2-255  
**Mode** Interface Config

#### 4.9.7.1 no dot1as timeout announce

Use the `no dot1as timeout announce` command in Interface Configuration mode to set the ANNOUNCE timeout to the default value.

**Format** no dot1as timeout announce  
**Mode** Interface Config

#### 4.9.8 dot1as timeout sync

Use the `dot1as timeout sync` command in Interface Configuration mode to configure the number of SYNC intervals that have to pass without receipt of a SYNC message, before considering that the master is no longer transmitting.

**Default** 3  
**Format** dot1as timeout sync 2-255  
**Mode** Interface Config

#### 4.9.8.1 no dot1as timeout sync

Use the `no dot1as timeout sync` command in Interface Configuration mode to set the SYNC timeout to the default value.

#### 4.9.9 dot1as pdelaythreshold

Use the `dot1as pdelaythreshold` command in Interface Configuration mode to configure the propagation delay threshold in nanoseconds, above which an interface is not considered capable of participating in the IEEE 802.1AS protocol.

**Default** 2500  
**Format** dot1as pdelaythreshold 0-1000000000  
**Mode** Interface Config

#### 4.9.9.1 no dot1as pdelaythreshold

Use the `dot1as pdelaythreshold` command in Interface Configuration mode to set the pdelaythreshold to the default value.

**Format** no dot1as pdelaythreshold  
**Mode** Interface Config

#### 4.9.10 dot1as allowedlostresp

Use the `dot1as allowedlostresp` command in Interface Configuration mode to configure the number of Pdelay\_Req messages for which a valid response is not received, above which a port is considered to not be exchanging peer delay messages with its neighbor.

**Default** 3  
**Format** dot1as allowedlostresp 0-65535  
**Mode** Interface Config

### 4.9.10.1 no dot1as allowedlostresp

Use the `no dot1as allowedlostresp` command in Interface Configuration mode to set the value of allowed lost PDELAY responses to the default.

**Format**            `no dot1as allowedlostresp`

**Mode**             Interface Config

### 4.9.11 clear dot1as statistics

Use the `clear dot1as statistics` command in Privileged EXEC mode to clear IEEE 802.1AS statistics for a specified port or for all ports.

**Format**            `clear dot1as statistics {slot/port | all}`

**Mode**             Privileged EXEC

### 4.9.12 show dot1as summary

Use the `show dot1as summary` command in Privileged EXEC or User EXEC mode to display a summary of the IEEE 802.1AS component.

**Format**            `show dot1as summary`

**Mode**             • Privileged EXEC  
• User EXEC

| Parameter                         | Description                                                               |
|-----------------------------------|---------------------------------------------------------------------------|
| 802.1AS Global Admin Mode         | Configured value of IEEE 802.1AS global admin mode.                       |
| Grandmaster Present               | Indicates where a IEEE 802.1AS grandmaster is present or not.             |
| Best Clock Identity               | Specifies the clock identity of the IEEE 802.1AS grandmaster.             |
| Best Clock Priority1              | Specifies the priority1 value of IEEE 802.1AS grandmaster.                |
| Best Clock Priority2              | Specifies the priority2 value of IEEE 802.1AS grandmaster.                |
| Steps to Best Clock               | Specifies the number of hops between the local clock and the grandmaster. |
| Local Clock Identity              | Specifies the clock identity of the local clock.                          |
| Local Clock Priority1             | Specifies the priority1 value of IEEE 802.1AS local clock.                |
| Local Clock Priority2             | Specifies the priority2 value of local clock.                             |
| Grandmaster Change Count          | Specifies the number of GM change events occurred.                        |
| Last Grandmaster Change Timestamp | Specifies the timestamp of the last GM change event.                      |

**Example:** The following shows example CLI display output for the command.

```
#show dot1as summary
```

```
802.1AS Global Admin Mode..... Enabled
Grandmaster Present..... TRUE
Best Clock Identity..... 02:10:18:FF:FE:57:80:10
Best Clock Priority1..... 127
Best Clock Priority2..... 255
Steps to Best Clock..... 1
Local Clock Identity..... 00:10:18:FF:FE:82:11:DB
Local Clock Priority1..... 246
Local Clock Priority2..... 248
Grandmaster Change Count..... 5
Last Grandmaster Change Timestamp..... 2819202563
```

### 4.9.13 show dot1as interface

Use the `show dot1as interface` command in Privileged EXEC or User EXEC mode to display the IEEE 802.1AS interface status.

**Format**            `show dot1as interface {slot/port | summary}`

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                     | Description                                                                                                                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intf                          | slot/port                                                                                                                                                                                                                      |
| Mode                          | IEEE 802.1AS interface admin mode (enabled/disabled).                                                                                                                                                                          |
| asCapable                     | Indicates whether interface is asCapable.                                                                                                                                                                                      |
| MeasuringPdelay               | Indicates whether interface is measuring PDELAY.                                                                                                                                                                               |
| Pdelay                        | Indicates the value of the propagation delay on this interface.                                                                                                                                                                |
| Role                          | Indicates one of the IEEE 802.1AS port roles (MASTER, SLAVE, PASSIVE, DISABLED).                                                                                                                                               |
| Pdelay Threshold              | Specifies the propagation delay threshold in nanoseconds, above which an interface is not considered capable of participating in the IEEE 802.1AS protocol.                                                                    |
| Pdelay Lost Responses Allowed | Specifies the number of Pdelay_Req messages for which a valid response is not received, above which a port is considered to not be exchanging peer delay messages with its neighbor.                                           |
| Neighbor Rate Ratio           | Specifies an estimate of the ratio of the frequency of the LocalClock entity of the time-aware system at the other end of the link attached to this port, to the frequency of the LocalClock entity of this time-aware system. |
| Initial Pdelay Interval       | Specifies the configured mean time interval between successive PDELAY_REQ messages sent over a link, in logarithm to base 2 format.                                                                                            |
| Initial Announce Interval     | Specifies the configured mean time interval between successive ANNOUNCE messages in logarithm to base 2 format.                                                                                                                |
| Initial Sync Interval         | Specifies the configured mean time interval between successive SYNC messages, in logarithm to base 2 format.                                                                                                                   |
| Current Pdelay Interval       | Specifies the current mean time interval between successive PDELAY_REQ messages sent over a link, in logarithm to base 2 format.                                                                                               |
| Current Announce Interval     | Specifies the current mean time interval between successive ANNOUNCE messages in logarithm to base 2 format.                                                                                                                   |
| Current Sync Interval         | Specifies the current mean time interval between successive SYNC messages, in logarithm to base 2 format.                                                                                                                      |
| Sync Timeout                  | Specifies the number of SYNC intervals that have to pass without receipt of SYNC information, before considering that the master is no longer transmitting.                                                                    |
| Announce Timeout              | Specifies the number of ANNOUNCE intervals that have to pass without receipt of ANNOUNCE PDU, before considering that the master is no longer transmitting.                                                                    |

**Example:** The following shows example CLI display output for the command.

```
#show dot1as interface summary
```

```
Intf Mode asCapable measuringPdelay Pdelay Role
----- -
0/1 Enabled No No 0 Disabled
0/2 Enabled Yes Yes 811 Master
0/3 Enabled No No 0 Disabled
0/4 Enabled Yes Yes 806 Master
0/5 Enabled No No 0 Disabled
```

```
#show dot1as interface 0/1
```

```
802.1AS Interface Admin Mode..... Enabled
802.1AS Capable..... No
```

```

Is Measuring Delay..... No
Propagation Delay..... 0
Port Role..... Disabled
PDELAY Threshold..... 2500
PDELAY lost responses allowed..... 3
Neighbor Rate Ratio..... 0
Initial Sync Interval..... -5
Initial Pdelay Interval..... 3
Initial Announce Interval..... 5
Current Sync Interval..... 0
Current Pdelay Interval..... 0
Current Announce Interval..... 0
Sync Receipt Timeout..... 3
Announce Receipt Timeout..... 3

```

#### 4.9.14 show dot1as statistics

Use the `show dot1as statistics` command in Privileged EXEC or User EXEC mode to display the IEEE 802.1AS interface statistics.

**Format**            `show dot1as statistics slot/port`

**Mode**            • Privileged EXEC

                  • User EXEC

**Example:** The following shows example CLI display output for the command.

```

#show dot1as statistics 0/3

Port..... 0/3
Sync messages transmitted..... 0
Sync messages received..... 0
Followup messages transmitted..... 0
Followup messages received..... 0
Announce messages transmitted..... 0
Announce messages received..... 0
Pdelay_Req messages transmitted..... 0
Pdelay_Req messages received..... 0
Pdelay_Resp messages transmitted..... 0
Pdelay_Resp messages received..... 0
Pdelay_Resp_Followup messages transmitted..... 0
Pdelay_Resp_Followup messages received..... 0
Signaling messages transmitted..... 0
Signaling messages received..... 0
Sync receipt timeouts..... 0
Sync messages discarded..... 0
Announce receipt timeouts..... 0
Announces messages discarded..... 0
Pdelay receipt timeouts..... 0
Pdelay messages discards..... 0
PTP message discards..... 0
Pdelay allowed lost responses..... 0
Invalid 802.1AS messages received..... 0

```



## 4.10 Provisioning (IEEE 802.1p) Commands

This section describes the commands you use to configure provisioning (IEEE 802.1p) which allows you to prioritize ports.

### 4.10.1 `vlan port priority all`

This command configures the port priority assigned for untagged packets for all ports presently plugged into the device. The range for the priority is 0 to 7. Any subsequent per port configuration will override this configuration setting.

**Format** `vlan port priority all priority`  
**Mode** Global Config

### 4.10.2 `vlan priority`

This command configures the default IEEE 802.1p port priority assigned for untagged packets for a specific interface. The range for the priority is 0 to 7.

**Default** 0  
**Format** `vlan priority priority`  
**Mode** Interface Config

## 4.11 Asymmetric Flow Control

### NOTICE

- Asymmetric Flow Control can only be configured globally for all ports on XGS® IV silicon-based switches.
- Asymmetric Flow Control is not supported on Fast Ethernet platforms.
- If Asymmetric Flow Control is not supported on the platform, then only symmetric, or no flow control, modes are configurable.

When in asymmetric flow control mode, the switch responds to PAUSE frames received from a peer by stopping packet transmission, but the switch does not initiate MAC control PAUSE frames.

When you configure the switch in asymmetric flow control (or no flow control mode), the device is placed in egress drop mode. Egress drop mode maximizes the throughput of the system at the expense of packet loss in a heavily congested system, and this mode avoids head-of-line blocking.

### 4.11.1 `flowcontrol {symmetric|asymmetric}`

### NOTICE

The `flowcontrol {symmetric|asymmetric}` command is available if the platform supports the asymmetric flow control feature.

Use this command to enable or disable the symmetric or asymmetric flow control on the switch. Asymmetric here means that Tx Pause can never be enabled. Only Rx Pause can be enabled.

**Default** Flow control is disabled.  
**Format** `flowcontrol {symmetric|asymmetric}`  
**Mode** Global Config

#### 4.11.1.1 `no flowcontrol {symmetric|asymmetric}`

Use the `no` form of this command to disable symmetric or asymmetric flow control.

**Format** `no flowcontrol {symmetric|asymmetric}`  
**Mode** Global Config

## 4.11.2 flowcontrol

### NOTICE

This flowcontrol command is available if the platform supports only the symmetric flow control feature.

Use this command to enable or disable the symmetric flow control on the switch.

**Default** Flow control is disabled.  
**Format** flowcontrol  
**Mode** Global Config

### 4.11.2.1 no flowcontrol

Use the no form of this command to disable the symmetric flow control.

**Format** no flowcontrol  
**Mode** Global Config

## 4.11.3 show flowcontrol

Use this command to display the IEEE 802.3 Annex 31B flow control settings and status for a specific interface or all interfaces. The command also displays IEEE 802.3 Tx and Rx pause counts. Priority Flow Control frames counts are not displayed. If the port is enabled for priority flow control, operational flow control status is displayed as *Inactive*. Operational flow control status for stacking ports is always displayed as *N/A*.

**Format** show flowcontrol [*sSlot/port*]  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching)#show flowcontrol
```

```
Admin Flow Control: Symmetric
```

| Port | Flow Control<br>Oper | RxPause | TxPause |
|------|----------------------|---------|---------|
| 0/1  | Active               | 310     | 611     |
| 0/2  | Inactive             | 0       | 0       |

**Example:** The following shows example CLI display output for the command.

```
(Switching)#show flowcontrol interface 0/1
```

```
Admin Flow Control: Symmetric
```

| Port | Flow Control<br>Oper | RxPause | TxPause |
|------|----------------------|---------|---------|
| 0/1  | Active               | 310     | 611     |

## 4.12 Protected Ports Commands

This section describes commands you use to configure and view protected ports on a switch. Protected ports do not forward traffic to each other, even if they are on the same VLAN. However, protected ports can forward traffic to all unprotected ports in their group. Unprotected ports can forward traffic to both protected and unprotected ports. Ports are unprotected by default.

If an interface is configured as a protected port, and you add that interface to a Port Channel or Link Aggregation Group (LAG), the protected port status becomes operationally disabled on the interface, and the interface follows the configuration of the LAG port. However, the protected port configuration for the interface remains unchanged. Once the interface is no longer a member of a LAG, the current configuration for that interface automatically becomes effective.

### 4.12.1 switchport protected (Global Config)

Use this command to create a protected port group. The *groupid* parameter identifies the set of protected ports. Use the *name name* pair to assign a name to the protected port group. The name can be up to 32 alphanumeric characters long, including blanks. The default is blank.

---

#### NOTICE

Port protection occurs within a single switch. Protected port configuration does not affect traffic between ports on two different switches. No traffic forwarding is possible between two protected ports.

---

|                |                                                      |
|----------------|------------------------------------------------------|
| <b>Default</b> | unprotected                                          |
| <b>Format</b>  | switchport protected <i>groupid</i> name <i>name</i> |
| <b>Mode</b>    | Global Config                                        |

#### 4.12.1.1 no switchport protected (Global Config)

Use this command to remove a protected port group. The *groupid* parameter identifies the set of protected ports. The *name* keyword specifies the name to remove from the group.

|               |                                             |
|---------------|---------------------------------------------|
| <b>Format</b> | no switchport protected <i>groupid</i> name |
| <b>Mode</b>   | Global Config                               |

### 4.12.2 switchport protected (Interface Config)

Use this command to add an interface to a protected port group. The *groupid* parameter identifies the set of protected ports to which this interface is assigned. You can only configure an interface as protected in one group.

---

#### NOTICE

Port protection occurs within a single switch. Protected port configuration does not affect traffic between ports on two different switches. No traffic forwarding is possible between two protected ports.

---

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | unprotected                         |
| <b>Format</b>  | switchport protected <i>groupid</i> |
| <b>Mode</b>    | Interface Config                    |

#### 4.12.2.1 no switchport protected (Interface Config)

Use this command to configure a port as unprotected. The *groupid* parameter identifies the set of protected ports to which this interface is assigned.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | no switchport protected <i>groupid</i> |
| <b>Mode</b>   | Interface Config                       |

### 4.12.3 show switchport protected

This command displays the status of all the interfaces, including protected and unprotected interfaces.

- Format**            `show switchport protected groupid`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter              | Description                                                                                                                                                               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Group ID               | The number that identifies the protected port group.                                                                                                                      |
| Name                   | An optional name of the protected port group. The name can be up to 32 alphanumeric characters long, including blanks. The default is blank.                              |
| List of Physical Ports | List of ports, that are configured as protected for the group identified with <i>groupid</i> . If no port is configured as protected for this group, this field is blank. |

### 4.12.4 show interfaces switchport

This command displays the status of the interface (protected/unprotected) under the *groupid*.

- Format**            `show interfaces switchport slot/port groupid`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter | Description                                                                                                                                                            |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name      | A string associated with this group as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. This field is optional. |
| Protected | Indicates whether the interface is protected or not. It shows TRUE or FALSE. If the group is a multiple groups then it shows TRUE in Group <i>groupid</i> .            |

## 4.13 GARP Commands

This section describes the commands you use to configure Generic Attribute Registration Protocol (GARP) and view GARP status. The commands in this section affect both GARP VLAN Registration Protocol (GVRP) and GARP Multicast Registration Protocol (GMRP). GARP is a protocol that allows client stations to register with the switch for membership in VLANs (by using GVMP) or multicast groups (by using GVMMP).

### 4.13.1 set garp timer join

This command sets the GVRP join time per GARP for one interface, a range of interfaces, or all interfaces. Join time is the interval between the transmission of GARP Protocol Data Units (PDUs) registering (or reregistering) membership for a VLAN or multicast group. This command has an effect only when GVRP is enabled. The time is from 10 to 100 (centiseconds). The value 20 centiseconds is 0.2 seconds.

- Default**            20
- Format**            `set garp timer join 10-100`
- Mode**
- Interface Config
  - Global Config

#### 4.13.1.1 no set garp timer join

This command sets the GVRP join time to the default and only has an effect when GVRP is enabled.

- Format**            `no set garp timer join`
- Mode**
- Interface Config
  - Global Config

## 4.13.2 set garp timer leave

This command sets the GVRP leave time for one interface, a range of interfaces, or all interfaces or all ports and only has an effect when GVRP is enabled. Leave time is the time to wait after receiving an unregister request for a VLAN or a multicast group before deleting the VLAN entry. This can be considered a buffer time for another station to assert registration for the same attribute to maintain uninterrupted service. The leave time is 20 to 600 (centiseconds). The value 60 centiseconds is 0.6 seconds. The leave time must be greater than or equal to three times the join time.

|                |                                                                                           |
|----------------|-------------------------------------------------------------------------------------------|
| <b>Default</b> | 60                                                                                        |
| <b>Format</b>  | set garp timer leave 20-600                                                               |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>Interface Config</li> <li>Global Config</li> </ul> |

### 4.13.2.1 no set garp timer leave

This command sets the GVRP leave time on all ports or a single port to the default and only has an effect when GVRP is enabled.

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| <b>Format</b> | no set garp timer leave                                                                   |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Interface Config</li> <li>Global Config</li> </ul> |

## 4.13.3 set garp timer leaveall

This command sets how frequently Leave All PDUs are generated. A Leave All PDU indicates that all registrations will be unregistered. Participants would need to rejoin to maintain registration. The value applies per port and per GARP participation. The time may range from 200 to 6000 (centiseconds). The value 1000 centiseconds is 10 seconds. You can use this command on all ports (Global Config mode), or on a single port or a range of ports (Interface Config mode) and it only has an effect only when GVRP is enabled. The leave all time must be greater than the leave time.

|                |                                                                                           |
|----------------|-------------------------------------------------------------------------------------------|
| <b>Default</b> | 1000                                                                                      |
| <b>Format</b>  | set garp timer leaveall 200-6000                                                          |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>Interface Config</li> <li>Global Config</li> </ul> |

### 4.13.3.1 no set garp timer leaveall

This command sets how frequently Leave All PDUs are generated the default and only has an effect when GVRP is enabled.

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| <b>Format</b> | no set garp timer leaveall                                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Interface Config</li> <li>Global Config</li> </ul> |

## 4.13.4 show garp

This command displays GARP information.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | show garp                                                                            |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>Privileged EXEC</li> <li>User EXEC</li> </ul> |

| Parameter       | Description                                                                            |
|-----------------|----------------------------------------------------------------------------------------|
| GMRP Admin Mode | The administrative mode of GARP Multicast Registration Protocol (GMRP) for the system. |
| GVRP Admin Mode | The administrative mode of GARP VLAN Registration Protocol (GVRP) for the system.      |

## 4.14 GVRP Commands

This section describes the commands you use to configure and view GARP VLAN Registration Protocol (GVRP) information. GVRP-enabled switches exchange VLAN configuration information, which allows GVRP to provide dynamic VLAN creation on trunk ports and automatic VLAN pruning.

---

If GVRP is disabled, the system does not forward GVRP messages.

---

### NOTICE

#### 4.14.1 set gvrp adminmode

This command enables GVRP on the system.

|                |                    |
|----------------|--------------------|
| <b>Default</b> | disabled           |
| <b>Format</b>  | set gvrp adminmode |
| <b>Mode</b>    | Privileged EXEC    |

##### 4.14.1.1 no set gvrp adminmode

This command disables GVRP.

|               |                       |
|---------------|-----------------------|
| <b>Format</b> | no set gvrp adminmode |
| <b>Mode</b>   | Privileged EXEC       |

#### 4.14.2 set gvrp interfacemode

This command enables GVRP on a single port (Interface Config mode), a range of ports (Interface Range mode), or all ports (Global Config mode).

|                |                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                 |
| <b>Format</b>  | set gvrp interfacemode                                                                                                   |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Interface Config</li> <li>• Interface Range</li> <li>• Global Config</li> </ul> |

##### 4.14.2.1 no set gvrp interfacemode

This command disables GVRP on a single port (Interface Config mode) or all ports (Global Config mode). If GVRP is disabled, Join Time, Leave Time and Leave All Time have no effect.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | no set gvrp interfacemode                                                                     |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Interface Config</li> <li>• Global Config</li> </ul> |

#### 4.14.3 show gvrp configuration

This command displays Generic Attributes Registration Protocol (GARP) information for one or all interfaces.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| <b>Format</b> | show gvrp configuration {slot/port   all}                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Privileged EXEC</li> <li>• User EXEC</li> </ul> |

| Parameter | Description |
|-----------|-------------|
| Interface | slot/port   |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Join Timer     | The interval between the transmission of GARP PDUs registering (or reregistering) membership for an attribute. Current attributes are a VLAN or multicast group. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 10 to 100 centiseconds (0.1 to 1.0 seconds). The factory default is 20 centiseconds (0.2 seconds). The finest granularity of specification is one centisecond (0.01 seconds).                                                                             |
| Leave Timer    | The period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0 seconds). The factory default is 60 centiseconds (0.6 seconds).            |
| LeaveAll Timer | This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin to maintain registration. There is an instance of this timer on a per-Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is 1000 centiseconds (10 seconds). |
| Port GMRP Mode | The GMRP administrative mode for the port, which is enabled or disabled (default). If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect.                                                                                                                                                                                                                                                                                                                                                      |

## 4.15 GMRP Commands

This section describes the commands you use to configure and view GARP Multicast Registration Protocol (GMRP) information. Like IGMP snooping, GMRP helps control the flooding of multicast packets. GMRP-enabled switches dynamically register and de-register group membership information with the MAC networking devices attached to the same segment. GMRP also allows group membership information to propagate across all networking devices in the bridged LAN that support Extended Filtering Services.

---

If GMRP is disabled, the system does not forward GMRP messages.

### NOTICE

### 4.15.1 set gmrp adminmode

This command enables GARP Multicast Registration Protocol (GMRP) on the system.

**Default** disabled  
**Format** set gmrp adminmode  
**Mode** Privileged EXEC

#### 4.15.1.1 no set gmrp adminmode

This command disables GARP Multicast Registration Protocol (GMRP) on the system.

**Format** no set gmrp adminmode  
**Mode** Privileged EXEC

### 4.15.2 set gmrp interfacemode

This command enables GARP Multicast Registration Protocol on a single interface (Interface Config mode), a range of interfaces, or all interfaces (Global Config mode). If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), GARP functionality is disabled on that interface. GARP functionality is subsequently reenabled if routing is disabled and port-channel (LAG) membership is removed from an interface that has GARP enabled.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                      |
| <b>Format</b>  | set gmrp interfacemode                                                                        |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Interface Config</li> <li>• Global Config</li> </ul> |

#### 4.15.2.1 no set gmrp interfacemode

This command disables GARP Multicast Registration Protocol on a single interface or all interfaces. If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), GARP functionality is disabled. GARP functionality is subsequently reenabled if routing is disabled and port-channel (LAG) membership is removed from an interface that has GARP enabled.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | no set gmrp interfacemode                                                                     |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Interface Config</li> <li>• Global Config</li> </ul> |

#### 4.15.3 show gmrp configuration

This command displays Generic Attributes Registration Protocol (GARP) information for one or all interfaces.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| <b>Format</b> | show gmrp configuration { <i>slot/port</i>   all}                                        |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Privileged EXEC</li> <li>• User EXEC</li> </ul> |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface      | The <i>slot/port</i> of the interface that this row in the table describes.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Join Timer     | The interval between the transmission of GARP PDUs registering (or reregistering) membership for an attribute. Current attributes are a VLAN or multicast group. There is an instance of this timer on a per-port, per-GARP participant basis. Permissible values are 10 to 100 centiseconds (0.1 to 1.0 seconds). The factory default is 20 centiseconds (0.2 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).                                                                               |
| Leave Timer    | The period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0 seconds). The factory default is 60 centiseconds (0.6 seconds).            |
| LeaveAll Timer | This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin to maintain registration. There is an instance of this timer on a per-Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is 1000 centiseconds (10 seconds). |
| Port GMRP Mode | The GMRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect.                                                                                                                                                                                                                                                                                                                                                               |

#### 4.15.4 show mac-address-table gmrp

This command displays the GMRP entries in the Multicast Forwarding Database (MFDB) table.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | show mac-address-table gmrp |
| <b>Mode</b>   | Privileged EXEC             |



| Parameter   | Description                                                                                                                                                                                        |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID     | The VLAN in which the MAC Address is learned.                                                                                                                                                      |
| MAC Address | A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Type        | The type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.                         |
| Description | The text description of this multicast table entry.                                                                                                                                                |
| Interfaces  | The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).                                                                                                             |

## 4.16 Port-Based Network Access Control Commands

This section describes the commands you use to configure port-based network access control (IEEE 802.1X and Authentication Manager). Port-based network access control allows you to permit access to network services only to and devices that are authorized and authenticated.

Starting with FASTPATH release 8.4.2, the IEEE 802.1X version has been upgraded from the 2004 standard to the 2010 standard. The authenticator and supplicant PACP state machines now comply with the 2010 standard.

Due to this migration, several IEEE 802.1X (dot1x) commands have been deprecated. For information about the deprecated commands, see [Section : "Deprecated IEEE 802.1X Commands"](#)

### 4.16.1 aaa authentication dot1x default

Use this command to configure the authentication method for port-based access to the switch. The possible methods are as follows:

- `ias`. Uses the internal authentication server users database for authentication. This method can be used with any one of the existing methods like `local`, `radius`, and so on.
- `local`. Uses the local username database for authentication.
- `none`. Uses no authentication.
- `radius`. Uses the list of all RADIUS servers for authentication.

**Format**            `aaa authentication dot1x default {[ias | local | none | radius]}`

**Mode**             Global Config

**Example:** The following is an example of the command.

```
(Routing) #configure
(Routing) (Config)#aaa authentication dot1x default local
```

### 4.16.2 clear dot1x statistics

This command resets the IEEE 802.1X statistics for the specified port or for all ports.

**Format**            `clear dot1x statistics {slot/port | all}`

**Mode**             Privileged EXEC

### 4.16.3 clear radius statistics

This command is used to clear all RADIUS statistics.

**Format**            `clear radius statistics`

**Mode**             Privileged EXEC

### 4.16.4 dot1x eapolflood

Use this command to enable EAPOL flood support on the switch.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | dot1x eapolflood |
| <b>Mode</b>    | Global Config    |

#### 4.16.4.1 no dot1x eapolflood

This command disables EAPOL flooding on the switch.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | no dot1x eapolflood |
| <b>Mode</b>   | Global Config       |

#### 4.16.5 authentication dynamic-vlan enable

Use this command to enable the switch to create VLANs dynamically when a RADIUS-assigned VLAN does not exist in the switch.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | Disabled                           |
| <b>Format</b>  | authentication dynamic-vlan enable |
| <b>Mode</b>    | Global Config                      |

#### 4.16.5.1 no authentication dynamic-vlan enable

Use this command to prevent the switch from creating VLANs when a RADIUS-assigned VLAN does not exist in the switch.

|               |                                       |
|---------------|---------------------------------------|
| <b>Format</b> | no authentication dynamic-vlan enable |
| <b>Mode</b>   | Global Config                         |

#### 4.16.6 authentication event no-response action authorize vlan

This command configures the specified VLAN as the guest VLAN on an interface or a range of interfaces. The range is 1 to the maximum VLAN ID supported by the platform. By default, the guest VLAN is 0, which means it is invalid and is not operational.

|                |                                                                       |
|----------------|-----------------------------------------------------------------------|
| <b>Default</b> | disabled                                                              |
| <b>Format</b>  | authentication event no-response action authorize vlan <i>vlan-id</i> |
| <b>Mode</b>    | Interface Config                                                      |

#### 4.16.6.1 no authentication event no-response action authorize vlan

This command disables Guest VLAN on the interface.

|                |                                                           |
|----------------|-----------------------------------------------------------|
| <b>Default</b> | disabled                                                  |
| <b>Format</b>  | no authentication event no-response action authorize vlan |
| <b>Mode</b>    | Interface Config                                          |

#### 4.16.7 authentication event fail action authorize vlan

Use this command to configure the unauthenticated VLAN associated with the specified interface or range of interfaces. This VLAN is used when the AAA server fails to recognize the client credentials and rejects the authentication attempt. The unauthenticated VLAN ID can be a valid VLAN ID from 0-Maximum supported VLAN ID (4093 for FASTPATH). By default, the unauthenticated VLAN is 0, that is, invalid and not operational.

**Default** 0  
**Format** authentication event fail action authorize vlan *vlan id*  
**Mode** Interface Config

#### 4.16.7.1 no authentication event fail action authorize vlan

This command resets the unauthenticated VLAN associated with the port to its default value.

**Format** no authentication event fail action authorize vlan  
**Mode** Interface Config

#### 4.16.8 authentication event fail retry

Use this command to configure the number of times authentication may be reattempted by the client before a port moves to the authentication fail VLAN. The reattempts range is 1 to 5.

**Default** 3  
**Format** authentication event fail retry *max-attempts*  
**Mode** Interface Config

#### 4.16.8.1 no authentication event fail retry

Use this command to disable the authentication reattempts by the client.

**Format** no authentication event fail retry  
**Mode** Interface Config

#### 4.16.9 clear authentication sessions

This command clears information for all authentication manager sessions. All the authenticated clients are re-initialized and forced to authenticate again.

**Format** clear authentication sessions  
**Mode** Privileged EXEC

#### 4.16.10 dot1x max-reauth-req

This command sets the maximum number of times (attempts), the authenticator state machine on this port will retransmit EAPOL EAP Request-Identity frames before timing out the supplicant. The *count* value range is 1 to 20.

**Default** 2  
**Format** dot1x max-reauth-req *count*  
**Mode** Interface Config

#### 4.16.10.1 no dot1x max-reauth-req

This command resets maximum number of retries allowed per port to its default value.

**Format** no dot1x max-reauth-req  
**Mode** Interface Config

### 4.16.11 dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will retransmit EAPOL EAP Request frames (excluding Request-Identity frames) before restarting the authentication process. The count value ranges from 1 to 10.

**Default** 2  
**Format** dot1x max-req *count*  
**Mode** Interface Config

#### 4.16.11.1 no dot1x max-req

This command resets maximum number of retries allowed per port to its default value.

**Format** no dot1x max-req  
**Mode** Interface Config

### 4.16.12 authentication max-users

Use this command to set the maximum number of clients supported on an interface or range of interfaces when multi-authentication host mode is enabled on the port. The maximum users supported per port is dependent on the product. The *count* value is in the range 1 to 48.

**Default** 48  
**Format** authentication max-users *count*  
**Mode** Interface Config

#### 4.16.12.1 no authentication max-users

This command resets the maximum number of clients allowed per port to its default value.

**Format** no authentication max-users  
**Mode** Interface Config

### 4.16.13 authentication periodic

This command enables periodic reauthentication of the supplicant for the specified interface or range of interfaces.

**Default** Disabled  
**Format** authentication periodic  
**Mode** Interface Config

#### 4.16.13.1 no authentication periodic

This command resets the periodic reauthentication to the default.

**Format** no authentication periodic  
**Mode** Interface Config

#### 4.16.14 authentication port-control

This command sets the authentication mode to be used on the specified interface or range of interfaces. The configuration on the interface takes precedence over the global configuration of this parameter.

Use the `force-unauthorized` parameter to specify that the authenticator PAE unconditionally sets the controlled port to unauthorized. Use the `force-authorized` parameter to specify that the authenticator PAE unconditionally sets the controlled port to authorized. Use the `auto` parameter to specify that the authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

**Default** auto  
**Format** authentication port-control {force-unauthorized | force-authorized | auto }  
**Mode** Interface Config

##### 4.16.14.1 no authentication port-control

This command sets the authentication-enabled port control mode on the specified port to the default value.

**Format** no authentication port-control  
**Mode** Interface Config

#### 4.16.15 authentication port-control all

This command configures the global authentication port-control mode. The interface port-control mode takes precedence over the global port-control mode.

Select `force-unauthorized` to specify that the authenticator PAE unconditionally sets the controlled port to unauthorized. Select `force-authorized` to specify that the authenticator PAE unconditionally sets the controlled port to authorized. Select `auto` to specify that the authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

**Default** auto  
**Format** authentication port-control all {force-unauthorized | force-authorized | auto }  
**Mode** Global Config

##### 4.16.15.1 no authentication port-control all

This command sets the authentication mode on all ports to the default value.

**Format** no authentication port-control all  
**Mode** Global Config

#### 4.16.16 authentication host-mode

This command configures the host mode of a port. The configuration on the interface mode takes precedence over the global configuration of this parameter.

**Default** multi-host  
**Format** authentication host-mode { multi-auth | multi-domain | multi-host | single-host | multi-domain-multi-host }  
**Mode** Interface Config

##### 4.16.16.1 no authentication host-mode

This command sets the host mode for the port to the default value.

**Format**           no authentication host-mode  
**Mode**             Interface Config

#### 4.16.17 authentication host-mode all

This command configures the global authentication host mode. The interface host mode takes precedence over the global host mode.

**Default**           multi-host  
**Format**           authentication host-mode all { multi-auth | multi-domain | multi-host | single-host  
                       | multi-domain-multi-host }  
**Mode**             Global Config

#### 4.16.17.1 no authentication host-mode

This command sets the host mode to the default value.

**Format**           no authentication host-mode all  
**Mode**             Global Config

#### 4.16.18 mab

This command is used to enable MAC Authentication Bypass (MAB) on an interface. MAB is a supplemental authentication mechanism that allows IEEE 802.1X unaware clients—such as printers, fax machines, and some IP phones—to authenticate to the network using the client MAC address as an identifier. However MAB can also be used to authenticate IEEE 802.1X aware clients.

This command also provides options to specify the type of authentication to be used, which can be either EAP-MD5, PAP, or CHAP. If enabled, EAP-MD5 is used by default.

**Default**           Status: Disabled  
                       If enabled, the default authentication type is EAP-MD5.  
**Format**           mab [auth-type {pap | eap-md5 | chap}]  
**Mode**             Interface Config

#### 4.16.18.1 no mab

This command disables MAC authentication bypass (MAB) on an interface and resets the authentication type to the default value.

**Format**           no mab  
**Mode**             Interface Config

#### 4.16.19 dot1x system-auth-control

Use this command to enable the dot1x authentication support on the switch and to set the FASTPATH implementation of the IEEE 802.1X feature (dot1x) to version 1. By default, the current dot1x implementation version is 0.

While disabled, the dot1x configuration is retained and can be changed, but is not activated.

**Default**           disabled  
**Format**           dot1x system-auth-control  
**Mode**             Global Config

### 4.16.19.1 no dot1x system-auth-control

This command is used to disable the dot1x authentication support on the switch.

**Format** no dot1x system-auth-control  
**Mode** Global Config

### 4.16.20 authentication monitor

Use this command to enable the authentication monitor mode on the switch. The purpose of Monitor mode is to help troubleshoot port-based authentication configuration issues without disrupting network access for hosts connected to the switch. In Monitor mode, a host is granted network access to an authentication-enabled port even if it fails the authentication process. The results of the process are logged for diagnostic purposes.

**Default** disabled  
**Format** authentication monitor  
**Mode** Global Config

#### 4.16.20.1 no authentication monitor

This command disables the authentication monitor mode on the switch.

**Format** no authentication monitor  
**Mode** Global Config

### 4.16.21 dot1x software version

This command configures the version of IEEE 802.1X software implemented on the switch. This command configures the FASTPATH implementation, and not the protocol version of IEEE 802.1X. The value of the current software version is 1, and the value of the legacy software version is 0.

This command cannot be run from the CLI. The software version is set to 1 whenever the dot1x system-auth-control command is executed.

**Default** 0  
**Format** dot1x software version { 0 | 1 }  
**Mode** N/A

### 4.16.22 dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator or supplicant state machines on an interface or range of interfaces. Depending on the token used and the value (in seconds) passed, various timeout configurable parameters are set. The following tokens are supported.

| Tokens         | Description                                                                                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| quiet-period   | The value, in seconds, of the timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. This is the period for which the authenticator state machine stays in the HELD state. |
| tx-period      | The value, in seconds, of the timer used by the authenticator state machine on this port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant.                                                                                      |
| server-timeout | The value, in seconds, of the timer used by the authenticator state machine on this port to timeout the authentication server.                                                                                                                                 |
| supp-timeout   | The value, in seconds, of the timer used by the authenticator state machine on this port to timeout the supplicant.                                                                                                                                            |
| auth-period    | The value, in seconds, of the timer used by the supplicant state machine on this port to timeout an authenticator when waiting for a response to packets other than EAPOL-Start.                                                                               |

| Tokens       | Description                                                                                                                                                                                                                                                                                              |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| start-period | The value, in seconds, of the timer used by the supplicant state machine on this port to determine the interval between two successive EAPOL-Start frames when they are being retransmitted.                                                                                                             |
| held-period  | The value, in seconds, of the timer used by the supplicant state machine on this port to determine the length of time it will wait before trying to send the authentication credentials again after a failed attempt. This is the period for which the supplicant state machine stays in the HELD state. |

- Default**
- quiet-period: 60 seconds
  - tx-period: 30 seconds
  - supp-timeout: 30 seconds
  - server-timeout: 30 seconds
  - auth-period: 30 seconds
  - start-period: 30 seconds
  - held-period: 60 seconds

**Format** dot1x timeout {quiet-period *seconds* | tx-period *seconds* | supp-timeout *seconds* | server-timeout *seconds* | auth-period *seconds* | start-period *seconds* | held-period *seconds*}

**Mode** Interface Config

#### 4.16.22.1 no dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port to the default values. Depending on the token used, the corresponding default values are set.

**Format** no dot1x timeout {quiet-period *seconds* | tx-period *seconds* | supp-timeout *seconds* | server-timeout *seconds* | auth-period *seconds* | start-period *seconds* | held-period *seconds*}

**Mode** Interface Config

#### 4.16.23 dot1x user

This command adds the specified user to the list of users with access to the specified port or all ports. The *user* parameter must be a configured user.

**Format** dot1x user *user* {*slot/port* | all}

**Mode** Global Config

#### 4.16.23.1 no dot1x user

This command removes the user from the list of users with access to the specified port or all ports.

**Format** no dot1x user *user* {*slot/port* | all}

**Mode** Global Config

#### 4.16.24 authentication event server dead action

This command configures the actions to take when all the authentication servers are dead. The command also configures the critical VLAN ID. If the VLAN ID is not specified, the port PVID is used as the critical VLAN ID.

The *reinitialize* action triggers re-authentication for all authenticated clients on the port. Supplicants on the voice VLAN, unauthenticated VLAN (authentication failed clients), and guest VLAN are not disturbed. During re-authentication if all the servers are still dead, the supplicant is authorized and placed in the critical VLAN without contacting the RADIUS server for authentication.



The `authorize` action authorizes the authenticated supplicants and assigns them to the critical VLAN. Supplicants on the RADIUS assigned VLAN, voice VLAN, unauthenticated VLAN, and guest VLAN are not disturbed. Supplicants authorized on the port PVID are reauthorized on the critical VLAN.

**Default**            Action: None  
                      VLAN: Port PVID

**Format**            `authentication event server dead action [{reinitialize | authorize}][vlan vlan-id]`

**Mode**              Interface Config

#### 4.16.24.1 no authentication event server dead action

This command configures the dead server action to none.

**Format**            `no authentication server dead action`

**Mode**              Interface Config

#### 4.16.25 authentication event server dead action authorize voice

This command enables authorization of voice devices on the critical voice VLAN when all the authentication servers are dead. The configured voice VLAN of the port, on which the voice device is connected, is used as the critical voice VLAN ID.

The connected device is identified as a voice device by the vendor-specific RADIUS attribute "device-traffic-class=voice", which is sent in the RADIUS Access-Accept message. This means that the device should have been identified and authenticated once by reachable RADIUS servers before they went dead. The critical voice VLAN feature is activated under the following conditions:

- This command is configured.
- The RADIUS servers have stopped responding (that is, are dead).
- A re-authentication of identified and authenticated voice devices occurs.

When this command is not configured, the voice device is not authorized when all RADIUS servers are dead.

**Default**            Action: None

**Format**            `authentication event server dead action authorize voice`

**Mode**              Interface Config

#### 4.16.25.1 no authentication event server dead action authorize voice

This command configures the dead server action for voice devices to none.

**Format**            `no authentication server dead action authorize voice`

**Mode**              Interface Config

#### 4.16.26 authentication event server alive action

This command configures the actions to take when one authentication server comes back alive after all were dead. The `reinitialize` action triggers the re-authentication of supplicants authenticated on the critical VLAN.

**Default**            Action: None

**Format**            `authentication event server alive action [reinitialize]`

**Mode**              Interface Config

#### 4.16.26.1 no authentication event server alive action

This command configures the alive server action to none.

**Format**            `no authentication server alive action`

**Mode**              Interface Config

## 4.16.27 authentication violation

This command is used to configure the action to be taken when a security violation occurs on a port. The authentication violation can occur when a device tries to connect to a port where maximum number of devices has been exceeded.

**Default** Restrict  
**Format** authentication violation { protect | restrict | shutdown }  
**Mode** Interface Config

### 4.16.27.1 no authentication violation

This command resets the authentication violation mode allowed per port to its default mode.

**Format** no authentication violation  
**Mode** Interface Config

## 4.16.28 mab request format attribute 1

This command sets configuration parameters that are used to format attribute1 for MAB requests to the RADIUS server. RADIUS attribute 1 is the username, which is often the client MAC address.

**Default** The group size is 2  
The separator is :  
The case is uppercase.  
**Format** mab request format attribute 1 groupsize {1 | 2 | 4 | 12} separator {- | : | .}  
[lowercase | uppercase]  
**Mode** Global Config

| Parameter             | Description                                                                                                                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| groupsize             | The number of characters included in a group.<br>In the following example, the group size is 2.<br>00:10:18:99:F2:B3<br>In the following example, the group size is 4.<br>0010:1899:F2B3             |
| separator             | The character that separates the group.<br>In the following example, the separator is - (hyphen).<br>00-10-18-99-F2-B3<br>In the following example, the separator is : (colon).<br>00:10:18:99:F2:B3 |
| lowercase   uppercase | The case of any letters in the username.<br>In the following example, the case is lowercase.<br>00:10:18:99:f2:b3<br>In the following example, the case is uppercase.<br>00:10:18:99:F2:B3           |

### 4.16.28.1 no mab request format attribute 1

This command attribute1 formats for MAB requests to the RADIUS server to the default values.

**Format** no mab request format attribute 1  
**Mode** Global Config

#### 4.16.29 authentication allow-unauth dhcp

This command configures whether DHCP packets are allowed on, from, and to unauthorized clients on the port.

|                |                                  |
|----------------|----------------------------------|
| <b>Default</b> | disabled                         |
| <b>Format</b>  | authentication allow-unauth dhcp |
| <b>Mode</b>    | Interface Config                 |

##### 4.16.29.1 no authentication allow-unauth dhcp

This sets the command to the default value, not allowing DHCP packets on, from, and to unauthorized clients on the port.

|               |                                     |
|---------------|-------------------------------------|
| <b>Format</b> | no authentication allow-unauth dhcp |
| <b>Mode</b>   | Interface Config                    |

#### 4.16.30 authentication critical recovery max-reauth

This command configures the number of supplicants that are re-authenticated per second. This configuration is for the entire system across all the supplicants on all ports. This is used to control the system and network load when the number of supplicants to be re-authenticated is large. These re-authentications can be triggered due to the configured dead or alive server reinitialize actions.

The range for *number-of-clients* is 1 to 50 clients.

|                |                                                                      |
|----------------|----------------------------------------------------------------------|
| <b>Default</b> | 10 clients                                                           |
| <b>Format</b>  | authentication critical recovery max-reauth <i>number-of-clients</i> |
| <b>Mode</b>    | Global Config                                                        |

##### 4.16.30.1 no authentication critical recovery max-reauth

This command resets the number of supplicants that are re-authenticated per second to the default value.

|               |                                                |
|---------------|------------------------------------------------|
| <b>Format</b> | no authentication critical recovery max-reauth |
| <b>Mode</b>   | Global Config                                  |

#### 4.16.31 authentication enable

This command globally enables the Authentication Manager. Interface configuration takes effect only if the Authentication Manager is enabled with this command.

|                |                       |
|----------------|-----------------------|
| <b>Default</b> | disabled              |
| <b>Format</b>  | authentication enable |
| <b>Mode</b>    | Global Config         |

##### 4.16.31.1 no authentication enable

This command disables the Authentication Manager.

|               |                          |
|---------------|--------------------------|
| <b>Format</b> | no authentication enable |
| <b>Mode</b>   | Global Config            |

#### 4.16.32 authentication open

This command configures Open Authentication mode on the port.

**Default** disabled  
**Format** authentication open  
**Mode** Interface Config

#### 4.16.32.1 no authentication open

This command disables Open Authentication mode on the port.

**Format** no authentication open  
**Mode** Interface Config

#### 4.16.33 authentication linksec policy

Use this command to apply a MACsec LinkSec security policy on an interface. The configured policy can be overridden for a client by RADIUS. This command is used only for host-to-switch MACsec.

**Default** should-secure  
**Format** authentication linksec policy <policy>  
**Mode** Interface Config

| Parameter       | Description                                                                              |
|-----------------|------------------------------------------------------------------------------------------|
| should-secure   | MKA is attempted. If it fails or times out, unsecure traffic is allowed with the client. |
| must-secure     | Only secure traffic is allowed between the switch and the client.                        |
| must-not-secure | Only unsecure traffic is allowed between the switch and the client.                      |

#### 4.16.34 no authentication linksec policy

Use the command to return the MACsec LinkSec security policy on an interface to the default.

**Format** no authentication linksec policy  
**Mode** Interface Config

#### 4.16.35 eapol announcement

Use this command to configure an unsecure announcement on a specific physical interface.

**Default** eapol announcement is disabled  
**Format** eapol announcement  
**Mode** Interface Config

#### 4.16.36 no eapol announcement

Use this command to set the eapol announcement to the default value.

**Format** no eapol announcement  
**Mode** Interface Config

#### 4.16.37 authentication control-direction

Use this command to set the authentication control direction for the traffic flow of the interface.

**Default** both  
**Format** authentication control-direction {both|in}  
**Mode** Interface Config

**Example:** The following shows an example of the command.

```
(Routing) (Interface 1/0/1)# authentication control-direction in
```

#### 4.16.38 no authentication control-direction

Use this command to set the default value for the authentication control direction on an interface.

**Format** no authentication control-direction  
**Mode** Interface Config

**Example:** The following shows an example of the command.

```
(Routing) (Interface 1/0/1)# no authentication control-direction
```

#### 4.16.39 authentication order

This command sets the order of authentication methods used on a port. The available authentication methods are Dot1x, MAB, and captive portal. Ordering sets the order of methods that the switch attempts when trying to authenticate a new device connected to a port. If one method is unsuccessful or timed out, the next method is attempted.

Each method can only be entered once. Ordering is only possible between IEEE 802.1x and MAB. Captive portal can be configured either as a stand-alone method or as the last method in the order.

**Format** authentication order {dot1x [mab [captive-portal] | captive-portal] | mab [dot1x [captive-portal]| captive-portal] | captive-portal}  
**Mode** Interface Config

#### 4.16.39.1 no authentication order

This command returns the port to the default authentication order.

**Format** no authentication order  
**Mode** Interface Config

#### 4.16.40 authentication priority

This command sets the priority for the authentication methods used on a port. The available authentication methods are Dot1x, MAB, and captive portal. The authentication priority decides if a previously authenticated client is reauthenticated with a higher-priority method when the same is received. Captive portal is always the last method in the list.

**Default** authentication order dot1x mab captive portal  
**Format** authentication priority {dot1x [mab [captive portal] | captive portal] | mab [dot1x [captive portal]| captive portal] | captive portal}  
**Mode** Interface Config

#### 4.16.40.1 no authentication priority

This command returns the port to the default order of priority for the authentication methods.

**Format** no authentication priority  
**Mode** Interface Config

#### 4.16.41 authentication timer restart

This command sets the time, in seconds, after which reauthentication starts. (The default time is 30 seconds.) The timer restarts the authentication only after all the authentication methods fail. At the expiration of this timer, authentication is reinitiated for the port.

**Format**            *authentication timer restart <10-65535>*  
**Mode**             Interface Config

##### 4.16.41.1 no authentication timer restart

This command sets the reauthentication value to the default value of 3600 seconds.

**Format**            *no authentication timer restart*  
**Mode**             Interface Config

#### 4.16.42 authentication timer reauthenticate

This command configures the period of time after which the Authenticator attempts to reauthenticate a supplicant on the port. You can specify the timeout value, in seconds, or use the `server` parameter to get the re-authentication timeout value from the server (for example, RADIUS). The `server` option specifies that the server-supplied session timeout and session termination-action are used by the Authenticator to reauthenticate a supplicant on the port. The `server` option is enabled by default. The reauthenticate seconds value range is 1 to 65535.

For reauthentication to happen after the configured or server-provided timeout, the `authentication periodic` command should have periodic reauthentication enabled (see the [authentication periodic](#) command).

**Default**            `server`  
**Format**            *authentication timer reauthenticate {seconds | server}*  
**Mode**             Interface Config

##### 4.16.42.1 no authentication timer reauthenticate

This command sets the reauthentication value to the default value.

**Format**            *no authentication timer reauthenticate*  
**Mode**             Interface Config

#### 4.16.43 clear authentication statistics

Use this command to clear the authentication statistics on an interface.

**Format**            *clear authentication statistics {slot/port} | all}*  
**Mode**             Privileged EXEC

#### 4.16.44 clear authentication authentication-history

Use this command to clear the authentication history log for an interface.

**Format**            *clear authentication authentication-history {slot/port} | all}*  
**Mode**             Privileged EXEC

## IEEE 802.1X Supplicant Commands

FASTPATH supports IEEE 802.1X ("dot1x") supplicant functionality on point-to-point ports. The administrator can configure the user name and password used in authentication and capabilities of the supplicant port.

### 4.16.45 dot1x pae

This command sets the port's dot1x role. The port can serve as a supplicant, an authenticator, or none.

**Default** authenticator  
**Format** dot1x pae {supplicant | authenticator | none}  
**Mode** Interface Config

### 4.16.46 dot1x supplicant port-control

This command sets the ports authorization state (Authorized or Unauthorized) either manually or by setting the port to auto-authorize upon startup. By default all the ports are authenticators. If the port's attribute needs to be moved from <authenticator to supplicant> or <supplicant to authenticator>, use this command.

**Default** auto  
**Format** dot1x supplicant port-control {auto | force-authorized | force\_unauthorized}  
**Mode** Interface Config

| Parameter          | Description                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| auto               | The port is in the Unauthorized state until it presents its user name and password credentials to an authenticator. If the authenticator authorizes the port, then it is placed in the Authorized state. |
| force-authorized   | Sets the authorization state of the port to Authorized, bypassing the authentication process.                                                                                                            |
| force-unauthorized | Sets the authorization state of the port to Unauthorized, bypassing the authentication process.                                                                                                          |

#### 4.16.46.1 no dot1x supplicant port-control

This command sets the port-control mode to the default, auto.

**Default** auto  
**Format** no dot1x supplicant port-control  
**Mode** Interface Config

### 4.16.47 dot1x max-start

This command configures the number of attempts that the supplicant makes (EAP start frames sent) to find the authenticator before the supplicant assumes that there is no authenticator.

**Default** 3  
**Format** dot1x max-start <1-10>  
**Mode** Interface Config

#### 4.16.47.1 no dot1x max-start

This command sets the max-start value to the default.

**Format** no dot1x max-start  
**Mode** Interface Config

#### 4.16.48 dot1x supplicant user

Use this command to configure the user credentials to be used by the supplicant state machine for authentication.

|                |                              |
|----------------|------------------------------|
| <b>Default</b> | None                         |
| <b>Format</b>  | dot1x supplicant user {user} |
| <b>Mode</b>    | Interface Config             |

#### 4.16.48.1 no dot1x supplicant user

Use this command to configure the user credentials to the default.

|               |                          |
|---------------|--------------------------|
| <b>Format</b> | no dot1x supplicant user |
| <b>Mode</b>   | Interface Config         |

### Authentication Show Commands

#### 4.16.49 show authentication

This command displays the authentication manager global information and the number of authenticated clients.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | show authentication |
| <b>Mode</b>   | Privileged EXEC     |

| Parameter                         | Description                                                                                                              |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Authentication Manager Status     | The admin status of the Authentication Manager on the switch. This is a global configuration.                            |
| Dynamic VLAN Creation Mode        | Indicates whether the switch can dynamically create a RADIUS-assigned VLAN if it does not currently exist on the switch. |
| VLAN Assignment Mode              | Indicates whether assignment of an authorized port to a RADIUS-assigned VLAN is allowed (enabled) or not (disabled).     |
| Authentication Monitor Mode       | Indicates whether the Monitor mode on the switch is enabled or disabled.                                                 |
| Critical Recovery Max ReAuth      | Indicates the number of supplicants that are re-authenticated per second.                                                |
| Number of Authenticated clients   | The total number of clients authenticated on the switch except the ones in Monitor Mode.                                 |
| Number of clients in Monitor Mode | The number clients authorized by Monitor mode on the switch.                                                             |

**Example:** The following shows example command output.

```
(dhcp-10-130-86-142) #show authentication
```

```
Authentication Manager Status..... Disabled
Dynamic Vlan Creation Mode..... Disabled
VLAN Assignment Mode..... Disabled
Authentication Monitor Mode..... Disabled
Critical Recovery Max ReAuth..... 10
```

```
Number of Authenticated clients..... 2
Number of clients in Monitor mode..... 0
```

#### 4.16.50 show authentication authentication-history

Use this command to display information about the authentication history for a specified interface.



**Format**        `show authentication authentication-history slot/port`  
**Mode**         Privileged EXEC

| Parameter   | Description                                      |
|-------------|--------------------------------------------------|
| Timestamp   | The time of the authentication.                  |
| Interface   | The interface.                                   |
| MAC-Address | The MAC address for the interface.               |
| Auth Status | The authentication and status for the interface. |
| Method      | The authentication method for the interface.     |

**Example:** The following information is shown for the interface.

```
(switch) #show authentication authentication-history 1/0/2
```

| Timestamp            | Interface | MAC-Address       | Auth Status  | Method |
|----------------------|-----------|-------------------|--------------|--------|
| May 07 2018 13:02:41 | 1/0/2     | 58:05:94:1C:00:00 | Unauthorized | 802.1X |
| May 07 2018 13:01:33 | 1/0/2     | 58:05:94:1C:00:00 | Unauthorized | 802.1X |

#### 4.16.51 show authentication clients

Use this command to display Authentication Manager information for the clients authenticated on an interface.

**Format**        `show authentication clients {all | {interface slot/port}}`  
**Mode**         Privileged EXEC

| Parameter                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                                | The interface for which authentication configuration information is being displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Mac Address                              | The MAC address of the client.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| User Name                                | The user name associated with the client.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| VLAN Assigned Reason                     | This can take one of the following values: <ul style="list-style-type: none"> <li>Default VLAN—The client has been authenticated on the port default VLAN and the authentication server is not RADIUS.</li> <li>RADIUS—RADIUS is used for authenticating the client.</li> <li>Voice VLAN—The client is identified as a Voice device.</li> <li>Critical VLAN—The client has been authenticated on the Critical VLAN.</li> <li>Unauthenticated VLAN—The client has been authenticated on the Unauthenticated VLAN.</li> <li>Guest VLAN—The client has been authenticated on the Guest VLAN.</li> <li>Monitor Mode—The client has been authenticated by Monitor mode.</li> </ul> |
| Host Mode                                | The authentication host mode configured on the interface. The possible values are multi-auth, multi-domain, multi-host, single-host and multi-domain-multi-host.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Method                                   | The method used to authenticate the client on the interface. The possible values are 802.1x, MAB, Captive Portal and None.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Control Mode                             | The configured control mode for this port. Possible values are force-unauthorized, auto and unauthorized.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Session Time                             | The amount of time the client session has been active.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Session Timeout                          | This value indicates the time for which the given session is valid. The time period in seconds is returned by the RADIUS server on authentication of the port.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Time left for Session Termination Action | This value indicates the time left for the session termination action to occur. This field is valid only when the authentication periodic parameter is configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Parameter                  | Description                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Session Termination Action | This value indicates the action to be taken once the session timeout expires. Possible values are <code>Default</code> and <code>Radius-Request</code> . If the value is <code>Default</code> , the session is terminated and client details are cleared. If the value is <code>Radius-Request</code> , then a reauthentication of the client is performed. |
| Filter ID                  | Identifies the Filter ID returned by the RADIUS server when the client was authenticated. This is a configured DiffServ policy name on the switch.                                                                                                                                                                                                          |
| ACS ACL Name               | Identifies the dynamic ACL returned by the RADIUS server when the client was authenticated. The downloadable ACL is the same as that returned by using <code>CiscoSecure-Defined-ACL-AVP</code> .                                                                                                                                                           |
| DAACL                      | Identifies the Dynamic ACL returned by the RADIUS server when the client was authenticated. The name of the DAACL includes the name of the static ACL name that was used to create the dynamic ACL.                                                                                                                                                         |
| Redirect ACL               | A static ACL sent in the RADIUS attribute <code>redirect-acl</code> . It is used to redirect matching packets to the CPU for further action.                                                                                                                                                                                                                |
| Redirect URL               | A URL sent in the RADIUS attribute <code>redirect-url</code> . It is used by the Redirect component logic to redirect matching packets to the redirect URL by using HTTP 302 response code.                                                                                                                                                                 |
| Acct Session ID            | The Accounting Session Id associated with the client session.                                                                                                                                                                                                                                                                                               |
| LinkSec Policy             | The LinkSec policy for the client.                                                                                                                                                                                                                                                                                                                          |

**Example:** The following shows example command output.

```
(Switching) #show authentication clients all
```

```
(Switching) (Interface 0/10)#show authentication clients all
```

```
Interface MAC-Address Method Host Mode Control Mode VLAN Assigned
Reason

0/16 10:8D:B6:C6:00:00 802.1X multi-host auto RADIUS Assigned
VLAN (10)
```

**Example:** The following shows example command output.

```
(switch) #show authentication clients interface 1/0/2
```

```
Mac Address..... 58:05:94:1C:00:00
User Name..... testixia
VLAN Assigned Reason..... Voice VLAN (100)
Host Mode multi-auth
Method..... 802.1X
Control Mode..... auto
Session time ... 10
Session timeout 100
Time left for Session Termination Action..... 90
Session Termination Action..... Default
Filter-Id None
ACS ACL Name..... xACSACLx-IP-FP_ACL-5ee227a2
DAACL..... None

Session Termination Action..... Default
Acct SessionId:..... testixia:200000003
LinkSec Policy..... Should Secure
```

**Example:** The following shows example command output.

```
(Switching)#show authentication clients 0/1
```

```
Interface..... 0/1
Mac Address..... 00:00:00:11:22:33
User Name..... 00:00:00:11:22:33
VLAN Assigned Reason..... RADIUS Assigned VLAN (20)
Host Mode..... multi-auth
```

```

Method..... mab
Control Mode..... auto
Session time..... 71
Session timeout..... 600
Time left for Session Termination Action..... 229
Session Termination Action..... Reauthenticate
Filter ID.....
DACL..... IP-STATIC-IN-ipacl-00000001#d
Redirect ACL.....
Redirect URL.....
Acct SessionId..... 000000112233:100000001
Linksec policy.....

```

#### 4.16.52 show authentication interface

Use this command to display authentication method information either for all interfaces or a specified port.

**Format**            `show authentication interface {all | slot/port}`

**Mode**             Privileged EXEC

The following information is displayed for each interface.

| Parameter                                   | Description                                                                                                                                                           |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Authentication Manager Status               | The admin status of Authentication on the switch. This is a global configuration.                                                                                     |
| Interface                                   | The interface for which authentication configuration information is being displayed.                                                                                  |
| Port Control Mode                           | The configured control mode for this port. Possible values are force-unauthorized   auto   unauthorized.                                                              |
| Host Mode                                   | The authentication host mode configured on the interface.                                                                                                             |
| Authentication Restart timer                | The time, in seconds, after which reauthentication starts.                                                                                                            |
| Configured method order                     | The order of authentication methods used on the interface.                                                                                                            |
| Enabled method order                        | The order of authentication methods used on the interface.                                                                                                            |
| Configured method priority                  | The priority for the authentication methods used on the interface.                                                                                                    |
| Enabled method priority                     | The priority for the authentication methods used on the interface.                                                                                                    |
| Reauthentication Period                     | The period after which all clients on the interface will be reauthenticated.                                                                                          |
| Reauthentication Enabled                    | Indicates whether reauthentication is enabled on the interface.                                                                                                       |
| Maximum Users                               | The maximum number of clients that can be authenticated on the interface if the interface is configured as multi-auth host mode.                                      |
| Guest VLAN ID                               | The VLAN id to be used to authorize clients that time out or fail authentication due to invalid credentials. This is applicable only for IEEE 802.1x unaware clients. |
| Unauthenticated VLAN ID                     | The VLAN id to be used to authorize clients that that time out or fail authentication due to invalid credentials. This is applicable only for IEEE 802.1x clients.    |
| Critical VLAN ID                            | The VLAN id to be used to authorize clients that that time out due to unreachable RADIUS servers.                                                                     |
| Authentication Violation Mode               | The action to be taken when a security violation occurs on a port.                                                                                                    |
| Authentication Server Dead action           | The action to be undertaken for data clients when all RADIUS servers are found dead.                                                                                  |
| Authentication Server Dead action for Voice | The action to be undertaken for voice clients when all RADIUS servers are found dead.                                                                                 |

| Parameter                              | Description                                                                                                   |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Authentication Server Alive action     | The action to be undertaken for data clients when a RADIUS server comes back alive after all were found dead. |
| Allowed Protocols on Unauthorized Port | The action to drop or forward the particular protocol packet from and to unauthorized clients on the port.    |
| Open Authentication                    | Indicates if Open Authentication is enabled on the interface.                                                 |
| LinkSec Policy                         | Displays the MACsec LinkSec configured on the interface.                                                      |
| Authentication Control Direction       | Displays the authentication control direction configured on the interface.                                    |

**Example:** The following example displays the output for the command.

```
(switch) #show authentication interface 1/0/1

Authentication Manager Status..... Enabled

Interface..... 1/0/1
Authentication Restart timer..... 300
Configured method order..... mab undefined undefined
Enabled method order..... mab undefined undefined
Configured method priority..... dot1x mab captive-portal
Enabled method priority..... dot1x mab undefined
Reauthentication Period (secs)..... 3600
Reauthentication Enabled..... False
Maximum Users..... 48
Guest VLAN ID..... 0
Unauthenticated VLAN ID..... 0
Critical Vlan Id..... 0
Authentication Violation Mode..... Restrict
Authentication Server Dead action..... None
Authentication Server Dead action for Voice.... None
Authentication Server Alive action..... None
Allowed protocols on unauthorized port..... dhcp
Open Authentication..... Disabled
LinkSec Policy..... Should Secure
Authentication Control Direction..... In
```

#### 4.16.53 show authentication methods

Use this command to display information about the authentication methods.

**Format** show authentication methods

**Mode** Privileged EXEC

| Parameter                 | Description                                                           |
|---------------------------|-----------------------------------------------------------------------|
| Authentication Login List | The authentication login listname.                                    |
| Method 1                  | The first method in the specified authentication login list, if any.  |
| Method 2                  | The second method in the specified authentication login list, if any. |
| Method 3                  | The third method in the specified authentication login list, if any.  |

**Example:** The following example displays the authentication configuration.

```
(switch)#show authentication methods
```

```
Login Authentication Method Lists

defaultList : local
```

```
networkList : local
```

#### Enable Authentication Method Lists

```

enableList : enable none
enableNetList : enable deny
```

```
Line Login Method List Enable Method List

Console defaultList enableList
Telnet networkList enableNetList
SSH networkList enableNetList
```

```
HTTPS :local
HTTP :local
DOT1X :
```

### 4.16.54 show authentication statistics

Use this command to display the authentication statistics for an interface.

**Format**            show authentication statistics slot/port

**Mode**             Privileged EXEC

The following information is displayed for each interface.

| Parameter                      | Description                                                                            |
|--------------------------------|----------------------------------------------------------------------------------------|
| Port                           | The port for which information is being displayed.                                     |
| 802.1X attempts                | The number of Dot1x authentication attempts for the port.                              |
| 802.1X failed attempts         | The number of failed Dot1x authentication attempts for the port.                       |
| MAB attempts                   | The number of MAB (MAC authentication bypass) authentication attempts for the port.    |
| MAB failed attempts            | The number of failed MAB authentication attempts for the port.                         |
| Captive-portal attempts        | The number of captive portal (Web authorization) authentication attempts for the port. |
| Captive-portal failed attempts | The number of failed captive portal authentication attempts for the port.              |

**Example:** The following shows example command output.

```
(Routing) #show authentication statistics 1/0/1
```

```
Port..... 1/0/1
802.1X attempts..... 0
802.1X failed attempts..... 0
Mab attempts..... 0
Mab failed attempts..... 0
Captive-portal attempts..... 0
Captive-Portal failed attempts..... 0
```

### 4.16.55 show dot1x

This command is used to show a summary of the global dot1x configuration, summary information of the dot1x configuration for a specified port or all ports, the detailed dot1x configuration for a specified port and the dot1x statistics for a specified port - depending on the tokens used.

**Format**            show dot1x [{supplicant summary {slot/port | all} | detail slot/port | statistics slot/port}]

**Mode**             Privileged EXEC

If you do not use the optional parameters *unit/slot/port*, the command displays the global configuration.

| Parameter           | Description                                                         |
|---------------------|---------------------------------------------------------------------|
| Administrative Mode | Indicates whether 8021X is enabled or disabled.                     |
| EAPOL Flood Mode    | Indicates whether the EAPOL flood support is enabled on the switch. |
| Software Version    | The version of the dot1X implementation running on the switch.      |

**Example:** The following shows example command output.

```
(switch) #show dot1x
```

```
Administrative Mode..... Enabled
EAPOL Flood Mode..... Disabled
Software Version..... 1
```

If you use the optional parameter *supplicant summary {slot/port | all}*, the dot1x supplicant authorization for the specified port or all ports are displayed.

---

MAC-based dot1x authentication support is platform-dependent.

### NOTICE

| Parameter   | Description                                                                                              |
|-------------|----------------------------------------------------------------------------------------------------------|
| Port        | The interface whose configuration is displayed.                                                          |
| Port Status | Indicates whether the port is authorized or unauthorized. Possible values are authorized   unauthorized. |

**Example:** The following shows example CLI display output for the command `show dot1x supplicant summary 1/0/1`.

```
Operating
Interface Port Status

0/1 Authorized
```

If the port is configured as an Authenticator, the optional parameter `detail slot/port` displays the detailed dot1x configuration for the specified port.

| Parameter                  | Description                                                                                                                                                                                                                                                                                                  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                       | The interface whose configuration is displayed.                                                                                                                                                                                                                                                              |
| Protocol Version           | The protocol version associated with this port. The only possible value is 1, corresponding to the first version of the dot1x specification.                                                                                                                                                                 |
| PAE Capabilities           | The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.                                                                                                                                                                                                    |
| Quiet Period               | The timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The value is expressed in seconds and will be in the range 0 and 65535. This is the period for which the authenticator state machine stays in the HELD state. |
| Transmit Period            | The timer used by the authenticator state machine on the specified port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.                                                                          |
| Supplicant Timeout         | The timer used by the authenticator state machine on this port to timeout the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.                                                                                                                                         |
| Server Timeout             | The timer used by the authenticator on this port to timeout the authentication server. The value is expressed in seconds and will be in the range of 1 and 65535.                                                                                                                                            |
| Maximum Request-Identities | The maximum number of times (attempts), the authenticator state machine on this port will retransmit an EAPOL EAP Request-Identity frames before timing out the supplicant.                                                                                                                                  |

| Parameter                  | Description                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum Requests           | The maximum number of times the authenticator state machine on this port will retransmit an EAPOL EAP Request/Identity before restarting the authentication process. |
| Key Transmission Enabled   | Indicates if the key is transmitted to the supplicant for the specified port. Possible values are True or False.                                                     |
| EAPOL Announcement Enabled | Indicates if the EAPOL announcement is transmitted for the specified port. Possible values are True or False.                                                        |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show dot1x detail 1/0/3
Port..... 1/0/3
Protocol Version..... 1
PAE Capabilities..... Authenticator
Quiet Period (secs)..... 60
Transmit Period (secs)..... 30
Supplicant Timeout (secs)..... 30
Server Timeout (secs)..... 30
Maximum Request-Identities..... 2
Maximum Requests..... 2
Key Transmission Enabled..... False
EAPOL Announcement Enabled..... False
```

If the port is configured as a Supplicant, the `show dot1x detail slot/port` command will display the following dot1x parameters

| Parameter              | Description                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                   | The interface whose statistics are displayed.                                                                                                           |
| Protocol Version       | The protocol version associated with this port. The only possible value is 1, corresponding to the first version of the dot1x specification.            |
| PAE Capabilities       | The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.                                               |
| Control Mode           | The configured control mode for this port. Possible values are force-unauthorized   auto   unauthorized.                                                |
| Supplicant PACP State  | Current state of the authenticator PACP state machine. Possible values are Initialize, Logoff, Held, Unauthenticated, Authenticating and Authenticated. |
| Maximum Start Messages | The maximum number of EAP Start messages that the supplicant will send before moving to Unauthenticated State.                                          |
| Start period           | The timer period between each EAP Start message the supplicant sends when it does not hear from the authenticator.                                      |
| Held period            | The time period the supplicant waits before it restarts authentication after an EAP failure.                                                            |
| Authentication period  | The time period the supplicant waits before it declares EAP timeout after it sends an EAP message (except EAP Start).                                   |

**Example:** The following shows example CLI display output for the command.

```
(switch) (Config)#show dot1x detail 1/0/24

Port..... 1/0/24
Protocol Version..... 1
PAE Capabilities..... Supplicant
Control Mode..... auto
Supplicant PAE State..... Authenticated

Maximum Start Messages..... 3
Start Period (secs)..... 30
Held Period (secs)..... 60
Authentication Period (secs)..... 30
```

If you use the optional parameter `statistics slot/port`, the following dot1x statistics for the specified port appear.

| Parameter                         | Description                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Port                              | The interface whose statistics are displayed.                                                                           |
| PAE Capabilities                  | The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.               |
| EAPOL Frames Received             | The number of valid EAPOL frames of any type that have been received by this authenticator.                             |
| EAPOL Frames Transmitted          | The number of EAPOL frames of any type that have been transmitted by this authenticator.                                |
| EAPOL Start Frames Received       | The number of EAPOL start frames that have been received by this authenticator.                                         |
| EAPOL Logoff Frames Received      | The number of EAPOL logoff frames that have been received by this authenticator.                                        |
| Last EAPOL Frame Version          | The protocol version number carried in the most recently received EAPOL frame.                                          |
| Last EAPOL Frame Source           | The source MAC address carried in the most recently received EAPOL frame.                                               |
| EAP Response/Id Frames Received   | The number of EAP response/identity frames that have been received by this authenticator.                               |
| EAP Response Frames Received      | The number of valid EAP response frames (other than resp/id frames) that have been received by this authenticator.      |
| EAP Request/Id Frames Transmitted | The number of EAP request/identity frames that have been transmitted by this authenticator.                             |
| EAP Request Frames Transmitted    | The number of EAP request frames (other than request/identity frames) that have been transmitted by this authenticator. |
| Invalid EAPOL Frames Received     | The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.     |
| EAP Length Error Frames Received  | The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.     |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show dot1x statistics 0/1
Port..... 0/1
EAPOL Frames Received..... 0
EAPOL Frames Transmitted..... 0
EAPOL Start Frames Transmitted..... 3
EAPOL Logoff Frames Received..... 0
EAP Resp/Id frames transmitted..... 0
EAP Response frames transmitted..... 0
EAP Req/Id frames transmitted..... 0
EAP Req frames transmitted..... 0
Invalid EAPOL frames received..... 0
EAP length error frames received..... 0
Last EAPOL Frame Version..... 0
Last EAPOL Frame Source..... 00:00:00:00:02:01
```

#### 4.16.56 show dot1x users

This command displays IEEE 802.1X port security user information for locally configured users.

**Format**            `show dot1x users slot/port`

**Mode**             Privileged EXEC

| Parameter | Description                                                    |
|-----------|----------------------------------------------------------------|
| Users     | Users configured locally to have access to the specified port. |



**Example:** The following shows example command output.

```
#show dot1x users 1/0/1
```

```
Users

admin
guest
test4
```

#### 4.16.57 show mab

This command shows a summary of the global MAB configuration and summary information about the MAB configuration for all ports. This command also provides the detailed MAB sessions for a specified port.

**Format**            show mab [interface slot/port]

**Mode**             Privileged EXEC

| Parameter                       | Description                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------|
| MAB Request Fmt Attr1 Groupsize | Displays the group size to be used by the switch for formatting RADIUS attribute 1 in MAB requests.                    |
| MAB Request Fmt Attr1 Separator | Displays the separator to be used by the switch for formatting RADIUS attribute 1 in MAB requests.                     |
| MAB Request Fmt Attr1 Case      | Displays the case (uppercase or lowercase) to be used by the switch for formatting RADIUS attribute 1 in MAB requests. |
| Interface                       | Identifies the port.                                                                                                   |
| Admin Mode                      | Indicates whether authentication control on the switch is enabled or disabled.                                         |
| Auth-type                       | The type of authentication used for a MAB-enabled port, which can be either EAP-MD5, PAP, or CHAP.                     |

**Example:** The following shows example command output.

```
(switch) #show mab
```

```
MAB Request Fmt Attr1 Groupsize... 2
MAB Request Fmt Attr1 Separator... legacy(:)
MAB Request Fmt Attr1 Case..... uppercase
```

```
Interface Admin Mode Auth-type

1/0/1 Disabled N/A
1/0/2 Enabled eap-md5
1/0/3 Disabled N/A
1/0/4 Disabled N/A
```

**Example:** The following shows example command output.

```
(switch) #show mab interface 1/0/2
```

```
Interface Admin Mode Auth-type

1/0/2 Enabled eap-md5
```

#### Deprecated IEEE 802.1X Commands

The following table lists the CLI commands that are deprecated and replaced as a result of the move from the IEEE 802.1X

2004 standard to the 2010 standard.

**Table 10: Deprecated IEEE 802.1X Commands**

| Deprecated Command                                 | Replaced By                                                                                                                                           |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>dot1x initialize</code>                      | <code>clear authentication sessions</code>                                                                                                            |
| <code>dot1x re-authenticate</code>                 |                                                                                                                                                       |
| <code>dot1x critical recovery max-reauth</code>    | <code>authentication critical recovery max-reauth</code>                                                                                              |
| <code>dot1x system-auth-control monitor</code>     | <code>authentication monitor</code>                                                                                                                   |
| <code>dot1x port-control all</code>                | <code>authentication port-control all</code>                                                                                                          |
| <code>dot1x dynamic-vlan enable</code>             | <code>authentication dynamic-vlan enable</code>                                                                                                       |
| <code>dot1x guest-vlan</code>                      | <code>authentication event no-response action authorize vlan</code>                                                                                   |
| <code>dot1x unauthenticated-vlan</code>            | <code>authentication event fail action authorize vlan</code>                                                                                          |
| <code>dot1x mac-auth-bypass</code>                 | <code>mab</code>                                                                                                                                      |
| <code>dot1x max-users</code>                       | <code>authentication max-users</code>                                                                                                                 |
| <code>dot1x re-authentication</code>               | <code>authentication periodic</code>                                                                                                                  |
| <code>dot1x timer reauth-period</code>             | <code>authentication timer reauthenticate</code>                                                                                                      |
| <code>dot1x supplicant timeout start-period</code> | <code>dot1x timer start-period</code>                                                                                                                 |
| <code>dot1x supplicant timeout auth-period</code>  | <code>dot1x timer auth-period</code>                                                                                                                  |
| <code>dot1x supplicant timeout held-period</code>  | <code>dot1x timer held-period</code>                                                                                                                  |
| <code>dot1x supplicant max-start</code>            | <code>dot1x max-start</code>                                                                                                                          |
| <code>dot1x port-control mac-based</code>          | <code>authentication enable</code><br><code>authentication port-control auto</code><br><code>authentication host-mode multi-auth</code>               |
| <code>dot1x port-control auto</code>               | <code>authentication enable</code><br><code>authentication port-control auto</code><br><code>authentication host-mode multi-domain-multi-host</code>  |
| <code>dot1x port-control force-authorized</code>   | <code>authentication enable</code><br><code>authentication port-control force-authorized</code><br><code>authentication host-mode multi-host</code>   |
| <code>dot1x port-control force-unauthorized</code> | <code>authentication enable</code><br><code>authentication port-control force-unauthorized</code><br><code>authentication host-mode multi-host</code> |
| <code>clear dot1x authentication-history</code>    | <code>clear authentication authentication-history</code>                                                                                              |
| <code>show dot1x authentication-history</code>     | <code>show authentication authentication-history</code>                                                                                               |
| <code>show dot1x clients</code>                    | <code>show authentication clients</code>                                                                                                              |

## 4.17 Microsoft Active Directory Authentication Commands

FASTPATH supports Microsoft Active Directory (MS AD) user authentication for management interfaces. MS AD provides an Lightweight Directory Access Protocol (LDAP) interface through which authentication is performed.

LDAP is defined in RFC 4511 and is a standard application protocol for accessing and maintaining distributed directory information services over the network. It is typically used to store information such as organizations, individuals, and other resources such as files and devices in a hierarchical manner. Microsoft Windows domain users and devices can be authenticated by looking up such information by using the LDAP protocol.

In FASTPATH, authentication into the Windows domain network is done using an LDAP simple bind operation and optionally over TLS. Authorization is done based on the memberOf attribute or the description attribute carrying a Cisco VSA (cisco-av-pair) configured on MS AD.

### Global Configuration Commands

#### 4.17.1 ldap-server host

This command adds a new LDAP server entry. During authentication the LDAP client (the switch) uses the configured server details to authenticate the user. In LDAP, DN is the distinguished name, which is a unique name for an entry in the directory service.

**Default** port = 389, timeout = 5 seconds, enable-ssl = false

**Format** ldap-server host { *ipv4-address* | *ipv6-address* | *host-name* } [enable-ssl] [rootDN *dnString* [password *passwd*]] [ port *tcp-port* [ timeout *seconds* ]]

**Mode** Global Config

**Example:** The following examples configure various LDAP server parameters.

```
(switch) (Config)#ldap-server host 10.130.84.11 port 389 timeout 10
(switch) (Config)#ldap-server host 10.130.84.11 rootDN cn=admin,dc=fp,dc=broadcom,dc=in password
test
(switch) (Config)#ldap-server host 10.130.84.12 enable-ssl
```

**Example:** If SSL is enabled for a server, proper root CA certificates need to be installed on the device. This can be done by using copy command with the nvram:root-ca-certs option.

```
(switch)#copy scp://jdoe@192.168.25.12/cacert.pem nvram:root-ca-certs
```

#### 4.17.1.1 no ldap-server host

This command deletes the LDAP server entry configuration or resets the SSL mode, port, and timeout to the default values.

**Format** no ldap-server host { *ipv4-address* | *ipv6-address* | *host-name* } [enable-ssl] [rootDN *dnString* [password *passwd*]] [ port *tcp-port* [ timeout *seconds* ]]

**Mode** Global Config

#### 4.17.2 ldap authentication bind-first

This command instructs the switch to bind first and then search. The default authentication method is to first search and then bind. This command is helpful if an LDAP search is not allowed without a valid authentication.

**Format** ldap authentication bind-first [ append-with-baseDN *DNstring*]

**Mode** Global Config

#### 4.17.2.1 no ldap authentication bind-first

This command resets the authentication method to the default method, which is to search first and then bind. Optionally, this command resets the append-with-baseDN string to none.

**Format** no ldap authentication bind-first [ append-with-baseDN *DNstring*]

**Mode** Global Config

### 4.17.3 ldap search-map

This command creates a search map and enters LDAP Search Map Mode. In this mode, it is possible to configure the LDAP search to send the search query to the server. The search query is used to fetch the user's privilege level or group membership information.

**Format**            `ldap search-map map-name`  
**Mode**             Global Config

#### 4.17.3.1 no ldap search-map

This command deletes search map configuration entry.

**Format**            `no ldap search-map map-name`  
**Mode**             Global Config

## LDAP Search Map Mode Config Commands

### 4.17.4 userprofile attribute-name

This command configures search map details for fetching a user privilege level. The attribute-name argument is the name of the attribute in the LDAP server that contains the privilege-level information. For example, the vendor-specific Cisco-AVPair attribute can contain `shell:priv-lvl=15`, which sets the authenticating user to privilege level 15.

**Format**            `userprofile attribute-name attribute-name search-filter filter base-DN base-DN-name`  
**Mode**             LDAP Search Map Mode Config

**Example:** The following shows an example of the command.

```
(switch) (config-ldap-search-map)#userprofile attribute-name memberOf search-filter "(cn=$userid)"
base-DN DC=broadcom,DC=net
```

### 4.17.5 no userprofile

This command deletes the user profile mapping with the LDAP search query

**Format**            `no userprofile`  
**Mode**             LDAP Search Map Mode Config

## Privileged Exec mode Config Commands

### 4.17.6 debug ldap

This command enables LDAP authentication or packet debugging.

**Format**            `debug ldap {authentication | packet}`  
**Mode**             Privileged EXEC

#### 4.17.6.1 no debug ldap authentication

This command disables LDAP authentication debugging.

**Format**            `no debug ldap {authentication | packet}`  
**Mode**             Privileged EXEC

## Show Commands

### 4.17.7 show ldap-server

This command displays LDAP server configuration information for all hosts or for the specified host.

**Format**            `show ldap-server [ip-address|ipv6-address|host-name]`  
**Mode**             Privileged EXEC

The command output includes the fields shown in the following table.

| Parameter    | Description                                       |
|--------------|---------------------------------------------------|
| Host Address | Host address of the LDAP server                   |
| SSL Enabled  | Whether SSL mode is enabled                       |
| Port         | LDAP port                                         |
| Timeout      | Timeout value for the LDAP operation, in seconds. |

**Example:** The following shows example command output.

```
(localhost) (Config)#show ldap-server
```

```
Authentication : Bind and Search
Bind and Search : append with basedn "cn=$userid,ou=users"
```

| Host address         | SSL Enabled | Port  | Timeout |
|----------------------|-------------|-------|---------|
| -----                | -----       | ----- | -----   |
| 192.168.1.1          | No          | 389   | 10 sec  |
| server1.broadcom.net | Yes         | 636   | 5 sec   |

```
(localhost) (Config)#show ldap-server 192.168.1.1
```

```
Authentication : Bind and Search
Bind and Search : append with basedn "cn=$userid,ou=users"
```

| Host address | SSL Enabled | Port  | Timeout |
|--------------|-------------|-------|---------|
| -----        | -----       | ----- | -----   |
| 192.168.1.1  | No          | 389   | 10 sec  |

### 4.17.8 show ldap-search-map

This command displays LDAP search map configuration information.

**Format**            `show ldap-search-map`  
**Mode**             Privileged EXEC

The command output includes the fields shown in the following table.

| Parameter       | Description                                    |
|-----------------|------------------------------------------------|
| Search Map Name | User-configured name of the search map.        |
| Attribute Name  | Name of the LDAP attribute.                    |
| Search Filter   | Search filter names                            |
| Base DN         | Base DN within which the search was performed. |

**Example:** The following shows example command output.

```
(localhost)#show ldap-search-map

SEARCH MAP map1:
User Profile:
BaseDN..... DC=broadcom,DC=net
Attribute Name..... Cisco-AVPair
Search Filter..... (cn=$userid)

SEARCH MAP map2:
User Profile:
BaseDN DC=broadcom,DC=net
Attribute Name..... memberOf
Search Filter..... (sAMAccountName=$userid)
```

### 4.17.9 show ldap-server statistics

This command displays LDAP server statistics for all hosts or for the specified host.

**Format**            `show ldap-server statistics[ip-address|ipv6-address|host-name]`  
**Mode**              Privileged EXEC

The command output includes the fields shown in the following table.

| Parameter                    | Description                       |
|------------------------------|-----------------------------------|
| Failed Transactions          | Number of failed transactions     |
| Successful Transactions      | Number of successful transactions |
| Number of requests sent      | Number of total requests sent     |
| Number of requests timed out | Number of requests timed out      |
| Number of requests searches  | Number of searches done           |

## 4.18 Task-Based Authorization

Task-based authorization allows users to have different permission levels (read, write, execute, debug) at a per-component level. Task-based authorization uses the concept of components/tasks to define permission for commands for a given user.

Users are assigned to User Groups that are, in turn, associated with Task Groups. Each Task Group is then associated with one or more tasks/components. This release supports the AAA and OSPF components. Also, this feature is supported only for users who are authenticated locally using the CLI interface.

### 4.18.1 usergroup

This command creates a user group with the specified name and enters user group configuration mode.

**Format**            `usergroup usergroup-name`  
**Mode**              Global Config

#### 4.18.1.1 no usergroup

This command removes the user group with the specified name.

**Format**            `no usergroup usergroup-name`  
**Mode**              Global Config

## 4.18.2 taskgroup

This command creates a task group with the specified name and enters task group configuration mode.

**Format** taskgroup *taskgroup-name*

**Mode** Global Config

### 4.18.2.1 no taskgroup

This command removes the task group with the specified name.

**Format** no taskgroup *taskgroup-name*

**Mode** Global Config

## 4.18.3 username usergroup

This command assigns the specified user to the specified user group.

**Format** username <*username*> usergroup *usergroup-name*

**Mode** Global Config

### 4.18.3.1 no username usergroup

This command removes the specified user from the specified user group.

**Format** no usergroup *usergroup-name*

**Mode** Global Config

## 4.18.4 description (User Group Mode)

This command sets a description for the user group.

**Format** description *description*

**Mode** User Group

### 4.18.4.1 no description (User Group Mode)

This command removes the description from the user group.

**Format** no description

**Mode** User Group

## 4.18.5 inherit usergroup

This command sets the parent user group of the current user group. The user group will have the permissions of the specified parent group.

**Format** inherit usergroup *usergroup-name*

**Mode** User Group

### 4.18.5.1 no inherit usergroup

This command removes the specified parent group relationship from the user group.

**Format** no inherit usergroup *usergroup-name*

**Mode** User Group

## 4.18.6 taskgroup (User Group Mode)

This command associates the user group with the specified task group.

**Format** taskgroup *taskgroup-name*

**Mode** User Group

### 4.18.6.1 no taskgroup (User Group Mode)

This command removes the user group's relationship with the associated task group.

**Format** no taskgroup *taskgroup-name*

**Mode** User Group

## 4.18.7 description (Task Group Mode)

This command sets a description for the task group.

**Format** description *description*

**Mode** Task Group

### 4.18.7.1 no description (Task Group Mode)

This command removes the description from the task group.

**Format** no description

**Mode** Task Group

## 4.18.8 inherit taskgroup

This command sets the parent task group of the current task group. The task group will have the permissions of the specified parent task group.

**Format** inherit taskgroup *taskgroup-name*

**Mode** Task Group

### 4.18.8.1 no inherit taskgroup

This command removes the specified parent group relationship from the user group.

**Format** no inherit taskgroup *taskgroup-name*

**Mode** Task Group

## 4.18.9 task [read] [write] [debug] [execute]

This command associates the task group with the specified set of task permissions.

**Default** No permissions

**Format** task [read] [write] [debug] [execute] {aaa | ospf}

**Mode** Task Group

**Example:** The following example gives all users in the task group tg1 read-only permissions for AAA and read, write, execute, and debug permissions for OSPF.

```
(Routing) #configure
(Routing) (Config)#taskgroup tg1
(Routing) (config-taskgroup)#task read aaa
```



(Routing) (config-taskgroup)#task read write execute debug ospf

#### 4.18.9.1 no task {aaa | ospf}

This command removes all relationships with the associated task.

**Format**            *no task {aaa | ospf}*

**Mode**             Task Group

#### 4.18.10 show aaa usergroup

This command displays a list of user groups and their configuration.

**Format**            show aaa usergroup [*usergroup-name*]

**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

(Routing) #show aaa usergroup group1

User group "group1"

Description : "Example"

Parent user groups: ""

Contained task groups:

task group#1: "tg1"

Operational permissions:

|           |        |       |         |       |
|-----------|--------|-------|---------|-------|
| Task: aaa | : READ | WRITE | EXECUTE | DEBUG |
|-----------|--------|-------|---------|-------|

|            |        |       |         |       |
|------------|--------|-------|---------|-------|
| Task: ospf | : READ | WRITE | EXECUTE | DEBUG |
|------------|--------|-------|---------|-------|

#### 4.18.11 show aaa taskgroup

This command displays a list of task groups and their configuration.

**Format**            show aaa taskgroup [*taskgroup-name*]

**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

(Routing) #show aaa taskgroup

Task group "default-taskgroup-name"

Description : ""

Parent taskgroups: ""

Configured permissions:

|           |        |       |         |       |
|-----------|--------|-------|---------|-------|
| Task: aaa | : READ | WRITE | EXECUTE | DEBUG |
|-----------|--------|-------|---------|-------|

|            |        |       |         |       |
|------------|--------|-------|---------|-------|
| Task: ospf | : READ | WRITE | EXECUTE | DEBUG |
|------------|--------|-------|---------|-------|

Operational permission:

|           |        |       |         |       |
|-----------|--------|-------|---------|-------|
| Task: aaa | : READ | WRITE | EXECUTE | DEBUG |
|-----------|--------|-------|---------|-------|

|            |        |       |         |       |
|------------|--------|-------|---------|-------|
| Task: ospf | : READ | WRITE | EXECUTE | DEBUG |
|------------|--------|-------|---------|-------|

Task group "task1"

Description : ""

Parent taskgroups: ""

```

Configured permissions:
Task: aaa : READ WRITE EXECUTE DEBUG
Task: ospf : READ
Operational permission:
Task: aaa : READ WRITE EXECUTE DEBUG
Task: ospf : READ

```

#### 4.18.12 show aaa userdb

This command displays a list of users and list of groups the users participate in.

```

Format show aaa userdb [username]
Mode Privileged EXEC

```

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show aaa userdb admin
```

```
User "admin"
```

```

Contained user groups:
user group#1 : "default-usergroup-name"

```

```

Operational permissions:
Task: aaa : READ WRITE EXECUTE DEBUG
Task: ospf : READ WRITE EXECUTE DEBUG

```

### 4.19 Storm-Control Commands

This section describes commands you use to configure storm-control and view storm-control configuration information. A traffic storm is a condition that occurs when incoming packets flood the LAN, which creates performance degradation in the network. The Storm-Control feature protects against this condition.

FASTPATH provides broadcast, multicast, and unicast storm recovery for individual interfaces. Unicast Storm-Control protects against traffic whose MAC addresses are not known by the system. For broadcast, multicast, and unicast storm-control, if the rate of traffic ingressing on an interface increases beyond the configured threshold for that type, the traffic is dropped.

To configure storm-control, you will enable the feature for all interfaces or for individual interfaces, and you will set the threshold (storm-control level) beyond which the broadcast, multicast, or unicast traffic will be dropped. The Storm-Control feature allows you to limit the rate of specific types of packets through the switch on a per-port, per-type, basis.

Configuring a storm-control level also enables that form of storm-control. Disabling a storm-control level (using the `no` version of the command) sets the storm-control level back to the default value and disables that form of storm-control. Using the `no` version of the storm-control command (not stating a "level") disables that form of storm-control but maintains the configured "level" (to be active the next time that form of storm-control is enabled.)

#### **NOTICE**

The actual rate of ingress traffic required to activate storm-control is based on the size of incoming packets and the hard-coded average packet size of 512 bytes—used to calculate a packet-per-second (pps) rate—as the forwarding-plane requires pps versus an absolute rate kilobits per second (Kb/s). For example, if the configured limit is 10%, this is converted to ~25000 pps, and this pps limit is set in forwarding plane (hardware). You get the approximate desired output when 512-byte packets are used.

#### 4.19.1 storm-control broadcast

Use this command to enable broadcast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If the mode is enabled, broadcast storm recovery is active and, if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of broadcast traffic will be limited to the configured threshold.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                      |
| <b>Format</b>  | <code>storm-control broadcast</code>                                                          |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.1.1 no storm-control broadcast

Use this command to disable broadcast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control broadcast</code>                                                       |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.2 storm-control broadcast action

This command configures the broadcast storm recovery action to either `shutdown` or `trap` for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If configured to `shutdown`, the interface that receives the broadcast packets at a rate above the threshold is diagnostically disabled. If set to `trap`, the interface sends trap messages approximately every 30 seconds until broadcast storm control recovers.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                          |
| <b>Format</b>  | <code>storm-control broadcast action {shutdown   trap}</code>                                 |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.2.1 no storm-control broadcast action

This command configures the broadcast storm recovery action option to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control broadcast action</code>                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.3 storm-control broadcast level

Use this command to configure the broadcast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) as a percentage of link speed and enable broadcast storm recovery. If the mode is enabled, broadcast storm recovery is active, and if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic is dropped. Therefore, the rate of broadcast traffic is limited to the configured threshold.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 5                                                                                             |
| <b>Format</b>  | <code>storm-control broadcast level 0-100</code>                                              |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.3.1 no storm-control broadcast level

This command sets the broadcast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables broadcast storm recovery.

**Format**            `no storm-control broadcast level`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.4 storm-control broadcast rate

Use this command to configure the broadcast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) in packets per second. If the mode is enabled, broadcast storm recovery is active, and if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic is dropped. Therefore, the rate of broadcast traffic is limited to the configured threshold.

**Default**            0  
**Format**            `storm-control broadcast rate 0-33554431`  
**Mode**             • Global Config  
                      • Interface Config

##### 4.19.4.1 no storm-control broadcast rate

This command sets the broadcast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables broadcast storm recovery.

**Format**            `no storm-control broadcast rate`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.5 storm-control multicast

This command enables multicast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If the mode is enabled, multicast storm recovery is active, and if the rate of L2 multicast traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of multicast traffic will be limited to the configured threshold.

**Default**            disabled  
**Format**            `storm-control multicast`  
**Mode**             • Global Config  
                      • Interface Config

##### 4.19.5.1 no storm-control multicast

This command disables multicast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

**Format**            `no storm-control multicast`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.6 storm-control multicast action

This command configures the multicast storm recovery action to either `shutdown` or `trap` for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If configured to `shutdown`, the interface that receives multicast packets at a rate above the threshold is diagnostically disabled. The option `trap` sends trap messages approximately every 30 seconds until multicast storm control recovers.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                          |
| <b>Format</b>  | <code>storm-control multicast action {shutdown   trap}</code>                                 |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.6.1 no storm-control multicast action

This command returns the multicast storm recovery action option to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control multicast action</code>                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.7 storm-control multicast level

This command configures the multicast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) as a percentage of link speed and enables multicast storm recovery mode. If the mode is enabled, multicast storm recovery is active, and if the rate of L2 multicast traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of multicast traffic will be limited to the configured threshold.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 5                                                                                             |
| <b>Format</b>  | <code>storm-control multicast level 0-100</code>                                              |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

##### 4.19.7.1 no storm-control multicast level

This command sets the multicast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables multicast storm recovery.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control multicast level 0-100</code>                                           |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.8 storm-control multicast rate

Use this command to configure the multicast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) in packets per second. If the mode is enabled, multicast storm recovery is active, and if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic is dropped. Therefore, the rate of multicast traffic is limited to the configured threshold.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                             |
| <b>Format</b>  | <code>storm-control multicast rate 0-33554431</code>                                          |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

##### 4.19.8.1 no storm-control multicast rate

This command sets the multicast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables multicast storm recovery.

**Format**            `no storm-control multicast rate`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.9 storm-control unicast

This command enables unicast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If the mode is enabled, unicast storm recovery is active, and if the rate of unknown L2 unicast (destination lookup failure) traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of unknown unicast traffic will be limited to the configured threshold.

**Default**            disabled  
**Format**            `storm-control unicast`  
**Mode**             • Global Config  
                      • Interface Config

##### 4.19.9.1 no storm-control unicast

This command disables unicast storm recovery mode for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

**Format**            `no storm-control unicast`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.10 storm-control unicast action

This command configures the unicast storm recovery action to either `shutdown` or `trap` for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode). If configured to `shutdown`, the interface that receives unicast packets at a rate above the threshold is diagnostically disabled. The option `trap` sends trap messages approximately every 30 seconds until unicast storm control recovers.

**Default**            None  
**Format**            `storm-control unicast action {shutdown | trap}`  
**Mode**             • Global Config  
                      • Interface Config

##### 4.19.10.1 no storm-control unicast action

This command returns the unicast storm recovery action option to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode).

**Format**            `no storm-control unicast action`  
**Mode**             • Global Config  
                      • Interface Config

#### 4.19.11 storm-control unicast level

This command configures the unicast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) as a percentage of link speed, and enables unicast storm recovery. If the mode is enabled, unicast storm recovery is active, and if the rate of unknown L2 unicast (destination lookup failure) traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of unknown unicast traffic will be limited to the configured threshold. This command also enables unicast storm recovery mode for an interface.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 5                                                                                             |
| <b>Format</b>  | <code>storm-control unicast level 0-100</code>                                                |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.11.1 no storm-control unicast level

This command sets the unicast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables unicast storm recovery.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control unicast level</code>                                                   |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.12 storm-control unicast rate

Use this command to configure the unicast storm recovery threshold for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) in packets per second. If the mode is enabled, unicast storm recovery is active, and if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic is dropped. Therefore, the rate of unicast traffic is limited to the configured threshold.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                             |
| <b>Format</b>  | <code>storm-control unicast rate 0-33554431</code>                                            |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.12.1 no storm-control unicast rate

This command sets the unicast storm recovery threshold to the default value for all interfaces (Global Config mode) or one or more interfaces (Interface Config mode) and disables unicast storm recovery.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no storm-control unicast rate</code>                                                    |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.19.13 show storm-control

This command displays switch configuration information. If you do not use any of the optional parameters, this command displays global storm control configuration parameters:

- `Broadcast Storm Recovery Mode` may be enabled or disabled. The factory default is disabled.
- `802.3x Flow Control Mode` may be enabled or disabled. The factory default is disabled.

Use the `all` keyword to display the per-port configuration parameters for all interfaces, or specify the `slot/port` to display information about a specific interface.

|               |                                                   |
|---------------|---------------------------------------------------|
| <b>Format</b> | <code>show storm-control [all   slot/port]</code> |
| <b>Mode</b>   | Privileged EXEC                                   |

| Parameter   | Description                                                                                             |
|-------------|---------------------------------------------------------------------------------------------------------|
| Bcast Mode  | Shows whether the broadcast storm control mode is enabled or disabled. The factory default is disabled. |
| Bcast Level | The broadcast storm control level.                                                                      |
| Mcast Mode  | Shows whether the multicast storm control mode is enabled or disabled.                                  |
| Mcast Level | The multicast storm control level.                                                                      |

| Parameter   | Description                                                                                                      |
|-------------|------------------------------------------------------------------------------------------------------------------|
| Ucast Mode  | Shows whether the Unknown Unicast or DLF (Destination Lookup Failure) storm control mode is enabled or disabled. |
| Ucast Level | The Unknown Unicast or DLF (Destination Lookup Failure) storm control level.                                     |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show storm-control
```

```
Broadcast Storm Control Mode..... Disable
Broadcast Storm Control Level..... 5 percent
Broadcast Storm Control Action..... None
Multicast Storm Control Mode..... Disable
Multicast Storm Control Level..... 5 percent
Multicast Storm Control Action..... None
Unicast Storm Control Mode..... Disable
Unicast Storm Control Level..... 5 percent
Unicast Storm Control Action..... None
```

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show storm-control 1/0/1
```

|       | Bcast<br>Intf | Bcast<br>Mode | Bcast<br>Level | Bcast<br>Action | Mcast<br>Mode | Mcast<br>Level | Mcast<br>Action | Ucast<br>Mode | Ucast<br>Level | Ucast<br>Action |
|-------|---------------|---------------|----------------|-----------------|---------------|----------------|-----------------|---------------|----------------|-----------------|
| 1/0/1 | Disable       | 5%            | None           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |

**Example:** The following shows an example of part of the CLI display output for the command.

```
(Routing) #show storm-control all
```

|        | Bcast<br>Intf | Bcast<br>Mode | Bcast<br>Level | Bcast<br>Action | Mcast<br>Mode | Mcast<br>Level | Mcast<br>Action | Ucast<br>Mode | Ucast<br>Level | Ucast<br>Action |
|--------|---------------|---------------|----------------|-----------------|---------------|----------------|-----------------|---------------|----------------|-----------------|
| 1/0/1  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/2  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/3  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/4  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/5  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/6  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/7  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/8  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/9  | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/10 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/11 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/12 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/13 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/14 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/15 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/16 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/17 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/18 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |
| 1/0/19 | Enable        | 50            | Trap           | Disable         | 5%            | None           | Disable         | 5%            | None           |                 |



## 4.20 Link Dependency Commands

The following commands configure link dependency. Link dependency allows the link status of specified ports to be dependent on the link status of other ports. Consequently, if a port that is depended on by other ports loses link, the dependent ports are administratively disabled or administratively enabled so that the dependent ports links are brought down or up respectively.

### 4.20.0.1 no link state track

This command clears link-dependency options for the selected group identifier.

**Format**            `no link state track group-id`

**Mode**             Global Config

### 4.20.1 link state group

Use this command to indicate if the downstream interfaces of the group should mirror or invert the status of the upstream interfaces. The default configuration for a group is down (that is, the downstream interfaces will mirror the upstream link status by going down when all upstream interfaces are down). The action up option causes the downstream interfaces to be up when no upstream interfaces are down.

**Default**           Down

**Format**           `link state group group-id action {up | down}`

**Mode**             Global Config

#### 4.20.1.1 no link state group

Use this command to restore the link state to down for the group.

**Format**           `no link state group group-id action`

**Mode**             Global Config

### 4.20.2 link state group downstream

Use this command to add interfaces to the downstream interface list. Adding an interface to a downstream list brings the interface down until an upstream interface is added to the group. The link status then follows the interface specified in the upstream command. To avoid bringing down interfaces, enter the upstream command prior to entering the downstream command.

**Format**           `link state group group-id downstream`

**Mode**             Interface Config

#### 4.20.2.1 no link state group downstream

Use this command to remove the selected interface from the downstream list.

**Format**           `no link state group group-id downstream`

**Mode**             Interface Config

### 4.20.3 link state group upstream

Use this command to add interfaces to the upstream interface list. Note that an interface that is defined as an upstream interface cannot also be defined as a downstream interface in the same link state group or as a downstream interface in a different link state group, if either configuration creates a circular dependency between groups.

**Format**           `link state group group-id upstream`

**Mode**             Interface Config

### 4.20.3.1 no link state group upstream

Use this command to remove the selected interfaces from upstream list.

**Format** no link state group *group-id* upstream  
**Mode** Interface Config

### 4.20.4 show link state group

Use this command to display information for all configured link-dependency groups or a specified link-dependency group.

**Format** show link state group *group-id*  
**Mode** Privileged EXEC

**Example:** This example displays information for all configured link-dependency groups.

```
(Switching)#show link-state group
```

| GroupId | Downstream Interfaces     | Upstream Interfaces | Link Action | Group State |
|---------|---------------------------|---------------------|-------------|-------------|
| 1       | 2/0/3-2/0/7,2/0/12-2/0/17 | 2/0/12-2/0/32,0/3/5 | Link Up     | Up          |
| 4       | 2/0/18,2/0/27             | 2/0/22-2/0/33,0/3/1 | Link Up     | Down        |

**Example:** This example displays information for a specified link-dependency groups

```
(Switching)#show link state group 1
```

| GroupId | Downstream Interfaces     | Upstream Interfaces | Link Action | Group State |
|---------|---------------------------|---------------------|-------------|-------------|
| 1       | 2/0/3-2/0/7,2/0/12-2/0/17 | 2/0/12-2/0/32,0/3/5 | Link Up     | Up          |

### 4.20.5 show link state group detail

Use this command to display detailed information about the state of upstream and downstream interfaces for a selected link-dependency group. Group Transitions is a count of the number of times the downstream interface has gone into its "action" state as a result of the upstream interfaces link state.

**Format** show link state group *group-id* detail  
**Mode** Privileged EXEC

```
(Switching) # show link state group 1 detail
```

```
GroupId: 1
Link Action: Up
Group State: Up
```

```
Downstream Interface State:
```

```
Link Up: 2/0/3
Link Down: 2/0/4-2/0/7,2/0/12-2/0/17
```

```
Upstream Interface State:
```

```
Link Up: -
Link Down: 2/0/12-2/0/32,0/3/5
```

```
Group Transitions: 0
Last Transition Time: 00:52:35 (UTC+0:00) Jan 1 1970
```

## 4.21 MMRP Commands

### 4.21.1 mmrp (Global Config)

Use the `mmrp` command in Global Config mode to enable MMRP. MMRP must also be enabled on the individual interfaces.

|                |                   |
|----------------|-------------------|
| <b>Default</b> | disabled          |
| <b>Format</b>  | <code>mmrp</code> |
| <b>Mode</b>    | Global Config     |

#### 4.21.1.1 no mmrp (Global Config)

Use the `no mmrp` command in Global Config mode to disable MMRP.

|               |                      |
|---------------|----------------------|
| <b>Format</b> | <code>no mmrp</code> |
| <b>Mode</b>   | Global Config        |

### 4.21.2 mmrp periodic state machine

Use the `mmrp periodic state machine` command in Global Config mode to enable MMRP periodic state machine.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | disabled                                 |
| <b>Format</b>  | <code>mmrp periodic state machine</code> |
| <b>Mode</b>    | Global Config                            |

#### 4.21.2.1 no mmrp periodic state machine

Use the `no mmrp periodic state machine` command in Global Config mode to disable MMRP periodic state machine.

|               |                                             |
|---------------|---------------------------------------------|
| <b>Format</b> | <code>no mmrp periodic state machine</code> |
| <b>Mode</b>   | Global Config                               |

### 4.21.3 mmrp (Interface Config)

Use the `mmrp` command in Interface Config mode on the interface. MMRP can be enabled on physical interfaces or LAG interfaces. When configured on a LAG member port, MMRP is operationally disabled. Enabling MMRP on an interface automatically enables dynamic MFDB entries creation.

|                |                   |
|----------------|-------------------|
| <b>Default</b> | disabled          |
| <b>Format</b>  | <code>mmrp</code> |
| <b>Mode</b>    | Interface Config  |

#### 4.21.3.1 no mmrp (Interface Config)

Use the `no mmrp` command in Interface Config mode to disable MMRP mode on the interface.

|               |                      |
|---------------|----------------------|
| <b>Format</b> | <code>no mmrp</code> |
| <b>Mode</b>   | Global Config        |

### 4.21.4 clear mmrp statistics

Use the `clear mmrp` command in Privileged EXEC mode to clear MMRP statistics of one or all interfaces.

**Format**            `clear mmrp statistics [slot/port|all]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                                |
|-----------|------------------------------------------------------------------------------------------------------------|
| slot/port | If used with <code>slot/port</code> parameter, the command clears MMRP statistics for the given interface. |
| all       | If the <code>all</code> parameter is specified, the command clears MMRP statistics for all the interfaces. |

#### 4.21.5 show mmrp

Use the `show mmrp` command in Privileged EXEC mode to display the status of the MMRP mode.

**Format**            `show mmrp [summary | interface [slot/port | summary]]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                |
|-----------|----------------------------------------------------------------------------------------------------------------------------|
| summary   | If used with the <code>summary</code> parameter, the command displays global MMRP information.                             |
| interface | If the <code>interface</code> is specified, the command displays the MMRP mode of that interface.                          |
| summary   | If the <code>summary</code> option is specified, the command shows a table containing MMRP global mode for all interfaces. |

The following shows example CLI display output for the command.

```
(Switching) #show mmrp summary
```

```
MMRP Global Admin Mode..... Disabled
MMRP Periodic State Machine..... Disabled
```

```
(Switching) #show mmrp interface 0/12
```

```
MMRP Interface Admin Mode..... Disabled
```

```
(Switching) #show mmrp interface summary
```

```
Intf Mode

0/1 Disabled
0/2 Disabled
0/3 Disabled
0/4 Disabled
0/5 Disabled
0/6 Disabled
0/7 Disabled
0/8 Disabled
0/9 Disabled
0/10 Disabled
0/11 Disabled
0/12 Disabled
0/13 Disabled
0/14 Disabled
0/15 Disabled
0/16 Disabled
0/17 Disabled
```

## 4.21.6 show mmrp statistics

Use the `show mmrp statistics` command in Privileged EXEC mode to display statistical information about the MMRP PDUs sent and received on the interface.

**Format**            `show mmrp statistics {summary | [slot/port | all]}`  
**Mode**             Privileged EXEC

The following statistics display when the `summary` or `slot/port` keywords are used. Using the `summary` keyword displays global statistics, and using the `slot/port` keyword displays per-interface statistics.

| Parameter                              | Description                                                     |
|----------------------------------------|-----------------------------------------------------------------|
| MMRP messages received                 | Total number of MMRP messages received.                         |
| MMRP messages received with bad header | Total number of MMRP frames with bad headers received           |
| MMRP messages received with bad format | Total number of MMRP frames with bad PDUs body formats received |
| MMRP messages transmitted              | Total number of MMRP frames that sent                           |
| MMRP messages failed to transmit       | Total number of MMRP frames that failed to be transmitted       |

The following statistics display when the `all` keyword is used.

| Parameter  | Description                                                     |
|------------|-----------------------------------------------------------------|
| Intf       | The interface associated with the rest of the data in the row.  |
| Rx         | Total number of MMRP messages received.                         |
| Bad Header | Total number of MMRP frames with bad headers received           |
| Bad Format | Total number of MMRP frames with bad PDUs body formats received |
| Tx         | Total number of MMRP frames that sent                           |
| Tx Failed  | Total number of MMRP frames that failed to be transmitted       |

## 4.22 MSRP Commands

### 4.22.1 msrp (Global Config)

Use the `msrp` command in Global Config mode to enable MSRP global admin mode. For MSRP to be operational, MSRP mode must also be enabled on individual interfaces.

**Default**            enabled  
**Format**            `msrp`  
**Mode**             Global Config

#### 4.22.1.1 no msrp (Global Config)

Use the `no msrp` command in Global Config mode to disable MSRP global admin mode.

**Format**            `no msrp`  
**Mode**             Global Config

## 4.22.2 msrc srClassQav

Use the `msrp srClassQav` command in Global Config mode to configure EAV traffic class mapping.

**Default**

- Class A: pcp = 3, remap = 1
- Class B: pcp = 2, remap = 1

**Format** `msrp SrclassQav class [A | B] [pcp | remap] 0-7`

**Mode** Global Config

### 4.22.2.1 no msrc srClassQav

Use the `no msrc srClassQav` command in Global Config mode to reset EAV traffic class mapping to the default value.

**Format** `no msrc SrclassQav class [A | B] [pcp | remap]`

**Mode** Global Config

## 4.22.3 msrc boundaryPropagate

Use the `msrp boundaryPropagate` command in Global Config mode to enable MSRP boundary propagation.

**Default** disabled

**Format** `msrp boundaryPropagate`

**Mode** Global Config

### 4.22.3.1 no msrc boundaryPropagate

Use the `no msrc boundaryPropagate` command in Global Config mode to enable MSRP boundary propagation.

**Format** `no msrc boundaryPropagate`

**Mode** Global Config

## 4.22.4 msrc talker-pruning

Use the `msrp talker-pruning` command in Global Config mode to enable MSRP talker-pruning.

**Default** disabled

**Format** `msrp talker-pruning`

**Mode** Global Config

### 4.22.4.1 no msrc talker-pruning

Use the `no msrc talker-pruning` command in Global Config mode to disable MSRP talker-pruning.

**Format** `no msrc talker-pruning`

**Mode** Global Config

## 4.22.5 msrc max-fan-in-ports

Use this `command` in Global Config mode to configure the MSRP max fan-in ports value.

**Default** 12

**Format** `msrp max-fan-in-ports 0-52`

**Mode** Global Config

### 4.22.5.1 no msrp max-fan-in-ports

Use the `no msrp max-fan-in-ports` command in Global Config mode to reset the MSRP `max-fan-in-ports` value to the default.

**Format** `msrp max-fan-in-ports`

**Mode** Global Config

### 4.22.6 msrp (Interface Config)

Use the `msrp` command in Interface Config mode to enable MSRP admin mode on the interface. MSRP can be enabled only on the physical interfaces.

**Default** enabled

**Format** `msrp`

**Mode** Interface Config

#### 4.22.6.1 no msrp (Interface Config)

Use the `no msrp` command in Interface Config mode to disable MSRP admin mode on the interface.

**Format** `no msrp`

**Mode** Interface Config

### 4.22.7 msrp srClassPVID

Use the `msrp srClassPVID` command in Interface Config mode to configure MSRP VLAN ID for the SR traffic class on the interface.

**Default** 2

**Format** `msrp srClassPVID 1-4093`

**Mode** Interface Config

### 4.22.8 msrp deltaBandwidth

Use the `msrp deltaBandwidth` command in Interface Config mode to configure MSRP delta bandwidth for the SR traffic classes A and B.

**Default**

- Class A – 75
- Class B – 0

**Format** `msrp deltaBandwidth class [A|B] 0-75`

**Mode** Interface Config

### 4.22.9 clear msrp

Use the `clear msrp` command in Privileged EXEC mode to clear the MSRP statistics of one or all interfaces.

**Format** `clear msrp statistics [slot/port | all]`

**Mode** Privileged EXEC

| Parameter | Description                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------|
| slot/port | If used with the slot/port parameter, the command clears MSRP statistics for the given interface. |
| all       | If the all parameter is specified, the command clears MSRP statistics for all the interfaces.     |

## 4.22.10 show msrp

Use the `show msrp` command in Privileged EXEC mode to display the status of the MSRP mode.

**Format** `show msrp [summary | interface [slot/port | summary]]`

**Mode** Privileged EXEC

| Parameter | Description                                                                                                                |
|-----------|----------------------------------------------------------------------------------------------------------------------------|
| summary   | If the <code>summary</code> parameter is used, the command shows global MSRP information.                                  |
| interface | If the <code>interface</code> is specified, the command shows MSRP information for that interface.                         |
| summary   | If the <code>summary</code> option is specified, the command shows a table containing MSRP information for all interfaces. |

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp summary

```
MSRP Global Admin Mode..... Enabled
MSRP Talker Pruning..... Disabled
MSRP Maximum Fan-in Ports..... 12
MSRP Boundary Propagation..... Disabled
QAV class A priority..... 3
QAV class A remap priority..... 1
QAV class B priority..... 2
QAV class B remap priority..... 1
```

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp interface 0/12

```
MSRP Interface Admin Mode..... Enabled
SRclassPVID..... 2
MSRP class A Boundary port status..... True
MSRP class B Boundary port status..... True
MSRP QAV class A delta bandwidth..... 75
MSRP QAV class A delta bandwidth..... 0
MSRP class A bandwidth (allocated/total)..... 0 / 0
MSRP class B bandwidth (allocated/total)..... 0 / 0
MSRP total bandwidth (allocated/total)..... 0 / 0
QAV class A priority..... 3
QAV class A remap priority..... 1
QAV class B priority..... 2
QAV class B remap priority..... 1
```

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp interface summary

| Intf | Mode    | SrPVID | A-Prio | A-Remap | B-Prio | B-Remap | Boundary(A/B) |
|------|---------|--------|--------|---------|--------|---------|---------------|
| 0/1  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/2  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/3  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/4  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/5  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/6  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/7  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/8  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/9  | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/10 | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |
| 0/11 | Enabled | 2      | 3      | 1       | 2      | 1       | True / True   |



### 4.22.11 show msrp interface bandwidth

Use the `show msrp interface bandwidth` command in Privileged EXEC mode to display the MSRP bandwidth reservation details for all interfaces.

**Format** `show msrp interface bandwidth`

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp interface bandwidth

| Intf | Delta Bandwidth |         | Allocated/Total Bandwidth |         |
|------|-----------------|---------|---------------------------|---------|
|      | Class A         | Class B | Class A                   | Class B |
| 0/1  | 75              | 0       | 0/0                       | 0/0     |
| 0/2  | 75              | 0       | 0/0                       | 0/0     |
| 0/3  | 75              | 0       | 0/0                       | 0/0     |
| 0/4  | 75              | 0       | 0/0                       | 0/0     |
| 0/5  | 75              | 0       | 0/0                       | 0/0     |
| 0/6  | 75              | 0       | 0/0                       | 0/0     |
| 0/7  | 75              | 0       | 0/0                       | 0/0     |
| 0/8  | 75              | 0       | 0/0                       | 0/0     |
| 0/9  | 75              | 0       | 0/0                       | 0/0     |

### 4.22.12 show msrp reservations

Use the `show msrp reservations` command in Privileged EXEC mode to display MSRP stream reservation details for the given interface.

**Format** `show msrp reservations slot/port [detail | summary]`

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp reservations 0/10 summary

| Stream ID | Stream MAC Address | Talker Type | Listener Type | Fail Code | Information Interface | Stream Age |
|-----------|--------------------|-------------|---------------|-----------|-----------------------|------------|
| 41543     | 12:22:e1:65:a3:f8  | R.Adv       | D.Ready       | 0         | 0                     | 0          |

(Switching) #show msrp reservations 0/10 detail

| Stream ID | Stream MAC Address | Failure Information |      |                   | Acc Latency |
|-----------|--------------------|---------------------|------|-------------------|-------------|
|           |                    | Code                | Intf | MAC Address       |             |
| 41543     | 12:22:e1:65:a3:f8  | 0                   | 0    | 00:00:00:00:00:00 | 647         |

### 4.22.13 show msrp stream

Use the `show msrp stream` command in Privileged EXEC mode to display MSRP stream information.

**Format** `show msrp stream [detail | summary]`

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

(Switching) #show msrp stream detail

| Stream ID | Stream MAC Address | Traffic | Stream Type | Failure Information | Talker |
|-----------|--------------------|---------|-------------|---------------------|--------|
|-----------|--------------------|---------|-------------|---------------------|--------|

```

ID MAC Address Class TSpec Code Intf MAC Address Port
----- -
41543 12:22:e1:65:a3:f8 A 128 1 0 0 00:00:00:00:00:00 10

```

```
(Switching) #show msrp stream summary
```

```

Stream Stream Destination Acc. VLAN Stream
ID MAC Address MAC Address Latency ID Rank
----- -
41543 12:22:e1:65:a3:f8 01:00:00:80:42:01 647 2 Regular

```

## 4.22.14 show msrp statistics

Use the `show msrp statistics` command in Privileged EXEC mode to display MSRP statistics.

**Format**            `show msrp statistics [summary | slot/port]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                |
|-----------|--------------------------------------------------------------------------------------------|
| summary   | If used with the <code>summary</code> parameter, the command shows global MSRP statistics. |
| interface | If the interface is specified, the command shows MSRP statistics for that interface.       |

**Example:** The following shows example CLI display output for the command.

```
(Switching) # show msrp statistics summary
```

```

MSRP messages received..... 1790
MSRP messages received with bad header..... 0
MSRP messages received with bad format..... 0
MSRP messages transmitted..... 830
MSRP messages failed to transmit..... 0
MSRP Message Queue Failures..... 0

```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show msrp statistics 0/10
```

```

Port..... 0/10
MSRP messages received..... 741
MSRP messages received with bad header..... 0
MSRP messages received with bad format..... 0
MSRP messages transmitted..... 674
MSRP messages failed to transmit..... 0
MSRP failed registrations..... 0

```

## 4.23 MVR Commands

This section lists the Multicast VLAN Registration (MVR) commands.

### 4.23.1 mvr

Use this command to enable MVR. This is disabled by default.

**Default**            Disabled  
**Format**            `mvr`  
**Mode**             Interface Config; Global Config

### 4.23.1.1 no mvr

Use this command to disable MVR.

**Format**            no mvr  
**Mode**             Interface Config; Global Config

### 4.23.2 mvr group

Use this command to addan MVR membership group.

**Format**            mvr group  
**Mode**             Global Config

#### 4.23.2.1 no mvr group

Use this command to disable an MVR membership group.

**Format**            no mvr group  
**Mode**             Global Config

### 4.23.3 mvr immediate

Use this command to enable MVR Immediate Leave mode. If the interface is configured as source port, MVR Immediate Leave mode cannot be enabled. MVR Immediate Leave mode disabled by default.

**Default**          Disabled  
**Format**            mvr immediate  
**Mode**             Interface Config

#### 4.23.3.1 no mvr immediate

Use this command to disable MVR Immediate Leave mode.

**Format**            mvr immediate  
**Mode**             Interface Config

### 4.23.4 mvr mode

Use this command to change the MVR mode type. Compatible is the default mode type.

**Format**            mvr mode [compatible | dynamic]  
**Mode**             Global Config

#### 4.23.4.1 no mvr mode

Use this command to set the MVR mode type to the default value of compatible.

**Format**            no mvr mode  
**Mode**             Global Config

### 4.23.5 mvr querytime

Use this command to set the MVR query response time in units of tenths of a second. The query time is the maximum time to wait for an IGMP membership report on a receiver port before removing the port from the multicast group. The query time only applies to receiver ports and is specified in tenths of a second. The default is 5.

**Format**            `mvr querytime 1-100`  
**Mode**             Global Config

#### 4.23.5.1 no mvr querytime

Use this command to set the MVR query response time to the default value.

**Format**            `no mvr querytime`  
**Mode**             Global Config

### 4.23.6 mvr type

Use this command to set the MVR port type. The default is none.

**Format**            `mvr type [receiver | source]`  
**Mode**             Interface Config

#### 4.23.6.1 no mvr type

Use this command to reset the MVR port type to None.

**Format**            `no mvr type`  
**Mode**             Interface Config

### 4.23.7 mvr vlan

Use this command to set the MVR multicast VLAN.

**Default**           1  
**Format**            `mvr vlan 1-4093`  
**Mode**             Global Config

#### 4.23.7.1 no mvr vlan

Use this command to set the MVR multicast VLAN to the default value.

**Format**            `no mvr vlan`  
**Mode**             Global Config

### 4.23.8 mvr vlan group

Use this command to make a port participate in a specific MVR group. The default value is None.

**Format**            `mvr vlan mVlan group A.B.C.D.`  
**Mode**             Interface Config

### 4.23.8.1 no mvr vlan group

Use this command to remove port participation in the specific MVR group.

**Format**           no mvr vlan *mvLan* group *A.B.C.D.*  
**Mode**             Interface Config

### 4.23.9 show mvr

Use this command to display global MVR settings.

**Format**           show mvr  
**Mode**             Privileged EXEC

**Example:** The following shows example command output.

```
(Switching) # show mvr
MVR Disabled.
```

```
(Switching) # show mvr
MVR Running..... TRUE
MVR multicast VLAN..... 1
MVR Max Multicast Groups..... 256
MVR Current multicast groups..... 0
MVR Global query response time.... 5 (tenths of sec)
MVR Mode..... compatible
```

### 4.23.10 show mvr members

Use this command to display the allocated MVR membership groups.

**Format**           show mvr members [*A.B.C.D.*]  
**Mode**             Privileged EXEC

**Example:** The following shows example command output.

```
(Switching) # show mvr members
MVR Disabled
```

```
(Switching) # show mvr members
```

| MVR Group IP | Status   | Members             |
|--------------|----------|---------------------|
| 224.1.1.1    | INACTIVE | 1/0/1, 1/0/2, 1/0/3 |

```
(Switching) # show mvr members 224.1.1.1
```

| MVR Group IP | Status   | Members             |
|--------------|----------|---------------------|
| 224.1.1.1    | INACTIVE | 1/0/1, 1/0/2, 1/0/3 |

### 4.23.11 show mvr interface

Use this command to display the configuration of MVR-enabled interfaces.

**Format**           show mvr interface [*interface-id* [members [vlan *vlan-id*]]]  
**Mode**             Privileged EXEC

**Example:** The following shows example command output.

```
(Switching) # show mvr interface
Port Type Status Immediate Leave

1/0/9 RECEIVER ACTIVE/inVLAN DISABLED
```

```
(Switching) # show mvr interface 0/4
```

```
Type: NONE Status: INACTIVE/InVLAN Immediate Leave: DISABLED
```

```
show mvr interface 1/0/23 members
235.0.0.1 STATIC ACTIVE
```

```
(Switching) # show mvr interface 1/0/23 members vlan 12
235.0.0.1 STATIC ACTIVE
235.1.1.1 STATIC ACTIVE
```

#### 4.23.12 show mvr traffic

Use this command to display global MVR statistics.

**Format**            show mvr traffic  
**Mode**             Privileged EXEC

**Example:** The following shows example command output.

```
(Switching) # show mvr traffic
```

```
IGMP Query Received..... 0
IGMP Report V1 Received..... 0
IGMP Report V2 Received..... 0
IGMP Leave Received..... 0
IGMP Query Transmitted..... 0
IGMP Report V1 Transmitted..... 0
IGMP Report V2 Transmitted..... 0
IGMP Leave Transmitted..... 0
IGMP Packet Receive Failures..... 0
IGMP Packet Transmit Failures..... 0
```

#### 4.23.13 debug mvr trace

Use this command to enable MVR debug tracing. The default value is disabled.

**Format**            debug mvr trace  
**Mode**             Privileged EXEC

##### 4.23.13.1 no debug mvr trace

Use this command to disable MVR debug tracing.

**Format**            no debug mvr trace  
**Mode**             Privileged EXEC

### 4.23.14 debug mvr packet

Use this command to enable MVR receive/transmit packets debug tracing. If it is executed without specifying the arguments, both receive and transmit packets debugging is enabled. The default is enabled.

**Format**            `debug mvr packet [receive | transmit]`  
**Mode**             Privileged EXEC

#### 4.23.14.1 no debug mvr packet

Use this command to disable MVR receive/transmit packet debug tracing.

**Format**            `no debug mvr packet [receive | transmit]`  
**Mode**             Privileged EXEC

## 4.24 MVRP Commands

### 4.24.1 mvrp (Global Config)

Use the `mvrp` command in Global Configuration mode to enable MVRP. MVRP must also be enabled on the individual interfaces.

---

#### **NOTICE**

If MVRP is enabled on all devices and STP is disabled, statically created VLANs are propagated to other devices. Each device ends up with all the VLANs and connecting ports participating in all the VLANs. This may cause loops in the network.

---

**Default**            enabled  
**Format**            `mvrp`  
**Mode**             Global Config

#### 4.24.1.1 no mvrp (Global Config)

Use the `no mvrp` command in Global Configuration mode to disable MVRP.

**Format**            `no mvrp`  
**Mode**             Global Config

### 4.24.2 mvrp periodic state machine

Use the `mvrp periodic state machine` command in Global Configuration mode to enable the MVRP periodic state machine.

**Default**            disabled  
**Format**            `mvrp periodic state machine`  
**Mode**             Global Config

#### 4.24.2.1 no mvrp periodic state machine

Use the `no mvrp periodic state machine` command in Global Configuration mode to disable the MVRP periodic state machine.

**Format**            `no mvrp periodic state machine`  
**Mode**             Global Config

### 4.24.3 mvrp (Interface Config)

Use the `mvrp` command in Interface Configuration mode to enable MVRP mode on the interface. The port should be configured in trunk or general mode. MVRP can be enabled on physical interfaces or LAG interfaces. When configured on a LAG member port, MVRP is operationally disabled. Enabling MVRP on an interface automatically enabled dynamic VLAN creation.

**Default**            enabled  
**Format**            mvrp  
**Mode**              Interface Config

#### 4.24.3.1 no mvrp (Interface Config)

Use the `no mvrp` command in Interface Configuration mode to disable MVRP mode on the interface.

**Format**            no mvrp  
**Mode**              Interface Config

#### 4.24.4 clear mvrp

Use the `clear mvrp` command in Privileged EXEC mode to clear the MVRP statistics of one or all interfaces.

**Format**            clear mvrp statistics [slot/port | all]  
**Mode**              Privileged EXEC

| Parameter | Description                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------|
| slot/port | If used with the slot/port parameter, the command clears MVRP statistics for the given interface. |
| all       | If the all parameter is specified, the command clears MVRP statistics for all the interfaces.     |

#### 4.24.5 show mvrp

Use the `show mvrp` command in Privileged EXEC mode to display the status of the MVRP mode.

**Format**            show mvrp [summary | interface [slot/port | all]]  
**Mode**              Privileged EXEC

| Parameter | Description                                                                                                            |
|-----------|------------------------------------------------------------------------------------------------------------------------|
| summary   | If the summary parameter is used, the command shows global MVRP information.                                           |
| interface | If the interface is specified, the command shows MVRP mode information for that interface.                             |
| all       | If the all option is specified, the command shows a table containing MVRP global mode and the mode for all interfaces. |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show mvrp summary
```

```
MVRP global state..... Disabled
MVRP Periodic State Machine state..... Disabled
VLANs created via MVRP..... 20-45, 3001-3050
```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show mvrp interface 0/12
```



```
MVRP interface state..... Enabled
VLANs declared..... 20-45, 3001-3050
VLANs registered..... none
```

#### 4.24.6 show mvrp statistics

Use the `show mvrp statistics` command in Privileged EXEC mode to display MVRP statistics.

**Format**            `show mvrp statistics [summary | slot/port | all]`  
**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                                 |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------|
| summary   | If used with the <code>summary</code> parameter, the command shows global MVRP statistics.                                                  |
| interface | If the <code>interface</code> is specified, the command shows MVRP statistics for that interface.                                           |
| all       | If used with the <code>all</code> option, the command shows a table containing MVRP statistics for all interfaces on which MVRP is enabled. |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show mvrp statistics summary
```

```
MVRP messages received..... 45
MVRP messages received with bad header..... 0
MVRP messages received with bad format..... 0
MVRP messages transmitted..... 16
MVRP messages failed to transmit..... 0
MVRP Message Queue Failures..... 0
```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show mvrp statistics 0/12
```

```
Port..... 0/12
MVRP messages received..... 21
MVRP messages received with bad header..... 0
MVRP messages received with bad format..... 0
MVRP messages transmitted..... 8
MVRP messages failed to transmit..... 0
MVRP failed reservations..... 0
```

## 4.25 Port-Channel/LAG (IEEE 802.3ad) Commands

This section describes the commands you use to configure port-channels, which is defined in the IEEE 802.3ad specification, and that are also known as link aggregation groups (LAGs). Link aggregation allows you to combine multiple full-duplex Ethernet links into a single logical link. Network devices treat the aggregation as if it were a single link, which increases fault tolerance and provides load sharing. The LAG feature initially load shares traffic based upon the source and destination MAC address. Assign the port-channel (LAG) VLAN membership after you create a port-channel. If you do not assign VLAN membership, the port-channel might become a member of the management VLAN which can result in learning and switching issues.

A port-channel (LAG) interface can be either static or dynamic, but not both. All members of a port channel must participate in the same protocols.) A static port-channel interface does not require a partner system to be able to aggregate its member ports.

### NOTICE

If you configure the maximum number of dynamic port-channels (LAGs) that your platform supports, additional port-channels that you configure are automatically static.

#### 4.25.1 port-channel

This command configures a new port-channel (LAG) and generates a logical `slot/port` number for the port-channel.

The name field is a character string which allows the dash "-" character as well as alphanumeric characters. Use the `show port channel` command to display the `slot/port` number for the logical interface. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**NOTICE**

Before you include a port in a port-channel, set the port physical mode. For more information, see the [speed](#) command.

**Format**            `port-channel name`  
**Mode**             Global Config

### 4.25.2    `addport`

This command adds one port to the port-channel (LAG). The first interface is a logical `slot/port` number of a configured port-channel. You can add a range of ports by specifying the port range when you enter Interface Config mode (for example: `interface 1/0/1-1/0/4`). Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**NOTICE**

Before adding a port to a port-channel, set the physical mode of the port. For more information, see the [speed](#) command.

**Format**            `addport logical slot/port`  
**Mode**             Interface Config

### 4.25.3    `deleteport (Interface Config)`

This command deletes a port or a range of ports from the port-channel (LAG). The interface is a logical `slot/port` number of a configured port-channel (or range of port-channels). Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `deleteport logical slot/port`  
**Mode**             Interface Config

### 4.25.4    `deleteport (Global Config)`

This command deletes all configured ports from the port-channel (LAG). The interface is a logical `slot/port` number of a configured port-channel. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `deleteport {logical slot/port | all}`  
**Mode**             Global Config

### 4.25.5    `lacp admin key`

Use this command to configure the administrative value of the key for the port-channel. The value range of key is 0 to 65535.

**Default**           0  
**Format**            `lacp admin key key`  
**Mode**             Interface Config

---

This command is applicable only to port-channel interfaces.

**NOTICE**

---

This command can be used to configure a single interface or a range of interfaces.

#### 4.25.5.1 no lacp admin key

Use this command to configure the default administrative value of the key for the port-channel.

**Format** no lacp admin key  
**Mode** Interface Config

#### 4.25.6 lacp collector max-delay

Use this command to configure the port-channel collector maximum delay. This command can be used to configure a single interface or a range of interfaces. The valid range of *delay* is 0 to 65535.

**Default** 0  
**Format** lacp collector max delay *delay*  
**Mode** Interface Config

---

This command is applicable only to port-channel interfaces.

**NOTICE**

#### 4.25.6.1 no lacp collector max delay

Use this command to configure the default port-channel collector maximum delay.

**Format** no lacp collector max delay  
**Mode** Interface Config

#### 4.25.7 lacp actor admin key

Use this command to configure the administrative value of the LACP actor admin key on an interface or range of interfaces. The valid range for *key* is 0 to 65535.

**Default** Internal interface number of this physical port  
**Format** lacp actor admin key *key*  
**Mode** Interface Config

---

This command is applicable only to physical interfaces.

**NOTICE**

#### 4.25.7.1 no lacp actor admin key

Use this command to configure the default administrative value of the key.

**Format** no lacp actor admin key  
**Mode** Interface Config

## 4.25.8 lacp actor admin state individual

Use this command to set LACP actor admin state to individual.

**Format** lacp actor admin state individual

**Mode** Interface Config

---

This command is applicable only to physical interfaces.

### NOTICE

### 4.25.8.1 no lacp actor admin state individual

Use this command to set the LACP actor admin state to aggregation.

**Format** no lacp actor admin state individual

**Mode** Interface Config

## 4.25.9 lacp actor admin state longtimeout

Use this command to set LACP actor admin state to longtimeout.

**Format** lacp actor admin state longtimeout

**Mode** Interface Config

---

This command is applicable only to physical interfaces.

### NOTICE

### 4.25.9.1 no lacp actor admin state longtimeout

Use this command to set the LACP actor admin state to short timeout.

**Format** no lacp actor admin state longtimeout

**Mode** Interface Config

---

This command is applicable only to physical interfaces.

### NOTICE

## 4.25.10 lacp actor admin state passive

Use this command to set the LACP actor admin state to passive.

**Format** lacp actor admin state passive

**Mode** Interface Config

---

This command is applicable only to physical interfaces.

### NOTICE

#### 4.25.10.1 no lacp actor admin state passive

Use this command to set the LACP actor admin state to active.

**Format**           no lacp actor admin state passive  
**Mode**             Interface Config

#### 4.25.11 lacp actor admin state

Use this command to configure the administrative value of actor state as transmitted by the Actor in LACPDUs. This command can be used to configure a single interfaces or a range of interfaces.

**Default**           0x07  
**Format**           lacp actor admin state {individual|longtimeout|passive}  
**Mode**             Interface Config

---

This command is applicable only to physical interfaces.

#### **NOTICE**

#### 4.25.11.1 no lacp actor admin state

Use this command the configure the default administrative values of actor state as transmitted by the Actor in LACPDUs.

#### **NOTICE**

Both the no portlacptimeout and the no lacp actor admin state commands set the values back to default, regardless of the command used to configure the ports. Consequently, both commands will display in show running-config.

**Format**           no lacp actor admin state {individual|longtimeout|passive}  
**Mode**             Interface Config

#### 4.25.12 lacp actor port priority

Use this command to configure the priority value assigned to the Aggregation Port for an interface or range of interfaces. The valid range for *priority* is 0 to 65535.

**Default**           0x80  
**Format**           lacp actor port priority 0-65535  
**Mode**             Interface Config

---

This command is applicable only to physical interfaces.

#### **NOTICE**

#### 4.25.12.1 no lacp actor port priority

Use this command to configure the default priority value assigned to the Aggregation Port.

**Format**           no lacp actor port priority  
**Mode**             Interface Config

### 4.25.13 lacp partner admin key

Use this command to configure the administrative value of the key for the protocol partner. This command can be used to configure a single interface or a range of interfaces. The valid range for *key* is 0 to 65535.

|                |                                   |
|----------------|-----------------------------------|
| <b>Default</b> | 0x0                               |
| <b>Format</b>  | lacp partner admin key <i>key</i> |
| <b>Mode</b>    | Interface Config                  |

---

This command is applicable only to physical interfaces.

#### NOTICE

#### 4.25.13.1 no lacp partner admin key

Use this command to set the administrative value of the key for the protocol partner to the default.

|               |                           |
|---------------|---------------------------|
| <b>Format</b> | no lacp partner admin key |
| <b>Mode</b>   | Interface Config          |

### 4.25.14 lacp partner admin state individual

Use this command to set LACP partner admin state to individual.

|               |                                     |
|---------------|-------------------------------------|
| <b>Format</b> | lacp partner admin state individual |
| <b>Mode</b>   | Interface Config                    |

---

This command is applicable only to physical interfaces.

#### NOTICE

#### 4.25.14.1 no lacp partner admin state individual

Use this command to set the LACP partner admin state to aggregation.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | no lacp partner admin state individual |
| <b>Mode</b>   | Interface Config                       |

### 4.25.15 lacp partner admin state longtimeout

Use this command to set LACP partner admin state to longtimeout.

|               |                                      |
|---------------|--------------------------------------|
| <b>Format</b> | lacp partner admin state longtimeout |
| <b>Mode</b>   | Interface Config                     |

---

This command is applicable only to physical interfaces.

#### NOTICE

#### 4.25.15.1 no lacp partner admin state longtimeout

Use this command to set the LACP partner admin state to short timeout.

**Format**        no lacp partner admin state longtimeout  
**Mode**         Interface Config

---

This command is applicable only to physical interfaces.

**NOTICE**

---

#### 4.25.16 lacp partner admin state passive

Use this command to set the LACP partner admin state to passive.

**Format**        lacp partner admin state passive  
**Mode**         Interface Config

---

This command is applicable only to physical interfaces.

**NOTICE**

---

##### 4.25.16.1 no lacp partner admin state passive

Use this command to set the LACP partner admin state to active.

**Format**        no lacp partner admin state passive  
**Mode**         Interface Config

#### 4.25.17 lacp partner port id

Use this command to configure the LACP partner port id. This command can be used to configure a single interface or a range of interfaces. The valid range for *port-id* is 0 to 65535.

**Default**        0x80  
**Format**        lacp partner port-id *port-id*  
**Mode**         Interface Config

---

This command is applicable only to physical interfaces.

**NOTICE**

---

##### 4.25.17.1 no lacp partner port id

Use this command to set the LACP partner port id to the default.

**Format**        no lacp partner port-id  
**Mode**         Interface Config

## 4.25.18 lacp partner port priority

Use this command to configure the LACP partner port priority. This command can be used to configure a single interface or a range of interfaces. The valid range for *priority* is 0 to 65535.

|                |                                            |
|----------------|--------------------------------------------|
| <b>Default</b> | 0x0                                        |
| <b>Format</b>  | lacp partner port priority <i>priority</i> |
| <b>Mode</b>    | Interface Config                           |

---

This command is applicable only to physical interfaces.

### NOTICE

### 4.25.18.1 no lacp partner port priority

Use this command to configure the default LACP partner port priority.

|               |                               |
|---------------|-------------------------------|
| <b>Format</b> | no lacp partner port priority |
| <b>Mode</b>   | Interface Config              |

## 4.25.19 lacp partner system-id

Use this command to configure the 6-octet MAC Address value representing the administrative value of the Aggregation Port's protocol Partner's System ID. This command can be used to configure a single interface or a range of interfaces. The valid range of *system-id* is 00:00:00:00:00:00 - FF:FF:FF:FF:FF:FF.

|                |                                         |
|----------------|-----------------------------------------|
| <b>Default</b> | 00:00:00:00:00:00                       |
| <b>Format</b>  | lacp partner system-id <i>system-id</i> |
| <b>Mode</b>    | Interface Config                        |

---

This command is applicable only to physical interfaces.

### NOTICE

### 4.25.19.1 no lacp partner system-id

Use this command to configure the default value representing the administrative value of the Aggregation Port's protocol Partner's System ID.

|               |                           |
|---------------|---------------------------|
| <b>Format</b> | no lacp partner system-id |
| <b>Mode</b>   | Interface Config          |

## 4.25.20 lacp partner system priority

Use this command to configure the administrative value of the priority associated with the Partner's System ID. This command can be used to configure a single interface or a range of interfaces. The valid range for *priority* is 0 to 65535.

|                |                                              |
|----------------|----------------------------------------------|
| <b>Default</b> | 0x0                                          |
| <b>Format</b>  | lacp partner system priority <i>priority</i> |
| <b>Mode</b>    | Interface Config                             |



---

This command is applicable only to physical interfaces.

**NOTICE**

#### 4.25.20.1 no lacp partner system priority

Use this command to configure the default administrative value of priority associated with the Partner's System ID.

**Format**           no lacp partner system priority

**Mode**             Interface Config

#### 4.25.21 interface lag

Use this command to enter Interface configuration mode for the specified LAG.

**Format**           interface lag lag-interface-number

**Mode**             Global Config

#### 4.25.22 ip dynamic-loadbalance

Use this command to configure Dynamic Load Balance (DLB) on all the ECMP groups in a system.

**Format**           ip dynamic-loadbalance <id>

**Mode**             Global Config

The load-balance IDs are 1, 2, or 3 as follows:

1. DLB Spray mode
2. DLB Fixed Assignment mode
3. DLB Eligibility mode

**NOTICE**

---

For existing ECMP groups, using this command to configure DLB does not take effect until a switch reload is performed.

---

#### 4.25.22.1 no ip dynamic-loadbalance

Use this command to disable DLB on the ECMP group, and set the load-balance mode to the default value for the platform.

The default mode for ECMP is 6, which is Src IP, Dst IP, Src L4 Port, and Dst L4 Port.

**Format**           no ip dynamic-loadbalance <id>

**Mode**             Global Config

#### 4.25.23 port-channel static

This command enables the static mode on a port-channel (LAG) interface or range of interfaces. By default the static mode for a new port-channel is enabled, which means the port-channel is static. If the maximum number of allowable dynamic port-channels are already present in the system, the static mode for a new port-channel is enabled, which means the port-channel is static. You can only use this command on port-channel interfaces.

**Default**           enabled

**Format**           port-channel static

**Mode**             Interface Config

### 4.25.23.1 no port-channel static

This command sets the static mode on a particular port-channel (LAG) interface to the default value. This command will be executed only for interfaces of type port-channel (LAG).

**Format**           no port-channel static

**Mode**             Interface Config

### 4.25.24 port lacpmode

This command enables Link Aggregation Control Protocol (LACP) on a port or range of ports.

**Default**           enabled

**Format**           port lacpmode

**Mode**             Interface Config

#### 4.25.24.1 no port lacpmode

This command disables Link Aggregation Control Protocol (LACP) on a port.

**Format**           no port lacpmode

**Mode**             Interface Config

### 4.25.25 port lacpmode enable all

This command enables Link Aggregation Control Protocol (LACP) on all ports.

**Format**           port lacpmode enable all

**Mode**             Global Config

#### 4.25.25.1 no port lacpmode enable all

This command disables Link Aggregation Control Protocol (LACP) on all ports.

**Format**           no port lacpmode enable all

**Mode**             Global Config

### 4.25.26 port lacptimeout (Interface Config)

This command sets the timeout on a physical interface or range of interfaces of a particular device type (actor or partner) to either long or short timeout.

**Default**           long

**Format**           port lacptimeout {actor | partner} {long | short}

**Mode**             Interface Config

#### 4.25.26.1 no port lacptimeout

This command sets the timeout back to its default value on a physical interface of a particular device type (actor or partner).

**Format**           no port lacptimeout {actor | partner}

**Mode**             Interface Config

**NOTICE**

Both the `no portlacptimeout` and the `no lacp actor admin state` commands set the values back to default, regardless of the command used to configure the ports. Consequently, both commands will display in `show running-config`.

## 4.25.27 port lacptimeout (Global Config)

This command sets the timeout for all interfaces of a particular device type (actor or partner) to either long or short timeout.

**Default** long  
**Format** `port lacptimeout {actor | partner} {long | short}`  
**Mode** Global Config

### 4.25.27.1 no port lacptimeout

This command sets the timeout for all physical interfaces of a particular device type (actor or partner) back to their default values.

**Format** `no port lacptimeout {actor | partner}`  
**Mode** Global Config

**NOTICE**

Both the `no portlacptimeout` and the `no lacp actor admin state` commands set the values back to default, regardless of the command used to configure the ports. Consequently, both commands will display in `show running-config`.

## 4.25.28 port-channel adminmode

This command enables all configured port-channels with the same administrative mode setting.

**Format** `port-channel adminmode all`  
**Mode** Global Config

### 4.25.28.1 no port-channel adminmode

This command disables all configured port-channels with the same administrative mode setting.

**Format** `no port-channel adminmode all`  
**Mode** Global Config

## 4.25.29 port-channel linktrap

This command enables link trap notifications for the port-channel (LAG). The interface is a logical `slot/port` for a configured port-channel. The option `all` sets every configured port-channel with the same administrative mode setting. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Default** enabled  
**Format** `port-channel linktrap {logical slot/port | all}`  
**Mode** Global Config

### 4.25.29.1 no port-channel linktrap

This command disables link trap notifications for the port-channel (LAG). The interface is a logical slot and port for a configured port-channel. The option `all` sets every configured port-channel with the same administrative mode setting.

**Format**            `no port-channel linktrap {logical slot/port | all}`

**Mode**             Global Config

### 4.25.30 port-channel hash multicast

This command configures the multicast hash algorithm. The command allows the user to globally select the hash algorithm used for distribution of NUC (Non Unicast) traffic. This includes broadcast and multicast traffic, as well as unicast traffic to unknown destination MAC address (DLF, flooded). Traffic distribution may be based on any combination of MAC or IP Source address (`sa`), MAC or IP destination address (`da`) and module ID and port number.

**Format**            `port-channel hash multicast [sa | sa-port | da | da-port | port | sa-da | sa-da-port]`

**Mode**             Global Config

### 4.25.31 port-channel load-balance

This command configures the load-balancing option on a specified port-channel (LAG) or all LAGs in the system. Traffic is balanced on a port-channel (LAG) by selecting one of the links in the channel over which to transmit specific packets. The link is selected by creating a binary pattern from selected fields in a packet, and associating that pattern with a particular link.

Load-balancing is not supported on every device. The range of options for load-balancing may vary per device.

This command can be configured for a single interface, a range of interfaces, or all interfaces. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Default**            3

**Format**            `port-channel load-balance {1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10} {slot/port | all}`

**Mode**             Interface Config  
Global Config

| Parameter      | Description                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Source MAC, VLAN, EtherType, and incoming port associated with the packet                                                                                             |
| 2              | Destination MAC, VLAN, EtherType, and incoming port associated with the packet                                                                                        |
| 3              | Source/Destination MAC, VLAN, EtherType, and incoming port associated with the packet                                                                                 |
| 4              | Source IP and Source TCP/UDP fields of the packet                                                                                                                     |
| 5              | Destination IP and Destination TCP/UDP Port fields of the packet                                                                                                      |
| 6              | Source/Destination IP and source/destination TCP/UDP Port fields of the packet                                                                                        |
| 7              | Enhanced hashing mode                                                                                                                                                 |
| 8              | Dynamic Load Balancing (DLB) Spray Mode                                                                                                                               |
| 9              | DLB Eligibility Mode                                                                                                                                                  |
| 10             | DLB Fixed Assignment Mode                                                                                                                                             |
| slot/port  all | Global Config Mode only: The interface is a logical slot/port number of a configured port-channel. All applies the command to all currently configured port-channels. |

**NOTICE**

- In Global Config mode, currently there is no option available for the user to specify an aggregate member in fixed assignment mode.
- In Interface Config mode, Dynamic Load Balancing (DLB) decides on the member in fixed assignment mode and continues with that.
- Between Global and Interface-level commands to configure DLB mode (or any other hashing mode), the last executed value takes effect.

### 4.25.31.1 no port-channel load-balance

This command reverts to the default load balancing configuration.

**Format**            `no port-channel load-balance {slot/port | all}`

**Mode**             Interface Config

Global Config

| Parameter                  | Description                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>slot/port all</code> | Global Config Mode only: The interface is a logical <code>slot/port</code> number of a configured port-channel. <code>All</code> applies the command to all currently configured port-channels. |

### 4.25.32 port-channel local-preference

This command enables the local-preference mode on a port-channel (LAG) interface or range of interfaces. By default, the local-preference mode for a port-channel is disabled. This command can be used only on port-channel interfaces.

**Default**            disable

**Format**            `port-channel local-preference`

**Mode**             Interface Config

### 4.25.32.1 no port-channel local-preference

This command disables the local-preference mode on a port-channel.

**Format**            `no port-channel local-preference`

**Mode**             Interface Config

### 4.25.33 port-channel min-links

This command configures the port-channel's minimum links for lag interfaces.

**Default**            1

**Format**            `port-channel min-links 1-8`

**Mode**             Interface Config

### 4.25.34 port-channel name

This command defines a name for the port-channel (LAG). The interface is a logical `slot/port` for a configured port-channel, and `name` is an alphanumeric string up to 15 characters. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `port-channel name {logical slot/port} name`

**Mode**             Global Config

## 4.25.35 port-channel system priority

Use this command to configure port-channel system priority. The valid range of priority is 0 to 65535.

**Default** 0x8000  
**Format** port-channel system priority *priority*  
**Mode** Global Config

### 4.25.35.1 no port-channel system priority

Use this command to configure the default port-channel system priority value.

**Format** no port-channel system priority  
**Mode** Global Config

## 4.25.36 show hashdest

Use this command to predict how packets are forwarded over a LAG or to the next hop device when ECMP is the destination. Given the link aggregation method, ingress physical port and values of various packet fields, this command predicts an egress physical port within the LAG or ECMP for the packet.

**Format** show hashdest {lag *lag-id* | ecmp *prefix/prefix-length*} in\_port *sSlot/port* src-mac *macaddr* dst-mac *macaddr* [vlan *vlan-id*] ethertype *0xXXXX* [src-ip {*ipv4-addr* | *ipv6-addr*} dst-ip {*ipv4-addr* | *ipv6-addr*} protocol *pid* src-l4-port *port-num* dst-l4-port *port-num*]  
**Mode** Privileged EXEC

| Parameter   | Description                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| lag         | The LAG group for which to display the egress physical port.                                                                                |
| ecmp        | The IP address of the EMC_ group for which to display the egress physical port.                                                             |
| in_port     | The incoming physical port for the system.                                                                                                  |
| src-mac     | The source MAC address.                                                                                                                     |
| dst-mac     | The destination MAC address.                                                                                                                |
| vlan        | The VLAN ID for VLAN-tagged packets. Do not use this parameter or enter 0 for non-VLAN-tagged packets.                                      |
| ethertype   | The 16-bit EtherType value, in the form 0xXXXX. For layer 3 packets, hash prediction is only available for IPv4 (0x0800) and IPv6 (0x86DD). |
| src-ip      | The source IP address, entered as x.x.x.x for IPv4 or x:x:x:x:x:x for IPv6 packets.                                                         |
| dst-ip      | The destination IP address, entered as x.x.x.x for IPv4 or x:x:x:x:x:x for IPv6 packets.                                                    |
| protocol    | The protocol ID.                                                                                                                            |
| src-l4-port | The layer 4 source port.                                                                                                                    |
| dst-l4-port | The layer 4 destination port.                                                                                                               |

**Example:** Layer 2 VLAN tagged packet forwarded to a LAG.

```
(Routing) #show hashdest lag 1 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac 00:10:18:99:F7:4E vlan 10 ethertype 0x8870
```

```
LAG Destination Port

1 0/29
```

**Example:** Layer 2 non-VLAN tagged packet forwarded to a LAG.

```
(Routing) # show hashdest lag 1 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac 00:10:18:99:F7:4E ethertype 0x8870
```

```
LAG Destination Port
```

```

1 0/31
```

**Example:** Non-VLAN tagged IPv4 UDP packet forwarded to a LAG.

```
(Routing) #show hashdest lag 1 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac 00:10:18:99:F7:4E
ethertype 0x0800 src-ip 7.0.0.2 dst-ip 3.0.0.2 protocol 17 src-l4-port 63 dst-l4-port 64
```

```
LAG Destination Port

1 0/32
```

**Example:** VLAN tagged IPv4 TCP packet forwarded to a LAG.

```
(Routing) #show hashdest lag 1 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac 00:10:18:99:F7:4E vlan
10 ethertype 0x0800 src-ip 7.0.0.2 dst-ip 3.0.0.2 protocol 6 src-l4-port 67 dst-l4-port 68
```

```
LAG Destination Port

1 0/31
```

**Example:** Non-VLAN tagged IPv4 UDP packet forwarded to an ECMP group.

```
(Routing) #show hashdest ecmp 10.0.0.2/16 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac
00:10:18:99:F7:4E vlan 0 ethertype 0x0800 src-ip 7.0.0.2 dst-ip 3.0.0.2 protocol 17 src-l4-port 63
dst-l4-port 64
```

Egress Port

```

30.0.0.2 on interface 0/31
```

**Example:** VLAN tagged IPv4 TCP packet forwarded to an ECMP group.

```
(Routing) #show hashdest ecmp 10.0.0.2/16 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac
00:10:18:99:F7:4E vlan 10 ethertype 0x0800 src-ip 7.0.0.2 dst-ip 3.0.0.2 protocol 6 src-l4-port 67
dst-l4-port 68
```

Egress Port

```

0/29
```

**Example:** Non-VLAN tagged IPv6 UDP packet forwarded to an ECMP group.

```
(Routing) #show hashdest ecmp 4001::200/64 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac
00:10:18:99:F7:4E ethertype 0x86dd src-ip 7001:0:0:0:0:0:2 dst-ip 3001:0:0:0:0:0:2 protocol 17
src-l4-port 63 dst-l4-port 64
```

Egress Port

```

6001::200 on interface 0/31
```

**Example:** Non-VLAN tagged IPv6 TCP packet forwarded to an ECMP group.

```
(Routing) #show hashdest ecmp 6001::200/64 in_port 0/3 src-mac 00:00:20:21:AE:8A dst-mac
00:10:18:99:F7:4E ethertype 0x86dd src-ip 7001:0:0:0:0:0:2 dst-ip 3001:0:0:0:0:0:2 protocol 6
src-l4-port 67 dst-l4-port 68
```

Egress Port

```

8001::200 on interface 0/32
```

#### 4.25.37 show ip dynamic-loadbalance

Use this command to display the configured Dynamic Load Balancing (DLB) mode for ECMP groups.

**Format** show ip dynamic-loadbalance

**Mode** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing)#show ip dynamic-loadbalance
```

```

ECMP admin Dynamic Hashing Mode: 0
(Disabled)
ECMP operational Dynamic Hashing Mode: 0
(Disabled)

```

#### 4.25.38 show ip resilient-hashing

Use this command to display the resilient hashing property for the ECMP.

**Format**            show ip resilient-hashing  
**Mode**             Privileged EXEC

| Parameter         | Description                            |
|-------------------|----------------------------------------|
| Resilient Hashing | Resilient hashing mode for the system. |

**Example:** The following shows example command output.

```
(Routing) #show ip resilient-hashing
```

```
Resilient Hashing..... Enabled
```

```
(Routing)#
```

#### 4.25.39 show lacp actor

Use this command to display LACP actor attributes. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            show lacp actor {slot/port|all}  
**Mode**             Global Config

The following output parameters are displayed.

| Parameter       | Description                                                                          |
|-----------------|--------------------------------------------------------------------------------------|
| System Priority | The administrative value of the Key.                                                 |
| Actor Admin Key | The administrative value of the Key.                                                 |
| Port Priority   | The priority value assigned to the Aggregation Port.                                 |
| Admin State     | The administrative values of the actor state as transmitted by the Actor in LACPDUs. |

#### 4.25.40 show lacp partner

Use this command to display LACP partner attributes. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            show lacp actor {slot/port|all}  
**Mode**             Privileged EXEC

The following output parameters are displayed.

| Parameter       | Description                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------|
| System Priority | The administrative value of priority associated with the Partner's System ID.               |
| System-ID       | Represents the administrative value of the Aggregation Port's protocol Partner's System ID. |
| Admin Key       | The administrative value of the Key for the protocol Partner.                               |



| Parameter     | Description                                                            |
|---------------|------------------------------------------------------------------------|
| Port Priority | The administrative value of the Key for protocol Partner.              |
| Port-ID       | The administrative value of the port number for the protocol Partner.  |
| Admin State   | The administrative values of the actor state for the protocol Partner. |

#### 4.25.41 show port-channel brief

This command displays the static capability of all port-channel (LAG) interfaces on the device as well as a summary of individual port-channel interfaces. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port-channel brief`

**Mode**             User EXEC

For each port-channel the following information is displayed.

| Parameter         | Description                                                             |
|-------------------|-------------------------------------------------------------------------|
| Logical Interface | The slot/port of the logical interface.                                 |
| Port-channel Name | The name of port-channel (LAG) interface.                               |
| Link-State        | Shows whether the link is up or down.                                   |
| Trap Flag         | Shows whether trap flags are enabled or disabled.                       |
| Type              | Shows whether the port-channel is statically or dynamically maintained. |
| Mbr Ports         | The members of this port-channel.                                       |
| Active Ports      | The ports that are actively participating in the port-channel.          |

#### 4.25.42 show port-channel

This command displays an overview of all port-channels (LAGs) on the switch. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port-channel`

**Mode**             Privileged EXEC

| Parameter             | Description                                                                                                                                                                                                                                                                                                |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Logical Interface     | The valid slot/port number.                                                                                                                                                                                                                                                                                |
| Port-Channel Name     | The name of this port-channel (LAG). You may enter any string of up to 15 alphanumeric characters.                                                                                                                                                                                                         |
| Link State            | Indicates whether the Link is up or down.                                                                                                                                                                                                                                                                  |
| Admin Mode            | May be enabled or disabled. The factory default is enabled.                                                                                                                                                                                                                                                |
| Type                  | The status designating whether a particular port-channel (LAG) is statically or dynamically maintained. <ul style="list-style-type: none"> <li>• <code>Static</code> - The port-channel is statically maintained.</li> <li>• <code>Dynamic</code> - The port-channel is dynamically maintained.</li> </ul> |
| Load Balance Option   | The load balance option associated with this LAG. See the <a href="#">port-channel load-balance</a> command.                                                                                                                                                                                               |
| Local Preference Mode | Indicates whether the local preference mode is enabled or disabled.                                                                                                                                                                                                                                        |
| Mbr Ports             | A listing of the ports that are members of this port-channel (LAG), in <code>slot/port</code> notation. There can be a maximum of eight ports assigned to a given port-channel (LAG).                                                                                                                      |
| Device Timeout        | For each port, lists the timeout ( <code>long</code> or <code>short</code> ) for Device Type ( <code>actor</code> or <code>partner</code> ).                                                                                                                                                               |
| Port Speed            | Speed of the port-channel port.                                                                                                                                                                                                                                                                            |

| Parameter    | Description                                                                       |
|--------------|-----------------------------------------------------------------------------------|
| Active Ports | This field lists ports that are actively participating in the port-channel (LAG). |

**Example:** The following shows example CLI display output for the command.

(Switch) #show port-channel 0/3/1

```

Local Interface..... 0/3/1
Channel Name..... ch1
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Port-channel Min-links..... 1

Load Balance Option..... 9
(Dynamic load balancing optimal mode)
Local Preference Mode..... Disabled

```

```

Mbr Device/ Port Port
Ports Timeout Speed Active

1/0/5 actor/long 10G Full True
 partner/long
1/0/6 actor/long 10G Full True
 partner/long
1/0/7 actor/long 10G Full True
 partner/long
1/0/8 actor/long 10G Full True
 partner/long

```

#### 4.25.43 show port-channel resilient-hashing

Use this command to display the resilient hashing property for the port channel interface.

**Format** show port-channel resilient-hashing

**Mode** Privileged EXEC

| Parameter         | Description                            |
|-------------------|----------------------------------------|
| Resilient Hashing | Resilient hashing mode for the system. |

**Example:** The following shows example command output.

(Routing) #show port-channel resilient-hashing

```
Resilient Hashing..... Enabled
```

(Routing) #

#### 4.25.44 show port-channel system priority

Use this command to display the port-channel system priority.

**Format** show port-channel system priority

**Mode** Privileged EXEC

#### 4.25.45 show port-channel counters

Use this command to display port-channel counters for the specified port.

**Format** show port-channel *slot/port* counters

**Mode** Privileged EXEC

| Parameter               | Description                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------|
| Local Interface         | The valid slot/port number.                                                                                     |
| Channel Name            | The name of this port-channel (LAG).                                                                            |
| Link State              | Indicates whether the Link is up or down.                                                                       |
| Admin Mode              | May be enabled or disabled. The factory default is enabled.                                                     |
| Port Channel Flap Count | The number of times the port-channel was inactive.                                                              |
| Mbr Ports               | The slot/port for the port member.                                                                              |
| Mbr Flap Counters       | The number of times a port member is inactive, either because the link is down, or the admin state is disabled. |

**Example:** The following shows example CLI display output for the command.

(Switch) #show port-channel 3/1 counters

```
Local Interface..... 3/1
Channel Name..... ch1
Link State..... Down
Admin Mode..... Enabled
Port Channel Flap Count..... 0
```

```
Mbr Mbr Flap
Ports Counters

0/1 0
0/2 0
0/3 1
0/4 0
0/5 0
0/6 0
0/7 0
0/8 0
```

#### 4.25.46 clear port-channel counters

Use this command to clear and reset specified port-channel and member flap counters for the specified interface.

**Format** clear port-channel {lag-intf-num | slot/port} counters

**Mode** Privileged EXEC

#### 4.25.47 clear port-channel all counters

Use this command to clear and reset all port-channel and member flap counters for the specified interface.

**Format** clear port-channel all counters

**Mode** Privileged EXEC

### 4.26 Port Mirroring Commands

Port mirroring, which is also known as port monitoring, selects network traffic that you can analyze with a network ana-

lyzer, such as a SwitchProbe device or other Remote Monitoring (RMON) probe.

#### 4.26.1 monitor session source

This command configures the source interface for a selected monitor session. Use the `source interface slot/port` parameter to specify the interface to monitor. Use `rx` to monitor only ingress packets, or use `tx` to monitor only egress packets. If you do not specify an `{rx | tx}` option, the destination port monitors both ingress and egress packets.

A VLAN can be configured as the source to a session (all member ports of that VLAN are monitored). Remote port mirroring is configured by adding the RSPAN VLAN ID. At the source switch, the destination is configured as the RSPAN VLAN and at the destination switch, the source is configured as the RSPAN VLAN.

---

The source and destination cannot be configured as remote on the same device.

#### NOTICE

---

The commands described below add a mirrored port (source port) to a session identified with `session-id`. The `session-id` parameter is an integer value used to identify the session. The maximum number of sessions which can be configured is `L7_MIRRORING_MAX_SESSIONS`. Option `rx` is used to monitor only ingress packets. Option `tx` is used to monitor only egress packets. If no option is specified, both ingress and egress packets, RX and TX, are monitored.

A VLAN can also be configured as the source to a session (all the member ports of that VLAN are monitored).

#### NOTICE

---

If an interface participates in some VLAN and is a LAG member, this VLAN cannot be assigned as a source VLAN for a Monitor session. At the same time, if an interface participates in some VLAN and this VLAN is assigned as a source VLAN for a Monitor session, the interface can be assigned as a LAG member.

---

Remote port mirroring is configured by giving the RSPAN VLAN ID. At the source switch the destination is configured as RSPAN VLAN and at the destination switch the source is configured as RSPAN VLAN.

#### NOTICE

---

On the intermediate switch, RSPAN VLAN should be created, the ports connected towards Source and Destination switch should have the RSPAN VLAN participation. RSPAN VLAN egress tagging should be enabled on the interface on the intermediate switch connected towards the Destination switch.

|                |                                                                                                                                      |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                                                                 |
| <b>Format</b>  | <code>monitor session session-id source {interface {slot/port   cpu   lag }   vlan vlan-id   remote vlan vlan-id} [{rx   tx}]</code> |
| <b>Mode</b>    | Global Config                                                                                                                        |

#### 4.26.1.1 no monitor session source

This command removes the specified mirrored port from the selected port mirroring session.

|                |                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                                        |
| <b>Format</b>  | <code>no monitor session session-id source {interface {slot/port   cpu   lag }   vlan   remote vlan}</code> |
| <b>Mode</b>    | Global Config                                                                                               |

#### 4.26.2 monitor session destination

This command configures the probe interface for a selected monitor session. This command configures a probe port and a monitored port for monitor session (port monitoring). Use `rx` to monitor only ingress packets, or use `tx` to monitor only egress packets. If you do not specify an `{rx | tx}` option, the destination port monitors both ingress and egress packets.

A VLAN can be configured as the source to a session (all member ports of that VLAN are monitored). Remote port mirroring is configured by adding the RSPAN VLAN ID. At the source switch, the destination is configured as the RSPAN VLAN

and at the destination switch, the source is configured as the RSPAN VLAN.

---

**NOTICE**

The source and destination cannot be configured as remote on the same device.

---

The `reflector-port` is configured at the source switch along with the destination RSPAN VLAN. The `reflector-port` forwards the mirrored traffic towards the destination switch.

---

**NOTICE**

This port must be configured with RSPAN VLAN membership.

---

Use the `destination interface slot/port` to specify the interface to receive the monitored traffic.

The commands described below add a mirrored port (source port) to a session identified with `session-id`. The `session-id` parameter is an integer value used to identify the session. The maximum number of sessions which can be configured is `L7_MIRRORING_MAX_SESSIONS`. Option `rx` is used to monitor only ingress packets. Option `tx` is used to monitor only egress packets. If no option is specified, both ingress and egress packets, RX and TX, are monitored.

A VLAN can also be configured as the source to a session (all the member ports of that VLAN are monitored).

---

**NOTICE**

If an interface participates in some VLAN and is a LAG member, this VLAN cannot be assigned as a source VLAN for a Monitor session. At the same time, if an interface participates in some VLAN and this VLAN is assigned as a source VLAN for a Monitor session, the interface can be assigned as a LAG member.

---

Remote port mirroring is configured by giving the RSPAN VLAN ID. At the source switch the destination is configured as RSPAN VLAN and at the destination switch the source is configured as RSPAN VLAN.

---

**NOTICE**

On the intermediate switch: RSPAN VLAN should be created, the ports connected towards Source and Destination switch should have the RSPAN VLAN participation. RSPAN VLAN egress tagging should be enabled on the interface on the intermediate switch connected towards the Destination switch.

---

|                |                                                                                                                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                                                                                                                                                 |
| <b>Format</b>  | <code>monitor session &lt;session-ID&gt; destination {interface {&lt;slot/port&gt;/lag &lt;lag ID&gt;} [remove-rspan-tag] remote vlan &lt;vlan ID&gt; reflector-port {&lt;slot/port&gt;/lag &lt;lag ID&gt;} }</code> |
| <b>Mode</b>    | Global Config                                                                                                                                                                                                        |

#### 4.26.2.1 no monitor session destination

This command removes the specified probe port from the selected port mirroring session.

|               |                                                                                        |
|---------------|----------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no monitor session &lt;session-ID&gt; destination {interface remote vlan}</code> |
| <b>Mode</b>   | Global Config                                                                          |

#### 4.26.3 monitor session filter

This command attaches an IP/MAC ACL to a selected monitor session. This command configures a probe port and a monitored port for monitor session (port monitoring). Attaching a filter is not supported for an ERSPAN mirror session.

An IP/MAC ACL can be attached to a session by giving the access list number/name.

Use the `filter` parameter to filter a specified access group either by IP address or MAC address.

The commands described below add a mirrored port (source port) to a session identified with `session-id`. The `session-id` parameter is an integer value used to identify the session. The maximum number of sessions which can be configured is `L7_MIRRORING_MAX_SESSIONS`.

Remote port mirroring is configured by giving the RSPAN VLAN ID. At the source switch the destination is configured as RSPAN VLAN and at the destination switch the source is configured as RSPAN VLAN.

**NOTICE**

- Source and destination cannot be configured as remote on the same device.
- IP/MAC ACL can be attached to a session by giving the access list number/name. On the platforms that do not support both IP and MAC ACLs to be assigned on the same Monitor session, an error message is thrown when user tries to configure ACLs of both types.

|                |                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                                                        |
| <b>Format</b>  | <code>monitor session session-id filter {ip access-group acl-id/aclname   mac access-group acl-name}</code> |
| <b>Mode</b>    | Global Config                                                                                               |

### 4.26.3.1 no monitor session filter

This command removes the specified IP/MAC ACL from the selected monitoring session.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no smonitor session session-id filter {ip access-group   mac access-group }</code> |
| <b>Mode</b>   | Global Config                                                                            |

### 4.26.4 monitor session mode

This command enables the selected port mirroring session. This command configures a probe port and a monitored port for monitor session (port monitoring).

A VLAN can be configured as the source to a session (all member ports of that VLAN are monitored). Remote port mirroring is configured by adding the RSPAN VLAN ID. At the source switch, the destination is configured as the RSPAN VLAN and at the destination switch, the source is configured as the RSPAN VLAN.

**NOTICE**

The source and destination cannot be configured as remote on the same device.

The commands described below add a mirrored port (source port) to a session identified with session-id. The session-id parameter is an integer value used to identify the session. The maximum number of sessions which can be configured is L7\_MIRRORING\_MAX\_SESSIONS. Option rx is used to monitor only ingress packets. Option tx is used to monitor only egress packets. If no option is specified, both ingress and egress packets, RX and TX, are monitored.

A VLAN can also be configured as the source to a session (all the member ports of that VLAN are monitored).

**NOTICE**

If an interface participates in some VLAN and is a LAG member, this VLAN cannot be assigned as a source VLAN for a Monitor session. At the same time, if an interface participates in some VLAN and this VLAN is assigned as a source VLAN for a Monitor session, the interface can be assigned as a LAG member.

Remote port mirroring is configured by giving the RSPAN VLAN ID. At the source switch the destination is configured as RSPAN VLAN and at the destination switch the source is configured as RSPAN VLAN.

**NOTICE**

- Source and destination cannot be configured as remote on the same device.
- On the intermediate switch: RSPAN VLAN should be created, the ports connected towards the Source and Destination switch should have the RSPAN VLAN participation. RSPAN VLAN egress tagging should be enabled on interface on intermediate switch connected towards Destination switch.

**Default**           None  
**Format**           `monitor session session-id mode`  
**Mode**             Global Config

#### 4.26.4.1 no monitor session mode

This command disables the selected port mirroring session.

**Format**           `no monitor session session-id mode`  
**Mode**             Global Config

#### 4.26.5 no monitor session

Use this command without optional parameters to remove the monitor session (port monitoring) designation from the source probe port, the destination monitored port and all VLANs. Once the port is removed from the VLAN, you must manually add the port to any desired VLANs. Use the `source interface slot/port` parameter or `destination interface` to remove the specified interface from the port monitoring session. Use the `mode` parameter to disable the administrative mode of the session.

**Format**           `no monitor session session-id {source {interface slot/port | cpu | lag} |vlan|  
remote vlan} | destination { interface | remote vlan | mode |filter {ip access-group  
|mac access-group}}}]`  
**Mode**             Global Config

#### 4.26.6 no monitor

This command removes all the source ports and a destination port and restores the default value for mirroring session mode for all the configured sessions.

---

This is a stand-alone no command. This command does not have a "normal" form.

### NOTICE

---

**Default**           enabled  
**Format**           `no monitor`  
**Mode**             Global Config

#### 4.26.7 monitor session type erspan-source

This command configures an ERSPAN source session number and enters ERSPAN Source Session Configuration mode for the session.

**Format**           `monitor session session-id type erspan-source`  
**Mode**             Global Config

#### 4.26.7.1 no monitor session type erspan-source

This command removes the specified ERSPAN source session configuration.

**Format**           `no monitor session session-id erspan-source`  
**Mode**             Global Config

#### 4.26.8 show monitor session

This command displays the Port monitoring information for a particular mirroring session.

**NOTICE**

- The `session-id` parameter is an integer value used to identify the session. In the current version of the software, the `session-id` parameter is always one (1).
- The displayed columns remain empty for non-configured parameters.
- The IP ACL and MAC ACL columns are not present for non-QoS builds.

**Format**            `show monitor session {session-id | all}`

**Mode**             Privileged EXEC

| Parameter                            | Description                                                                                                                                                                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Session ID                           | An integer value used to identify the session. Its value can be anything between 1 and the maximum number of mirroring sessions allowed on the platform.                                                                           |
| Session Type                         | The type of monitor session.                                                                                                                                                                                                       |
| Admin Mode                           | Indicates whether the Port Mirroring feature is enabled or disabled for the session identified with <code>session-id</code> . The possible values are Enabled and Disabled.                                                        |
| Probe Port                           | Probe port (destination port) for the session identified with <code>session-id</code> . If probe port is not set then this field is blank.                                                                                         |
| Remove RSPAN Tag                     | Remove RSPAN VLAN tag on the probe (destination) port. To configure this value probe port and remove RSPAN tag values should be specified simultaneously. If no probe port is configured for the session then this field is blank. |
| Source VLAN                          | All member ports of this VLAN are mirrored. If the source VLAN is not configured, this field is blank.                                                                                                                             |
| Mirrored Ports                       | The port that is configured as a mirrored port (source port) for the session identified with <code>session-id</code> . If no source port is configured for the session, this field is blank.                                       |
| Reflector Port                       | This port carries all the mirrored traffic at the source switch.                                                                                                                                                                   |
| Source RSPAN VLAN                    | The source VLAN configured at the destination switch. If remote VLAN is not configured, this field is blank                                                                                                                        |
| Destination RSPAN VLAN               | The destination VLAN configured at the source switch. If remote VLAN is not configured, this field is blank                                                                                                                        |
| Source ERSPAN Flow ID                | The ID number used by the source session to identify the ERSPAN traffic.                                                                                                                                                           |
| Source ERSPAN IP address             | The ERSPAN flow destination IP address , which must be an address on a local interface and match the address entered in the ERSPAN destination session configuration.                                                              |
| Destination ERSPAN Flow ID           | The ID number used by the destination session to identify the ERSPAN traffic, must also be entered in the ERSPAN destination session configuration.                                                                                |
| Destination ERSPAN IP address        | The ERSPAN flow destination IPv4 address , which must also be configured on an interface on the destination switch and be entered in the ERSPAN destination session configuration.                                                 |
| Destination ERSPAN Origin IP address | The IPv4 address used as the source of the ERSPAN traffic.                                                                                                                                                                         |
| Destination ERSPAN IP TTL            | The IPv4 TTL value of the packets in the ERSPAN traffic.                                                                                                                                                                           |
| Destination ERSPAN IP DSCP           | The IP DSCP value of the packets in the ERSPAN traffic.                                                                                                                                                                            |
| Destination ERSPAN IP Precedence     | The IP precedence value of the packets in the ERSPAN traffic.                                                                                                                                                                      |
| IP ACL                               | The IP access-list id or name attached to the port mirroring session.                                                                                                                                                              |
| MAC ACL                              | The MAC access-list name attached to the port mirroring session.                                                                                                                                                                   |

**Example:** This example shows the command output when the session ID is specified.

```
(Switch)#show monitor session 1
Session ID..... 1
```



```

Session Type..... ERSPAN Source
Admin Mode..... Enabled
Probe Port..... 1/0/8
Remove RSPAN Tag..... False
Source VLAN.....
Mirrored Ports.....
Reflector Port.....
Source RSPAN VLAN.....
Destination RSPAN VLAN.....
Source ERSPAN Flow ID..... 1023
Source ERSPAN IP Address..... 255.255.255.255
Destination ERSPAN Flow ID.....
Destination ERSPAN IP Address.....
Destination ERSPAN Origin IP.....
Destination ERSPAN IP TTL.....
Destination ERSPAN IP DSCP.....
Destination ERSPAN IP Precedence.....
IP ACL.....
MAC ACL..... mymac

```

**Example:** This example shows the command output when `all` is specified.

```
(Routing)#show monitor session all
```

```

Session ID..... 1
Session Type..... ERSPAN Destination
Admin Mode..... Enable
Probe Port..... 1/0/8
Remove RSPAN Tag..... False
Source VLAN.....
Mirrored Ports.....
Reflector Port.....
Source RSPAN VLAN.....
Destination RSPAN VLAN.....
Source ERSPAN Flow ID..... 1023
Source ERSPAN IP Address..... 255.255.255.255
Destination ERSPAN Flow ID.....
Destination ERSPAN IP Address.....
Destination ERSPAN Origin IP.....
Destination ERSPAN IP TTL.....
Destination ERSPAN IP DSCP.....
Destination ERSPAN IP Precedence.....
IP ACL.....
MAC ACL..... mymac

Session ID..... 2
Session Type..... Local
Admin Mode..... Disabled
Probe Port..... 1/0/2
Remove RSPAN Tag..... False
Source VLAN.....
Mirrored Ports..... 1/0/1(Rx), 1/0/19(Rx,Tx), 1/0/20(Tx)
Reflector Port.....
Source RSPAN VLAN.....
Destination RSPAN VLAN.....
Source ERSPAN Flow ID.....
Source ERSPAN IP Address.....
Destination ERSPAN Flow ID.....
Destination ERSPAN IP Address.....
Destination ERSPAN Origin IP.....
Destination ERSPAN IP TTL.....
Destination ERSPAN IP DSCP.....
Destination ERSPAN IP Precedence.....

```

```

IP ACL.....
MAC ACL.....

Session ID..... 3
Session Type..... RSPAN Source
Admin Mode..... Disabled
Probe Port.....
Remove RSPAN Tag.....
Source VLAN.....
Mirrored Ports..... 0/5/1(Rx,Tx)
Reflector Port..... 1/0/10
Source RSPAN VLAN.....
Destination RSPAN VLAN..... 2
Source ERSPAN Flow ID.....
Source ERSPAN IP Address.....
Destination ERSPAN Flow ID.....
Destination ERSPAN IP Address.....
Destination ERSPAN Origin IP.....
Destination ERSPAN IP TTL.....
Destination ERSPAN IP DSCP.....
Destination ERSPAN IP Precedence.....
IP ACL.....
MAC ACL.....

Session ID..... 4
Session Type..... RSPAN Destination
Admin Mode..... Disabled
Probe Port.....
Remove RSPAN Tag.....
Source VLAN.....
Mirrored Ports..... 0/3/1(Rx,Tx)
Reflector Port..... 1/0/3
Source RSPAN VLAN.....
Destination RSPAN VLAN..... 2
Source ERSPAN Flow ID.....
Source ERSPAN IP Address.....
Destination ERSPAN Flow ID.....
Destination ERSPAN IP Address.....
Destination ERSPAN Origin IP.....
Destination ERSPAN IP TTL.....
Destination ERSPAN IP DSCP.....
Destination ERSPAN IP Precedence.....
IP ACL..... ipacl
MAC ACL..... mmac

```

#### 4.26.9 show vlan remote-span

This command displays the configured RSPAN VLAN.

**Format** show vlan remote-span

**Mode** Privileged EXEC Mode

**Example:** The following shows example output for the command.

```
(Switch)# show vlan remote-span
```

```
Remote SPAN VLAN
```

```

100,102,201,303
```

## 4.27 ERSPAN Source Switch Configuration Commands

The Encapsulated Remote Port Analyzer (ERSPAN) feature allows port-mirroring collection points to be located anywhere across a routed network. This is achieved by encapsulating L2 mirrored packets using GRE with IP delivery. After a packet has been encapsulated, it can be forwarded throughout the L3-routed network.

ERSPAN uses a GRE tunnel to carry traffic between switches. ERSPAN consists of an ERSPAN source session, an ERSPAN destination session, and routable ERSPAN GRE-encapsulated traffic. All participating switches must be connected at Layer 3, and the network path must support the size of the ERSPAN traffic for the egress mirroring session.

To configure the source ERSPAN session, the following parameters should be configured at the source switch:

- Source ports (that is, the traffic on this port is mirrored)
- ERSPAN destination IPv4 address
- ERSPAN origin IPv4 address
- ERSPAN session ID
- TX/RX

The following sections describe the commands to configure the ERSPAN source session.

### 4.27.1 source

This command configures the source interface for selected ERSPAN monitor session.

|                |                                                                                  |
|----------------|----------------------------------------------------------------------------------|
| <b>Default</b> | None                                                                             |
| <b>Format</b>  | source {interface {slot/port   cpu   lag lag-group-id}   vlan vlan-id} [rx   tx] |
| <b>Mode</b>    | ERSPAN Source Session Configuration Mode                                         |

#### 4.27.1.1 no source

This command removes the specified mirrored port from the selected ERSPAN mirroring session.

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| <b>Format</b> | no source {interface {slot/port   cpu   lag lag-group-id}   vlan vlan-id } |
| <b>Mode</b>   | ERSPAN Source Session Configuration Mode                                   |

### 4.27.2 destination

Use this command to enter the ERSPAN Source Session Destination Configuration mode.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | None                                     |
| <b>Format</b>  | destination                              |
| <b>Mode</b>    | ERSPAN Source Session Configuration Mode |

#### 4.27.2.1 no destination

Use the `no` form of the command to remove the ERSPAN Source Session Destination configuration.

|               |                                          |
|---------------|------------------------------------------|
| <b>Format</b> | no destination                           |
| <b>Mode</b>   | ERSPAN Source Session Configuration Mode |

### 4.27.3 ip address

This command configures the ERSPAN destination IP address.

**NOTE:** The IP address is the address of the monitoring station on which the GRE traffic is recorded or decoded.

**Default**           None  
**Format**            *ip address ip-address*  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.3.1 no ip address

This command removes the ERSPAN destination IP address configuration.

**Format**            no ip address  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.4 erspan-id

This command configures the ERSPAN flow ID number used by the source and destination sessions to identify the ERSPAN traffic. The valid range for *erspan-id* is 1 to 1023.

**Default**           None  
**Format**            *erspan-id erspan-id*  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.4.1 no erspan-id

This command removes the ERSPAN destination IP address configuration.

**Format**            no erspan-id  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.5 origin ip address

This command configures the IP address used as the source of the ERSPAN traffic.

**Default**           None  
**Format**            *origin ip address ip-address*  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.5.1 no origin ip address

This command removes the ERSPAN origin IP address configuration.

**Format**            no origin ip address  
**Mode**             ERSPAN Source Session Destination Configuration Mode

#### 4.27.6 ip ttl

This command configures the IP time-to-live (TTL) value of the packets in the ERSPAN traffic. The valid range for *ttl-value* is 1 to 255.

**Default**           64  
**Format**            *ip ttl ttl-value*  
**Mode**             ERSPAN Source Session Destination Configuration Mode

### 4.27.6.1 no ip ttl

This command removes the ERSPAN IP TTL value configuration.

**Format** no ip ttl  
**Mode** ERSPAN Source Session Destination Configuration Mode

### 4.27.7 ip dscp

This command configures the IP DSCP value of the packets in the ERSPAN traffic. The valid range for *dscp-value* is 0 to 63.

**Default** 64  
**Format** ip dscp *dscp-value*  
**Mode** ERSPAN Source Session Destination Configuration Mode

#### 4.27.7.1 no ip dscp

This command removes the ERSPAN IP DSCP value configuration.

**Format** no ip dscp  
**Mode** ERSPAN Source Session Destination Configuration Mode

### 4.27.8 ip prec

This command configures the IP precedence value of the packets in the ERSPAN traffic. The valid range for *precedence-value* is 0 to 7.

**Default** 0  
**Format** ip prec *precedence-value*  
**Mode** ERSPAN Source Session Destination Configuration Mode

#### 4.27.8.1 no ip prec

This command removes the ERSPAN IP precedence value configuration.

**Format** no ip prec  
**Mode** ERSPAN Source Session Destination Configuration Mode

### 4.27.9 reflector-port

This command configures the reflector interface for the selected ERSPAN monitor session. You can configure a LAG port as a destination or reflector port in SPAN, RSPAN, and ERSPAN modes. In these modes, source and destination ports of a mirror session are distributed across multiple devices.

---

**NOTICE**

This command is not available in builds with the routing package. The command is only available in builds with the switching-only package.

---

**Default** 0  
**Format** reflector-port {*sLot/port* | *lag* <*lag-group-id*>}  
**Mode** ERSPAN Source Session Configuration Mode

### 4.27.9.1 no reflector-port

This command removes the reflector port from the selected ERSPAN mirroring session.

**Format** no reflector-port  
**Mode** ERSPAN Source Session Configuration Mode

## 4.28 Static MAC Filtering Commands

The commands in this section describe how to configure static MAC filtering. Static MAC filtering allows you to configure destination ports for a static multicast MAC filter irrespective of the platform.

### 4.28.1 macfilter

This command adds a static MAC filter entry for the MAC address *macaddr* on the VLAN *vlanid*. The value of the *macaddr* parameter is a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The restricted MAC Addresses are: 00:00:00:00:00:00, 01:80:C2:00:00:00 to 01:80:C2:00:00:0F, 01:80:C2:00:00:20 to 01:80:C2:00:00:21, and FF:FF:FF:FF:FF:FF. The *vlanid* parameter must identify a valid VLAN.

The number of static mac filters supported on the system is different for MAC filters where source ports are configured and MAC filters where destination ports are configured.

For current Broadcom platforms, you can configure the following combinations:

- Unicast MAC and source port
- Multicast MAC and source port
- Multicast MAC and destination port (only)
- Multicast MAC and source ports and destination ports

**Format** macfilter *macaddr* *vlanid*  
**Mode** Global Config

#### 4.28.1.1 no macfilter

This command removes all filtering restrictions and the static MAC filter entry for the MAC address *macaddr* on the VLAN *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The *vlanid* parameter must identify a valid VLAN.

**Format** no macfilter *macaddr* *vlanid*  
**Mode** Global Config

### 4.28.2 macfilter adddest

Use this command to add the interface or range of interfaces to the destination filter set for the MAC filter with the given *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

---

Configuring a destination port list is only valid for multicast MAC addresses.

#### **NOTICE**

**Format** macfilter adddest *macaddr*  
**Mode** Interface Config

#### 4.28.2.1 no macfilter adddest

This command removes a port from the destination filter set for the MAC filter with the given *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The *vlanid* parameter must identify a valid VLAN.

**Format**           no macfilter adddest *macaddr*  
**Mode**             Interface Config

### 4.28.3    macfilter adddest all

This command adds all interfaces to the destination filter set for the MAC filter with the given *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

---

Configuring a destination port list is only valid for multicast MAC addresses.

#### NOTICE

---

**Format**           macfilter adddest all *macaddr*  
**Mode**             Global Config

#### 4.28.3.1   no macfilter adddest all

This command removes all ports from the destination filter set for the MAC filter with the given *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

**Format**           no macfilter adddest all *macaddr*  
**Mode**             Global Config

### 4.28.4    macfilter addsrc

This command adds the interface or range of interfaces to the source filter set for the MAC filter with the MAC address of *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

**Format**           macfilter addsrc *macaddr vlanid*  
**Mode**             Interface Config

#### 4.28.4.1   no macfilter addsrc

This command removes a port from the source filter set for the MAC filter with the MAC address of *macaddr* and VLAN of *vlanid*. The *macaddr* parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

**Format**           no macfilter addsrc *macaddr vlanid*  
**Mode**             Interface Config

### 4.28.5    macfilter addsrc all

This command adds all interfaces to the source filter set for the MAC filter with the MAC address of *macaddr* and *vlanid*. You must specify the *macaddr* parameter as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6. The *vlanid* parameter must identify a valid VLAN.

**Format**           macfilter addsrc all *macaddr vlanid*  
**Mode**             Global Config

### 4.28.5.1 no macfilter addsrc all

This command removes all interfaces to the source filter set for the MAC filter with the MAC address of *macaddr* and VLAN of *vlanid*. You must specify the *macaddr* parameter as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The *vlanid* parameter must identify a valid VLAN.

**Format**           no macfilter addsrc all *macaddr* *vlanid*

**Mode**             Global Config

### 4.28.6 show mac-address-table static

This command displays the Static MAC Filtering information for all Static MAC Filters. If you specify *all*, all the Static MAC Filters in the system are displayed. If you supply a value for *macaddr*, you must also enter a value for *vlanid*, and the system displays Static MAC Filter information only for that MAC address and VLAN.

**Format**           show mac-address-table static {*macaddr* *vlanid* | *all*}

**Mode**             Privileged EXEC

The command output includes the fields shown in the following table.

| Parameter    | Description                                     |
|--------------|-------------------------------------------------|
| MAC Address  | The MAC Address of the static MAC filter entry. |
| VLAN ID      | The VLAN ID of the static MAC filter entry.     |
| Source Ports | The source port filter set's slot and ports.    |

---

Only multicast address filters will have destination port lists.

#### NOTICE

### 4.28.7 show mac-address-table staticfiltering

This command displays the Static Filtering entries in the Multicast Forwarding Database (MFDB) table.

**Format**           show mac-address-table staticfiltering

**Mode**             Privileged EXEC

| Parameter   | Description                                                                                                                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID     | The VLAN in which the MAC Address is learned.                                                                                                                                                                                                                                     |
| MAC Address | A unicast MAC address for which the switch has forwarding and or filtering information. As the data is gleaned from the MFDB, the address will be a multicast address. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Type        | The type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.                                                                                                        |
| Description | The text description of this multicast table entry.                                                                                                                                                                                                                               |
| Interfaces  | The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).                                                                                                                                                                                            |

## 4.29 DHCP L2 Relay Agent Commands

You can enable the switch to operate as a DHCP Layer 2 relay agent to relay DHCP requests from clients to a Layer 3 relay agent or server. The Circuit ID and Remote ID can be added to DHCP requests relayed from clients to a DHCP server. This information is included in DHCP Option 82, as specified in sections 3.1 and 3.2 of RFC3046.



## 4.29.1 dhcp l2relay

This command enables the DHCP Layer 2 Relay agent for an interface a range of interfaces in, or all interfaces. The subsequent commands mentioned in this section can only be used when the DHCP L2 relay is enabled.

**Format**            `dhcp l2relay`  
**Mode**             • Global Config  
                      • Interface Config

### 4.29.1.1 no dhcp l2relay

This command disables DHCP Layer 2 relay agent for an interface or range of interfaces.

**Format**            `no dhcp l2relay`  
**Mode**             • Global Config  
                      • Interface Config

## 4.29.2 dhcp l2relay circuit-id subscription

This command sets the Option-82 Circuit ID for a given service subscription identified by *subscription-string* on a given interface. The *subscription-string* is a character string which needs to be matched with a configured DOT1AD subscription string for correct operation. When circuit-id is enabled using this command, all Client DHCP requests that fall under this service subscription are added with Option-82 circuit-id as the incoming interface number.

**Default**            disabled  
**Format**            `dhcp l2relay circuit-id subscription subscription-string`  
**Mode**             Interface Config

### 4.29.2.1 no dhcp l2relay circuit-id subscription

This command resets the Option-82 Circuit ID for a given service subscription identified by *subscription-string* on a given interface. The *subscription-string* is a character string which needs to be matched with a configured DOT1AD subscription string for correct operation. When circuit-id is disabled using this command, all Client DHCP requests that fall under this service subscription are no longer added with Option-82 circuit-id.

**Format**            `no dhcp l2relay circuit-id subscription subscription-string`  
**Mode**             Interface Config

## 4.29.3 dhcp l2relay circuit-id vlan

This parameter sets the DHCP Option-82 Circuit ID for a VLAN. When enabled, the interface number is added as the Circuit ID in DHCP option 82.

**Format**            `dhcp l2relay circuit-id vlan vlan-list`  
**Mode**             Global Config

| Parameter | Description                                                                                                                                                  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | The VLAN ID. The range is 1 to 4093. Separate nonconsecutive IDs with a comma (,) no spaces and no zeros in between the range. Use a dash (-) for the range. |

### 4.29.3.1 no dhcp l2relay circuit-id vlan

This parameter clears the DHCP Option-82 Circuit ID for a VLAN.

**Format** no dhcp l2relay circuit-id vlan *vlan-list*  
**Mode** Global Config

#### 4.29.4 dhcp l2relay remote-id subscription

This command sets the Option-82 Remote-ID string for a given service subscription identified by *subscription-string* on a given interface or range of interfaces. The *subscription-string* is a character string which needs to be matched with a configured DOT1AD subscription string for correct operation. The *remoteid-string* is a character string. When *remote-id* string is set using this command, all Client DHCP requests that fall under this service subscription are added with Option-82 Remote-id as the configured *remote-id* string.

**Default** empty string  
**Format** dhcp l2relay remote-id *remoteid-string* subscription-name *subscription-string*  
**Mode** Interface Config

##### 4.29.4.1 no dhcp l2relay remote-id subscription

This command resets the Option-82 Remote-ID string for a given service subscription identified by *subscription-string* on a given interface. The *subscription-string* is a character string which needs to be matched with a configured DOT1AD subscription string for correct operation. When *remote-id* string is reset using this command, the Client DHCP requests that fall under this service subscription are not added with Option-82 Remote-id.

**Format** no dhcp l2relay remote-id *remoteid-string* subscription-name *subscription-string*  
**Mode** Interface Config

#### 4.29.5 dhcp l2relay remote-id vlan

This parameter sets the DHCP Option-82 Remote ID for a VLAN and subscribed service (based on *subscription-name*).

**Format** dhcp l2relay remote-id *remote-id-string* vlan *vlan-list*  
**Mode** Global Config

| Parameter | Description                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | The VLAN ID. The range is 1 to 4093. Separate nonconsecutive IDs with a comma (,), no spaces and no zeros in between the range. Use a dash (-) for the range. |

##### 4.29.5.1 no dhcp l2relay remote-id vlan

This parameter clears the DHCP Option-82 Remote ID for a VLAN and subscribed service (based on *subscription-name*).

**Format** no dhcp l2relay remote-id vlan *vlan-list*  
**Mode** Global Config

#### 4.29.6 dhcp l2relay subscription

This command enables relaying DHCP packets on an interface or range of interfaces that fall under the specified service subscription. The *subscription-string* is a character string that needs to be matched with configured DOT1AD subscription string for correct operation.

**Default** disabled (that is, no DHCP packets are relayed)  
**Format** dhcp l2relay subscription-name *subscription-string*  
**Mode** Interface Config

#### 4.29.6.1 no dhcp l2relay subscription

This command disables relaying DHCP packets that fall under the specified service subscription. The `subscription-string` is a character string that needs to be matched with configured DOT1AD subscription string for correct operation.

**Format**            `no dhcp l2relay subscription-name subscription-string`  
**Mode**             Interface Config

#### 4.29.7 dhcp l2relay trust

Use this command to configure an interface or range of interfaces as trusted for Option-82 reception.

**Default**            untrusted  
**Format**            `dhcp l2relay trust`  
**Mode**             Interface Config

#### 4.29.7.1 no dhcp l2relay trust

Use this command to configure an interface to the default untrusted for Option-82 reception.

**Format**            `no dhcp l2relay trust`  
**Mode**             Interface Config

#### 4.29.8 dhcp l2relay trust no-option-82 update

Use this command to configure an update action on trusted ports. When this action is configured, option-82 is added to frames received without option-82 on trusted ports. Option-82 that includes remote identifier and circuit identifier needs to be configured using the following commands:

- [Section 4.29.3: "dhcp l2relay circuit-id vlan"](#).
- [Section 4.29.5: "dhcp l2relay remote-id vlan"](#).

**Default**            drop  
**Format**            `dhcp l2relay trust no-option-82 update`  
**Mode**             Interface Config

#### 4.29.8.1 no dhcp l2relay trust no-option-82

The `no` form of the command configures the default action for packets received without option-82 on a trusted port. Upon issuing this command, frames received without option-82 on trusted ports are dropped.

**Format**            `no dhcp l2relay trust no-option-82`  
**Mode**             Interface Config

#### 4.29.9 dhcp l2relay vlan

Use this command to enable the DHCP L2 Relay agent for a set of VLANs. All DHCP packets which arrive on interfaces in the configured VLAN are subject to L2 Relay processing.

**Default**            disable  
**Format**            `dhcp l2relay vlan vlan-List`  
**Mode**             Global Config

| Parameter | Description                                                                                                                                                  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | The VLAN ID. The range is 1 to 4093. Separate nonconsecutive IDs with a comma (,) no spaces and no zeros in between the range. Use a dash (-) for the range. |

#### 4.29.9.1 no dhcp l2relay vlan

Use this command to disable the DHCP L2 Relay agent for a set of VLANs.

**Format** no dhcp l2relay vlan *vlan-list*

**Mode** Global Config

#### 4.29.10 show dhcp l2relay all

This command displays the summary of DHCP L2 Relay configuration. A column displays the action for `option-82` configured on trusted ports. On untrusted ports, `na` is displayed indicating not applicable. On trusted ports, by default, `drop` is displayed. For more information, see [Section 4.29.8: "dhcp l2relay trust no-option-82 update"](#).

**Format** show dhcp l2relay [{all} | {interface <slot/port>}]

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command `show dhcp l2relay all`.

(Switching) #show dhcp l2relay all

DHCP L2 Relay is Enabled.

| Interface | L2RelayMode | TrustMode | No-Option-82 |
|-----------|-------------|-----------|--------------|
| 1/0/1     | Disabled    | untrusted | na           |
| 1/0/2     | Disabled    | untrusted | na           |
| 1/0/3     | Disabled    | untrusted | na           |
| 1/0/4     | Disabled    | untrusted | na           |
| 1/0/5     | Disabled    | untrusted | na           |
| 1/0/6     | Disabled    | untrusted | na           |
| 1/0/7     | Disabled    | untrusted | na           |
| 1/0/8     | Disabled    | untrusted | na           |
| 1/0/9     | Disabled    | untrusted | na           |
| 1/0/10    | Disabled    | untrusted | na           |
| 1/0/11    | Disabled    | untrusted | na           |
| 1/0/12    | Disabled    | untrusted | na           |
| 1/0/13    | Disabled    | untrusted | na           |
| 1/0/14    | Disabled    | untrusted | na           |
| 1/0/15    | Disabled    | untrusted | na           |
| 1/0/16    | Disabled    | untrusted | na           |
| lag 1     | Enabled     | trusted   | update       |
| lag 2     | Disabled    | untrusted | na           |

**Example:** The following shows example CLI display output for the command `show dhcp l2relay interface 0/13/1`.

(Switching) #show dhcp l2relay interface 0/13/1

DHCP L2 Relay is Enabled.

| Interface | L2RelayMode | TrustMode | No-Option-82 |
|-----------|-------------|-----------|--------------|
| lag 1     | Enabled     | trusted   | update       |

### 4.29.11 show dhcp l2relay circuit-id vlan

This command displays DHCP circuit-id vlan configuration.

**Format** show dhcp l2relay circuit-id vlan *vlan-list*

**Mode** Privileged EXEC

| Parameter | Description                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | Enter VLAN IDs in the range 1 to 4093. Use a dash (-) to specify a range or a comma (,) to separate VLAN IDs in a list. Spaces and zeros are not permitted. |

### 4.29.12 show dhcp l2relay interface

This command displays DHCP L2 relay configuration specific to interfaces.

**Format** show dhcp l2relay interface {all | *interface-num*}

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show dhcp l2relay interface all
```

```
DHCP L2 Relay is Enabled.
```

```
Interface L2RelayMode TrustMode
----- -
0/2 Enabled untrusted
0/4 Disabled trusted
```

### 4.29.13 show dhcp l2relay remote-id vlan

This command displays DHCP Remote-id VLAN configuration.

**Format** show dhcp l2relay remote-id vlan *vlan-list*

**Mode** Privileged EXEC

| Parameter | Description                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | Enter VLAN IDs in the range 1 to 4093. Use a dash (-) to specify a range or a comma (,) to separate VLAN IDs in a list. Spaces and zeros are not permitted. |

### 4.29.14 show dhcp l2relay stats interface

This command displays statistics specific to DHCP L2 Relay configured interface.

**Format** show dhcp l2relay stats interface {all | *interface-num*}

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show dhcp l2relay stats interface all
```

```
DHCP L2 Relay is Enabled.
```

```
Interface UntrustedServer UntrustedClient TrustedServer TrustedClient
 MsgsWithOpt82 MsgsWithOpt82 MsgsWithoutOpt82 MsgsWithoutOpt82
----- -
0/1 0 0 0 0
```

|     |   |    |   |   |
|-----|---|----|---|---|
| 0/2 | 0 | 0  | 3 | 7 |
| 0/3 | 0 | 0  | 0 | 0 |
| 0/4 | 0 | 12 | 0 | 0 |
| 0/5 | 0 | 0  | 0 | 0 |
| 0/6 | 3 | 0  | 0 | 0 |
| 0/7 | 0 | 0  | 0 | 0 |
| 0/8 | 0 | 0  | 0 | 0 |
| 0/9 | 0 | 0  | 0 | 0 |

#### 4.29.15 show dhcp l2relay subscription interface

This command displays DHCP L2 Relay configuration specific to a service subscription on an interface.

**Format** show dhcp l2relay subscription interface {all|interface-num}  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show dhcp l2relay subscription interface all
Interface SubscriptionName L2Relay mode Circuit-Id mode Remote-Id mode

0/1 sub1 Enabled Disabled --NULL--
0/2 sub3 Enabled Disabled EnterpriseSwitch
0/2 sub22 Disabled Enabled --NULL--
0/4 sub4 Enabled Enabled --NULL--
```

#### 4.29.16 show dhcp l2relay agent-option vlan

This command displays the DHCP L2 Relay Option-82 configuration specific to VLAN.

**Format** show dhcp l2relay agent-option vlan *vlan-range*  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show dhcp l2relay agent-option vlan 5-10
```

DHCP L2 Relay is Enabled.

| VLAN Id | L2 Relay | CircuitId | RemoteId |
|---------|----------|-----------|----------|
| 5       | Enabled  | Enabled   | --NULL-- |
| 6       | Enabled  | Enabled   | broadcom |
| 7       | Enabled  | Disabled  | --NULL-- |
| 8       | Enabled  | Disabled  | --NULL-- |
| 9       | Enabled  | Disabled  | --NULL-- |
| 10      | Enabled  | Disabled  | --NULL-- |

#### 4.29.17 show dhcp l2relay vlan

This command displays DHCP vlan configuration.

**Format** show dhcp l2relay vlan *vlan-list*  
**Mode** Privileged EXEC

| Parameter | Description                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vlan-list | Enter VLAN IDs in the range 1 to 4093. Use a dash (-) to specify a range or a comma (,) to separate VLAN IDs in a list. Spaces and zeros are not permitted. |

### 4.29.18 clear dhcp l2relay statistics interface

Use this command to reset the DHCP L2 relay counters to zero. Specify the port with the counters to clear, or use the `all` keyword to clear the counters on all ports.

**Format**            `clear dhcp l2relay statistics interface {slot/port | all}`  
**Mode**             Privileged EXEC

## 4.30 DHCP Client Commands

FASTPATH can include vendor and configuration information in DHCP client requests relayed to a DHCP server. This information is included in DHCP Option 60, Vendor Class Identifier. The information is a string of 128 octets.

### 4.30.1 dhcp client vendor-id-option

This command enables the inclusion of DHCP Option-60, Vendor Class Identifier included in the requests transmitted to the DHCP server by the DHCP client operating in the FASTPATH switch.

**Format**            `dhcp client vendor-id-option`  
**Mode**             Global Config

#### 4.30.1.1 no dhcp client vendor-id-option

This command disables the inclusion of DHCP Option-60, Vendor Class Identifier included in the requests transmitted to the DHCP server by the DHCP client operating in the FASTPATH switch.

**Format**            `no dhcp client vendor-id-option`  
**Mode**             Global Config

### 4.30.2 dhcp client vendor-id-option-string

This parameter sets the DHCP Vendor Option-60 string to be included in the requests transmitted to the DHCP server by the DHCP client operating in the FASTPATH switch.

**Format**            `dhcp client vendor-id-option-string string`  
**Mode**             Global Config

#### 4.30.2.1 no dhcp client vendor-id-option-string

This parameter clears the DHCP Vendor Option-60 string.

**Format**            `no dhcp client vendor-id-option-string`  
**Mode**             Global Config

### 4.30.3 show dhcp client vendor-id-option

This command displays the configured administration mode of the `vendor-id-option` and the `vendor-id string` to be included in Option-43 in DHCP requests.

**Format**            `show dhcp client vendor-id-option`  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show dhcp client vendor-id-option
```

```
DHCP Client Vendor Identifier Option is Enabled
DHCP Client Vendor Identifier Option string is FastpathClient.
```

### 4.30.4 dhcp client client-id-option

This command specifies the mode for setting a DHCP client identifier (DHCP option 61). The client identifier is sent if one of the options below is specified, otherwise (default, "no"-command) the option is disabled. The user can either select an automatic constructed unique ID (parameter "auto") or define a fixed unique string (parameter "fixed").

All constructed identifiers are preceded by a byte 0x00 which defines the 'hardware-type' as 'other'. Related to the type the client identifier is then constructed as:

- "fixed":  
"hardware-type" followed by specified string.
- "auto":  
"hardware-type" followed by an ascii string containing the MAC Address and the network management VLAN ID separated by "-vl".  
(e.g. 0x00 "00a0.a573.449c-vl1")
- "oem":  
byte 1: 0x00 (hardware type)  
bytes 2-5: shelf address information (cabinet row/column and chassis vertical/horizontal dev)  
bytes 6-8: address information (logical slot number, module type and number)  
bytes 9-10: shelf address information (cabinet and subrack HMS number)  
bytes 11-12: device ID  
byte 13: request identifier (=0xff)  
bytes 14-16: release information (version/edition/repair)

**Format**            **dhcp client client-id-option** <string>  
                      **dhcp client client-id-option auto**  
                      **dhcp client client-id-option oem**

**Modes**            Global Config

#### 4.30.4.1 no dhcp client client-id-option

This command disables DHCP client identifier (DHCP option 61).

**Format**            **no dhcp client client-id-option**

**Modes**            Global Config

### 4.30.5 show dhcp client client-id-option

This command shows the status configured type of the DHCP client identifier (enabled/disabled). If the feature is enabled the type of DHCP client identifier calculation and the value are shown.

**Format**            **show dhcp client client-id-option**

**Modes**            Privileged Exec

### 4.30.6 ip dhcp force-client-id

This feature allows the manipulation of DHCP packets related to the receiving port and (optional and only if Layer3-functionality provided) VLAN.

This command enables the manipulation of a DHCP packet. If enabled a new client identifier is added either the specified one or (if not specified) a default identifier, containing the related slot/port. The manipulation can be done independent of the VLAN or for a special VLAN (only if Layer-3 functionality is provided). First VLAN related specifications are used before the general rule is used. Maximal 32 rules can be specified for a port.

**Format**            **ip dhcp force-client-id**  
                      **ip dhcp force-client-id** <identifier>  
                      **ip dhcp force-client-id vlan** <1-4093>  
                      **ip dhcp force-client-id vlan** <1-4093> <identifier>

**Mode**            Interface Config



### 4.30.6.1 no ip dhcp force-client-id

This command disables the manipulation of a DHCP packet.

**Format**            `no ip dhcp force-client-id`  
                       `no ip dhcp force-client-id vlan <1-4093>`

**Mode**             Interface Config

### 4.30.7 show ip dhcp force-client-id

This command displays the mode (enabled/disabled) and the related VLAN and client-identifier for a specified interface (<slot/port>) or for all physical interfaces.

**Format**            `show ip dhcp force-client-id { all | <slot/port>}`

**Mode**             Privileged Exec

### 4.30.8 clear ip dhcp force-client-id

This command clears all configured manipulation rules for DHCP packets for all interfaces.

**Format**            `clear ip dhcp force-client-id`

**Mode**             Privileged Exec

## 4.31 DHCP Snooping Configuration Commands

This section describes commands you use to configure DHCP Snooping.

### 4.31.1 ip dhcp snooping

Use this command to enable DHCP Snooping globally.

**Default**            disabled

**Format**            `ip dhcp snooping`

**Mode**             Global Config

#### 4.31.1.1 no ip dhcp snooping

Use this command to disable DHCP Snooping globally.

**Format**            `no ip dhcp snooping`

**Mode**             Global Config

### 4.31.2 ip dhcp snooping vlan

Use this command to enable DHCP Snooping on a list of comma-separated VLAN ranges.

**Default**            disabled

**Format**            `ip dhcp snooping vlan vlan-list`

**Mode**             Global Config

#### 4.31.2.1 no ip dhcp snooping vlan

Use this command to disable DHCP Snooping on VLANs.

**Format**            `no ip dhcp snooping vlan vlan-list`

**Mode**             Global Config

### 4.31.3 ip dhcp snooping verify mac-address

Use this command to enable verification of the source MAC address with the client hardware address in the received DHCP message.

**Default** enabled  
**Format** ip dhcp snooping verify mac-address  
**Mode** Global Config

#### 4.31.3.1 no ip dhcp snooping verify mac-address

Use this command to disable verification of the source MAC address with the client hardware address.

**Format** no ip dhcp snooping verify mac-address  
**Mode** Global Config

### 4.31.4 ip dhcp snooping database

Use this command to configure the persistent location of the DHCP Snooping database. This can be local or a remote file on a given IP machine.

**Default** local  
**Format** ip dhcp snooping database {local|tftp://hostIP/filename}  
**Mode** Global Config

### 4.31.5 ip dhcp snooping database write-delay

Use this command to configure the interval in seconds at which the DHCP Snooping database will be persisted. The interval value ranges from 15 to 86400 seconds.

**Default** 300 seconds  
**Format** ip dhcp snooping database write-delay *seconds*  
**Mode** Global Config

#### 4.31.5.1 no ip dhcp snooping database write-delay

Use this command to set the write delay value to the default value.

**Format** no ip dhcp snooping database write-delay  
**Mode** Global Config

### 4.31.6 ip dhcp snooping binding

Use this command to configure static DHCP Snooping binding.

**Format** ip dhcp snooping binding *mac-address* *vlan* *vlan-id* *ip address* *interface* *interface-id*  
**Mode** Global Config

#### 4.31.6.1 no ip dhcp snooping binding

Use this command to remove the DHCP static entry from the DHCP Snooping database.

**Format** no ip dhcp snooping binding *mac-address*  
**Mode** Global Config

### 4.31.7 ip verify binding

Use this command to configure static IP source guard (IPSG) entries.

**Format** ip verify binding *mac-address* *vlan* *vlan id* *ip address* interface *interface id*  
**Mode** Global Config

#### 4.31.7.1 no ip verify binding

Use this command to remove the IPSG static entry from the IPSG database.

**Format** no ip verify binding *mac-address* *vlan* *vlan id* *ip address* interface *interface id*  
**Mode** Global Config

### 4.31.8 ip dhcp snooping limit

Use this command to control the rate at which the DHCP Snooping messages come on an interface or range of interfaces. By default, rate limiting is disabled. When enabled, the rate can range from 0 to 300 packets per second. The burst level range is 1 to 15 seconds.

**Default** disabled (no limit)  
**Format** ip dhcp snooping limit {rate pps [*burst interval seconds*]}  
**Mode** Interface Config

#### 4.31.8.1 no ip dhcp snooping limit

Use this command to set the rate at which the DHCP Snooping messages come, and the burst level, to the defaults.

**Format** no ip dhcp snooping limit  
**Mode** Interface Config

### 4.31.9 ip dhcp snooping log-invalid

Use this command to control the logging DHCP messages filtration by the DHCP Snooping application. This command can be used to configure a single interface or a range of interfaces.

**Default** disabled  
**Format** ip dhcp snooping log-invalid  
**Mode** Interface Config

#### 4.31.9.1 no ip dhcp snooping log-invalid

Use this command to disable the logging DHCP messages filtration by the DHCP Snooping application.

**Format** no ip dhcp snooping log-invalid  
**Mode** Interface Config

### 4.31.10 ip dhcp snooping trust

Use this command to configure an interface or range of interfaces as trusted.

**Default** disabled  
**Format** ip dhcp snooping trust  
**Mode** Interface Config

### 4.31.10.1 no ip dhcp snooping trust

Use this command to configure the port as untrusted.

**Format** no ip dhcp snooping trust

**Mode** Interface Config

### 4.31.11 ip verify source

Use this command to configure the IPSG source ID attribute to filter the data traffic in the hardware. Source ID is the combination of IP address and MAC address. Normal command allows data traffic filtration based on the IP address. With the `port-security` option, the data traffic will be filtered based on the IP and MAC addresses.

This command can be used to configure a single interface or a range of interfaces.

**Default** the source ID is the IP address

**Format** ip verify source {port-security}

**Mode** Interface Config

#### 4.31.11.1 no ip verify source

Use this command to disable the IPSG configuration in the hardware. You cannot disable port-security alone if it is configured.

**Format** no ip verify source

**Mode** Interface Config

### 4.31.12 show ip dhcp snooping

Use this command to display the DHCP Snooping global configurations and per port configurations.

**Format** show ip dhcp snooping

**Mode**

- Privileged EXEC
- User EXEC

| Parameter        | Description                                                                                     |
|------------------|-------------------------------------------------------------------------------------------------|
| Interface        | The interface for which data is displayed.                                                      |
| Trusted          | If it is enabled, DHCP snooping considers the port as trusted. The factory default is disabled. |
| Log Invalid Pkts | If it is enabled, DHCP snooping application logs invalid packets on the specified interface.    |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip dhcp snooping
```

```
DHCP snooping is Disabled
DHCP snooping source MAC verification is enabled
DHCP snooping is enabled on the following VLANs:
11 - 30, 40
```

```
Interface Trusted Log Invalid Pkts

0/1 Yes No
0/2 No Yes
0/3 No Yes
0/4 No No
0/6 No No
```

### 4.31.13 show ip dhcp snooping binding

Use this command to display the DHCP Snooping binding entries. To restrict the output, use the following options:

- Dynamic: Restrict the output based on DHCP snooping.
- Interface: Restrict the output based on a specific interface.
- Static: Restrict the output based on static entries.
- VLAN: Restrict the output based on VLAN.

**Format**            show ip dhcp snooping binding [{static/dynamic}] [interface slot/port] [vlan id]  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter   | Description                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------|
| MAC Address | Displays the MAC address for the binding that was added. The MAC address is the key to the binding database. |
| IP Address  | Displays the valid IP address for the binding rule.                                                          |
| VLAN        | The VLAN for the binding rule.                                                                               |
| Interface   | The interface to add a binding into the DHCP snooping interface.                                             |
| Type        | Binding type; statically configured from the CLI or dynamically learned.                                     |
| Lease (sec) | The remaining lease time for the entry.                                                                      |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip dhcp snooping binding
```

```
Total number of bindings: 2
```

```
MAC Address IP Address VLAN Interface Type Lease time (Secs)

00:02:B3:06:60:80 210.1.1.3 10 0/1 86400
00:0F:FE:00:13:04 210.1.1.4 10 0/1 86400
```

### 4.31.14 show ip dhcp snooping database

Use this command to display the DHCP Snooping configuration related to the database persistence.

**Format**            show ip dhcp snooping database  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter   | Description                                                        |
|-------------|--------------------------------------------------------------------|
| Agent URL   | Bindings database agent URL.                                       |
| Write Delay | The maximum write time to write the database into local or remote. |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip dhcp snooping database
```

```
agent url: /10.131.13.79:/sai1.txt
```

```
write-delay: 5000
```

### 4.31.15 show ip dhcp snooping interfaces

Use this command to show the DHCP Snooping status of the interfaces.

**Format** show ip dhcp snooping interfaces

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip dhcp snooping interfaces
```

| Interface | Trust State | Rate Limit<br>(pps) | Burst Interval<br>(seconds) |
|-----------|-------------|---------------------|-----------------------------|
| 1/g1      | No          | 15                  | 1                           |
| 1/g2      | No          | 15                  | 1                           |
| 1/g3      | No          | 15                  | 1                           |

```
(switch) #show ip dhcp snooping interfaces ethernet 1/g15
```

| Interface | Trust State | Rate Limit<br>(pps) | Burst Interval<br>(seconds) |
|-----------|-------------|---------------------|-----------------------------|
| 1/g15     | Yes         | 15                  | 1                           |

### 4.31.16 show ip dhcp snooping statistics

Use this command to list statistics for DHCP Snooping security violations on untrusted ports.

**Format** show ip dhcp snooping statistics

**Mode**

- Privileged EXEC
- User EXEC

| Parameter              | Description                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface              | The IP address of the interface in <i>slot/port</i> format.                                                                                       |
| MAC Verify Failures    | Represents the number of DHCP messages that were filtered on an untrusted interface because of source MAC address and client HW address mismatch. |
| Client Ifc Mismatch    | Represents the number of DHCP release and Deny messages received on the different ports than learned previously.                                  |
| DHCP Server Msgs Rec'd | Represents the number of DHCP server messages received on Untrusted ports.                                                                        |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip dhcp snooping statistics
```

| Interface | MAC Verify Failures | Client Ifc Mismatch | DHCP Server Msgs Rec'd |
|-----------|---------------------|---------------------|------------------------|
| 1/0/2     | 0                   | 0                   | 0                      |
| 1/0/3     | 0                   | 0                   | 0                      |
| 1/0/4     | 0                   | 0                   | 0                      |
| 1/0/5     | 0                   | 0                   | 0                      |
| 1/0/6     | 0                   | 0                   | 0                      |
| 1/0/7     | 0                   | 0                   | 0                      |
| 1/0/8     | 0                   | 0                   | 0                      |
| 1/0/9     | 0                   | 0                   | 0                      |
| 1/0/10    | 0                   | 0                   | 0                      |
| 1/0/11    | 0                   | 0                   | 0                      |
| 1/0/12    | 0                   | 0                   | 0                      |

|        |   |   |   |
|--------|---|---|---|
| 1/0/13 | 0 | 0 | 0 |
| 1/0/14 | 0 | 0 | 0 |
| 1/0/15 | 0 | 0 | 0 |
| 1/0/16 | 0 | 0 | 0 |
| 1/0/17 | 0 | 0 | 0 |
| 1/0/18 | 0 | 0 | 0 |
| 1/0/19 | 0 | 0 | 0 |
| 1/0/20 | 0 | 0 | 0 |

#### 4.31.17 clear ip dhcp snooping binding

Use this command to clear all DHCP Snooping bindings on all interfaces or on a specific interface.

**Format** clear ip dhcp snooping binding [interface *slot/port*]

**Mode**

- Privileged EXEC
- User EXEC

#### 4.31.18 clear ip dhcp snooping statistics

Use this command to clear all DHCP Snooping statistics.

**Format** clear ip dhcp snooping statistics

**Mode**

- Privileged EXEC
- User EXEC

#### 4.31.19 show ip verify source

Use this command to display the IPSG configurations on all ports.

**Format** show ip verify source

**Mode**

- Privileged EXEC
- User EXEC

| Parameter   | Description                                                                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface   | Interface address in <i>slot/port</i> format.                                                                                                                                                              |
| Filter Type | Is one of two values: <ul style="list-style-type: none"> <li>• ip-mac: User has configured MAC address filtering on this interface.</li> <li>• ip: Only IP address filtering on this interface.</li> </ul> |
| IP Address  | IP address of the interface                                                                                                                                                                                |
| MAC Address | If MAC address filtering is not configured on the interface, the MAC Address field is empty. If port security is disabled on the interface, then the MAC Address field displays "permit-all."              |
| VLAN        | The VLAN for the binding rule.                                                                                                                                                                             |

**Example:** The following shows example CLI display output for the command.

(switch) #show ip verify source

| Interface | Filter Type | IP Address | MAC Address       | Vlan |
|-----------|-------------|------------|-------------------|------|
| 0/1       | ip-mac      | 210.1.1.3  | 00:02:B3:06:60:80 | 10   |
| 0/1       | ip-mac      | 210.1.1.4  | 00:0F:FE:00:13:04 | 10   |

### 4.31.20 show ip verify interface

Use this command to display the IPSG filter type for a specific interface.

- Format**            `show ip verify interface slot/port`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter   | Description                                                                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface   | Interface address in <i>slot/port</i> format.                                                                                                                                                              |
| Filter Type | Is one of two values: <ul style="list-style-type: none"> <li>• ip-mac: User has configured MAC address filtering on this interface.</li> <li>• ip: Only IP address filtering on this interface.</li> </ul> |

### 4.31.21 show ip source binding

Use this command to display the IPSG bindings.

- Format**            `show ip source binding [{dhcp-snooping|static}] [interface slot/port] [vlan id]`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter   | Description                                                                           |
|-------------|---------------------------------------------------------------------------------------|
| MAC Address | The MAC address for the entry that is added.                                          |
| IP Address  | The IP address of the entry that is added.                                            |
| Type        | Entry type; statically configured from CLI or dynamically learned from DHCP Snooping. |
| VLAN        | VLAN for the entry.                                                                   |
| Interface   | IP address of the interface in <i>slot/port</i> format.                               |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip source binding
```

| MAC Address       | IP Address | Type          | Vlan | Interface |
|-------------------|------------|---------------|------|-----------|
| 00:00:00:00:00:08 | 1.2.3.4    | dhcp-snooping | 2    | 1/0/1     |
| 00:00:00:00:00:09 | 1.2.3.4    | dhcp-snooping | 3    | 1/0/1     |
| 00:00:00:00:00:0A | 1.2.3.4    | dhcp-snooping | 4    | 1/0/1     |

## 4.32 Dynamic ARP Inspection Commands

Dynamic ARP Inspection (DAI) is a security feature that rejects invalid and malicious ARP packets. DAI prevents a class of man-in-the-middle attacks, where an unfriendly station intercepts traffic for other stations by poisoning the ARP caches of its unsuspecting neighbors. The miscreant sends ARP requests or responses mapping another station's IP address to its own MAC address.

DAI relies on DHCP snooping. DHCP snooping listens to DHCP message exchanges and builds a binding database of valid {MAC address, IP address, VLAN, and interface} tuples.

When DAI is enabled, the switch drops ARP packets whose sender MAC address and sender IP address do not match an entry in the DHCP snooping bindings database. You can optionally configure additional ARP packet validation.



### 4.32.1 ip arp inspection vlan

Use this command to enable Dynamic ARP Inspection on a list of comma-separated VLAN ranges.

**Default** disabled  
**Format** ip arp inspection vlan *vlan-list*  
**Mode** Global Config

#### 4.32.1.1 no ip arp inspection vlan

Use this command to disable Dynamic ARP Inspection on a list of comma-separated VLAN ranges.

**Format** no ip arp inspection vlan *vlan-list*  
**Mode** Global Config

### 4.32.2 ip arp inspection validate

Use this command to enable additional validation checks like source-mac validation, destination-mac validation, and ip address validation on the received ARP packets. Each command overrides the configuration of the previous command. For example, if a command enables src-mac and dst-mac validations, and a second command enables IP validation only, the `src-mac` and `dst-mac` validations are disabled as a result of the second command.

**Default** disabled  
**Format** ip arp inspection validate {[src-mac] [dst-mac] [ip]}  
**Mode** Global Config

#### 4.32.2.1 no ip arp inspection validate

Use this command to disable the additional validation checks on the received ARP packets.

**Format** no ip arp inspection validate {[src-mac] [dst-mac] [ip]}  
**Mode** Global Config

### 4.32.3 ip arp inspection validate interface

Use this command to enable source interface validation checks in the DHCP snooping binding database on the received ARP packets.

**Default** enabled  
**Format** ip arp inspection validate interface  
**Mode** Global Config

#### 4.32.3.1 no ip arp inspection validate interface

Use this command to disable the source interface check against the DHCP snooping binding database entry on the received ARP packets.

**Format** no ip arp inspection validate interface  
**Mode** Global Config

### 4.32.4 ip arp inspection vlan logging

Use this command to enable logging of invalid ARP packets on a list of comma-separated VLAN ranges.

|                |                                                 |
|----------------|-------------------------------------------------|
| <b>Default</b> | enabled                                         |
| <b>Format</b>  | ip arp inspection vlan <i>vlan-list</i> logging |
| <b>Mode</b>    | Global Config                                   |

#### 4.32.4.1 no ip arp inspection vlan logging

Use this command to disable logging of invalid ARP packets on a list of comma-separated VLAN ranges.

|               |                                                    |
|---------------|----------------------------------------------------|
| <b>Format</b> | no ip arp inspection vlan <i>vlan-list</i> logging |
| <b>Mode</b>   | Global Config                                      |

### 4.32.5 ip arp inspection trust

Use this command to configure an interface or range of interfaces as trusted for Dynamic ARP Inspection.

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | disabled                |
| <b>Format</b>  | ip arp inspection trust |
| <b>Mode</b>    | Interface Config        |

#### 4.32.5.1 no ip arp inspection trust

Use this command to configure an interface as untrusted for Dynamic ARP Inspection.

|               |                            |
|---------------|----------------------------|
| <b>Format</b> | no ip arp inspection trust |
| <b>Mode</b>   | Interface Config           |

### 4.32.6 ip arp inspection limit

Use this command to configure the rate limit and burst interval values for an interface or range of interfaces. Configuring `none` for the limit means the interface is not rate limited for Dynamic ARP Inspections. The maximum pps value shown in the range for the rate option might be more than the hardware allowable limit. Therefore you need to understand the switch performance and configure the maximum rate pps accordingly.

---

**NOTICE**

The user interface will accept a rate limit for a trusted interface, but the limit will not be enforced unless the interface is configured to be untrusted.

---

|                |                                                                                   |
|----------------|-----------------------------------------------------------------------------------|
| <b>Default</b> | 15 pps for rate and 1 second for burst-interval                                   |
| <b>Format</b>  | ip arp inspection limit {rate <i>pps</i> [burst interval <i>seconds</i> ]   none} |
| <b>Mode</b>    | Interface Config                                                                  |

#### 4.32.6.1 no ip arp inspection limit

Use this command to set the rate limit and burst interval values for an interface to the default values of 15 pps and 1 second, respectively.

|               |                            |
|---------------|----------------------------|
| <b>Format</b> | no ip arp inspection limit |
| <b>Mode</b>   | Interface Config           |

### 4.32.7 ip arp inspection filter

Use this command to configure the ARP ACL used to filter invalid ARP packets on a list of comma-separated VLAN ranges. If the static keyword is given, packets that do not match a permit statement are dropped without consulting the DHCP snooping bindings.

**Default** No ARP ACL is configured on a VLAN  
**Format** `ip arp inspection filter acl-name vlan vlan-list [static]`  
**Mode** Global Config

#### 4.32.7.1 no ip arp inspection filter

Use this command to unconfigure the ARP ACL used to filter invalid ARP packets on a list of comma-separated VLAN ranges.

**Format** `no ip arp inspection filter acl-name vlan vlan-list [static]`  
**Mode** Global Config

### 4.32.8 arp access-list

Use this command to create an ARP ACL.

**Format** `arp access-list acl-name`  
**Mode** Global Config

#### 4.32.8.1 no arp access-list

Use this command to delete a configured ARP ACL.

**Format** `no arp access-list acl-name`  
**Mode** Global Config

### 4.32.9 deny ip host mac host

Use this command to configure an explicit deny rule for a valid IP address and MAC address combination used in ARP packet validation.

**Format** `deny ip {any | host sender-ip} mac {any | host sender-mac}`  
**Mode** ARP Access-list Config

#### 4.32.9.1 no deny ip host mac host

Use this command to delete a deny rule for a valid IP address and MAC address combination.

**Format** `no deny ip {any | host sender-ip} mac {any | host sender-mac}`  
**Mode** ARP Access-list Config

### 4.32.10 permit ip host mac host

Use this command to configure an explicit permit rule for a valid IP address and MAC address combination used in ARP packet validation.

**Format** `permit ip {any | host sender-ip} mac {any | host sender-mac}`  
**Mode** ARP Access-list Config

### 4.32.10.1 no permit ip host mac host

Use this command to delete an explicit permit rule for a valid IP and MAC combination.

**Format**            `no permit ip {any | host sender-ip} mac {any | host sender-mac}`  
**Mode**             ARP Access-list Config

### 4.32.11 show ip arp inspection

Use this command to display the Dynamic ARP Inspection global configuration and configuration on all the VLANs. With the `vlan-list` argument (that is, comma separated VLAN ranges), the command displays the global configuration and configuration on all the VLANs in the given VLAN list. The global configuration includes the `source mac validation`, `destination mac validation` and `invalid IP validation` information.

**Format**            `show ip arp inspection [{interfaces slot/port| vlan vlan-list}]`  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter                  | Description                                                                 |
|----------------------------|-----------------------------------------------------------------------------|
| Source MAC Validation      | Displays whether Source MAC Validation of ARP frame is enabled or disabled. |
| Destination MAC Validation | Displays whether Destination MAC Validation is enabled or disabled.         |
| IP Address Validation      | Displays whether IP Address Validation is enabled or disabled.              |
| VLAN                       | The VLAN ID for each displayed row.                                         |
| Configuration              | Displays whether DAI is enabled or disabled on the VLAN.                    |
| Log Invalid                | Displays whether logging of invalid ARP packets is enabled on the VLAN.     |
| ACL Name                   | The ARP ACL Name, if configured on the VLAN.                                |
| Static Flag                | If the ARP ACL is configured static on the VLAN.                            |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip arp inspection vlan 10-12
```

```
Source Mac Validation : Disabled
Destination Mac Validation : Disabled
IP Address Validation : Disabled
```

| Vlan | Configuration | Log Invalid | ACL Name | Static flag |
|------|---------------|-------------|----------|-------------|
| 10   | Enabled       | Enabled     | H2       | Enabled     |
| 11   | Disabled      | Enabled     |          |             |
| 12   | Enabled       | Disabled    |          |             |

### 4.32.12 show ip arp inspection statistics

Use this command to display the statistics of the ARP packets processed by Dynamic ARP Inspection. Give the `vlan-list` argument and the command displays the statistics on all DAI-enabled VLANs in that list. Give the single `vlan` argument and the command displays the statistics on that VLAN. If no argument is included, the command lists a summary of the forwarded and dropped ARP packets.

**Format**            `show ip arp inspection statistics [vlan vlan-list]`  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter | Description                         |
|-----------|-------------------------------------|
| VLAN      | The VLAN ID for each displayed row. |

| Parameter    | Description                                                                        |
|--------------|------------------------------------------------------------------------------------|
| Forwarded    | The total number of valid ARP packets forwarded in this VLAN.                      |
| Dropped      | The total number of not valid ARP packets dropped in this VLAN.                    |
| DHCP Drops   | The number of packets dropped due to DHCP snooping binding database match failure. |
| ACL Drops    | The number of packets dropped due to ARP ACL rule match failure.                   |
| DHCP Permits | The number of packets permitted due to DHCP snooping binding database match.       |
| ACL Permits  | The number of packets permitted due to ARP ACL permit rule match.                  |
| ACL Denials  | The number of packets denied due to ARP ACL deny rule match.                       |
| Bad Src MAC  | The number of packets dropped due to Source MAC validation failure.                |
| Bad Dest MAC | The number of packets dropped due to Destination MAC validation failure.           |
| Invalid IP   | The number of packets dropped due to invalid IP checks.                            |

**Example:** The following shows example CLI display output for the command `show ip arp inspection statistics`, which lists the summary of forwarded and dropped ARP packets on all DAI-enabled VLANs.

```
VLAN Forwarded Dropped
---- -
 10 90 14
 20 10 3
```

**Example:** The following shows example CLI display output for the command `show ip arp inspection statistics vlan 10,20`.

```
VLAN DHCP ACL DHCP ACL ACL Bad Src Bad Dest Invalid
 Drops Drops Permits Permits Denials MAC MAC IP

 10 11 1 65 25 5 1 1 0
 20 1 0 8 2 3 0 1 1
```

### 4.32.13 clear ip arp inspection statistics

Use this command to reset the statistics for Dynamic ARP Inspection on all VLANs.

**Default** none  
**Format** `clear ip arp inspection statistics`  
**Mode** Privileged EXEC

### 4.32.14 show ip arp inspection interfaces

Use this command to display the Dynamic ARP Inspection configuration on all the DAI-enabled interfaces. An interface is said to be enabled for DAI if at least one VLAN, that the interface is a member of, is enabled for DAI. Given a *slot/port* interface argument, the command displays the values for that interface whether the interface is enabled for DAI or not.

**Format** `show ip arp inspection interfaces [slot/port]`  
**Mode**

- Privileged EXEC
- User EXEC

| Parameter             | Description                                            |
|-----------------------|--------------------------------------------------------|
| <b>Interface</b>      | The interface ID for each displayed row.               |
| <b>Trust State</b>    | Whether the interface is trusted or untrusted for DAI. |
| <b>Rate Limit</b>     | The configured rate limit value in packets per second. |
| <b>Burst Interval</b> | The configured burst interval value in seconds.        |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip arp inspection interfaces
```

| Interface | Trust State | Rate Limit<br>(pps) | Burst Interval<br>(seconds) |
|-----------|-------------|---------------------|-----------------------------|
| 0/1       | Untrusted   | 15                  | 1                           |
| 0/2       | Untrusted   | 10                  | 10                          |

### 4.32.15 show arp access-list

Use this command to display the configured ARP ACLs with the rules. Giving an ARP ACL name as the argument will display only the rules in that ARP ACL.

**Format** show arp access-list [*acl-name*]

- Mode**
- Privileged EXEC
  - User EXEC

**Example:** The following shows example CLI display output for the command.

```
Switch#show arp access-list
ARP access list H2
permit ip host 1.1.1.1 mac host 00:01:02:03:04:05
permit ip host 1.1.1.2 mac host 00:03:04:05:06:07
deny ip host 1.1.1.3 mac host 00:08:09:0A:0B:0C
ARP access list H3
ARP access list H4
permit ip host 1.1.1.3 mac any
deny ip any mac host 00:11:11:11:11:11
ARP access list H5
permit ip host 2.1.1.2 mac host 00:03:04:05:06:08
```

## 4.33 IGMP Snooping Configuration Commands

This section describes the commands you use to configure IGMP snooping. FASTPATH software supports IGMP Versions 1, 2, and 3. The IGMP snooping feature can help conserve bandwidth because it allows the switch to forward IP multicast traffic only to connected hosts that request multicast traffic. IGMPv3 adds source filtering capabilities to IGMP versions 1 and 2.

### NOTICE

This note clarifies the prioritization of MGMD Snooping Configurations. Many of the IGMP/MLD Snooping commands are available both in the Interface and VLAN modes. Operationally the system chooses or prefers the VLAN configured values over the Interface configured values for most configurations when the interface participates in the VLAN.

### 4.33.1 set igmp

This command enables IGMP Snooping on the system (Global Config Mode), an interface, or a range of interfaces. This command also enables IGMP snooping on a particular VLAN (VLAN Database Mode) and can enable IGMP snooping on all interfaces participating in a VLAN.

If an interface has IGMP Snooping enabled and you enable this interface for routing or enlist it as a member of a port-channel (LAG), IGMP Snooping functionality is disabled on that interface. IGMP Snooping functionality is reenabled if you disable routing or remove port-channel (LAG) membership from an interface that has IGMP Snooping enabled.

The IGMP application supports the following activities:

- Validation of the IP header checksum (as well as the IGMP header checksum) and discarding of the frame upon checksum error.
- Maintenance of the forwarding table entries based on the MAC address versus the IP address.
- Flooding of unregistered multicast data packets to all ports in the VLAN.

|                |                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                               |
| <b>Format</b>  | set igmp [vlan_id]                                                                                                     |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

#### 4.33.1.1 no set igmp

This command disables IGMP Snooping on the system, an interface, a range of interfaces, or a VLAN.

|               |                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | no set igmp [vlan_id]                                                                                                  |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

#### 4.33.2 set igmp header-validation

This command enables header validation for IGMP messages.

When header validation is enabled, IGMP Snooping checks:

- The time-to-live (TTL) field in the IGMP header and drops packets where TTL is not equal to 1. The TTL field should always be set to 1 in the headers of IGMP reports and queries.
- The presence of the router alert option (9404) in the IP packet header of the IGMPv2 message and drops packets that do not include this option.
- The presence of the router alert option (9404) and ToS Byte = 0xC0 (Internet Control) in the IP packet header of IGMPv3 message and drops packets that do not include these options.

|                |                            |
|----------------|----------------------------|
| <b>Default</b> | enabled                    |
| <b>Format</b>  | set igmp header-validation |
| <b>Mode</b>    | Global Config              |

#### 4.33.2.1 no set igmp header-validation

This command disables header validation for IGMP messages.

|               |                               |
|---------------|-------------------------------|
| <b>Format</b> | no set igmp header-validation |
| <b>Mode</b>   | Global Config                 |

#### 4.33.3 set igmp interfacemode

This command enables IGMP Snooping on all interfaces. If an interface has IGMP Snooping enabled and you enable this interface for routing or enlist it as a member of a port-channel (LAG), IGMP Snooping functionality is disabled on that interface. IGMP Snooping functionality is reenabled if you disable routing or remove port-channel (LAG) membership from an interface that has IGMP Snooping enabled.

|                |                        |
|----------------|------------------------|
| <b>Default</b> | disabled               |
| <b>Format</b>  | set igmp interfacemode |
| <b>Mode</b>    | Global Config          |

### 4.33.3.1 no set igmp interfacemode

This command disables IGMP Snooping on all interfaces.

**Format**           no set igmp interfacemode  
**Mode**             Global Config

### 4.33.4 set igmp fast-leave

This command enables or disables IGMP Snooping fast-leave admin mode on a selected interface, a range of interfaces, or a VLAN. Enabling fast-leave allows the switch to immediately remove the layer 2 LAN interface from its forwarding table entry upon receiving an IGMP leave message for that multicast group without first sending out MAC-based general queries to the interface.

You should enable fast-leave admin mode only on VLANs where only one host is connected to each layer 2 LAN port. This prevents the inadvertent dropping of the other hosts that were connected to the same layer 2 LAN port but were still interested in receiving multicast traffic directed to that group. Also, fast-leave processing is supported only with IGMP version 2 hosts.

**Default**           disabled  
**Format**           set igmp fast-leave [*vlan\_id*]  
**Mode**             Interface Config  
                   Interface Range  
                   VLAN Database

#### 4.33.4.1 no set igmp fast-leave

This command disables IGMP Snooping fast-leave admin mode on a selected interface.

**Format**           no set igmp fast-leave [*vlan\_id*]  
**Mode**             Interface Config  
                   Interface Range  
                   VLAN Database

### 4.33.5 set igmp groupmembership-interval

This command sets the IGMP Group Membership Interval time on a VLAN, one interface, a range of interfaces, or all interfaces. The Group Membership Interval time is the amount of time in seconds that a switch waits for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the IGMPv3 Maximum Response time value. The range is 2 to 3600 seconds.

**Default**           260 seconds  
**Format**           set igmp groupmembership-interval [*vlan\_id*] 2-3600  
**Mode**

- Interface Config
- Global Config
- VLAN Database

#### 4.33.5.1 no set igmp groupmembership-interval

This command sets the IGMPv3 Group Membership Interval time to the default value.

**Format**           no set igmp groupmembership-interval [*vlan\_id*]  
**Mode**

- Interface Config
- Global Config
- VLAN Database



### 4.33.6 set igmp maxresponse

This command sets the IGMP Maximum Response time for the system, on a particular interface or VLAN, or on a range of interfaces. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query on an interface because it did not receive a report for a particular group in that interface. This value must be less than the IGMP Query Interval time value. The range is 1 to 25 seconds.

|                |                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | 10 seconds                                                                                                             |
| <b>Format</b>  | set igmp maxresponse [vlan_id] 1-25                                                                                    |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

#### 4.33.6.1 no set igmp maxresponse

This command sets the max response time (on the interface or VLAN) to the default value.

|               |                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | no set igmp maxresponse [vlan_id]                                                                                      |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

### 4.33.7 set igmp mcrtrexpertime

This command sets the Multicast Router Present Expiration time. The time is set for the system, on a particular interface or VLAN, or on a range of interfaces. This is the amount of time in seconds that a switch waits for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 0 to 3600 seconds. A value of 0 indicates an infinite time-out, that is, no expiration.

|                |                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                                                      |
| <b>Format</b>  | set igmp mcrtrexpertime [vlan_id] 0-3600                                                                               |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

#### 4.33.7.1 no set igmp mcrtrexpertime

This command sets the Multicast Router Present Expiration time to 0. The time is set for the system, on a particular interface or a VLAN.

|               |                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | no set igmp mcrtrexpertime [vlan_id]                                                                                   |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Database</li> </ul> |

### 4.33.8 set igmp mrouter

This command configures the VLAN ID (*vlan\_id*) that has the multicast router mode enabled.

|               |                          |
|---------------|--------------------------|
| <b>Format</b> | set igmp mrouter vlan_id |
| <b>Mode</b>   | Interface Config         |

### 4.33.8.1 no set igmp mrouter

This command disables multicast router mode for a particular VLAN ID (*vlan\_id*).

**Format** no set igmp mrouter *vlan\_id*  
**Mode** Interface Config

### 4.33.9 set igmp mrouter interface

This command configures the interface or range of interfaces as a multicast router interface. When configured as a multicast router interface, the interface is treated as a multicast router interface in all VLANs.

**Default** disabled  
**Format** set igmp mrouter interface  
**Mode** Interface Config

### 4.33.9.1 no set igmp mrouter interface

This command disables the status of the interface as a statically configured multicast router interface.

**Format** no set igmp mrouter interface  
**Mode** Interface Config

### 4.33.10 set igmp report-suppression

Use this command to suppress the IGMP reports on a given VLAN ID. To optimize the number of reports traversing the network with no added benefits, a Report Suppression mechanism is implemented. When more than one client responds to an MGMT query for the same Multicast Group address within the max-response-time, only the first response is forwarded to the query and others are suppressed at the switch.

**Default** disabled  
**Format** set igmp report-suppression *vlan-id*  
**Mode** VLAN Database

| Parameter | Description                          |
|-----------|--------------------------------------|
| vlan-id   | A valid VLAN ID. Range is 1 to 4093. |

**Example:** The following shows an example of the command.

```
(Switching) #vlan database
(Switching) (Vlan)#set igmp report-suppression 1
```

### 4.33.10.1 no set igmp report-suppression

Use this command to return the system to the default.

**Format** no set igmp report-suppression  
**Mode** VLAN Database

### 4.33.11 show igmpsnooping

This command displays IGMP Snooping information for a given *slot/port* or VLAN. Configured information is displayed whether or not IGMP Snooping is enabled.

**Format** show igmpsnooping [*slot/port* | *vlan\_id*]  
**Mode** Privileged EXEC

When the optional arguments *slot/port* or *vlan\_id* are not used, the command displays the following information:

| Parameter                            | Description                                                           |
|--------------------------------------|-----------------------------------------------------------------------|
| Admin Mode                           | Indicates whether or not IGMP Snooping is active on the switch.       |
| Multicast Control Frame Count        | The number of multicast control frames that are processed by the CPU. |
| IGMP header validation               | Indicates enabled or disabled.                                        |
| Interfaces Enabled for IGMP Snooping | The list of interfaces on which IGMP Snooping is enabled.             |
| VLANs Enabled for IGMP Snooping      | The list of VLANs on which IGMP Snooping is enabled.                  |
| Report Flood Mode                    | Indicates whether the mode is enabled or disabled.                    |
| Exclude Mrouter Interface Mode       | Indicates whether the mode is enabled or disabled.                    |
| Operational Mode                     | Indicates whether the mode is enabled or disabled.                    |
| Fast Leave Auto-Assignment Mode      | Indicates whether the mode is enabled or disabled.                    |
| IGMP-Plus                            | Indicates whether the mode is enabled or disabled.                    |

When you specify the *slot/port* values, the following information appears.

| Parameter                    | Description                                                                                                                                                                                                        |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IGMP Snooping Admin Mode     | Indicates whether IGMP Snooping is active on the interface.                                                                                                                                                        |
| Fast Leave Mode              | Indicates whether IGMP Snooping Fast-leave is active on the interface.                                                                                                                                             |
| Group Membership Interval    | The amount of time in seconds that a switch will wait for a report from a particular group on a particular interface before deleting the interface from the entry. This value may be configured.                   |
| Maximum Response Time        | The amount of time in seconds the switch waits after it sends a query on an interface because it did not receive a report for a particular group on that interface. This value may be configured.                  |
| Multicast Router Expiry Time | The amount of time in seconds to wait before removing an interface from the list of interfaces with multicast routers attached. The interface is removed if a query is not received. This value may be configured. |

When you specify a value for *vlan\_id*, the following information appears.

| Parameter                           | Description                                                                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID                             | The VLAN ID.                                                                                                                                                                                                                              |
| IGMP Snooping Admin Mode            | Indicates whether IGMP Snooping is active on the VLAN.                                                                                                                                                                                    |
| Fast Leave Mode                     | Indicates whether IGMP Snooping Fast-leave is active on the VLAN.                                                                                                                                                                         |
| Group Membership Interval (secs)    | The amount of time in seconds that a switch will wait for a report from a particular group on a particular interface, which is participating in the VLAN, before deleting the interface from the entry. This value may be configured.     |
| Maximum Response Time (secs)        | The amount of time the switch waits after it sends a query on an interface, participating in the VLAN, because it did not receive a report for a particular group on that interface. This value may be configured.                        |
| Multicast Router Expiry Time (secs) | The amount of time to wait before removing an interface that is participating in the VLAN from the list of interfaces with multicast routers attached. The interface is removed if a query is not received. This value may be configured. |
| Report Suppression Mode             | Indicates whether IGMP reports (set by the command <code>set igmp report-suppression</code> ) is enabled.                                                                                                                                 |

**Example:** The following shows example CLI display output for the command at the Global level.

```
(Switching)#show igmpsnooping
```

```
Admin Mode..... Enable
Multicast Control Frame Count..... 0
IGMP header validation..... Enabled
Interfaces Enabled for IGMP Snooping..... None
VLANs enabled for IGMP snooping..... 1
Report Flood Mode..... Enabled
Exclude Mrouter Interface Mode..... Enabled
Operational Mode..... Enable
Fast Leave Auto-Assignment Mode..... Enable
IGMP-Plus..... Enabled

VLAN ID..... 1
IGMP Snooping Admin Mode..... Enabled
Fast Leave Mode..... Enabled
Group Membership Interval (secs)..... 600
Max Response Time (secs)..... 120
Multicast Router Expiry Time (secs)..... 300
Report Suppression Mode..... Disabled
Report Flood Mode..... Enabled
Exclude Mrouter Interface Mode..... Enabled
IGMP-Plus..... Enabled
```

**Example:** The following shows example CLI display output for the command at the VLAN level.

```
(Switching) #show igmpsnooping 1
```

```
VLAN ID..... 1
IGMP Snooping Admin Mode..... Enabled
Fast Leave Mode..... Enabled
Group Membership Interval (secs)..... 600
Max Response Time (secs)..... 120
Multicast Router Expiry Time (secs)..... 300
Report Suppression Mode..... Disabled
Report Flood Mode..... Enabled
Exclude Mrouter Interface Mode..... Enabled
IGMP-Plus..... Enabled
```

### 4.33.12 show igmpsnooping lag

This command displays IGMP Snooping details at a LAG level. Prior to this command, to view IGMP Snooping for a LAG interface, you were required to provide the LAG interface number in *slot/port* format. For example, to see LAG 1 details on M4300, you issue the `show igmpsnooping 0/13/1` command.

#### NOTICE

The support to display LAG with the internal *slot/port* has been kept intact. This additional and explicit LAG option provides the same level of details as the internal *slot/port* corresponding to a LAG interface.

**Format**        `show igmpsnooping lag lag-intf`  
**Mode**         Privileged EXEC

| Parameter | Description           |
|-----------|-----------------------|
| lag-intf  | LAG interface number. |

The following fields are displayed in the output of this command.

| Parameter                | Description                                                 |
|--------------------------|-------------------------------------------------------------|
| IGMP Snooping Admin Mode | Indicates whether IGMP Snooping is active on the interface. |

| Parameter                    | Description                                                                                                                                                                                                        |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fast Leave Mode              | Indicates whether IGMP Snooping Fast-leave is active on the interface.                                                                                                                                             |
| Group Membership Interval    | The amount of time in seconds that a switch will wait for a report from a particular group on a particular interface before deleting the interface from the entry. This value may be configured.                   |
| Maximum Response Time        | The amount of time in seconds the switch waits after it sends a query on an interface because it did not receive a report for a particular group on that interface. This value may be configured.                  |
| Multicast Router Expiry Time | The amount of time in seconds to wait before removing an interface from the list of interfaces with multicast routers attached. The interface is removed if a query is not received. This value may be configured. |

**Example:** The following shows an example of the command.

```
(Switching) #show igmpsnooping lag ?
```

```
<lag-intf-num> Enter LAG interface number.
```

```
(dhcp-10-130-181-143) #show igmpsnooping lag 1
```

```
IGMP Snooping Admin Mode..... Disable
Fast Leave Mode..... Disable
Group Membership Interval (secs)..... 260
Max Response Time (secs)..... 10
Multicast Router Expiry Time (secs)..... 0
```

### 4.33.13 show igmpsnooping mrouter interface

This command displays information about statically configured ports.

**Format** show igmpsnooping mrouter interface *slot/port*

**Mode** Privileged EXEC

| Parameter                 | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| Interface                 | The port on which multicast router information is being displayed.         |
| Multicast Router Attached | Indicates whether multicast router is statically enabled on the interface. |
| VLAN ID                   | The list of VLANs of which the interface is a member.                      |

### 4.33.14 show igmpsnooping mrouter vlan

This command displays information about statically configured ports.

**Format** show igmpsnooping mrouter vlan *slot/port*

**Mode** Privileged EXEC

| Parameter | Description                                                        |
|-----------|--------------------------------------------------------------------|
| Interface | The port on which multicast router information is being displayed. |
| VLAN ID   | The list of VLANs of which the interface is a member.              |

### 4.33.15 show igmpsnooping ssm entries

Use this command to display the source-specific multicast forwarding database (SSMFDB) built by IGMP snooping. SSM delivers multicast packets to receivers that originated from a source address specified by the receiver. SSM is only available with IGMPv3 and MLDv2.

**NOTICE**

A given {Source, Group, VLAN} combination can have a few interfaces in Include mode and a few interfaces in Exclude mode. In such instances, two rows for the same {Source, Group, VLAN} combinations are displayed.

**Format**            show igmpsnooping ssm entries  
**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Fields             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN               | The VLAN on which the entry is learned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Group              | The IPv4 multicast group address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Source             | The IPv4 source address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Source Filter Mode | The source filter mode (Include or Exclude) for the specified group.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Interfaces         | <ul style="list-style-type: none"> <li>If Source Filter Mode is Include, this field specifies the list of interfaces on which an incoming packet is forwarded if its source IP address is equal to the current entry's Source, destination IP address is equal to the current entry's Group, and the VLAN ID on which it arrived is the current entry's VLAN.</li> <li>If Source Filter Mode is Exclude, this field specifies the list of interfaces on which an incoming packet is forwarded if its source IP address is not equal to the current entry's Source, destination IP address is equal to the current entry's Group, and the VLAN ID on which it arrived is the current entry's VLAN.</li> </ul> |

#### 4.33.16 show igmpsnooping ssm groups

Use this command to display IGMP SSM group membership information. SSM delivers multicast packets to receivers that originated from a source address specified by the receiver. SSM is only available with IGMPv3 and MLDv2.

**Format**            show igmpsnooping ssm groups  
**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Fields              | Description                                                              |
|---------------------|--------------------------------------------------------------------------|
| VLAN                | The VLAN on which the IGMPv3 report is received.                         |
| Group               | The IPv4 multicast group address.                                        |
| Interface           | The interface on which the IGMPv3 report is received.                    |
| Reporter            | The IPv4 address of the host that sent the IGMPv3 report.                |
| Source Filter Mode  | The source filter mode (Include or Exclude) for the specified group.     |
| Source Address List | The list of source IP addresses for which source filtering is requested. |

#### 4.33.17 show igmpsnooping ssm stats

Use this command to display the statistics of IGMP snooping's SSMFDB. SSM delivers multicast packets to receivers that originated from a source address specified by the receiver. SSM is only available with IGMPv3 and MLDv2.

**Format**            show igmpsnooping ssm stats  
**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Fields        | Description                                                                 |
|---------------|-----------------------------------------------------------------------------|
| Total Entries | The total number of entries that can possibly be in IGMP snooping's SSMFDB. |

| Fields                        | Description                                                                         |
|-------------------------------|-------------------------------------------------------------------------------------|
| Most SSMFDB Entries Ever Used | The largest number of entries that have been present in the IGMP snooping's SSMFDB. |
| Current Entries               | The current number of entries in IGMP snooping's SSMFDB.                            |

### 4.33.18 show mac-address-table igmpsnoothing

This command displays the IGMP Snooping entries in the MFDB table.

Using the option „ipaddr“, the command output shows additionally the IP group addresses related to the MAC address. Note that different IP group addresses can be mapped to the same MAC address.

**Format** show mac-address-table igmpsnoothing

**Mode** Privileged EXEC

| Parameter   | Description                                                                                                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID     | The VLAN in which the MAC address is learned.                                                                                                                                                    |
| MAC Address | A multicast MAC address for which the switch has forwarding or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Type        | The type of the entry, which is either static (added by the user) or dynamic (added to the table as a result of a learning process or protocol).                                                 |
| Description | The text description of this multicast table entry.                                                                                                                                              |
| Interfaces  | The list of interfaces that are designated for forwarding (Fwd:.) and filtering (Flt:).                                                                                                          |

## 4.34 IGMP Snooping Querier Commands

IGMP Snooping requires that one central switch or router periodically query all end-devices on the network to announce their multicast memberships. This central device is the "IGMP Querier". The IGMP query responses, known as IGMP reports, keep the switch updated with the current multicast group membership on a port-by-port basis. If the switch does not receive updated membership information in a timely fashion, it will stop forwarding multicasts to the port where the end device is located.

This section describes commands used to configure and display information on IGMP Snooping Queriers on the network and, separately, on VLANs.

### NOTICE

This note clarifies the prioritization of MGLD Snooping Configurations. Many of the IGMP/MLD Snooping commands are available both in the Interface and VLAN modes. Operationally the system chooses or prefers the VLAN configured values over the Interface configured values for most configurations when the interface participates in the VLAN.

### 4.34.1 set igmp querier

Use this command to enable IGMP Snooping Querier on the system, using Global Config mode, or on a VLAN. Using this command, you can specify the IP Address that the Snooping Querier switch should use as the source address while generating periodic queries.

If a VLAN has IGMP Snooping Querier enabled and IGMP Snooping is operationally disabled on it, IGMP Snooping Querier functionality is disabled on that VLAN. IGMP Snooping functionality is reenabled if IGMP Snooping is operational on the VLAN.

### NOTICE

The Querier IP Address assigned for a VLAN takes preference over global configuration.

The IGMP Snooping Querier application supports sending periodic general queries on the VLAN to solicit membership reports.

|                |                                                                                        |
|----------------|----------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                               |
| <b>Format</b>  | set igmp querier [ <i>vlan-id</i> ] [address <i>ipv4_address</i> ]                     |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• VLAN Mode</li> </ul> |

#### 4.34.1.1 no set igmp querier

Use this command to disable IGMP Snooping Querier on the system. Use the optional *address* parameter to reset the querier address to 0.0.0.0.

|               |                                                                                        |
|---------------|----------------------------------------------------------------------------------------|
| <b>Format</b> | no set igmp querier [ <i>vlan-id</i> ] [address]                                       |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• VLAN Mode</li> </ul> |

#### 4.34.2 set igmp querier query-interval

Use this command to set the IGMP Querier Query Interval time. It is the amount of time in seconds that the switch waits before sending another general query.

|                |                                                |
|----------------|------------------------------------------------|
| <b>Default</b> | 60 seconds                                     |
| <b>Format</b>  | set igmp querier query-interval <i>1-18000</i> |
| <b>Mode</b>    | Global Config                                  |

#### 4.34.2.1 no set igmp querier query-interval

Use this command to set the IGMP Querier Query Interval time to its default value.

|               |                                    |
|---------------|------------------------------------|
| <b>Format</b> | no set igmp querier query-interval |
| <b>Mode</b>   | Global Config                      |

#### 4.34.3 set igmp querier timer expiry

Use this command to set the IGMP Querier timer expiration period. It is the time period that the switch remains in Non-Querier mode once it has discovered that there is a Multicast Querier in the network.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | 60 seconds                                  |
| <b>Format</b>  | set igmp querier timer expiry <i>60-300</i> |
| <b>Mode</b>    | Global Config                               |

#### 4.34.3.1 no set igmp querier timer expiry

Use this command to set the IGMP Querier timer expiration period to its default value.

|               |                                  |
|---------------|----------------------------------|
| <b>Format</b> | no set igmp querier timer expiry |
| <b>Mode</b>   | Global Config                    |

#### 4.34.4 set igmp querier version

Use this command to set the IGMP version of the query that the snooping switch is going to send periodically.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | 1                                   |
| <b>Format</b>  | set igmp querier version <i>1-2</i> |
| <b>Mode</b>    | Global Config                       |



#### 4.34.4.1 no set igmp querier version

Use this command to set the IGMP Querier version to its default value.

**Format**           no set igmp querier version  
**Mode**             Global Config

#### 4.34.5 set igmp querier election participate

Use this command to enable the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN. When this mode is enabled, if the Snooping Querier finds that the other Querier's source address is better (less) than the Snooping Querier's address, it stops sending periodic queries. If the Snooping Querier wins the election, then it will continue sending periodic queries.

**Default**           disabled  
**Format**           set igmp querier election participate  
**Mode**             VLAN Database

#### 4.34.5.1 no set igmp querier election participate

Use this command to set the Snooping Querier not to participate in querier election but go into non-querier mode as soon as it discovers the presence of another querier in the same VLAN.

**Format**           no set igmp querier election participate  
**Mode**             VLAN Database

#### 4.34.6 show igmpsnooping querier

Use this command to display IGMP Snooping Querier information. Configured information is displayed whether or not IGMP Snooping Querier is enabled.

**Format**           show igmpsnooping querier [{detail | vlan *vlanid*}]  
**Mode**             Privileged EXEC

When the optional argument *vlanid* is not used, the command displays the following information.

| Parameter       | Description                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Admin Mode      | Indicates whether or not IGMP Snooping Querier is active on the switch.                                                                  |
| Admin Version   | The version of IGMP that will be used while sending out the queries.                                                                     |
| Querier Address | The IP Address which will be used in the IPv4 header while sending out IGMP queries. It can be configured using the appropriate command. |
| Query Interval  | The amount of time in seconds that a Snooping Querier waits before sending out the periodic general query.                               |
| Querier Timeout | The amount of time to wait in the Non-Querier operational state before moving to a Querier state.                                        |

When you specify a value for *vlanid*, the following additional information appears.

| Parameter                          | Description                                                                                                                                                                                                                                                                                    |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN Admin Mode                    | Indicates whether IGMP Snooping Querier is active on the VLAN.                                                                                                                                                                                                                                 |
| VLAN Operational State             | Indicates whether IGMP Snooping Querier is in <i>Querier</i> or <i>Non-Querier</i> state. When the switch is in <i>Querier</i> state, it will send out periodic general queries. When in <i>Non-Querier</i> state, it will wait for moving to Querier state and does not send out any queries. |
| VLAN Operational Max Response Time | Indicates the time to wait before removing a Leave from a host upon receiving a Leave request. This value is calculated dynamically from the Queries received from the network. If the Snooping Switch is in Querier state, then it is equal to the configured value.                          |

| Parameter                      | Description                                                                                                                                     |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Querier Election Participation | Indicates whether the IGMP Snooping Querier participates in querier election if it discovers the presence of a querier in the VLAN.             |
| Querier VLAN Address           | The IP address will be used in the IPv4 header while sending out IGMP queries on this VLAN. It can be configured using the appropriate command. |
| Operational Version            | The version of IPv4 will be used while sending out IGMP queries on this VLAN.                                                                   |
| Last Querier Address           | Indicates the IP address of the most recent Querier from which a Query was received.                                                            |
| Last Querier Version           | Indicates the IGMP version of the most recent Querier from which a Query was received on this VLAN.                                             |

When the optional argument `detail` is used, the command shows the global information and the information for all Querier-enabled VLANs.

## 4.35 IGMP Proxy Querier Commands

### 4.35.1 `set igmp proxy-querier` (Global Config)

Use this command to configure the proxy-querier globally. For proxy-querier to become operational in a given VLAN or interface, you must enable it on the corresponding VLAN or interface as well.

When proxy-querier is enabled then IGMP proxy query with source IP 0.0.0.0 is sent in response to IGMP leave packet. If it is disabled then IGMP proxy query is not sent in response to IGMP leave packet.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | enabled                             |
| <b>Format</b>  | <code>set igmp proxy-querier</code> |
| <b>Mode</b>    | Global Config                       |

#### 4.35.1.1 `no set igmp proxy-querier`

Use the `no` form of the command to disable the proxy-querier.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | <code>no set igmp proxy-querier</code> |
| <b>Mode</b>   | Global Config                          |

### 4.35.2 `set igmp proxy-querier` (Interface Config)

Use this command to configure the proxy-querier on the interface. When proxy-querier is enabled, an IGMP proxy query with source IP 0.0.0.0 is sent in response to an IGMP leave packet.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | enabled                             |
| <b>Format</b>  | <code>set igmp proxy-querier</code> |
| <b>Mode</b>    | Interface Config                    |

#### 4.35.2.1 `no set igmp proxy-querier`

Use the `no` form of the command to disable the proxy-querier on the interface. If disabled, IGMP proxy query is not sent in response to an IGMP leave packet.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | <code>no set igmp proxy-querier</code> |
| <b>Mode</b>   | Interface Config                       |

### 4.35.3 set igmp proxy-querier (VLAN Config)

Use this command to configure the proxy-querier on the VLAN. When proxy-querier is enabled, an IGMP proxy query with source IP 0.0.0.0 is sent in response to an IGMP leave packet.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | enabled                               |
| <b>Format</b>  | set igmp proxy-querier <i>VLAN ID</i> |
| <b>Mode</b>    | VLAN Config                           |

#### 4.35.3.1 no set igmp proxy-querier

Use the `no` form of the command to disable the proxy-querier on the VLAN. If disabled, IGMP proxy query is not sent in response to an IGMP leave packet.

|               |                           |
|---------------|---------------------------|
| <b>Format</b> | no set igmp proxy-querier |
| <b>Mode</b>   | VLAN Config               |

### 4.35.4 show igmpsnooping proxy-querier

Use this command to display the proxy-querier status globally, for all interfaces and all VLANs.

|               |                                 |
|---------------|---------------------------------|
| <b>Format</b> | show igmpsnooping proxy-querier |
| <b>Mode</b>   | Privileged EXEC                 |

**Example:** The following shows example CLI display output for the command.

```
(Switching) # show igmpsnooping proxy-querier

Admin Mode..... Enable
Interfaces Enabled for IGMP Proxy Querier..... 1/0/1
 1/0/2
 1/0/3
 1/0/4
 1/0/5
 1/0/6
 1/0/7
 1/0/8
 1/0/9
 1/0/10
 lag 1
 lag 2
 lag 3
 lag 4
 lag 5
 lag 6
 lag 7
 lag 8
 lag 9
 lag 10
VLANs enabled for IGMP Proxy Querier..... 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
```

## 4.36 MLD Snooping Commands

This section describes commands used for MLD Snooping. In IPv4, Layer 2 switches can use IGMP Snooping to limit the flooding of multicast traffic by dynamically configuring Layer 2 interfaces so that multicast traffic is forwarded only to those interfaces associated with IP multicast addresses. In IPv6, MLD Snooping performs a similar function. With MLD Snooping, IPv6 multicast data is selectively forwarded to a list of ports that want to receive the data, instead of being flooded to all ports in a VLAN. This list is constructed by snooping IPv6 multicast control packets.

### NOTICE

This note clarifies the prioritization of MGLD Snooping Configurations. Many of the IGMP/MLD Snooping commands are available both in the Interface and VLAN modes. Operationally the system chooses or prefers the VLAN configured values over the Interface configured values for most configurations when the interface participates in the VLAN.

### 4.36.1 set mld

This command enables MLD Snooping on the system (Global Config Mode) or an Interface (Interface Config Mode). This command also enables MLD Snooping on a particular VLAN and enables MLD Snooping on all interfaces participating in a VLAN.

If an interface has MLD Snooping enabled and you enable this interface for routing or enlist it as a member of a port-channel (LAG), MLD Snooping functionality is disabled on that interface. MLD Snooping functionality is reenabled if you disable routing or remove port channel (LAG) membership from an interface that has MLD Snooping enabled.

MLD Snooping supports the following activities:

- Validation of address version, payload length consistencies and discarding of the frame upon error.
- Maintenance of the forwarding table entries based on the MAC address versus the IPv6 address.
- Flooding of unregistered multicast data packets to all ports in the VLAN.

|                |                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                           |
| <b>Format</b>  | <code>set mld <i>vlanid</i></code>                                                                                 |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Mode</li> </ul> |

#### 4.36.1.1 no set mld

Use this command to disable MLD Snooping on the system.

|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no set mld <i>vlanid</i></code>                                                                              |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Mode</li> </ul> |

### 4.36.2 set mld interfacemode

Use this command to enable MLD Snooping on all interfaces. If an interface has MLD Snooping enabled and you enable this interface for routing or enlist it as a member of a port-channel (LAG), MLD Snooping functionality is disabled on that interface. MLD Snooping functionality is reenabled if you disable routing or remove port-channel (LAG) membership from an interface that has MLD Snooping enabled.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | disabled                           |
| <b>Format</b>  | <code>set mld interfacemode</code> |
| <b>Mode</b>    | Global Config                      |

#### 4.36.2.1 no set mld interfacemode

Use this command to disable MLD Snooping on all interfaces.

**Format**        `no set mld interfacemode`  
**Mode**         Global Config

### 4.36.3    `set mld fast-leave`

Use this command to enable MLD Snooping fast-leave admin mode on a selected interface or VLAN. Enabling fast-leave allows the switch to immediately remove the Layer 2 LAN interface from its forwarding table entry upon receiving and MLD done message for that multicast group without first sending out MAC-based general queries to the interface.

#### **NOTICE**

- You should enable fast-leave admin mode only on VLANs where only one host is connected to each Layer 2 LAN port. This prevents the inadvertent dropping of the other hosts that were connected to the same layer 2 LAN port but were still interested in receiving multicast traffic directed to that group.
- Fast-leave processing is supported only with MLD version 1 hosts.

**Default**        disabled  
**Format**        `set mld fast-leave vLanid`  
**Mode**

- Interface Config
- VLAN Mode

#### 4.36.3.1   `no set mld fast-leave`

Use this command to disable MLD Snooping fast-leave admin mode on a selected interface.

**Format**        `no set mld fast-leave vLanid`  
**Mode**

- Interface Config
- VLAN Mode

### 4.36.4    `set mld groupmembership-interval`

Use this command to set the MLD Group Membership Interval time on a VLAN, one interface or all interfaces. The Group Membership Interval time is the amount of time in seconds that a switch waits for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the MLDv2 Maximum Response time value. The range is 2 to 3600 seconds.

**Default**        260 seconds  
**Format**        `set mld groupmembership-interval vLanid 2-3600`  
**Mode**

- Interface Config
- Global Config
- VLAN Mode

#### 4.36.4.1   `no set groupmembership-interval`

Use this command to set the MLDv2 Group Membership Interval time to the default value.

**Format**        `no set mld groupmembership-interval`  
**Mode**

- Interface Config
- Global Config
- VLAN Mode

### 4.36.5    `set mld maxresponse`

Use this command to set the MLD Maximum Response time for the system, on a particular interface or VLAN. The Maxi-

imum Response time is the amount of time in seconds that a switch will wait after sending a query on an interface because it did not receive a report for a particular group in that interface. This value must be less than the MLD Query Interval time value. The range is 1 to 65 seconds.

|                |                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | 10 seconds                                                                                                         |
| <b>Format</b>  | <code>set mld maxresponse 1-65</code>                                                                              |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Mode</li> </ul> |

#### 4.36.5.1 no set mld maxresponse

Use this command to set the maximum response time (on the interface or VLAN) to the default value.

|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no set mld maxresponse</code>                                                                                |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> <li>• VLAN Mode</li> </ul> |

#### 4.36.6 set mld mcrtexpiretime

Use this command to set the Multicast Router Present Expiration time. The time is set for the system, on a particular interface or VLAN. This is the amount of time in seconds that a switch waits for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 0 to 3600 seconds. A value of 0 indicates an infinite timeout, that is, no expiration.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                             |
| <b>Format</b>  | <code>set mld mcrtexpiretime vLanid 0-3600</code>                                             |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.36.6.1 no set mld mcrtexpiretime

Use this command to set the Multicast Router Present Expiration time to 0. The time is set for the system, on a particular interface or a VLAN.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no set mld mcrtexpiretime vLanid</code>                                                 |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

#### 4.36.7 set mld mrouter

Use this command to configure the VLAN ID for the VLAN that has the multicast router attached mode enabled.

|               |                                     |
|---------------|-------------------------------------|
| <b>Format</b> | <code>set mld mrouter vLanid</code> |
| <b>Mode</b>   | Interface Config                    |

#### 4.36.7.1 no set mld mrouter

Use this command to disable multicast router attached mode for a VLAN with a particular VLAN ID.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | <code>no set mld mrouter vLanid</code> |
| <b>Mode</b>   | Interface Config                       |

### 4.36.8 set mld mrouter interface

Use this command to configure the interface as a multicast router-attached interface. When configured as a multicast router interface, the interface is treated as a multicast router-attached interface in all VLANs.

|                |                           |
|----------------|---------------------------|
| <b>Default</b> | disabled                  |
| <b>Format</b>  | set mld mrouter interface |
| <b>Mode</b>    | Interface Config          |

#### 4.36.8.1 no set mld mrouter interface

Use this command to disable the status of the interface as a statically configured multicast router-attached interface.

|               |                              |
|---------------|------------------------------|
| <b>Format</b> | no set mld mrouter interface |
| <b>Mode</b>   | Interface Config             |

### 4.36.9 show mldsnoothing

Use this command to display MLD Snooping information. Configured information is displayed whether or not MLD Snooping is enabled.

|               |                                                             |
|---------------|-------------------------------------------------------------|
| <b>Format</b> | show mldsnoothing [ <i>unit/slot/port</i>   <i>vlanid</i> ] |
| <b>Mode</b>   | Privileged EXEC                                             |

When the optional arguments *unit/slot/port* or *vlanid* are not used, the command displays the following information.

| Parameter                           | Description                                                              |
|-------------------------------------|--------------------------------------------------------------------------|
| Admin Mode                          | Indicates whether or not MLD Snooping is active on the switch.           |
| Multicast Control Frame Count       | The number of multicast control frames that are processed by the CPU.    |
| Interfaces Enabled for MLD Snooping | Interfaces on which MLD Snooping is enabled.                             |
| MLD Control Frame Count             | Displays the number of MLD Control frames that are processed by the CPU. |
| VLANs Enabled for MLD Snooping      | VLANs on which MLD Snooping is enabled.                                  |
| Exclude Mrouter Interface Mode      | Indicates whether the mode is enabled or disabled.                       |
| MLD-Plus                            | Indicates whether the mode is enabled or disabled.                       |

When you specify the *unit/slot/port* values, the following information is displayed.

| Parameter                                | Description                                                                                                                                                                                                                                        |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MLD Snooping Admin Mode                  | Indicates whether MLD Snooping is active on the interface.                                                                                                                                                                                         |
| Fast Leave Mode                          | Indicates whether MLD Snooping Fast Leave is active on the VLAN.                                                                                                                                                                                   |
| Group Membership Interval                | Shows the amount of time in seconds that a switch will wait for a report from a particular group on a particular interface, which is participating in the VLAN, before deleting the interface from the entry. This value may be configured.        |
| Max Response Time                        | Displays the amount of time the switch waits after it sends a query on an interface, participating in the VLAN, because it did not receive a report for a particular group on that interface. This value may be configured.                        |
| Multicast Router Present Expiration Time | Displays the amount of time to wait before removing an interface that is participating in the VLAN from the list of interfaces with multicast routers attached. The interface is removed if a query is not received. This value may be configured. |

When you specify a value for *vlanid*, the following information appears.

| Parameter       | Description                                           |
|-----------------|-------------------------------------------------------|
| VLAN Admin Mode | Indicates whether MLD Snooping is active on the VLAN. |

**Example:** The following shows example CLI display output for the command at the Global level.

```
(Switching)#show mld Snooping
Admin Mode..... Enable
Multicast Control Frame Count..... 0
Interfaces Enabled for MLD Snooping..... None
VLANs enabled for MLD snooping..... 1
Exclude Mrouter Interface Mode..... Enabled
MLD-Plus..... Enabled
```

```
VLAN ID..... 1
MLD Snooping Admin Mode..... Enabled
Fast Leave Mode..... Enabled
Group Membership Interval (secs)..... 260
Max Response Time (secs)..... 10
Multicast Router Expiry Time (secs)..... 300
Exclude Mrouter Interface Mode..... Enabled
MLD-Plus..... Enabled
```

**Example:** The following shows example CLI display output for the command at the VLAN level.

```
(Switching)#show mld Snooping 1
VLAN ID..... 1
MLD Snooping Admin Mode..... Enabled
Fast Leave Mode..... Enabled
Group Membership Interval (secs)..... 260
Max Response Time (secs)..... 10
Multicast Router Expiry Time (secs)..... 300
Exclude Mrouter Interface Mode..... Enabled
MLD-Plus..... Enabled
```

#### 4.36.10 show mld Snooping mrouter interface

Use this command to display information about statically configured multicast router attached interfaces.

**Format** show mld Snooping mrouter interface *unit/slot/port*

**Mode** Privileged EXEC

| Parameter                 | Description                                                                   |
|---------------------------|-------------------------------------------------------------------------------|
| Interface                 | Shows the interface on which multicast router information is being displayed. |
| Multicast Router Attached | Indicates whether multicast router is statically enabled on the interface.    |
| VLAN ID                   | Displays the list of VLANs of which the interface is a member.                |



### 4.36.11 show mldsnoothing mrouter vlan

Use this command to display information about statically configured multicast router-attached interfaces.

**Format**            `show mldsnoothing mrouter vlan unit/slot/port`

**Mode**             Privileged EXEC

| Parameter | Description                                                                   |
|-----------|-------------------------------------------------------------------------------|
| Interface | Shows the interface on which multicast router information is being displayed. |
| VLAN ID   | Displays the list of VLANs of which the interface is a member.                |

### 4.36.12 show mldsnoothing ssm entries

Use this command to display the source-specific multicast forwarding database built by MLD snooping.

A given {Source, Group, VLAN} combination can have few interfaces in `Include` mode and few interfaces in `Exclude` mode. In such instances, two rows for the same {Source, Group, VLAN} combinations are displayed.

**Format**            `show mldsnoothing ssm entries`

**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Fields             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN               | The VLAN on which the entry is learned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Group              | The IPv6 multicast group address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Source             | The IPv6 source address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Source Filter Mode | The source filter mode ( <code>Include/Exclude</code> ) for the specified group.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Interfaces         | <ol style="list-style-type: none"> <li>1 If Source Filter Mode is <code>Include</code>, specifies the list of interfaces on which an incoming packet is forwarded. If its source IP address is equal to the current entry's Source, the destination IP address is equal to the current entry's Group and the VLAN ID on which it arrived is current entry's VLAN.</li> <li>2 If Source Filter Mode is <code>Exclude</code>, specifies the list of interfaces on which an incoming packet is forwarded. If its source IP address is <i>not</i> equal to the current entry's Source, the destination IP address is equal to the current entry's Group and VLAN ID on which it arrived is the current entry's VLAN.</li> </ol> |

### 4.36.13 show mldsnoothing ssm stats

Use this command to display the statistics of MLD snooping's SSMFDB. This command takes no options.

**Format**            `show mldsnoothing ssm stats`

**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Parameter                     | Description                                                                        |
|-------------------------------|------------------------------------------------------------------------------------|
| Total Entries                 | The total number of entries that can possibly be in the MLD snooping's SSMFDB.     |
| Most SSMFDB Entries Ever Used | The largest number of entries that have been present in the MLD snooping's SSMFDB. |
| Current Entries               | The current number of entries in the MLD snooping's SSMFDB.                        |

### 4.36.14 show mldsnoothing ssm groups

Use this command to display the MLD SSM group membership information.

**Format**            `show mld Snooping ssm groups`  
**Mode**             Privileged EXEC

The following fields are displayed in the output of this command.

| Parameter           | Description                                                          |
|---------------------|----------------------------------------------------------------------|
| VLAN                | VLAN on which the MLD v2 report is received.                         |
| Group               | The IPv6 multicast group address.                                    |
| Interface           | The interface on which the MLD v2 report is received.                |
| Reporter            | The IPv6 address of the host that sent the MLDv2 report.             |
| Source Filter Mode  | The source filter mode (Include/Exclude) for the specified group.    |
| Source Address List | List of source IP addresses for which source filtering is requested. |

#### 4.36.15 `show mac-address-table mld Snooping`

Use this command to display the MLD Snooping entries in the Multicast Forwarding Database (MFDB) table.

**Format**            `show mac-address-table mld Snooping`  
**Mode**             Privileged EXEC

| Parameter   | Description                                                                                                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID     | The VLAN in which the MAC address is learned.                                                                                                                                                    |
| MAC Address | A multicast MAC address for which the switch has forwarding or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Type        | The type of entry, which is either static (added by the user) or dynamic (added to the table as a result of a learning process or protocol.)                                                     |
| Description | The text description of this multicast table entry.                                                                                                                                              |
| Interfaces  | The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).                                                                                                           |

#### 4.36.16 `clear mld Snooping`

Use this command to delete all MLD snooping entries from the MFDB table.

**Format**            `clear mld Snooping`  
**Mode**             Privileged EXEC

### 4.37 MLD Snooping Querier Commands

In an IPv6 environment, MLD Snooping requires that one central switch or router periodically query all end-devices on the network to announce their multicast memberships. This central device is the MLD Querier. The MLD query responses, known as MLD reports, keep the switch updated with the current multicast group membership on a port-by-port basis. If the switch does not receive updated membership information in a timely fashion, it will stop forwarding multicasts to the port where the end device is located.

This section describes the commands you use to configure and display information on MLD Snooping queries on the network and, separately, on VLANs.

#### **NOTICE**

This note clarifies the prioritization of MGMD Snooping Configurations. Many of the IGMP/MLD Snooping commands are available both in the Interface and VLAN modes. Operationally the system chooses or prefers the VLAN configured values over the Interface configured values for most configurations when the interface participates in the VLAN.

### 4.37.1 set mld querier

Use this command to enable MLD Snooping Querier on the system (Global Config Mode) or on a VLAN. Using this command, you can specify the IP address that the snooping querier switch should use as a source address while generating periodic queries.

If a VLAN has MLD Snooping Querier enabled and MLD Snooping is operationally disabled on it, MLD Snooping Querier functionality is disabled on that VLAN. MLD Snooping functionality is reenabled if MLD Snooping is operational on the VLAN.

The MLD Snooping Querier sends periodic general queries on the VLAN to solicit membership reports.

**Default** disabled

**Format** `set mld querier [vlan-id] [address ipv6_address]`

**Mode**

- Global Config
- VLAN Mode

#### 4.37.1.1 no set mld querier

Use this command to disable MLD Snooping Querier on the system. Use the optional parameter `address` to reset the querier address.

**Format** `no set mld querier [vlan-id] [address]`

**Mode**

- Global Config
- VLAN Mode

### 4.37.2 set mld querier query\_interval

Use this command to set the MLD Querier Query Interval time. It is the amount of time in seconds that the switch waits before sending another general query.

**Default** 60 seconds

**Format** `set mld querier query_interval 1-18000`

**Mode** Global Config

#### 4.37.2.1 no set mld querier query\_interval

Use this command to set the MLD Querier Query Interval time to its default value.

**Format** `no set mld querier query_interval`

**Mode** Global Config

### 4.37.3 set mld querier timer expiry

Use this command to set the MLD Querier timer expiration period. It is the time period that the switch remains in Non-Querier mode once it has discovered that there is a Multicast Querier in the network.

**Default** 60 seconds

**Format** `set mld querier timer expiry 60-300`

**Mode** Global Config

#### 4.37.3.1 no set mld querier timer expiry

Use this command to set the MLD Querier timer expiration period to its default value.

**Format** `no set mld querier timer expiry`

**Mode** Global Config

### 4.37.4 set mld querier election participate

Use this command to enable the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN. When this mode is enabled, if the Snooping Querier finds that the other Querier's source address is better (less) than the Snooping Querier's address, it stops sending periodic queries. If the Snooping Querier wins the election, then it will continue sending periodic queries.

**Default** disabled  
**Format** set mld querier election participate  
**Mode** VLAN Database

#### 4.37.4.1 no set mld querier election participate

Use this command to set the snooping querier not to participate in querier election but go into a non-querier mode as soon as it discovers the presence of another querier in the same VLAN.

**Format** no set mld querier election participate  
**Mode** VLAN Database

### 4.37.5 show mldsnopping querier

Use this command to display MLD Snooping Querier information. Configured information is displayed whether or not MLD Snooping Querier is enabled.

**Format** show mldsnopping querier [{detail | vlan *vlanid*}]  
**Mode** Privileged EXEC

When the optional arguments *vlanid* are not used, the command displays the following information.

| Parameter       | Description                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Admin Mode      | Indicates whether or not MLD Snooping Querier is active on the switch.                                                                  |
| Admin Version   | Indicates the version of MLD that will be used while sending out the queries. This is defaulted to MLD v1 and it cannot be changed.     |
| Querier Address | Shows the IP address used in the IPv6 header while sending MLD queries. The IP address can be configured using the appropriate command. |
| Query Interval  | Shows the amount of time in seconds that a Snooping Querier waits before sending out the periodic general query.                        |
| Querier Timeout | Displays the amount of time to wait in the Non-Querier operational state before moving to a Querier state.                              |

When you specify a value for *vlanid*, the following information appears.

| Parameter                          | Description                                                                                                                                                                                                                                                           |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN Admin Mode                    | Indicates whether MLD Snooping Querier is active on the VLAN.                                                                                                                                                                                                         |
| VLAN Operational State             | Indicates whether MLD Snooping Querier is in "Querier" or "Non-Querier" state. When the switch is in Querier state, it will send out periodic general queries. When in Non-Querier state, it will wait for moving to Querier state and does not send out any queries. |
| VLAN Operational Max Response Time | Indicates the time to wait before removing a Leave from a host upon receiving a Leave request. This value is calculated dynamically from the Queries received from the network. If the Snooping Switch is in Querier state, then it is equal to the configured value. |
| Querier Election Participate       | Indicates whether the MLD Snooping Querier participates in querier election if it discovers the presence of a querier in the VLAN.                                                                                                                                    |
| Querier VLAN Address               | The IP address will be used in the IPv6 header while sending out MLD queries on this VLAN. It can be configured using the appropriate command.                                                                                                                        |
| Operational Version                | This version of IPv6 will be used while sending out MLD queriers on this VLAN.                                                                                                                                                                                        |

| Parameter            | Description                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------|
| Last Querier Address | Indicates the IP address of the most recent Querier from which a Query was received.               |
| Last Querier Version | Indicates the MLD version of the most recent Querier from which a Query was received on this VLAN. |

When the optional argument `detail` is used, the command shows the global information and the information for all Querier-enabled VLANs.

## 4.38 MLD Proxy Querier Commands

### 4.38.1 `set mld proxy-querier` (Global Config)

Use this command to configure the proxy-querier globally. For the proxy-querier to become operational on a given VLAN or interface, you must enable the proxy-querier on the corresponding VLAN or interface as well.

When proxy-querier is enabled, MLD proxy query with source IP :: is sent in response to the MLD leave packet.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | enabled                            |
| <b>Format</b>  | <code>set mld proxy-querier</code> |
| <b>Mode</b>    | Global Config                      |

#### 4.38.1.1 `no set mld proxy-querier`

Use the `no` form of the command to disable proxy-querier globally. If proxy-querier is disabled, the MLD proxy query is not sent in response to the MLD leave packet.

|               |                                       |
|---------------|---------------------------------------|
| <b>Format</b> | <code>no set mld proxy-querier</code> |
| <b>Mode</b>   | Global Config                         |

### 4.38.2 `set mld proxy-querier` (Interface Config)

Use this command to configure the proxy-querier on the interface. When proxy-querier is enabled, MLD proxy query with source IP :: is sent in response to the MLD leave packet.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | enabled                            |
| <b>Format</b>  | <code>set mld proxy-querier</code> |
| <b>Mode</b>    | Interface Config                   |

#### 4.38.2.1 `no set mld proxy-querier`

Use the `no` form of the command to disable proxy-querier on the interface. If proxy-querier is disabled, the MLD proxy query is not sent in response to the MLD leave packet.

|               |                                       |
|---------------|---------------------------------------|
| <b>Format</b> | <code>no set mld proxy-querier</code> |
| <b>Mode</b>   | Interface Config                      |

### 4.38.3 `set mld proxy-querier` (VLAN Config)

Use this command to configure the proxy-querier on the VLAN. When proxy-querier is enabled, MLD proxy query with source IP :: is sent in response to the MLD leave packet.

|                |                                            |
|----------------|--------------------------------------------|
| <b>Default</b> | enabled                                    |
| <b>Format</b>  | <code>set mld proxy-querier VLAN-ID</code> |
| <b>Mode</b>    | VLAN Config                                |

### 4.38.3.1 no set mld proxy-querier

Use the `no` form of the command to disable proxy-querier on the VLAN. If proxy-querier is disabled, the MLD proxy query is not sent in response to the MLD leave packet.

**Format**            `no set mld proxy-querier VLAN-ID`

**Mode**             VLAN Config

### 4.38.4 show mldsnopping proxy-querier

Use this command to display the proxy-querier status globally for all the interfaces and all VLANs.

**Format**            `show mldsnopping proxy-querier`

**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) # show mldsnopping proxy-querier
```

```
Admin Mode..... Enable
Interfaces Enabled for MLD Proxy Querier..... 1/0/1
 1/0/2
 1/0/3
 1/0/4
 1/0/5
 1/0/6
 1/0/7
 1/0/8
 1/0/9
 1/0/10
 lag 1
 lag 2
 lag 3
 lag 4
 lag 5
 lag 6
 lag 7
 lag 8
 lag 9
 lag 10
VLANs enabled for MLD Proxy Querier..... 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
```

## 4.39 Port Security Commands

This section describes the command you use to configure Port Security on the switch. Port security, which is also known as port MAC locking, allows you to secure the network by locking allowable MAC addresses on a given port. Packets with a matching source MAC address are forwarded normally, and all other packets are discarded.

---

To enable the SNMP trap specific to port security, see the `command`.

**NOTICE**

---

## 4.39.1 port-security

This command enables port locking on an interface, a range of interfaces, or at the system level.

|                |                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                                                                                        |
| <b>Format</b>  | <code>port-security</code>                                                                                                                                                                      |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config (to enable port locking globally)</li> <li>• Interface Config (to enable port locking on an interface or range of interfaces)</li> </ul> |

### 4.39.1.1 no port-security

This command disables port locking for one (Interface Config) or all (Global Config) ports.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no port-security</code>                                                                 |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

## 4.39.2 port-security aging time

Use this command to configure aging time that defines the inactive duration of the dynamically-locked MAC addresses on an interface. Aging time is in minutes; the range is 0 to 1440. Aging time of 0 implies aging is disabled.

|                |                                                      |
|----------------|------------------------------------------------------|
| <b>Default</b> | 5                                                    |
| <b>Format</b>  | <code>port-security aging time <i>minutes</i></code> |
| <b>Mode</b>    | Interface Config                                     |

## 4.39.3 port-security max-dynamic

This command sets the maximum number of dynamically locked MAC addresses allowed on a specific port. The valid range is 0 to 600.

|                |                                                        |
|----------------|--------------------------------------------------------|
| <b>Default</b> | 600                                                    |
| <b>Format</b>  | <code>port-security max-dynamic <i>maxvalue</i></code> |
| <b>Mode</b>    | Interface Config                                       |

### 4.39.3.1 no port-security max-dynamic

This command resets the maximum number of dynamically locked MAC addresses allowed on a specific port to its default value.

|               |                                           |
|---------------|-------------------------------------------|
| <b>Format</b> | <code>no port-security max-dynamic</code> |
| <b>Mode</b>   | Interface Config                          |

## 4.39.4 port-security max-static

This command sets the maximum number of statically locked MAC addresses allowed on a port. The valid range is 0 to 20.

|                |                                                       |
|----------------|-------------------------------------------------------|
| <b>Default</b> | 1                                                     |
| <b>Format</b>  | <code>port-security max-static <i>maxvalue</i></code> |
| <b>Mode</b>    | Interface Config                                      |

### 4.39.4.1 no port-security max-static

This command sets maximum number of statically locked MAC addresses to the default value.

**Format**           no port-security max-static  
**Mode**             Interface Config

### 4.39.5 port-security mac-address

This command adds a MAC address to the list of statically locked MAC addresses for an interface or range of interfaces. The *vid* is the VLAN ID.

**Format**           port-security mac-address *mac-address vid*  
**Mode**             Interface Config

#### 4.39.5.1 no port-security mac-address

This command removes a MAC address from the list of statically locked MAC addresses.

**Format**           no port-security mac-address *mac-address vid*  
**Mode**             Interface Config

### 4.39.6 port-security mac-address move

This command converts dynamically locked MAC addresses to statically locked addresses for an interface or range of interfaces.

**Format**           port-security mac-address move  
**Mode**             Interface Config

### 4.39.7 port-security mac-address sticky

This command enables sticky mode Port MAC Locking on a port. If accompanied by a MAC address and a VLAN id (for interface config mode only), it adds a sticky MAC address to the list of statically locked MAC addresses. These sticky addresses are converted back to dynamically locked addresses if sticky mode is disabled on the port. The <vid> is the VLAN ID. The Global command applies the "sticky" mode to all valid interfaces (physical and LAG). There is no global sticky mode as such.

Sticky addresses that are dynamically learned will appear in the command as "port-security mac-address sticky <mac> <vid>" entries. This distinguishes them from static entries.

**Format**           port-security mac-address sticky [<mac-address> <vid>]  
**Mode**

- Global Config
- Interface Config

**Example:** The following shows an example of the command.

```
(Switching)(Config)# port-security mac-address sticky
(Switching)(Interface)# port-security mac-address sticky
(Switching)(Interface)# port-security mac-address sticky
00:00:00:00:00:01 2
```

#### 4.39.7.1 no port-security mac-address sticky

The no form removes the sticky mode. The sticky MAC address can be deleted by using the command no port-security mac-address <mac-address> <vid>.

**Format**           no port-security mac-address sticky [<mac-address> <vid>]  
**Mode**

- Global Config
- Interface Config



### 4.39.8 mac-address-table limit

This command enables VLAN port security. VLAN MAC locking allows you to secure the network by locking down allowable MAC addresses on a given VLAN. Packets with a matching source MAC address can be forwarded normally. All other packets will be discarded. VLAN MAC locking will lock the dynamic MAC entries.

If VLAN and port MAC locking are enabled, VLAN MAC locking will be given precedence over port MAC locking.

|                |                                                                                                |
|----------------|------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                       |
| <b>Format</b>  | mac-address-table limit [action shutdown] [notification trap ] [maximum-num]<br>[vlan vlan-id] |
| <b>Mode</b>    | Global Config                                                                                  |

| Parameter           | Description                                                                                                                                                                                                 |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [action shutdown]   | After the MAC limit has been reached, the action will shut down the ports participating in the VLAN.                                                                                                        |
| [notification trap] | Enables <code>snmp-server enable traps violation</code> on the ports participating in the VLAN. After the MAC limit has been reached, log message will be generated with the violation MAC address details. |
| [maximum-num]       | MAC limit to be configured.                                                                                                                                                                                 |
| [vlan vlan]         | VLAN on which the MAC limit is to be applied.<br><b>Note:</b> Packets on all other VLAN will be discarded.                                                                                                  |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#mac-address-table limit 3 vlan 10
(Routing) (Config)#mac-address-table limit action shutdown 5 vlan 20
(Routing) (Config)#mac-address-table limit notification trap 4 vlan 30
(Routing) (Config)#mac-address-table limit action shutdown notification trap 6 vlan 100
```

#### 4.39.8.1 no mac-address-table limit

This command disables VLAN port security on the specified VLAN.

|                |                                                                                                   |
|----------------|---------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                          |
| <b>Format</b>  | no mac-address-table limit [action shutdown] [notification trap ] [maximum-num]<br>[vlan vlan-id] |
| <b>Mode</b>    | Global Config                                                                                     |

### 4.39.9 show port-security

This command displays the port-security settings for the ports. If you do not use a parameter, the command displays the Port Security Administrative mode. Use the optional parameters to display the settings on a specific interface or on all interfaces. Instead of slot/port, lag lag-intf-num can be used as an alternate way to specify the LAG interface. lag lag-intf-num can also be used to specify the LAG interface where lag-intf-num is the LAG port number.

|               |                                        |
|---------------|----------------------------------------|
| <b>Format</b> | show port-security [{slot/port   all}] |
| <b>Mode</b>   | Privileged EXEC                        |

| Parameter  | Description                                                                                       |
|------------|---------------------------------------------------------------------------------------------------|
| Admin Mode | Port Locking mode for the entire system. This field displays if you do not supply any parameters. |

For each interface, or for the interface you specify, the following information appears.

| Parameter           | Description                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------|
| Admin Mode          | Port Locking mode for the Interface.                                                                               |
| Dynamic Limit       | The maximum dynamically allocated MAC Addresses.                                                                   |
| Static Limit        | The maximum statically allocated MAC Addresses.                                                                    |
| Violation Trap Mode | Whether violation traps are enabled.                                                                               |
| Sticky Mode         | The administrative mode of the port security Sticky Mode feature on the interface.                                 |
| Aging Time          | The aging time in minutes configured on the port. See <a href="#">Section 4.39.2: "port-security aging time"</a> . |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show port-security 0/1
```

| Intf | Admin Mode | Dynamic Limit | Static Limit | Violation Trap Mode | Sticky Mode | Aging Time |
|------|------------|---------------|--------------|---------------------|-------------|------------|
| 0/1  | Disabled   | 1             | 1            | Disabled            | Enabled     | 20         |

#### 4.39.10 show port-security dynamic

This command displays the dynamically locked MAC addresses for the port. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port-security dynamic slot/port`

**Mode**             Privileged EXEC

| Parameter   | Description                            |
|-------------|----------------------------------------|
| MAC Address | MAC Address of dynamically locked MAC. |

#### 4.39.11 show port-security static

This command displays the statically locked MAC addresses for port. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port-security static {slot/port / lag lag-intf-num}`

**Mode**             Privileged EXEC

| Parameter                         | Description                                                               |
|-----------------------------------|---------------------------------------------------------------------------|
| Statically Configured MAC Address | The statically configured MAC address.                                    |
| VLAN ID                           | The ID of the VLAN that includes the host with the specified MAC address. |
| Sticky                            | Indicates whether the static MAC address entry is added in sticky mode.   |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show port-security static 1/0/1
```

```
Number of static MAC addresses configured: 2
```

| Statically configured MAC Address | VLAN ID | Sticky |
|-----------------------------------|---------|--------|
| 00:00:00:00:00:01                 | 2       | Yes    |
| 00:00:00:00:00:02                 | 2       | No     |

### 4.39.12 show port-security violation

This command displays the source MAC address of the last packet discarded on a locked port. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**Format**            `show port-security violation {slot/port | lag lag-id}`

**Mode**             Privileged EXEC

| Parameter   | Description                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------------------|
| MAC Address | The source MAC address of the last frame that was discarded at a locked port.                                      |
| VLAN ID     | The VLAN ID, if applicable, associated with the MAC address of the last frame that was discarded at a locked port. |

### 4.39.13 show mac-address-table limit

This command displays the VLAN port security configuration.

**Format**            `show mac-address-table limit [vlan-id]`

**Mode**             Privileged EXEC

| Parameter | Description                                           |
|-----------|-------------------------------------------------------|
| VLAN ID   | The VLAN ID on which MAC locking has been configured. |

**Example:** The following shows example command output.

```
(Routing) #show mac-address-table limit
```

```
Vlan MAC Locking Administration Mode: Enabled
```

```
For Vlan 10
Configured mac limit 3
Operational mac limit 3
Violation trap mode Enabled
Violation shutdown mode Disabled
```

```
vlan Interface Mac-Address

10 0/2 00:00:00:00:44:44
10 0/2 00:00:00:00:44:45
10 0/2 00:00:00:00:44:46
```

```
For Vlan 20
Configured mac limit 3
Operational mac limit 3
Violation trap mode Enabled
Violation shutdown mode Disabled
```

```
vlan Interface Mac-Address

20 0/28 00:00:00:00:00:11
20 0/28 00:00:00:00:00:12
20 0/28 00:00:00:00:00:13
```

```
(Routing) #show mac-address-table limit 10
```

```
Vlan MAC Locking Administration Mode: Enabled
```

```
For Vlan 10
```

```
Configured mac limit 3
Operational mac limit 3
```

```
vlan Interface Mac-Address

10 0/2 00:00:00:00:44:44
10 0/2 00:00:00:00:44:45
10 0/2 00:00:00:00:44:46
```

## 4.40 LLDP (IEEE 802.1ab) Commands

This section describes the command you use to configure Link Layer Discovery Protocol (LLDP), which is defined in the IEEE 802.1ab specification. LLDP allows stations on an 802 LAN to advertise major capabilities and physical descriptions. The advertisements allow a network management system (NMS) to access and display this information.

### 4.40.1 lldp transmit

Use this command to enable the LLDP advertise capability on an interface or a range of interfaces.

**Default** disabled  
**Format** lldp transmit  
**Mode** Interface Config

#### 4.40.1.1 no lldp transmit

Use this command to return the local data transmission capability to the default.

**Format** no lldp transmit  
**Mode** Interface Config

### 4.40.2 lldp receive

Use this command to enable the LLDP receive capability on an interface or a range of interfaces.

**Default** disabled  
**Format** lldp receive  
**Mode** Interface Config

#### 4.40.2.1 no lldp receive

Use this command to return the reception of LLDPDUs to the default value.

**Format** no lldp receive  
**Mode** Interface Config

### 4.40.3 lldp timers

Use this command to set the timing parameters for local data transmission on ports enabled for LLDP. The *interval-seconds* determines the number of seconds to wait between transmitting local data LLDPDUs. The range is 5 to 32768 seconds. The *hold-value* is the multiplier on the transmit interval that sets the TTL in local data LLDPDUs. The multiplier range is 2 to 10. The *reinit-seconds* is the delay before reinitialization, and the range is 1 to 10 seconds.

**Default**

- interval—30 seconds
- hold—4
- reinit—2 seconds

**Format** lldp timers [interval *interval-seconds*] [hold *hold-value*] [reinit *reinit-seconds*]  
**Mode** Global Config

### 4.40.3.1 no lldp timers

Use this command to return any or all timing parameters for local data transmission on ports enabled for LLDP to the default values.

**Format** no lldp timers [interval] [hold] [reinit]

**Mode** Global Config

### 4.40.4 lldp transmit-tlv

Use this command to specify which optional type length values (TLVs) in the IEEE 802.1ab basic management set are transmitted in the LLDPDUs from an interface or range of interfaces. Use *sys-name* to transmit the system name TLV. To configure the system name, see the `sys-name` command. Use *sys-desc* to transmit the system description TLV. Use *sys-cap* to transmit the system capabilities TLV. Use *port-desc* to transmit the port description TLV. To configure the port description, see the [description \(Interface Config\)](#) command.

**Default** no optional TLVs are included

**Format** lldp transmit-tlv [sys-desc] [sys-name] [sys-cap] [port-desc]

**Mode** Interface Config

#### 4.40.4.1 no lldp transmit-tlv

Use this command to remove an optional TLV from the LLDPDUs. Use the command without parameters to remove all optional TLVs from the LLDPDU.

**Format** no lldp transmit-tlv [sys-desc] [sys-name] [sys-cap] [port-desc]

**Mode** Interface Config

### 4.40.5 lldp transmit-mgmt

Use this command to include transmission of the local system management address information in the LLDPDUs. This command can be used to configure a single interface or a range of interfaces.

**Format** lldp transmit-mgmt

**Mode** Interface Config

#### 4.40.5.1 no lldp transmit-mgmt

Use this command to include transmission of the local system management address information in the LLDPDUs. Use this command to cancel inclusion of the management information in LLDPDUs.

**Format** no lldp transmit-mgmt

**Mode** Interface Config

### 4.40.6 lldp notification

Use this command to enable remote data change notifications on an interface or a range of interfaces.

**Default** disabled

**Format** lldp notification

**Mode** Interface Config

#### 4.40.6.1 no lldp notification

Use this command to disable notifications.

**Default** disabled  
**Format** no lldp notification  
**Mode** Interface Config

#### 4.40.7 lldp notification-interval

Use this command to configure how frequently the system sends remote data change notifications. The *interval* parameter is the number of seconds to wait between sending notifications. The valid interval range is 5 to 3600 seconds.

**Default** 5  
**Format** lldp notification-interval *interval*  
**Mode** Global Config

#### 4.40.7.1 no lldp notification-interval

Use this command to return the notification interval to the default value.

**Format** no lldp notification-interval  
**Mode** Global Config

#### 4.40.8 lldp portid-subtype

Use this command to set the Port ID Subtype of the [show lldp local-device detail](#) command as *interface-name* or *mac-address*. By default, the portid-subtype is set to *mac-address*.

**Default** mac-address  
**Format** lldp portid-subtype [*interface-name* | *mac-address*]  
**Mode** Interface Config

| Parameter      | Description                                        |
|----------------|----------------------------------------------------|
| interface-name | Configures LLDP port-id-subtype as interface-name. |
| mac-address    | Configures LLDP port-id-subtype as MAC-address.    |

#### 4.40.9 clear lldp statistics

Use this command to reset all LLDP statistics, including MED-related information.

**Format** clear lldp statistics  
**Mode** Privileged EXEC

#### 4.40.10 clear lldp remote-data

Use this command to delete all information from the LLDP remote data table, including MED-related information.

**Format** clear lldp remote-data  
**Mode** Global Config

### 4.40.11 show lldp

Use this command to display a summary of the current LLDP configuration.

**Format**            show lldp

**Mode**             Privileged EXEC

| Parameter                | Description                                                                      |
|--------------------------|----------------------------------------------------------------------------------|
| Transmit Interval        | How frequently the system transmits local data LLDPDUs, in seconds.              |
| Transmit Hold Multiplier | The multiplier on the transmit interval that sets the TTL in local data LLDPDUs. |
| Re-initialization Delay  | The delay before reinitialization, in seconds.                                   |
| Notification Interval    | How frequently the system sends remote data change notifications, in seconds.    |

### 4.40.12 show lldp interface

Use this command to display a summary of the current LLDP configuration for a specific interface or for all interfaces.

**Format**            show lldp interface {*slot/port* | all}

**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                                                                   |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface | The interface in a <i>slot/port</i> format.                                                                                                                                   |
| Link      | Shows whether the link is up or down.                                                                                                                                         |
| Transmit  | Shows whether the interface transmits LLDPDUs.                                                                                                                                |
| Receive   | Shows whether the interface receives LLDPDUs.                                                                                                                                 |
| Notify    | Shows whether the interface sends remote data change notifications.                                                                                                           |
| TLVs      | Shows whether the interface sends optional TLVs in the LLDPDUs. The TLV codes can be 0 (Port Description), 1 (System Name), 2 (System Description), or 3 (System Capability). |
| Mgmt      | Shows whether the interface transmits system management address information in the LLDPDUs.                                                                                   |

### 4.40.13 show lldp statistics

Use this command to display the current LLDP traffic and remote table statistics for a specific interface or for all interfaces.

**Format**            show lldp statistics {*slot/port* | all}

**Mode**             Privileged EXEC

| Parameter     | Description                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------------------|
| Last Update   | The amount of time since the last update to the remote table in days, hours, minutes, and seconds.        |
| Total Inserts | Total number of inserts to the remote data table.                                                         |
| Total Deletes | Total number of deletes from the remote data table.                                                       |
| Total Drops   | Total number of times the complete remote data received was not inserted due to insufficient resources.   |
| Total Ageouts | Total number of times a complete remote data entry was deleted because the Time to Live interval expired. |

The table contains the following column headings:

| Parameter    | Description                                                                                                            |
|--------------|------------------------------------------------------------------------------------------------------------------------|
| Interface    | The interface in <i>slot/port</i> format.                                                                              |
| TX Total     | Total number of LLDP packets transmitted on the port.                                                                  |
| RX Total     | Total number of LLDP packets received on the port.                                                                     |
| Discards     | Total number of LLDP frames discarded on the port for any reason.                                                      |
| Errors       | The number of invalid LLDP frames received on the port.                                                                |
| Ageouts      | Total number of times a complete remote data entry was deleted for the port because the Time to Live interval expired. |
| TVL Discards | The number of TLVs discarded.                                                                                          |
| TVL Unknowns | Total number of LLDP TLVs received on the port where the type value is in the reserved range, and not recognized.      |
| TLV MED      | The total number of LLDP-MED TLVs received on the interface.                                                           |
| TLV 802.1    | The total number of LLDP TLVs received on the interface that are of type IEEE 802.1.                                   |
| TLV 802.3    | The total number of LLDP TLVs received on the interface that are of type IEEE 802.3.                                   |

#### 4.40.14 show lldp remote-device

Use this command to display summary information about remote devices that transmit current LLDP data to the system. You can show information about LLDP remote data received on all ports or on a specific port.

**Format**            show lldp remote-device {*slot/port* | all}

**Mode**             Privileged EXEC

| Parameter       | Description                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------|
| Local Interface | The interface that received the LLDPDU from the remote device.                                                 |
| RemID           | An internal identifier to the switch to mark each remote device to the system.                                 |
| Chassis ID      | The ID that is sent by a remote device as part of the LLDP message, it is usually a MAC address of the device. |
| Port ID         | The port number that transmitted the LLDPDU.                                                                   |
| System Name     | The system name of the remote device.                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(FASTPATH Switching) #show lldp remote-device all
```

##### LLDP Remote Device Summary

```
Local
Interface RemID Chassis ID Port ID System Name

0/1
0/2
0/3
0/4
0/5
0/6
0/7 2 00:FC:E3:90:01:0F 00:FC:E3:90:01:11
0/7 3 00:FC:E3:90:01:0F 00:FC:E3:90:01:12
0/7 4 00:FC:E3:90:01:0F 00:FC:E3:90:01:13
0/7 5 00:FC:E3:90:01:0F 00:FC:E3:90:01:14
0/7 1 00:FC:E3:90:01:0F 00:FC:E3:90:03:11
0/7 6 00:FC:E3:90:01:0F 00:FC:E3:90:04:11
0/8
0/9
0/10
0/11
```



0/12  
--More-- or (q)uit

#### 4.40.15 show lldp remote-device detail

Use this command to display detailed information about remote devices that transmit current LLDP data to an interface on the system.

**Format** show lldp remote-device detail *slot/port*

**Mode** Privileged EXEC

| Parameter                     | Description                                                                                                                                                                                  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Interface               | The interface that received the LLDPDU from the remote device.                                                                                                                               |
| Remote Identifier             | An internal identifier to the switch to mark each remote device to the system.                                                                                                               |
| Chassis ID Subtype            | The type of identification used in the Chassis ID field.                                                                                                                                     |
| Chassis ID                    | The chassis of the remote device.                                                                                                                                                            |
| Port ID Subtype               | The type of port on the remote device.                                                                                                                                                       |
| Port ID                       | The port number that transmitted the LLDPDU.                                                                                                                                                 |
| System Name                   | The system name of the remote device.                                                                                                                                                        |
| System Description            | Describes the remote system by identifying the system name and versions of hardware, operating system, and networking software supported in the device.                                      |
| Port Description              | Describes the port in an alpha-numeric format. The port description is configurable.                                                                                                         |
| System Capabilities Supported | Indicates the primary functions of the device.                                                                                                                                               |
| System Capabilities Enabled   | Shows which of the supported system capabilities are enabled.                                                                                                                                |
| Management Address            | For each interface on the remote device with an LLDP agent, lists the type of address the remote LLDP agent uses and specifies the address used to obtain information related to the device. |
| Time To Live                  | The amount of time (in seconds) the remote device's information received in the LLDPDU should be treated as valid information.                                                               |

**Example:** The following shows example CLI display output for the command.

```
(FASTPATH Switching) #show lldp remote-device detail 0/7
```

```
LLDP Remote Device Detail
```

```
Local Interface: 0/7
```

```
Remote Identifier: 2
Chassis ID Subtype: MAC Address
Chassis ID: 00:FC:E3:90:01:0F
Port ID Subtype: MAC Address
Port ID: 00:FC:E3:90:01:11
System Name:
System Description:
Port Description:
System Capabilities Supported:
System Capabilities Enabled:
Time to Live: 24 seconds
```

#### 4.40.16 show lldp local-device

Use this command to display summary information about the advertised LLDP local data. This command can display summary information or detail for each interface.

**Format** show lldp local-device {*slot/port* | all}

**Mode** Privileged EXEC

| Parameter        | Description                                         |
|------------------|-----------------------------------------------------|
| Interface        | The interface in a <i>slot/port</i> format.         |
| Port ID          | The port ID associated with this interface.         |
| Port Description | The port description associated with the interface. |

#### 4.40.17 show lldp local-device detail

Use this command to display detailed information about the LLDP data a specific interface transmits.

**Format** show lldp local-device detail *slot/port*

**Mode** Privileged EXEC

| Parameter                     | Description                                                                                                                                            |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                     | The interface that sends the LLDPDU.                                                                                                                   |
| Chassis ID Subtype            | The type of identification used in the Chassis ID field.                                                                                               |
| Chassis ID                    | The chassis of the local device.                                                                                                                       |
| Port ID Subtype               | The type of port on the local device.                                                                                                                  |
| Port ID                       | The port number that transmitted the LLDPDU.                                                                                                           |
| System Name                   | The system name of the local device.                                                                                                                   |
| System Description            | Describes the local system by identifying the system name and versions of hardware, operating system, and networking software supported in the device. |
| Port Description              | Describes the port in an alpha-numeric format.                                                                                                         |
| System Capabilities Supported | Indicates the primary functions of the device.                                                                                                         |
| System Capabilities Enabled   | Shows which of the supported system capabilities are enabled.                                                                                          |
| Management Address            | The type of address and the specific address the local LLDP agent uses to send and receive information.                                                |

### 4.41 LLDP-MED Commands

Link Layer Discovery Protocol - Media Endpoint Discovery (LLDP-MED) (ANSI-TIA-1057) provides an extension to the LLDP standard. Specifically, LLDP-MED provides extensions for network configuration and policy, device location, Power over Ethernet (PoE) management and inventory management.

#### 4.41.1 lldp med

Use this command to enable MED on an interface or a range of interfaces. By enabling MED, you will be effectively enabling the transmit and receive function of LLDP.

**Default** disabled

**Format** lldp med

**Mode** Interface Config

### 4.41.1.1 no lldp med

Use this command to disable MED.

**Format** no lldp med  
**Mode** Interface Config

### 4.41.2 lldp med confignotification

Use this command to configure an interface or a range of interfaces to send the topology change notification.

**Default** disabled  
**Format** lldp med confignotification  
**Mode** Interface Config

### 4.41.2.1 no lldp med confignotification

Use this command to disable notifications.

**Format** no lldp med confignotification  
**Mode** Interface Config

### 4.41.3 lldp med transmit-tlv

Use this command to specify which optional Type Length Values (TLVs) in the LLDP MED set will be transmitted in the Link Layer Discovery Protocol Data Units (LLDPDUs) from this interface or a range of interfaces.

**Default** By default, the capabilities and network policy TLVs are included.  
**Format** lldp med transmit-tlv [capabilities] [ex-pd] [ex-pse] [inventory] [location] [network-policy]  
**Mode** Interface Config

| Parameter      | Description                           |
|----------------|---------------------------------------|
| capabilities   | Transmit the LLDP capabilities TLV.   |
| ex-pd          | Transmit the LLDP extended PD TLV.    |
| ex-pse         | Transmit the LLDP extended PSE TLV.   |
| inventory      | Transmit the LLDP inventory TLV.      |
| location       | Transmit the LLDP location TLV.       |
| network-policy | Transmit the LLDP network policy TLV. |

### 4.41.3.1 no lldp med transmit-tlv

Use this command to remove a TLV.

**Format** no lldp med transmit-tlv [capabilities] [network-policy] [ex-pse] [ex-pd] [location] [inventory]  
**Mode** Interface Config

### 4.41.4 lldp med all

Use this command to configure LLDP-MED on all the ports.

**Format** lldp med all  
**Mode** Global Config



**Example:** The following shows example CLI display output for the command.

```
(Routing) #show lldp med
LLDP MED Global Configuration

Fast Start Repeat Count: 3
Device Class: Network Connectivity

(Routing) #
```

#### 4.41.9 show lldp med interface

Use this command to display a summary of the current LLDP MED configuration for a specific interface. *unit/slot/port* indicates a specific physical interface. *all* indicates all valid LLDP interfaces.

**Format** show lldp med interface {*unit/slot/port* | all}  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show lldp med interface all
```

| Interface | Link | configMED | operMED  | ConfigNotify | TLVsTx |
|-----------|------|-----------|----------|--------------|--------|
| 1/0/1     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/2     | Up   | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/3     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/4     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/5     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/6     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/7     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/8     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/9     | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/10    | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/11    | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/12    | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/13    | Down | Disabled  | Disabled | Disabled     | 0,1    |
| 1/0/14    | Down | Disabled  | Disabled | Disabled     | 0,1    |

TLV Codes: 0- Capabilities, 1- Network Policy  
 2- Location, 3- Extended PSE  
 4- Extended Pd, 5- Inventory

--More-- or (q)uit

```
(Routing) #show lldp med interface 1/0/2
```

| Interface | Link | configMED | operMED  | ConfigNotify | TLVsTx |
|-----------|------|-----------|----------|--------------|--------|
| 1/0/2     | Up   | Disabled  | Disabled | Disabled     | 0,1    |

TLV Codes: 0- Capabilities, 1- Network Policy  
 2- Location, 3- Extended PSE  
 4- Extended Pd, 5- Inventory

```
(Routing) #
```

#### 4.41.10 show lldp med local-device detail

Use this command to display detailed information about the LLDP MED data that a specific interface transmits. *slot/port* indicates a specific physical interface.

**Format**            show lldp med local-device detail *sLot/port*  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show lldp med local-device detail 1/0/8
```

```
LLDP MED Local Device Detail
```

```
Interface: 1/0/8
```

```
Network Policies
```

```
Media Policy Application Type : voice
```

```
Vlan ID: 10
```

```
Priority: 5
```

```
DSCP: 1
```

```
Unknown: False
```

```
Tagged: True
```

```
Media Policy Application Type : streamingvideo
```

```
Vlan ID: 20
```

```
Priority: 1
```

```
DSCP: 2
```

```
Unknown: False
```

```
Tagged: True
```

```
Inventory
```

```
Hardware Rev: xxx xxx xxx
```

```
Firmware Rev: xxx xxx xxx
```

```
Software Rev: xxx xxx xxx
```

```
Serial Num: xxx xxx xxx
```

```
Mfg Name: xxx xxx xxx
```

```
Model Name: xxx xxx xxx
```

```
Asset ID: xxx xxx xxx
```

```
Location
```

```
Subtype: elin
```

```
Info: xxx xxx xxx
```

```
Extended POE
```

```
Device Type: pseDevice
```

```
Extended POE PSE
```

```
Available: 0.3 Watts
```

```
Source: primary
```

```
Priority: critical
```

```
Extended POE PD
```

```
Required: 0.2 Watts
```

```
Source: local
```

```
Priority: low
```

#### 4.41.11 show lldp med remote-device

Use this command to display the summary information about remote devices that transmit current LLDP MED data to the system. You can show information about LLDP MED remote data received on all valid LLDP interfaces or on a specific physical interface.

**Format**            show lldp med remote-device {*sLot/port* | all}

**Mode**             Privileged EXEC

| Parameter       | Description                                                                    |
|-----------------|--------------------------------------------------------------------------------|
| Local Interface | The interface that received the LLDPDU from the remote device.                 |
| Remote ID       | An internal identifier to the switch to mark each remote device to the system. |
| Device Class    | Device classification of the remote device.                                    |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show lldp med remote-device all
```

```
LLDP MED Remote Device Summary
```

```
Local
Interface Remote ID Device Class

1/0/8 1 Class I
1/0/9 2 Not Defined
1/0/10 3 Class II
1/0/11 4 Class III
1/0/12 5 Network Con
```

#### 4.41.12 show lldp med remote-device detail

Use this command to display detailed information about remote devices that transmit current LLDP MED data to an interface on the system.

**Format** show lldp med remote-device detail *slot/port*

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show lldp med remote-device detail 1/0/8
```

```
LLDP MED Remote Device Detail
```

```
Local Interface: 1/0/8
Remote Identifier: 18
Capabilities
MED Capabilities Supported: capabilities, networkpolicy, location, extendedpse
MED Capabilities Enabled: capabilities, networkpolicy
Device Class: Endpoint Class I
```

```
Network Policies
Media Policy Application Type : voice
Vlan ID: 10
Priority: 5
DSCP: 1
Unknown: False
Tagged: True
```

```
Media Policy Application Type : streamingvideo
Vlan ID: 20
Priority: 1
DSCP: 2
Unknown: False
Tagged: True
```

```
Inventory
Hardware Rev: xxx xxx xxx
Firmware Rev: xxx xxx xxx
```

Software Rev: xxx xxx xxx  
 Serial Num: xxx xxx xxx  
 Mfg Name: xxx xxx xxx  
 Model Name: xxx xxx xxx  
 Asset ID: xxx xxx xxx

Location  
 Subtype: elin  
 Info: xxx xxx xxx

Extended POE  
 Device Type: pseDevice

Extended POE PSE  
 Available: 0.3 Watts  
 Source: primary  
 Priority: critical

Extended POE PD

Required: 0.2 Watts  
 Source: local  
 Priority: low

## 4.42 Denial of Service Commands

---

Denial of Service (DataPlane) is supported on XGS® III and later platforms only.

### NOTICE

---

This section describes the commands you use to configure Denial of Service (DoS) Control. FASTPATH software provides support for classifying and blocking specific types of Denial of Service attacks. You can configure your system to monitor and block these types of attacks:

- SIP = DIP: Source IP address = Destination IP address.
- First Fragment: TCP Header size smaller than configured value.
- TCP Fragment: Allows the device to drop packets that have a TCP payload where the IP payload length minus the IP header size is less than the minimum allowed TCP header size.
- TCP Flag: TCP Flag SYN set and Source Port < 1024 or TCP Control Flags = 0 and TCP Sequence Number = 0 or TCP Flags FIN, URG, and PSH set and TCP Sequence Number = 0 or TCP Flags SYN and FIN set.
- L4 Port: Source TCP/UDP Port = Destination TCP/UDP Port.
- ICMP: Limiting the size of ICMP Ping packets.

---

Monitoring and blocking of the types of attacks listed below are only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

### NOTICE

- SMAC = DMAC: Source MAC address = Destination MAC address
- TCP Port: Source TCP Port = Destination TCP Port
- UDP Port: Source UDP Port = Destination UDP Port
- TCP Flag & Sequence: TCP Flag SYN set and Source Port < 1024 or TCP Control Flags = 0 and TCP Sequence Number = 0 or TCP Flags FIN, URG, and PSH set and TCP Sequence Number = 0 or TCP Flags SYN and FIN set.
- TCP Offset: Allows the device to drop packets that have a TCP header Offset set to 1.
- TCP SYN: TCP Flag SYN set.
- TCP SYN & FIN: TCP Flags SYN and FIN set.
- TCP FIN & URG & PSH: TCP Flags FIN and URG and PSH set and TCP Sequence Number = 0.



- ICMP V6: Limiting the size of ICMPv6 Ping packets.
- ICMP Fragment: Checks for fragmented ICMP packets.

#### 4.42.1 dos-control all

This command enables Denial of Service protection checks globally.

**Default** disabled  
**Format** dos-control all  
**Mode** Global Config

##### 4.42.1.1 no dos-control all

This command disables Denial of Service prevention checks globally.

**Format** no dos-control all  
**Mode** Global Config

#### 4.42.2 dos-control sipdip

This command enables Source IP address = Destination IP address (SIP = DIP) Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress with SIP = DIP, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control sipdip  
**Mode** Global Config

##### 4.42.2.1 no dos-control sipdip

This command disables Source IP address = Destination IP address (SIP = DIP) Denial of Service prevention.

**Format** no dos-control sipdip  
**Mode** Global Config

#### 4.42.3 dos-control firstfrag

This command enables Minimum TCP Header Size Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having a TCP Header Size smaller than the configured value, the packets will be dropped if the mode is enabled. The default is *disabled*. If you enable dos-control firstfrag, but do not provide a Minimum TCP Header Size, the system sets that value to 20.

**Default** disabled (20)  
**Format** dos-control firstfrag [0-255]  
**Mode** Global Config

##### 4.42.3.1 no dos-control firstfrag

This command sets Minimum TCP Header Size Denial of Service protection to the default value of *disabled*.

**Format** no dos-control firstfrag  
**Mode** Global Config

#### 4.42.4 dos-control tcpfrag

This command enables TCP Fragment Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having IP Fragment offset equal to 1, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpfrag  
**Mode** Global Config

##### 4.42.4.1 no dos-control tcpfrag

This command disables TCP Fragment Denial of Service protection.

**Format** no dos-control tcpfrag  
**Mode** Global Config

#### 4.42.5 dos-control tcpflag

This command enables TCP Flag Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attacks. If packets ingress having TCP Flag SYN set and a source port less than 1024 or having TCP Control Flags set to 0 and TCP Sequence Number set to 0 or having TCP Flags FIN, URG, and PSH set and TCP Sequence Number set to 0 or having TCP Flags SYN and FIN both set, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpflag  
**Mode** Global Config

##### 4.42.5.1 no dos-control tcpflag

This command sets disables TCP Flag Denial of Service protections.

**Format** no dos-control tcpflag  
**Mode** Global Config

#### 4.42.6 dos-control l4port

This command enables L4 Port Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having Source TCP/UDP Port Number equal to Destination TCP/UDP Port Number, the packets will be dropped if the mode is enabled.

---

#### **NOTICE**

Some applications mirror source and destination L4 ports - RIP for example uses 520 for both. If you enable dos-control l4port, applications such as RIP may experience packet loss which would render the application inoperable.

---

**Default** disabled  
**Format** dos-control l4port  
**Mode** Global Config

##### 4.42.6.1 no dos-control l4port

This command disables L4 Port Denial of Service protections.

**Format** no dos-control l4port  
**Mode** Global Config

### 4.42.7 dos-control icmp

This command enables Maximum ICMP Packet Size Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If ICMP Echo Request (ping) packets ingress having a size greater than the configured value, the packets will be dropped if the mode is enabled.

**Default** disabled (512)  
**Format** dos-control icmp 0-1023  
**Mode** Global Config

#### 4.42.7.1 no dos-control icmp

This command disables Maximum ICMP Packet Size Denial of Service protections.

**Format** no dos-control icmp  
**Mode** Global Config

### 4.42.8 dos-control port-ddisable

Use this command to enable moving an interface that is under DoS attack to the D-Disable state. In D-Disable state, the interface will not be able to receive or send data packets. To use the port again, the administrator has to manually reenable the port or configure auto-recovery.

**Default** disabled  
**Format** dos-control port-ddisable  
**Mode** Global Config

#### 4.42.8.1 no dos-control port-ddisable

This command disables moving an interface that is under DoS attack to the D-Disable state.

**Format** no dos-control port-ddisable  
**Mode** Global Config

### 4.42.9 dos-control smacdmac

---

#### **NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables Source MAC address = Destination MAC address (SMAC = DMAC) Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress with SMAC = DMAC, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control smacdmac  
**Mode** Global Config

#### 4.42.9.1 no dos-control smacdmac

This command disables Source MAC address = Destination MAC address (SMAC = DMAC) DoS protection.

**Format** no dos-control smacdmac  
**Mode** Global Config

## 4.42.10 dos-control tcpport

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP L4 source = destination port number (Source TCP Port = Destination TCP Port) Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress with Source TCP Port = Destination TCP Port, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpport  
**Mode** Global Config

### 4.42.10.1 no dos-control tcpport

This command disables TCP L4 source = destination port number (Source TCP Port = Destination TCP Port) Denial of Service protection.

**Format** no dos-control tcpport  
**Mode** Global Config

## 4.42.11 dos-control udpport

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables UDP L4 source = destination port number (Source UDP Port = Destination UDP Port) DoS protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress with Source UDP Port = Destination UDP Port, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control udpport  
**Mode** Global Config

### 4.42.11.1 no dos-control udpport

This command disables UDP L4 source = destination port number (Source UDP Port = Destination UDP Port) Denial of Service protection.

**Format** no dos-control udpport  
**Mode** Global Config

## 4.42.12 dos-control tcpflagseq

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP Flag and Sequence Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP Flag SYN set and a source port less than 1024 or having TCP Control Flags set to 0 and TCP Sequence Number set to 0 or having TCP Flags FIN, URG, and PSH set and TCP Sequence Number set to 0 or having TCP Flags SYN and FIN both set, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpflagseq  
**Mode** Global Config

#### 4.42.12.1 no dos-control tcpflagseq

This command sets disables TCP Flag and Sequence Denial of Service protection.

**Format** no dos-control tcpflagseq  
**Mode** Global Config

#### 4.42.13 dos-control tcpoffset

---

### NOTICE

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP Offset Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP Header Offset equal to one (1), the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpoffset  
**Mode** Global Config

#### 4.42.13.1 no dos-control tcpoffset

This command disabled TCP Offset Denial of Service protection.

**Format** no dos-control tcpoffset  
**Mode** Global Config

#### 4.42.14 dos-control tcpsyn

---

### NOTICE

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP SYN and L4 source = 0-1023 Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP flag SYN set and an L4 source port from 0 to 1023, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpsyn  
**Mode** Global Config

#### 4.42.14.1 no dos-control tcpsyn

This command sets disables TCP SYN and L4 source = 0-1023 Denial of Service protection.

**Format** no dos-control tcpsyn  
**Mode** Global Config

## 4.42.15 dos-control tcpsynfin

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP SYN and FIN Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP flags SYN and FIN set, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpsynfin  
**Mode** Global Config

### 4.42.15.1 no dos-control tcpsynfin

This command sets disables TCP SYN & FIN Denial of Service protection.

**Format** no dos-control tcpsynfin  
**Mode** Global Config

## 4.42.16 dos-control tcpfinurgpsh

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables TCP FIN and URG and PSH and SEQ = 0 checking Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP FIN, URG, and PSH all set and TCP Sequence Number set to 0, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control tcpfinurgpsh  
**Mode** Global Config

### 4.42.16.1 no dos-control tcpfinurgpsh

This command sets disables TCP FIN and URG and PSH and SEQ = 0 checking Denial of Service protections.

**Format** no dos-control tcpfinurgpsh  
**Mode** Global Config

## 4.42.17 dos-control icmpv4

---

**NOTICE**

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables Maximum ICMPv4 Packet Size Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If ICMPv4 Echo Request (ping) packets ingress having a size greater than the configured value, the packets will be dropped if the mode is enabled.

**Default** disabled (512)  
**Format** dos-control icmpv4 [0-16376]  
**Mode** Global Config

#### 4.42.17.1 no dos-control icmpv4

This command disables Maximum ICMP Packet Size Denial of Service protections.

**Format** no dos-control icmpv4  
**Mode** Global Config

#### 4.42.18 dos-control icmpv6

---

### NOTICE

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables Maximum ICMPv6 Packet Size Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If ICMPv6 Echo Request (ping) packets ingress having a size greater than the configured value, the packets will be dropped if the mode is enabled.

**Default** disabled (512)  
**Format** dos-control icmpv6 0-16376  
**Mode** Global Config

#### 4.42.18.1 no dos-control icmpv6

This command disables Maximum ICMP Packet Size Denial of Service protections.

**Format** no dos-control icmpv6  
**Mode** Global Config

#### 4.42.19 dos-control icmpfrag

---

### NOTICE

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

---

This command enables ICMP Fragment Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having fragmented ICMP packets, the packets will be dropped if the mode is enabled.

**Default** disabled  
**Format** dos-control icmpfrag  
**Mode** Global Config

#### 4.42.19.1 no dos-control icmpfrag

This command disabled ICMP Fragment Denial of Service protection.

**Format** no dos-control icmpfrag  
**Mode** Global Config

## 4.42.20 dos-control vlan0tagged-snap

Use this command to enable Vlan0 tagged and snap mode to forward or drop Vlan0-tagged packets and snap packets for security measures.

|                |                              |
|----------------|------------------------------|
| <b>Default</b> | disabled                     |
| <b>Format</b>  | dos-control vlan0tagged-snap |
| <b>Mode</b>    | Global Config                |

## 4.42.21 show dos-control

This command displays Denial of Service configuration information.

|               |                  |
|---------------|------------------|
| <b>Format</b> | show dos-control |
| <b>Mode</b>   | Privileged EXEC  |

### NOTICE

This command is only supported on the BCM56224, BCM56514, BCM56624, BCM56634, BCM56636, and BCM56820 platforms.

| Parameter                | Description                                                                                                                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port D-disable Mode      | May be enabled or disabled. The factory default is disabled.                                                                                                                                                                                                             |
| SIPDIP Mode              | May be enabled or disabled. The factory default is disabled.                                                                                                                                                                                                             |
| First Fragment Mode      | The administrative mode of First Fragment DoS prevention. When enabled, this causes the switch to drop packets that have a TCP header smaller than the configured Min TCP Hdr Size.                                                                                      |
| Min TCP Hdr Size         | The minimum TCP header size the switch will accept if First Fragment DoS prevention is enabled. The range is 0 to 255. The factory default is 20.                                                                                                                        |
| L4 Port Mode             | May be enabled or disabled. The factory default is disabled.                                                                                                                                                                                                             |
| ICMP Mode                | The administrative mode of ICMP DoS prevention. When enabled, this causes the switch to drop ICMP packets that have a type set to ECHO_REQ (ping) and a size greater than the configured ICMP Payload Size. May be enabled or disabled. The factory default is disabled. |
| Max ICMP Pkt Size        | The range is 0 to 1023. The factory default is 512.                                                                                                                                                                                                                      |
| Max ICMPv4 Payload Size  | The maximum ICMPv4 payload size to accept when ICMPv4 DoS protection is enabled.                                                                                                                                                                                         |
| Max ICMPv6 Payload Size  | The maximum ICMPv6 payload size to accept when ICMPv6 DoS protection is enabled.                                                                                                                                                                                         |
| ICMPv4 Fragment Mode     | The administrative mode of ICMPv4 Fragment DoS prevention. When enabled, this causes the switch to drop fragmented ICMPv4 packets.                                                                                                                                       |
| TCP Port Mode            | The administrative mode of TCP Port DoS prevention. When enabled, this causes the switch to drop packets that have the TCP source port equal to the TCP destination port.                                                                                                |
| UDP Port Mode            | The administrative mode of UDP Port DoS prevention. When enabled, this causes the switch to drop packets that have the UDP source port equal to the UDP destination port.                                                                                                |
| SIPDIP Mode              | The administrative mode of SIP=DIP DoS prevention. Enabling this causes the switch to drop packets that have a source IP address equal to the destination IP address. The factory default is disabled.                                                                   |
| SMACDMAC Mode            | The administrative mode of SMAC=DMAC DoS prevention. Enabling this causes the switch to drop packets that have a source MAC address equal to the destination MAC address.                                                                                                |
| TCP FIN&URG& PSH Mode    | The administrative mode of TCP FIN & URG & PSH DoS prevention. Enabling this causes the switch to drop packets that have TCP flags FIN, URG, and PSH set and TCP Sequence Number = 0.                                                                                    |
| TCP Flag & Sequence Mode | The administrative mode of TCP Flag DoS prevention. Enabling this causes the switch to drop packets that have TCP control flags set to 0 and TCP sequence number set to 0. The factory default is disabled.                                                              |



| Parameter                   | Description                                                                                                                                                                                                                                                                |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP SYN Mode                | The administrative mode of TCP SYN DoS prevention. Enabling this causes the switch to drop packets that have TCP Flags SYN set.                                                                                                                                            |
| TCP SYN & FIN Mode          | The administrative mode of TCP SYN & FIN DoS prevention. Enabling this causes the switch to drop packets that have TCP Flags SYN and FIN set.                                                                                                                              |
| TCP Fragment Mode           | The administrative mode of TCP Fragment DoS prevention. Enabling this causes the switch to drop packets that have a TCP payload in which the IP payload length minus the IP header size is less than the minimum allowed TCP header size. The factory default is disabled. |
| TCP Offset Mode             | The administrative mode of TCP Offset DoS prevention. Enabling this causes the switch to drop packets that have a TCP header Offset equal to 1.                                                                                                                            |
| Stacked VLAN0 Tag Drop Mode | May be enabled or disabled. The factory default is disabled.                                                                                                                                                                                                               |

## 4.43 MAC Database Commands

This section describes the commands you use to configure and view information about the MAC databases.

### 4.43.1 bridge aging-time

This command configures the forwarding database address aging timeout in seconds. The *seconds* parameter must be within the range of 10 to 1,000,000 seconds. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | 300                            |
| <b>Format</b>  | bridge aging-time 10-1,000,000 |
| <b>Mode</b>    | Global Config                  |

#### 4.43.1.1 no bridge aging-time

This command sets the forwarding database address aging timeout to the default value. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

|               |                      |
|---------------|----------------------|
| <b>Format</b> | no bridge aging-time |
| <b>Mode</b>   | Global Config        |

### 4.43.2 show forwardingdb agetime

This command displays the timeout for address aging.

|                |                           |
|----------------|---------------------------|
| <b>Default</b> | all                       |
| <b>Format</b>  | show forwardingdb agetime |
| <b>Mode</b>    | Privileged EXEC           |

| Parameter              | Description                                                   |
|------------------------|---------------------------------------------------------------|
| Address Aging Time-out | Displays the system's address aging timeout value in seconds. |

### 4.43.3 show mac-address-table multicast

This command displays the Multicast Forwarding Database (MFDB) information. If you enter the command with no parameter, the entire table is displayed. You can display the table entry for one MAC Address by specifying the MAC address as an optional parameter.

**Format**        `show mac-address-table multicast macaddr`  
**Mode**         Privileged EXEC

| Parameter     | Description                                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID       | The VLAN in which the MAC address is learned.                                                                                                                                                    |
| MAC Address   | A multicast MAC address for which the switch has forwarding or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. |
| Source        | The component that is responsible for this entry in the Multicast Forwarding Database. The source can be IGMP Snooping, GMRP, and Static Filtering.                                              |
| Type          | The type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.                       |
| Description   | The text description of this multicast table entry.                                                                                                                                              |
| Interfaces    | The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).                                                                                                           |
| Fwd Interface | The resultant forwarding list is derived from combining all the component's forwarding interfaces and removing the interfaces that are listed as the static filtering interfaces.                |

**Example:** If one or more entries exist in the multicast forwarding table, the command output looks similar to the following:

(Routing) #show mac-address-table multicast

```

VLAN ID MAC Address Source Type Description Interface Fwd

1 01:00:5E:01:02:03 Filter Static Mgmt Config Fwd: Fwd:
 1/0/1, 1/0/1,
 1/0/2, 1/0/2,
 1/0/3, 1/0/3,
 1/0/4, 1/0/4,
 1/0/5, 1/0/5,
 1/0/6, 1/0/6,
 1/0/7, 1/0/7,
 1/0/8, 1/0/8,
 1/0/9, 1/0/9,

```

--More-- or (q)uit

#### 4.43.4 show mac-address-table stats

This command displays the Multicast Forwarding Database (MFDB) statistics.

**Format**        `show mac-address-table stats`  
**Mode**         Privileged EXEC

| Parameter                   | Description                                                                                                                                            |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Entries               | The total number of entries that can possibly be in the Multicast Forwarding Database table.                                                           |
| Most MFDB Entries Ever Used | The largest number of entries that have been present in the Multicast Forwarding Database table. This value is also known as the MFDB high-water mark. |
| Current Entries             | The current number of entries in the MFDB.                                                                                                             |

## 4.44 ISDP Commands

This section describes the commands you use to configure the industry standard Discovery Protocol (ISDP). The Address TLV in ISDP sends and interprets IPv6 addresses.

### 4.44.1 isdp run

This command enables ISDP on the switch.

|                |               |
|----------------|---------------|
| <b>Default</b> | enabled       |
| <b>Format</b>  | isdp run      |
| <b>Mode</b>    | Global Config |

#### 4.44.1.1 no isdp run

This command disables ISDP on the switch.

|               |               |
|---------------|---------------|
| <b>Format</b> | no isdp run   |
| <b>Mode</b>   | Global Config |

### 4.44.2 isdp holdtime

This command configures the hold time for ISDP packets that the switch transmits. The hold time specifies how long a receiving device should store information sent in the ISDP packet before discarding it. The range is given in seconds.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | 180 seconds          |
| <b>Format</b>  | isdp holdtime 10-255 |
| <b>Mode</b>    | Global Config        |

### 4.44.3 isdp timer

This command sets the period of time between sending new ISDP packets. The range is given in seconds.

|                |                  |
|----------------|------------------|
| <b>Default</b> | 60 seconds       |
| <b>Format</b>  | isdp timer 5-254 |
| <b>Mode</b>    | Global Config    |

### 4.44.4 isdp advertise-v2

This command enables the sending of ISDP version 2 packets from the device.

|                |                   |
|----------------|-------------------|
| <b>Default</b> | enabled           |
| <b>Format</b>  | isdp advertise-v2 |
| <b>Mode</b>    | Global Config     |

#### 4.44.4.1 no isdp advertise-v2

This command disables the sending of ISDP version 2 packets from the device.

|               |                      |
|---------------|----------------------|
| <b>Format</b> | no isdp advertise-v2 |
| <b>Mode</b>   | Global Config        |

### 4.44.5 isdp enable

This command enables ISDP on an interface or range of interfaces.

#### NOTICE

ISDP must be enabled both globally and on the interface for the interface to transmit ISDP packets. If ISDP is globally disabled on the switch, the interface will not transmit ISDP packets, regardless of the ISDP status on the interface. To enable ISDP globally, use the [isdp run](#) command.

|                |                  |
|----------------|------------------|
| <b>Default</b> | enabled          |
| <b>Format</b>  | isdp enable      |
| <b>Mode</b>    | Interface Config |

#### 4.44.5.1 no isdp enable

This command disables ISDP on the interface.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no isdp enable   |
| <b>Mode</b>   | Interface Config |

### 4.44.6 clear isdp counters

This command clears ISDP counters.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | clear isdp counters |
| <b>Mode</b>   | Privileged EXEC     |

### 4.44.7 clear isdp table

This command clears entries in the ISDP table.

|               |                  |
|---------------|------------------|
| <b>Format</b> | clear isdp table |
| <b>Mode</b>   | Privileged EXEC  |

### 4.44.8 show isdp

This command displays global ISDP settings.

|               |                 |
|---------------|-----------------|
| <b>Format</b> | show isdp       |
| <b>Mode</b>   | Privileged EXEC |

| Parameter                              | Description                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Timer                                  | The frequency with which this device sends ISDP packets. This value is given in seconds.                                            |
| Hold Time                              | The length of time the receiving device should save information sent by this device. This value is given in seconds.                |
| Version 2 Advertisements               | The setting for sending ISDPv2 packets. If disabled, version 1 packets are transmitted.                                             |
| Neighbors table time since last change | The amount of time that has passed since the ISPD neighbor table changed.                                                           |
| Device ID                              | The Device ID advertised by this device. The format of this Device ID is characterized by the value of the Device ID Format object. |

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device ID Format Capability | Indicates the Device ID format capability of the device. <ul style="list-style-type: none"> <li><code>serialNumber</code> indicates that the device uses a serial number as the format for its Device ID.</li> <li><code>macAddress</code> indicates that the device uses a Layer 2 MAC address as the format for its Device ID.</li> <li><code>other</code> indicates that the device uses its platform-specific format as the format for its Device ID.</li> </ul>                                                                                                  |
| Device ID Format            | Indicates the Device ID format of the device. <ul style="list-style-type: none"> <li><code>serialNumber</code> indicates that the value is in the form of an ASCII string containing the device serial number.</li> <li><code>macAddress</code> indicates that the value is in the form of a Layer 2 MAC address.</li> <li><code>other</code> indicates that the value is in the form of a platform specific ASCII string containing info that identifies the device. For example, ASCII string contains serialNumber appended/prepended with system name.</li> </ul> |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show isdp
```

```
Timer..... 30
Hold Time..... 180
Version 2 Advertisements..... Enabled
Neighbors table time since last change..... 0 days 00:00:00
Device ID..... 1114728
Device ID format capability..... Serial Number, Host Name
Device ID format..... Serial Number
```

#### 4.44.9 show isdp interface

This command displays ISDP settings for the specified interface.

**Format**            `show isdp interface {all | slot/port}`  
**Mode**              Privileged EXEC

| Parameter | Description                                           |
|-----------|-------------------------------------------------------|
| Interface | The slot/port of the specified interface.             |
| Mode      | ISDP mode enabled/disabled status for the interfaces. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show isdp interface 0/1
```

```
Interface Mode

0/1 Enabled
```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show isdp interface all
```

```
Interface Mode

0/1 Enabled
0/2 Enabled
0/3 Enabled
```

|     |         |
|-----|---------|
| 0/4 | Enabled |
| 0/5 | Enabled |
| 0/6 | Enabled |
| 0/7 | Enabled |
| 0/8 | Enabled |

#### 4.44.10 show isdp entry

This command displays ISDP entries. If the device id is specified, then only entries for that device are shown.

**Format** show isdp entry {all | deviceid}

**Mode** Privileged EXEC

| Parameter               | Description                                                                   |
|-------------------------|-------------------------------------------------------------------------------|
| Device ID               | The device ID associated with the neighbor which advertised the information.  |
| IP Addresses            | The IP address(es) associated with the neighbor.                              |
| Capability              | ISDP Functional Capabilities advertised by the neighbor.                      |
| Platform                | The hardware platform advertised by the neighbor.                             |
| Interface               | The interface (slot/port) on which the neighbor's advertisement was received. |
| Port ID                 | The port ID of the interface from which the neighbor sent the advertisement.  |
| Hold Time               | The hold time advertised by the neighbor.                                     |
| Version                 | The software version that the neighbor is running.                            |
| Advertisement Version   | The version of the advertisement packet received from the neighbor.           |
| Entry Last Changed Time | The time when the entry was last changed.                                     |

**Example:** The following shows example CLI display output for the command.

(Switching) #show isdp entry Switch

```

Device ID Switch
Address(es):
 IP Address: 172.20.1.18
 IP Address: 172.20.1.18
Capability Router IGMP
Platform cisco WS-C4948
Interface 0/1
Port ID GigabitEthernet1/1
Holdtime 64
Advertisement Version 2
Entry last changed time 0 days 00:13:50

```

### 4.44.11 show isdp neighbors

This command displays the list of neighboring devices.

**Format** show isdp neighbors [{slot/port | detail}]

**Mode** Privileged EXEC

| Parameter               | Description                                                                            |
|-------------------------|----------------------------------------------------------------------------------------|
| Device ID               | The device ID associated with the neighbor which advertised the information.           |
| IP Addresses            | The IP addresses associated with the neighbor.                                         |
| Capability              | ISDP functional capabilities advertised by the neighbor.                               |
| Platform                | The hardware platform advertised by the neighbor.                                      |
| Interface               | The interface ( <i>slot/port</i> ) on which the neighbor's advertisement was received. |
| Port ID                 | The port ID of the interface from which the neighbor sent the advertisement.           |
| Hold Time               | The hold time advertised by the neighbor.                                              |
| Advertisement Version   | The version of the advertisement packet received from the neighbor.                    |
| Entry Last Changed Time | Time when the entry was last modified.                                                 |
| Version                 | The software version that the neighbor is running.                                     |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge,
 S - Switch, H - Host, I - IGMP, r - Repeater
```

```
Device ID Intf Holdtime Capability Platform Port ID

Switch 0/1 165 RI cisco WS-C4948 GigabitEthernet1/1
```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show isdp neighbors detail

Device ID 0001f45f1bc0
Address(es):
 IP Address: 10.27.7.57
Capability Router Trans Bridge Switch IGMP
Platform SecureStack C2
Interface 0/48
Port ID ge.3.14
Holdtime 131
Advertisement Version 2
Entry last changed time 0 days 00:01:59
Version: 05.00.56
```

### 4.44.12 show isdp traffic

This command displays ISDP statistics.

**Format** show isdp traffic

**Mode** Privileged EXEC

| Parameter             | Description                           |
|-----------------------|---------------------------------------|
| ISDP Packets Received | Total number of ISDP packets received |

| Parameter                  | Description                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------|
| ISDP Packets Transmitted   | Total number of ISDP packets transmitted                                                    |
| ISDPv1 Packets Received    | Total number of ISDPv1 packets received                                                     |
| ISDPv1 Packets Transmitted | Total number of ISDPv1 packets transmitted                                                  |
| ISDPv2 Packets Received    | Total number of ISDPv2 packets received                                                     |
| ISDPv2 Packets Transmitted | Total number of ISDPv2 packets transmitted                                                  |
| ISDP Bad Header            | Number of packets received with a bad header                                                |
| ISDP Checksum Error        | Number of packets received with a checksum error                                            |
| ISDP Transmission Failure  | Number of packets which failed to transmit                                                  |
| ISDP Invalid Format        | Number of invalid packets received                                                          |
| ISDP Table Full            | Number of times a neighbor entry was not added to the table due to a full database          |
| ISDP IP Address Table Full | Displays the number of times a neighbor entry was added to the table without an IP address. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show isdp traffic
```

```
ISDP Packets Received..... 4253
ISDP Packets Transmitted..... 127
ISDPv1 Packets Received..... 0
ISDPv1 Packets Transmitted..... 0
ISDPv2 Packets Received..... 4253
ISDPv2 Packets Transmitted..... 4351
ISDP Bad Header..... 0
ISDP Checksum Error..... 0
ISDP Transmission Failure..... 0
ISDP Invalid Format..... 0
ISDP Table Full..... 392
ISDP IP Address Table Full..... 737
```

#### 4.44.13 debug isdp packet

This command enables tracing of ISDP packets processed by the switch. ISDP must be enabled on both the device and the interface to monitor packets for a particular interface.

**Format**            debug isdp packet [{receive | transmit}]

**Mode**             Privileged EXEC

##### 4.44.13.1 no debug isdp packet

This command disables tracing of ISDP packets on the receive or the transmit sides or on both sides.

**Format**            no debug isdp packet [{receive | transmit}]

**Mode**             Privileged EXEC



## 4.45 Interface Error Disable and Auto Recovery

Interface error disable automatically disables an interface when an error is detected; no traffic is allowed until the interface is either manually reenabled or, if auto recovery is configured, the configured auto recovery time interval has passed.

For interface error disable and auto recovery, an error condition is detected for an interface, the interface is placed in a diagnostic disabled state by shutting down the interface. The error disabled interface does not allow any traffic until the interface is reenabled. The error disabled interface can be manually enabled. Alternatively administrator can enable auto recovery feature. FASTPATH Auto Recovery reenables the interface after the expiry of configured time interval.

### 4.45.1 errdisable recovery cause

Use this command to enable auto recovery for a specified cause or all causes. When auto recovery is enabled, ports in the diag-disable state are recovered (link up) when the recovery interval expires. If the interface continues to experience errors, the interface may be placed back in the diag-disable state and disabled (link down). Interfaces in the diag-disable state can be manually recovered by entering the `no shutdown` command for the interface.

**Default** none

**Format** `errdisable recovery cause {all | arp-inspection | bpduguard | dhcp-rate-limit | sfp-mismatch | udld | ucast-storm | bcast-storm | mcast-storm | bpdustorm | keep-alive | mac-locking | denial-of-service | link-flap}`

**Mode** Global Config

#### 4.45.1.1 no errdisable recovery cause

Use this command to disable auto recovery for a specific cause. When disabled, auto recovery will not occur for interfaces in a diag-disable state due to that cause.

**Format** `no errdisable recovery cause {all | arp-inspection | bpduguard | dhcp-rate-limit | sfp-mismatch | udld | ucast-storm | bcast-storm | mcast-storm | bpdustorm | keep-alive | mac-locking | denial-of-service | link-flap}`

**Mode** Global Config

### 4.45.2 errdisable recovery interval

Use this command to configure the auto recovery time interval. The auto recovery time interval is common for all causes. The time can be any value from 30 to 86400 seconds. When the recovery interval expires, the system attempts to bring interfaces in the diag-disable state back into service (link up).

**Default** 300

**Format** `errdisable recovery interval 30-86400`

**Mode** Global Config

#### 4.45.2.1 no errdisable recovery interval

Use this command to reset the auto recovery interval to the factory default value of 300.

**Format** `no errdisable recovery interval`

**Mode** Global Config

### 4.45.3 show errdisable recovery

Use this command to display the errdisable configuration status of all configurable causes.

**Format** `show errdisable recovery`

**Mode** Privileged EXEC

The following information is displayed.

| Parameter         | Description                                             |
|-------------------|---------------------------------------------------------|
| dhcp-rate-limit   | Enable/Disable status of dhcp-rate-limit auto recovery. |
| arp-inspection    | Enable/Disable status of arp-inspection auto recovery.  |
| sfp-mismatch      | Enable/Disable status of sfp-mismatch auto recovery.    |
| udld              | Enable/Disable status of UDLD auto recovery.            |
| bcast-storm       | Enable/Disable status of broadcast storm auto recovery. |
| mcast-storm       | Enable/Disable status of multicast storm auto recovery. |
| ucast-storm       | Enable/Disable status of unicast storm auto recovery.   |
| bpdguard          | Enable/Disable status of bpdguard auto recovery.        |
| bpdustorm         | Enable/Disable status of bpdustorm auto recovery.       |
| keepalive         | Enable/Disable status of keepalive auto recovery.       |
| mac-locking       | Enable/Disable status of MAC locking auto recovery.     |
| denial-of-service | Enable/Disable status of DoS auto recovery.             |
| link-flap         | Enable/Disable status of link-flap auto recovery.       |
| time interval     | Time interval for auto recovery in seconds.             |

**Example:** The following shows example command output.

```

Errdisable Reason Auto-recovery Status

dhcp-rate-limit Disabled
arp-inspection Disabled
udld Disabled
bcast-storm Disabled
mcast-storm Disabled
ucast-storm Disabled
bpdguard Disabled
bpdustorm Disabled
sfp-mismatch Disabled
keepalive Disabled
mac-locking Disabled
denial-of-service Disabled
link-flap Disabled
Timeout for Auto-recovery from D-Disable state 300

```

#### 4.45.4 show interfaces status err-disabled

Use this command to display the interfaces that are error disabled and the amount of time remaining for auto recovery.

**Format** show interfaces status err-disabled

**Mode** Privileged EXEC

The following information is displayed.

| Parameter               | Description                                          |
|-------------------------|------------------------------------------------------|
| interface               | An interface that is error disabled.                 |
| Errdisable Reason       | The cause of the interface being error disabled.     |
| Auto-Recovery Time Left | The amount of time left before auto recovery begins. |

**Example:** The following shows example command output.

```
(Routing) #show interfaces status err-disabled
```

```

Interface Errdisable Reason Auto-Recovery Time Left(sec)

```

|     |           |     |
|-----|-----------|-----|
| 0/1 | udld      | 279 |
| 0/2 | bpduguard | 285 |
| 0/3 | bpdustorm | 291 |
| 0/4 | keepalive | 11  |

## 4.46 Multicast Handling Commands

### 4.46.1 multicast (interface)

This command configures the port based multicast handling. The command defines the handling for port specific unregistered multicast addresses. The default handling in FASTPATH is that such packets are flooded (argument 'default'). The user can change the behaviour that such packets are dropped (argument 'none'). The flooding mode is set per port. It can be applied to either individual physical ports or to a port-channel.

**Format**            **multicast flood** {*default* | *none*}

**Mode**             Interface Config

### 4.46.2 show port multicast

This command displays the port based multicast handling. The command displays for a specified interface or all interfaces the multicast flooding settings. The displayed fields are

- the interface
- the multicast flooding, indicating whether a packet with unregistered multicast address should be flooded or not (yes/no)

**Format**            **show port multicast** {<*slot/port*> | *all*}

**Mode**             Privileged Exec

### 4.46.3 multicast (VLAN)

This command configures the VLAN based multicast handling. The command defines the handling for VLAN based unregistered multicast addresses. The default handling in FASTPATH is that such packets are flooded (argument 'default'). The user can change the behaviour that such packets are dropped (argument 'none'). The flooding mode is set per VLAN, the VLAN ID range is 1-4093. If a created VLAN is deleted again, the flooding mode is reset to default.

**Format**            **multicast** <*1-4093*> **flood** {*default* | *none*}

**Mode**             VLAN Config

### 4.46.4 show vlan multicast

This command displays the VLAN based multicast handling. The command displays for a specified VLAN ID (range is 1-4093) or all created VLANs (inclusive default VLAN) the multicast flooding settings. The displayed fields are

- the VLAN Identifier (VID) associated with each VLAN
- the VLAN type (default, static or dynamic)
- the multicast flooding, indicating whether a packet with unregistered multicast address should be flooded or not (yes/no)

**Format**            **show vlan multicast** { <*1 - 4093*> | *all*}

**Mode**             Privileged Exec

### 4.46.5 set igmp proxy-report interfacemode

This command enables sending of IGMP reports to the specified interface. The reports are sent for all locally subscribed multicast groups. All received membership reports are forwarded at once, the leave report is only sent if the last member has left the group. This command is similar to "set igmp mrouter interfacemode" command, but multicast traffic will not be forwarded to the interface by default. The command can also be used for "querier" ports (connected to an external querier) to avoid the forwarding of multicast traffic for multicast groups registered on other interfaces.

The forwarding of IGMP messages is done independent of any VLAN configuration. If the forwarding should be done with considering the VLAN configuration, the parameter "vlan-aware" must be specified. In this case the IGMP message is only forwarded if the forwarding port (egress) is member of the related (ingress) VLAN.

**Format**            **set igmp proxy-report interfacemode [vlan-aware]**  
**Mode**             Interface Config

### 4.46.6 no set igmp proxy-report interfacemode

If using the 'no' command with parameter "vlan-aware" only the vlan aware flag is deleted but the proxy setting is kept. If using the 'no' command without parameter, the proxy setting is deleted.

**Format**            **no set igmp proxy-report interfacemode [vlan-aware]**  
**Mode**             Interface Config

## 4.47 Port Bridging Commands

### 4.47.1 L2-port-bridge

This command configures layer2 port bridging. L2 port bridging is a feature that allows a packet to be transmitted in egress direction through the same port it was received on.

**Format**            **L2-port-bridge**  
**Mode**             Interface Config

### 4.47.2 no L2-port-bridge

This command resets L2 port bridging.

**Format**            **no L2-port-bridge**  
**Mode**             Interface Config

### 4.47.3 show port L2-port-bridge

This command displays the L2 port bridge setting. The command displays for a specified interface or all interfaces the settings. The displayed fields are

- the interface
- enabled/disabled L2 port bridge

**Format**            **show port L2-port-bridge {<slot/port> | all}**  
**Mode**             Priviledged Exec

## 4.48 UniDirectional Link Detection Commands

The purpose of the UniDirectional Link Detection (UDLD) feature is to detect and avoid unidirectional links. A unidirectional link is a forwarding anomaly in a Layer 2 communication channel in which a bi-directional link stops passing traffic in one direction. Use the UDLD commands to detect unidirectional links' physical ports. UDLD must be enabled on both sides of the link to detect a unidirectional link. The UDLD protocol operates by exchanging packets containing information about neighboring devices.

### 4.48.1 `udld enable` (Global Config)

This command enables UDLD globally on the switch.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | disable                  |
| <b>Format</b>  | <code>udld enable</code> |
| <b>Mode</b>    | Global Config            |

### 4.48.1.1 `no udld enable` (Global Config)

This command disables udld globally on the switch.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | <code>no udld enable</code> |
| <b>Mode</b>   | Global Config               |

### 4.48.2 `udld message time`

This command configures the interval between UDLD probe messages on ports that are in the advertisement phase. The range is from 1 to 90 seconds.

|                |                                                |
|----------------|------------------------------------------------|
| <b>Default</b> | 15 seconds                                     |
| <b>Format</b>  | <code>udld message time <i>interval</i></code> |
| <b>Mode</b>    | Global Config                                  |

### 4.48.3 `udld timeout interval`

This command configures the time interval after which UDLD link is considered to be unidirectional. The range is from 3 to 60 seconds.

|                |                                                    |
|----------------|----------------------------------------------------|
| <b>Default</b> | 5 seconds                                          |
| <b>Format</b>  | <code>udld timeout interval <i>interval</i></code> |
| <b>Mode</b>    | Global Config                                      |

### 4.48.4 `udld reset`

This command resets all interfaces that have been shutdown by UDLD.

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | none                    |
| <b>Format</b>  | <code>udld reset</code> |
| <b>Mode</b>    | Privileged EXEC         |

### 4.48.5 `udld enable` (Interface Config)

This command enables UDLD on the specified interface.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | disable                  |
| <b>Format</b>  | <code>udld enable</code> |
| <b>Mode</b>    | Interface Config         |

### 4.48.5.1 no udld enable (Interface Config)

This command disables UDLD on the specified interface.

**Format**           no udld enable  
**Mode**             Interface Config

### 4.48.6 udld port

This command selects the UDLD mode operating on this interface. If the keyword *aggressive* is not entered, the port operates in normal mode.

**Default**          normal  
**Format**          udld port [*aggressive*]  
**Mode**            Interface Config

### 4.48.7 show udld

This command displays the global settings of UDLD.

**Format**          show udld  
**Mode**

- User EXEC
- Privileged EXEC

| Parameter        | Description                                                                            |
|------------------|----------------------------------------------------------------------------------------|
| Admin Mode       | The global administrative mode of UDLD.                                                |
| Message Interval | The time period (in seconds) between the transmission of UDLD probe packets.           |
| Timeout Interval | The time period (in seconds) before making a decision that the link is unidirectional. |

**Example:** The following shows example CLI display output for the command after the feature was enabled and nondefault interval values were configured.

(Routing) #show udld

```
Admin Mode..... Enabled
Message Interval..... 13
Timeout Interval..... 31
```

### 4.48.8 show udld slot/port

This command displays the UDLD settings for the specified *slot/port*. If the *all* keyword is entered, it displays information for all ports.

**Format**          show udld {*slot/port* | *all*}  
**Mode**

- User EXEC
- Privileged EXEC

| Parameter  | Description                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------------------|
| Port       | The identifying port of the interface.                                                                           |
| Admin Mode | The administrative mode of UDLD configured on this interface. This is either <i>Enabled</i> or <i>Disabled</i> . |
| UDLD Mode  | The UDLD mode configured on this interface. This is either <i>Normal</i> or <i>Aggressive</i> .                  |

| Parameter   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UDLD Status | <p>The status of the link as determined by UDLD. The options are:</p> <ul style="list-style-type: none"> <li>Undetermined – UDLD has not collected enough information to determine the state of the port.</li> <li>Not applicable – UDLD is disabled, either globally or on the port.</li> <li>Shutdown – UDLD has detected a unidirectional link and shutdown the port. That is, the port is in an errDisabled state.</li> <li>Bidirectional – UDLD has detected a bidirectional link.</li> <li>Undetermined (Link Down) – The port would transition into this state when the port link physically goes down due to any reasons other than the port been put into D-Disable mode by the UDLD protocol on the switch.</li> </ul> |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show udld 0/1
```

```
Port Admin Mode UDLD Mode UDLD Status

0/1 Enabled Normal Not Applicable
```

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show udld all
```

```
Port Admin Mode UDLD Mode UDLD Status

0/1 Enabled Normal Shutdown
0/2 Enabled Normal Undetermined
0/3 Enabled Normal Bidirectional
0/4 Enabled Normal Not Applicable
0/5 Enabled Normal Not Applicable
0/6 Enabled Normal Not Applicable
0/7 Enabled Normal Not Applicable
0/8 Enabled Normal Shutdown
0/9 Enabled Normal Not Applicable
0/10 Enabled Normal Not Applicable
0/11 Enabled Normal Not Applicable
0/12 Enabled Normal Undetermined
0/13 Enabled Normal Bidirectional
0/14 Disabled Normal Not Applicable
0/15 Disabled Normal Not Applicable
0/16 Disabled Normal Not Applicable
0/17 Disabled Normal Not Applicable
0/18 Disabled Normal Not Applicable
0/19 Disabled Normal Not Applicable
0/20 Disabled Normal Not Applicable
--More-- or (q)uit
```

```
(Switching) #
```

## 4.49 Link-Flap Feature on the DUT

### 4.49.1 link-flap d-disable

Use this command in Global Config mode to enable the link-flap feature on the DUT. When enabled, this feature counts the number of link-flaps on a given port in a certain duration of time. If the number of link-flaps on a given port is greater than or equal to the configured value, the port is put in the D-Disable state.

**Default**            disabled  
**Format**            link-flap d-disable  
**Mode**                Global Config

### 4.49.1.1 no link-flap d-disable

Use this command to disable the link-flap feature on the DUT.

**Format**            no link-flap d-disable  
**Mode**             Global Config

### 4.49.2 link flap d-disable duration

Use this command to configure the duration in seconds in which to count the number of link-flaps. If the number of link-flaps on a given port is greater than or equal to the configured value, the port is put in the D-Disable state. The range for duration is 3 to 200 seconds.

**Default**           10 seconds  
**Format**           link-flap d-disable duration duration  
**Mode**             Global Config

#### 4.49.2.1 no link flap d-disable duration

Use this command to set the link-flap duration to its default value.

**Format**           no link-flap d-disable duration  
**Mode**             Global Config

### 4.49.3 link-flap d-disable max-count

Use this command to configure the maximum number of link-flaps at which the port will be put in D-Disable state. The range for count is 2 to 100.

**Default**           5  
**Format**           link-flap d-disable max-count count  
**Mode**             Global Config

#### 4.49.3.1 no link-flap d-disable max-count

Use this command to set the link-flap count to its default value.

**Format**           no link-flap d-disable max-count  
**Mode**             Global Config

### 4.49.4 show link-flap d-disable

Use this command to display the link-flap parameters.

**Format**           show link-flap d-disable  
**Mode**             Privileged EXEC

The following information is displayed.

| Parameter   | Description                                                     |
|-------------|-----------------------------------------------------------------|
| Admin State | Specifies whether the link-flap feature is enabled or disabled. |
| Duration    | Specifies the duration in seconds.                              |
| Max-Count   | Specifies the max-count of link-flaps.                          |



**Example:**

```
(Routing) #show link-flap d-disable
```

```
Link flap admin mode..... Disabled
Link flap max count..... 5
Link flap duration time..... 10
```

## 4.50 IPv4 Device Tracking Commands

The IPv4 Device Tracking (IPv4DT) feature enables the network administrator to track IPv4 hosts that are attached to physical ports or LAGs on an L2 or L3 switch.

The DHCP Snooping feature (see [4.31 DHCP Snooping Configuration Commands](#)) already provides mapping from host IP address to physical port on L2 switch, for the IP address acquired using DHCP. But DHCP Snooping cannot track the statically configured hosts, nor can it detect the movement of the hosts in a VLAN.

The IPv4 Device Tracking feature snoops the ARP packets exchanged in a VLAN and populates the tracking table with the information like {IP address, MAC address, VLAN, Interface} for each host.

### 4.50.1 ip device tracking

Use this command to enable the IPv4 Device Tracking feature.

|                |                    |
|----------------|--------------------|
| <b>Default</b> | inactive           |
| <b>Format</b>  | ip device tracking |
| <b>Mode</b>    | Global Config      |

#### 4.50.1.1 no ip device tracking

Use the `no` form of the command to clear all the entries in the IPv4 Device Tracking table.

|               |                       |
|---------------|-----------------------|
| <b>Format</b> | no ip device tracking |
| <b>Mode</b>   | Global Config         |

### 4.50.2 ip device tracking probe

Use this command to enable the ARP probe generation for each entry in the IPv4 Device Tracking database.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | active                   |
| <b>Format</b>  | ip device tracking probe |
| <b>Mode</b>    | Global Config            |

#### 4.50.2.1 no ip device tracking probe

Invoking the `no` form of the command, all the ACTIVE state entries in the IPv4 Device Tracking database are in ACTIVE state until the port moves to non-forwarding state or lease of those entries is removed.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | no ip device tracking probe |
| <b>Mode</b>   | Global Config               |

### 4.50.3 ip device tracking probe interval

Use this command to enable the ARP probe generation for each entry in the IPv4 Device Tracking database.

|                |                                                  |
|----------------|--------------------------------------------------|
| <b>Default</b> | 30 seconds                                       |
| <b>Format</b>  | ip device tracking probe interval <i>seconds</i> |
| <b>Mode</b>    | Global Config                                    |

| Parameter | Description                                                                                                                             |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|
| seconds   | The minimum time between two ARP probes for each entry in the IPv4 Device Tracking database in seconds. The range is 30 to 300 seconds. |

#### 4.50.3.1 no ip device tracking probe interval

Use this command to reset the probe interval to the default 30 seconds.

**Format**           no ip device tracking probe interval  
**Mode**             Global Config

#### 4.50.4 ip device tracking probe count

Use this command to set the number of probes sent without any responses from the client before declaring its state INACTIVE in the IPv4 Device Tracking database.

**Default**           3  
**Format**           ip device tracking probe count *number*  
**Mode**             Global Config

| Parameter | Description                                                                             |
|-----------|-----------------------------------------------------------------------------------------|
| number    | The number of ARP probes sent without responses from the client. The range is 1 to 255. |

#### 4.50.4.1 no ip device tracking probe count

Use the `no` form of the command to reset the probe count to 3.

**Format**           no ip device tracking probe count *number*  
**Mode**             Global Config

#### 4.50.5 ip device tracking probe delay

Use this command to set the delay in seconds before the probe is sent when a port is moving from non-forwarding state to forwarding state.

**Default**           30 seconds  
**Format**           ip device tracking probe delay *seconds*  
**Mode**             Global Config

| Parameter | Description                                                                                                                                                                                                                              |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| seconds   | The minimum delay to send the first ARP probe for each entry in the IPv4 Device Tracking database in seconds whenever the entry's associated port is moved from non-forwarding state to forwarding state. The range is 1 to 120 seconds. |

#### 4.50.5.1 no ip device tracking probe delay

Use the `no` form of the command to reset the probe delay to 30 seconds.

**Format**           no ip device tracking probe delay  
**Mode**             Global Config

### 4.50.6 ip device tracking probe auto-source fallback

Use this command to set the source address in the ARP probe packet for non-routing interface entries to avoid the duplicate IP 0.0.0.0 address problem. Invoking the normal form of the command (`ip device tracking probe auto-source fallback host-ip mask override`), the source address in the probe packet is set to a new address based on the configured host-ip, mask, and destination for each of the non-routing interface entries in the IPv4DT table.

|                |                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------|
| <b>Default</b> | The source IP address in the probe packet for non-routing interfaces is set to 0.0.0.0 address. |
| <b>Format</b>  | <code>ip device tracking probe auto-source fallback host-ip mask override</code>                |
| <b>Mode</b>    | Global Config                                                                                   |

| Parameter | Description                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------------|
| host-ip   | An IPv4 host in dotted notation (for example, 0.0.0.1).                                                       |
| mask      | An IPv4 host used for the destination IP of the IPv4DT entries in dotted notation (for example, 255.255.0.0). |

**Example:** The following example sets the source ip address in the probe packet for non-routing interfaces.

```
(Switching)(Config)# ip device tracking probe auto-source fallback 0.0.0.1 255.255.255.0 override
```

If the probe entry is for a host IP address 10.5.5.20, then an ARP probe with source address 10.5.5.1 is generated.

### 4.50.7 ip device tracking maximum

Use this command to configure the maximum number of entries learned on a specified routing or non-routing interface. Using the normal form of the command (`ip device tracking maximum number`) clears all the entries learned on a specified interface and sets the maximum entries to be learned on that interface. If the maximum entries is configured to zero, then IPv4DT is effectively disabled on that interface.

|                |                                                |
|----------------|------------------------------------------------|
| <b>Default</b> | no limit                                       |
| <b>Format</b>  | <code>ip device tracking maximum number</code> |
| <b>Mode</b>    | Interface Config                               |

| Parameter | Description                                                                    |
|-----------|--------------------------------------------------------------------------------|
| number    | The number of entries learned on an interface by IPv4DT. The range is 0 to 10. |

#### 4.50.7.1 no ip device tracking maximum

Use the `no` form of the command to reset the maximum number of entries learned on a specified routing or non-routing interface to the default.

|               |                                            |
|---------------|--------------------------------------------|
| <b>Format</b> | <code>no ip device tracking maximum</code> |
| <b>Mode</b>   | Interface Config                           |

### 4.50.8 clear ip device tracking

Use this command to clear the entries present in an IPv4DT database. Specify arguments to clear based on interface name, IPv4 address, and MAC address. Invoking the command `clear ip device tracking`, the ARP probes are sent out to repopulate the entries.

|               |                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>clear ip device tracking {all   interface if-name   ip ipv4-address   mac mac-address}</code> |
| <b>Mode</b>   | Privileged EXEC                                                                                     |

| Parameter    | Description                                          |
|--------------|------------------------------------------------------|
| all          | Clears the entire IPv4DT table.                      |
| if-name      | Clears the entries learned on a specified interface. |
| ipv4-address | Clears the entries matching the host IPv4 address.   |
| mac-address  | Clears the entries matching the mac address.         |

#### 4.50.9 show ip device tracking all

Use this command to display all the IPv4DT (IPv4/VLAN/MAC) entries in the IPv4DT table.

**Format** show ip device tracking all [active|inactive]

**Mode** Privileged EXEC

| Parameter | Description                                           |
|-----------|-------------------------------------------------------|
| active    | (Optional) Displays only the ACTIVE status entries.   |
| inactive  | (Optional) Displays only the INACTIVE status entries. |

The following fields are displayed in the output of this command.

| Parameter             | Description                                                              |
|-----------------------|--------------------------------------------------------------------------|
| IP Address            | The learned IPv4 address of the device.                                  |
| MAC Address           | The MAC address associated with the learned IPv4 address.                |
| VLAN                  | The VLAN ID associated with an interface on which the device is learned. |
| Interface             | The interface name on which the device is learned.                       |
| Time left to inactive | The number of seconds before the reachable device is set to INACTIVE.    |
| Time since inactive   | The number of seconds since the INACTIVE device was last reachable.      |
| State                 | Specifies the device is in ACTIVE or INACTIVE state.                     |
| Source                | Specifies the source of the device whether it is ARP, DHCP, or Static.   |

**Example:** The following shows example CLI display output for the command.

(Switching) #show ip device tracking all

```
IP Device Tracking for clients..... Enable
IP Device Tracking Probe Generation..... Enable
IP Device Tracking Probe Count..... 3
IP Device Tracking Probe Interval.....30
IP Device Tracking Probe Delay Interval.....30

IP Address MAC Address Vlan Interface Time-left Time-since State Source
 to inactive inactive

10.21.1.1 01:02:03:04:05:06 2 1/0/1 30 0 ACTIVE ARP
```

Total number interfaces enabled: 1

Enabled interfaces:

1/0/1

#### 4.50.10 show ip device tracking all count

Use this command to display the number of ARP, DHCP, Active, and Inactive IPv4DT entries in the IPv4DT table.

**Format** show ip device tracking all count

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show ip device tracking all count

IP Device Tracking ARP Entries Count 40
IP Device Tracking DHCP Entries Count 0

IP Device Tracking ACTIVE Entries Count 30
IP Device Tracking INACTIVE Entries Count 10

IP Device Tracking Total Entries Count 40
```

#### 4.50.11 show ip device tracking interface

Use this command to display all the IPv4DT (IPv4/VLAN/MAC) entries in the IPv4DT table learned on a specified interface.

**Format**            show ip device tracking interface *if-name*  
**Mode**               Privileged EXEC

| Parameter | Description     |
|-----------|-----------------|
| if-name   | Interface name. |

The following fields are displayed in the output of this command.

| Parameter             | Description                                                              |
|-----------------------|--------------------------------------------------------------------------|
| IP Address            | The learned IPv4 address of the device.                                  |
| MAC Address           | The MAC address associated with the learned IPv4 address.                |
| VLAN                  | The VLAN ID associated with an interface on which the device is learned. |
| Interface             | The interface name on which the device is learned.                       |
| Time left to inactive | The number of seconds before the reachable device is set to INACTIVE.    |
| Time since inactive   | The number of seconds since the INACTIVE device was last reachable.      |
| State                 | Specifies the device is in ACTIVE or INACTIVE state.                     |
| Source                | Specifies the source of the device whether it is ARP, DHCP, or Static.   |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show ip device tracking interface Gi1/0/1

IP Device Tracking for clients..... Enable
IP Device Tracking Probe Generation..... Enable
IP Device Tracking Probe Count..... 3
IP Device Tracking Probe Interval.....30
IP Device Tracking Probe Delay Interval.....30
IP Device Tracking Interface Max Entry LimitNo Limit

IP Address MAC Address Vlan Interface Time-left Time-since State Source
 to inactive inactive

10.21.1.1 01:02:03:04:05:06 2 1/0/1 50 0 ACTIVE ARP
20.21.1.1 01:02:03:04:05:07 2 1/0/1 80 0 ACTIVE ARP
```

### 4.50.12 show ip device tracking ip

Use this command to display all the IPv4DT (IPv4/VLAN/MAC) entries in the IPv4DT table matching a specified host IPv4 address.

**Format** show ip device tracking ip *ipv4-address*

**Mode** Privileged EXEC

| Parameter    | Description                 |
|--------------|-----------------------------|
| ipv4-address | IPv4 address of the device. |

The following fields are displayed in the output of this command.

| Parameter             | Description                                                              |
|-----------------------|--------------------------------------------------------------------------|
| IP Address            | The learned IPv4 address of the device.                                  |
| MAC Address           | The MAC address associated with the learned IPv4 address.                |
| VLAN                  | The VLAN ID associated with an interface on which the device is learned. |
| Interface             | The interface name on which the device is learned.                       |
| Time left to inactive | The number of seconds before the reachable device is set to INACTIVE.    |
| Time since inactive   | The number of seconds since the INACTIVE device was last reachable.      |
| State                 | Specifies the device is in ACTIVE or INACTIVE state.                     |
| Source                | Specifies the source of the device whether it is ARP, DHCP, or Static.   |

**Example:** The following shows example CLI display output for the command.

(Switching) #show ip device tracking ip 10.21.1.1

```
IP Device Tracking for clients..... Enable
IP Device Tracking Probe Generation..... Enable
IP Device Tracking Probe Count..... 3
IP Device Tracking Probe Interval.....30
IP Device Tracking Probe Delay Interval.....30

IP Address MAC Address Vlan Interface Time-left Time-since State Source
 to inactive inactive

10.21.1.1 01:02:03:04:05:06 2 1/0/1 50 0 ACTIVE ARP
10.21.1.1 01:02:03:04:05:07 2 1/0/2 50 0 ACTIVE ARP
```

### 4.50.13 show ip device tracking mac

Use this command to display all the IPv4DT (IPv4/VLAN/MAC) entries in the IPv4DT table matching a specified MAC address.

**Format** show ip device tracking mac *mac-address*

**Mode** Privileged EXEC

| Parameter   | Description                |
|-------------|----------------------------|
| mac-address | MAC address of the device. |

The following fields are displayed in the output of this command.

| Parameter   | Description                                               |
|-------------|-----------------------------------------------------------|
| IP Address  | The learned IPv4 address of the device.                   |
| MAC Address | The MAC address associated with the learned IPv4 address. |

| Parameter             | Description                                                              |
|-----------------------|--------------------------------------------------------------------------|
| VLAN                  | The VLAN ID associated with an interface on which the device is learned. |
| Interface             | The interface name on which the device is learned.                       |
| Time left to inactive | The number of seconds before the reachable device is set to INACTIVE.    |
| Time since inactive   | The number of seconds since the INACTIVE device was last reachable.      |
| State                 | Specifies the device is in ACTIVE or INACTIVE state.                     |
| Source                | Specifies the source of the device whether it is ARP, DHCP, or Static.   |

**Example:** The following shows example CLI display output for the command.

```
(Switching) #show ip device tracking mac 01:02:03:04:05:06
```

```
IP Device Tracking for clients..... Enable
IP Device Tracking Probe Generation..... Enable
IP Device Tracking Probe Count..... 3
IP Device Tracking Probe Interval.....30
IP Device Tracking Probe Delay Interval.....30
```

```

IP Address MAC Address Vlan Interface Time-left Time-since State Source
 to inactive inactive

10.21.1.1 01:02:03:04:05:06 2 1/0/1 50 0 ACTIVE ARP
20.21.1.1 01:02:03:04:05:06 2 1/0/1 50 0 ACTIVE ARP
```

#### 4.50.14 debug ipdt logging

Use the `debug ipdt logging` command to enable debug tracing of IPv4DT events. Debug messages are sent to the system log at the DEBUG severity level. To print them on the console, enable console logging at the DEBUG level using the `logging console debug` command. See the command.

**Default**            enabled  
**Format**            debug ipdt logging  
**Mode**              Privileged EXEC

##### 4.50.14.1 no debug ipdt logging

Use the `no` form of the command to disable debug tracing.

**Format**            no debug ipdt logging  
**Mode**              Privileged EXEC

## 4.51 ARP Guard Commands

The ARP Guard feature protects the switch CPU from DoS attacks with ARP messages. This feature provides:

- Rate limiting of incoming ARP packets on a per-host basis.
- Detecting and logging ARP attack from a host, upon crossing a threshold.

### 4.51.1 arp-guard enable

Use this command to enable the ARP Guard feature globally.

**Default**            disabled  
**Format**            arp-guard enable  
**Mode**              Global Config

### 4.51.1.1 no arp-guard enable

Use the `no` form of the command to disable the ARP Guard feature and clear all the operational entries in all ARP Guard tables.

**Format**            `no arp-guard enable`

**Mode**             Global Config

### 4.51.2 arp-guard rate-limit

Use this command to configure the rate limit for ARP packet processing at a given rate measured in packets-per-second. The ARP packets rate limit can be configured independently on a per-port basis and on a per-host basis (hosts identified based on source IP address, VLAN ID, and port and hosts identified based on the link-layer source MAC address, VLAN ID, and port).

**Default**            Although the range is the same for all ARP rate limiting types, the default values vary and are as follows:

- Per-port rate limit: Default 15.
- Per-host (SMAC) rate limit: Default 10.
- Per-host (SIP) rate limit: Default 10.

**Format**            `arp-guard rate-limit { per-src-ip | per-src-mac | per-port } pps`

**Mode**             Global Config

| Parameter                | Description                                                                                                                         |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <code>per-src-ip</code>  | Limits the rate of each source IP address.                                                                                          |
| <code>per-src-mac</code> | Limits the rate of each source MAC address.                                                                                         |
| <code>per-port</code>    | Limits the rate of each port.                                                                                                       |
| <code>pps</code>         | Indicates the rate limit in packets-per-second, ranging from 0 to 300. A value of zero (0) means no limit—the value is not tracked. |

**Example:** The following example sets the rate-limit for hosts identified by source IP address.

```
(Switching)(Config)# arp-guard rate-limit per-src-ip 100
```

### 4.51.2.1 no arp-guard rate-limit

Use the `no` form of the command to reset the rate limit to the corresponding default value.

**Format**            `no arp-guard rate-limit { per-src-ip | per-src-mac | per-port }`

**Mode**             Global Config

### 4.51.3 arp-guard attack-threshold

Use this command to configure the attach threshold for ARP packets attack detection at a given rate measured in packets-per-second. The ARP packets attack threshold can be configured independently on a per-port basis and on a per-host basis (hosts identified based on source IP address, VLAN ID, and port and hosts identified based on the link-layer source MAC address, VLAN ID, and port).

**Default**            Although the range is the same for all ARP rate limiting types, the default values vary and are as follows:

- Per-port attack threshold default: 30.
- Per-host (SMAC) attack threshold default: 20.
- Per-host (SIP) attack threshold default: 20.

**Format**            `arp-guard attack-threshold { per-src-ip | per-src-mac | per-port } pps`

**Mode**             Global Config



| Parameter   | Description                                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------|
| per-src-ip  | Detects ARP attacks by hosts identified by source IP address.                                                                       |
| per-src-mac | Detects ARP attacks by hosts identified by source MAC address.                                                                      |
| per-port    | Detects ARP attacks on per port basis.                                                                                              |
| pps         | Indicates the rate limit in packets-per-second, ranging from 0 to 300. A value of zero (0) means no limit—the value is not tracked. |

**Example:** The following example sets the rate-limit for hosts identified by source MAC address.

```
(Switching)(Config)# arp-guard attack-threshold per-src-mac 100
```

#### 4.51.3.1 no arp-guard attack-threshold

Use the `no` form of the command to reset the attack threshold to the corresponding default value. The attack threshold for a given tracking type should always equal or exceed the corresponding rate limit on the port. An error occurs if configured otherwise. An exception to this is the value 0—it is okay to have a rate limit but not an attack detect threshold of 0.

#### 4.51.4 arp-guard mode

Use this command to enable the ARP Guard feature on a specified interface. Configuring the disable option disables the feature on a specified interface and clears all the operational entries in the ARP Guard tables associated with a specified interface. In the case when the per-interface configuration value is configured, then it overrides the global value on the given port, otherwise the global value is used on the port.

**Default** ARP Guard on an interface is disabled by default.  
**Format** `arp-guard mode {enable|disable}`  
**Mode** Interface Config

##### 4.51.4.1 no arp-guard mode

Use the `no` form of the command to unconfigure the admin-mode configuration on the interface, and the global `arp-guard admin-mode config` value takes effect.

**Format** `no arp-guard mode`  
**Mode** Interface Config

#### 4.51.5 arp-guard rate-limit

Use this command to configure the rate limit on a specified interface for ARP packets processing at a given rate measured in packets-per-second. The ARP packets rate limit can be configured on the specified interface independently on a per-port basis and on a per-host basis (hosts identified based on source IP address, VLAN ID, and port and hosts identified based on the link-layer source MAC address, VLAN ID, and port).

**Format** `arp-guard rate-limit { per-src-ip | per-src-mac | per-port } pps`  
**Mode** Interface Config

| Parameter   | Description                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| per-src-ip  | Limits the rate of each source IP address on the specified interface.                                                                                          |
| per-src-mac | Limits the rate of each source MAC address on the specified interface.                                                                                         |
| per-port    | Limits the rate on the specified port.                                                                                                                         |
| pps         | Indicates the rate limit on the specified interface in packets-per-second, ranging from 0 to 300. A value of zero (0) means no limit—the value is not tracked. |

**Example:** The following example sets the rate-limit on interface 1/0/2 for hosts identified by source IP address.

```
(Switching)(Interface-1/0/2-Config)# arp-guard rate-limit per-src-ip 100
```

#### 4.51.5.1 no arp-guard rate-limit

There are no defaults at interface level for this configuration. Using the no form of the command causes the rate limit to be unconfigured on the specified interface. In the case when the per-interface value is configured, it overrides the global value, otherwise the global (configured value or the global default) value is used on the port.

**Format**           no arp-guard rate-limit { per-src-ip | per-src-mac | per-port }

**Mode**             Interface Config

#### 4.51.6 arp-guard attack-threshold

Use this command to configure the attack threshold on a specified interface for ARP packets attack detection at a given rate measured in packets-per-second. The ARP packets attack threshold on the interface can be configured independently on a per-port basis and on a per-host basis (hosts identified based on source IP address, VLAN ID, and port and hosts identified based on the link-layer source MAC address, VLAN ID, and port).

The attack threshold on the port for a given tracking type should always equal or exceed the corresponding rate limit on the port. An error occurs if configured otherwise. An exception to this is the value 0—it is okay to have a rate limit but not an attack detect threshold of 0.

**Format**           arp-guard attack-threshold { per-src-ip | per-src-mac | per-port } pps

**Mode**             Interface Config

| Parameter   | Description                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| per-src-ip  | Detects ARP attacks on the specified interface by hosts identified by source IP address.                                                                       |
| per-src-mac | Detects ARP attacks on the specified interface by hosts identified by source MAC address.                                                                      |
| per-port    | Detects ARP attacks on the specified interface.                                                                                                                |
| pps         | Indicates the rate limit on the specified interface in packets-per-second, ranging from 0 to 300. A value of zero (0) means no limit—the value is not tracked. |

**Example:** The following example sets the rate-limit on interface 1/0/2 for hosts identified by source MAC address.

```
(Switching)(Interface-1/0/2-Config)# arp-guard attack-threshold per-src-mac 100
```

#### 4.51.6.1 no arp-guard attack-threshold

There are no defaults at interface level for this configuration. Using the no form of the command causes the attack-threshold to be unconfigured on the specified interface. When the per-interface value is configured, it overrides the global value, otherwise the global (configured value or the global default) value is used on the port.

**Format**           no arp-guard attack-threshold { per-src-ip | per-src-mac | per-port }

**Mode**             Interface Config

#### 4.51.7 clear arp-guard statistics

Use this command to clear ARP Guard statistics on a specific interface or for all interfaces. When all is selected, even global statistics are cleared.

**Format**           clear arp-guard statistics {all | interface unit/slot/port | lag lag-num}

**Mode**             Privileged EXEC

| Parameter      | Description                                                                 |
|----------------|-----------------------------------------------------------------------------|
| all            | Clears the ARP Guard statistics for both global and all interfaces.         |
| unit/slot/port | Clears the ARP Guard statistics for the given interface unit/slot/port.     |
| lag-num        | Clears the ARP Guard statistics for the given LAG identified by LAG number. |

#### 4.51.8 clear arp-guard attack-history

Use this command to clear ARP Guard attack history for per host source IP category, or per host source MAC category, or per port category, or for all three of these categories. When `all` is selected, attack history is cleared for the three categories.

**Format**            `clear arp-guard attack-history {all | per-src-ip | per-src-mac | per-port }`  
**Mode**             Privileged EXEC

| Parameter   | Description                                                                                                 |
|-------------|-------------------------------------------------------------------------------------------------------------|
| all         | Clears the ARP Guard attack history for all three categories (per source IP, per source MAC, and per port). |
| per-src-ip  | Clears the ARP Guard attack history for the per source IP category.                                         |
| per-src-mac | Clears the ARP Guard attack history for the per source MAC category.                                        |
| per-port    | Clears the ARP Guard attack history for the per port category.                                              |

#### 4.51.9 show arp-guard summary

This command displays the ARP Guard feature configuration on all or for the given interface/LAG (port-channel).

**Format**            `show arp-guard {summary | interface unit/slot/port | lag lag-num}`  
**Mode**             Privileged EXEC

| Parameter      | Description                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------|
| summary        | Displays the ARP Guard global configuration and for all the interfaces.                            |
| unit/slot/port | Displays the ARP Guard configuration for the given interface identified by <i>unit/slot/port</i> . |
| lag-num        | Displays the ARP Guard configuration for the LAG interface identified by the LAG number.           |

**Example:** The following example shows the ARP Guard configuration for global and also for all interfaces.

(Switching) `#show arp-guard summary`

(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)

```
Interface Admin Mode Status Rate-limit(in pps) Attack-threshold(in pps)

Global Disabled Disabled 10/50/200 50/100/400
1/0/2 Enabled Enabled 25/50/150 50/100/200
1/0/5 Enabled Enabled 15/25/50 50/50/100
1/0/6 Enabled Enabled 50/50/150 100/100/200
1/0/18 Enabled Enabled 50/50/150 100/100/200
```

**Example:** The example below shows the ARP Guard configuration for interface 1/0/2.

```
(Switching) #show arp-guard summary
```

(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)

```
Interface Status Rate-limit(in pps) Attack-threshold(in pps)
----- -
1/0/2 Enabled 25/50/150 50/100/200
```

#### 4.51.10 show arp-guard statistics

This command displays all the ARP Guard statistics on the given interface, or LAG (port-channel), or all interfaces that have ARP Guard enabled on them.

**Format** show arp-guard statistics {all | interface *unit/slot/port* | lag *lag-number*}

**Mode** Privileged EXEC

| Parameter      | Description                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------------|
| all            | Displays the ARP Guard global statistics, and statistics of all the interfaces.                        |
| unit/slot/port | Displays the ARP Guard global statistics for the given interface identified by <i>unit/slot/port</i> . |
| lag-num        | Displays the ARP Guard global statistics for the given LAG interface identified by the LAG number.     |

**Example:** The following example shows the ARP Guard statistics on interface 1/0/2.

```
(Switching) #show arp-guard statistics interface 1/0/2
```

```
Interface 1/0/2
```

```
Rate limit hit count on the interface..... 10
Rate limit hit count per Host source IP..... 12
Rate limit hit count per Host source MAC..... 3
Attacks detected on the interface..... 7
Attacks detected per Host source IP..... 15
Attacks detected per Host source MAC..... 14
```

**Example:** The following example shows the ARP Guard global statistics for all the interfaces.

```
(Switching) #show arp-guard statistics interface all
```

```
Global Statistics
```

```
Rate limit hit count on all interfaces..... 23
Rate limit hit count per Host source IP..... 14
Rate limit hit count per Host source MAC..... 11
Attacks detected on all interfaces..... 22
Attacks detected per Host source IP..... 19
Attacks detected per Host source MAC..... 32
```

```
Interface 1/0/2
```

```
Rate limit hit count on the interface..... 13
Rate limit hit count per Host source IP..... 2
Rate limit hit count per Host source MAC..... 8
Attacks detected on the interface..... 15
Attacks detected per Host source IP..... 4
Attacks detected per Host source MAC..... 18
```

Interface 1/0/16

```
Rate limit hit count on the interface..... 10
Rate limit hit count per Host source IP..... 12
Rate limit hit count per Host source MAC..... 3
Attacks detected on the interface..... 7
Attacks detected per Host source IP..... 15
Attacks detected per Host source MAC..... 14
```

#### 4.51.11 show arp-guard attack history

Use this command to display the ARP attack events history for per host (either based on Source IP or Source MAC), or for per port category.

**Format** show arp-guard attack history {per-src-ip | per-src-mac | per-port | all}

**Mode** Privileged EXEC

| Parameter   | Description                                                                                                                             |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| per-src-ip  | Displays the ARP Guard attack event history for the per host source IP category.                                                        |
| per-src-mac | Displays the ARP Guard attack event history for the per host source MAC category.                                                       |
| per-port    | Displays the ARP Guard attack event history for the per port/interface category.                                                        |
| all         | Displays the ARP Guard attack event history for all three categories (per host source IP, per host source MAC, and per port/interface). |

**Example:** The following example shows the ARP Guard attacks event history per host based on source IP.

(Switching) #show arp-guard attack history per-src-ip

```
VLAN Interface IP address Timestamp

1 1/0/2 4.5.5.17 0h 17m 26s
10 1/0/14 7.6.14.2 0h 38m 13s
20 1/0/9 5.58.12.23 0h 54m 49s
```

**Example:** The following example shows the ARP-Guard attacks events history per host based on Source MAC.

(Switching) #show arp-guard attack history per-src-mac

```
VLAN Interface MAC address Timestamp

1 1/0/5 00:1a:b3:c9:46:03 0h 12m 28s
10 1/0/26 00:2c:67:f4:33:a5 0h 30m 06s
20 1/0/13 00:d8:a5:23:b4:c9 0h 42m 37s
```

**Example:** The following example shows the ARP-Guard attacks events history for per interface/port category.

(Switching) #show arp-guard attack history per-port

```
VLAN Interface Timestamp

1 1/0/5 0h 22m 07s
10 1/0/26 0h 47m 19s
20 1/0/13 0h 12m 33s
```

#### 4.51.12 debug arp-guard

Use this command to enable debug tracing of ARP Guard events. This enables tracing on these events in the logs:

- When rate limit threshold is reached per host IP, host MAC, interface.
- When attack detection threshold is reached per host IP, host MAC, interface.

**Default** disabled  
**Format** debug arp-guard logging  
**Mode** Privileged EXEC

#### 4.51.12.1 no debug arp-guard

Use the `no` form of the command to disable debug tracing of ARP Guard events.

**Format** no debug arp-guard logging  
**Mode** Privileged EXEC

## 5/ Routing Commands

This chapter describes the routing commands available in the FASTPATH CLI.

### NOTICE

The commands in this chapter are in one of three functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Clear commands clear some or all of the settings to factory defaults.

## 5.1 Address Resolution Protocol Commands

This section describes the commands you use to configure Address Resolution Protocol (ARP) and to view ARP information on the switch. ARP associates IP addresses with MAC addresses and stores the information as ARP entries in the ARP cache.

### 5.1.1 arp

This command creates an ARP entry in the default router. The value for *ipaddress* is the IP address of a device on a subnet attached to an existing routing interface. The parameter *macaddr* is a unicast MAC address for that device. The *interface* parameter specifies the next hop interface.

The format of the MAC address is 6 two-digit hexadecimal numbers that are separated by colons, for example 00:06:29:32:81:40.

**Format**            `arp ipaddress macaddr interface {slot/port | vlan id}`

**Mode**             Global Config

#### 5.1.1.1 no arp

This command deletes an ARP entry in the default router. The value for *ipaddress* is the IP address of a device on a subnet attached to an existing routing interface. The parameter *macaddr* is a unicast MAC address for that device. The *interface* parameter specifies the next hop interface.

**Format**            `no arp ipaddress macaddr interface slot/port`

**Mode**             Global Config

### 5.1.2 ip proxy-arp

This command enables proxy ARP on a router interface or range of interfaces. Without proxy ARP, a device only responds to an ARP request if the target IP address is an address configured on the interface where the ARP request arrived. With proxy ARP, the device may also respond if the target IP address is reachable. The device only responds if all next hops in its route to the destination are through interfaces other than the interface that received the ARP request.

**Default**            enabled

**Format**            `ip proxy-arp`

**Mode**             Interface Config

#### 5.1.2.1 no ip proxy-arp

This command disables proxy ARP on a router interface.

**Format**            `no ip proxy-arp`

**Mode**             Interface Config

### 5.1.3 ip local-proxy-arp

Use this command to allow an interface to respond to ARP requests for IP addresses within the subnet and to forward traffic between hosts in the subnet.

|                |                    |
|----------------|--------------------|
| <b>Default</b> | disabled           |
| <b>Format</b>  | ip local-proxy-arp |
| <b>Mode</b>    | Interface Config   |

#### 5.1.3.1 no ip local-proxy-arp

This command resets the local proxy ARP mode on the interface to the default value.

|               |                       |
|---------------|-----------------------|
| <b>Format</b> | no ip local-proxy-arp |
| <b>Mode</b>   | Interface Config      |

### 5.1.4 arp cachesize

This command configures the ARP cache size. The ARP cache size value is a platform specific integer value. The default size also varies depending on the platform.

|               |                                                      |
|---------------|------------------------------------------------------|
| <b>Format</b> | arp cachesize <i>platform specific integer value</i> |
| <b>Mode</b>   | Global Config                                        |

#### 5.1.4.1 no arp cachesize

This command configures the default ARP cache size.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no arp cachesize |
| <b>Mode</b>   | Global Config    |

### 5.1.5 arp dynamicrenew

This command enables the ARP component to automatically renew dynamic ARP entries when they age out. When an ARP entry reaches its maximum age, the system must decide whether to retain or delete the entry. If the entry has recently been used to forward data packets, the system will renew the entry by sending an ARP request to the neighbor. If the neighbor responds, the age of the ARP cache entry is reset to 0 without removing the entry from the hardware. Traffic to the host continues to be forwarded in hardware without interruption. If the entry is not being used to forward data packets, then the entry is deleted from the ARP cache, unless the dynamic renew option is enabled. If the dynamic renew option is enabled, the system sends an ARP request to renew the entry. When an entry is not renewed, it is removed from the hardware and subsequent data packets to the host trigger an ARP request. Traffic to the host may be lost until the router receives an ARP reply from the host. Gateway entries, entries for a neighbor router, are always renewed. The dynamic renew option applies only to host entries.

The disadvantage of enabling dynamic renew is that once an ARP cache entry is created, that cache entry continues to take space in the ARP cache as long as the neighbor continues to respond to ARP requests, even if no traffic is being forwarded to the neighbor. In a network where the number of potential neighbors is greater than the ARP cache capacity, enabling dynamic renew could prevent some neighbors from communicating because the ARP cache is full.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | arp dynamicrenew |
| <b>Mode</b>    | Privileged EXEC  |

#### 5.1.5.1 no arp dynamicrenew

This command prevents dynamic ARP entries from renewing when they age out.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | no arp dynamicrenew |
| <b>Mode</b>   | Privileged EXEC     |



## 5.1.6 arp purge

This command causes the specified IP address to be removed from the ARP cache in the default router. Only entries of type dynamic or gateway are affected by this command.

**Format**           arp purge *ipaddress* interface {*slot/port* | *vlan id*}

**Mode**             Privileged EXEC

| Parameter        | Description                                            |
|------------------|--------------------------------------------------------|
| <i>ipaddress</i> | The IP address to remove from the ARP cache.           |
| <i>interface</i> | The interface from which IP addresses will be removed. |

## 5.1.7 arp resptime

This command configures the ARP request response timeout.

The value for *seconds* is a valid positive integer, which represents the IP ARP entry response timeout time in seconds. The range for *seconds* is between 1 to 10 seconds.

**Default**           1

**Format**           arp resptime *1-10*

**Mode**             Global Config

### 5.1.7.1 no arp resptime

This command configures the default ARP request response timeout.

**Format**           no arp resptime

**Mode**             Global Config

## 5.1.8 arp retries

This command configures the ARP count of maximum request for retries.

The value for *retries* is an integer, which represents the maximum number of request for retries. The range for *retries* is an integer between 0 to 10 retries.

**Default**           4

**Format**           arp retries *0-10*

**Mode**             Global Config

### 5.1.8.1 no arp retries

This command configures the default ARP count of maximum request for retries.

**Format**           no arp retries

**Mode**             Global Config

## 5.1.9 arp timeout

This command configures the ARP entry ageout time.

The value for *seconds* is a valid positive integer, which represents the IP ARP entry ageout time in seconds. The range for *seconds* is between 15 to 21600 seconds.

**Default** 1200  
**Format** arp timeout 15-21600  
**Mode** Global Config

### 5.1.9.1 no arp timeout

This command configures the default ARP entry ageout time.

**Format** no arp timeout  
**Mode** Global Config

### 5.1.10 clear arp-cache

This command causes all ARP entries of type dynamic to be removed from the ARP cache for the default router. If the gateway keyword is specified, the dynamic entries of type gateway are purged as well.

**Format** clear arp-cache [gateway]  
**Mode** Privileged EXEC

### 5.1.11 clear arp-switch

Use this command to clear the contents of the switch's Address Resolution Protocol (ARP) table that contains entries learned through the Management port. To observe whether this command is successful, ping from the remote system to the DUT. Issue the show arp switch command to see the ARP entries. Then issue the clear arp-switch command and check the show arp switch entries. There will be no more arp entries.

**Format** clear arp-switch  
**Mode** Privileged EXEC

### 5.1.12 show arp

This command displays the Address Resolution Protocol (ARP) cache for the default router. The displayed results are not the total ARP entries. To view the total ARP entries, the operator should view the show arp results in conjunction with the show arp switch results.

**Format** show arp  
**Mode** Privileged EXEC

| Parameter                        | Description                                                                                                     |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Age Time (seconds)               | The time it takes for an ARP entry to age out. This is configurable. Age time is measured in seconds.           |
| Response Time (seconds)          | The time it takes for an ARP request timeout. This value is configurable. Response time is measured in seconds. |
| Retries                          | The maximum number of times an ARP request is retried. This value is configurable.                              |
| Cache Size                       | The maximum number of entries in the ARP table. This value is configurable.                                     |
| Dynamic Renew Mode               | Displays whether the ARP component automatically attempts to renew dynamic ARP entries when they age out.       |
| Total Entry Count Current / Peak | The total entries in the ARP table and the peak entry count in the ARP table.                                   |
| Static Entry Count Current / Max | The static entry count in the ARP table and maximum static entry count in the ARP table.                        |

The following are displayed for each ARP entry:

| Parameter   | Description                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------|
| IP Address  | The IP address of a device on a subnet attached to an existing routing interface.                                         |
| MAC Address | The hardware MAC address of that device.                                                                                  |
| Interface   | The routing <i>slot/port</i> associated with the device ARP entry.                                                        |
| Type        | The type that is configurable. The possible values are <i>Local</i> , <i>Gateway</i> , <i>Dynamic</i> and <i>Static</i> . |
| Age         | The current age of the ARP entry since last refresh (in hh:mm:ss format).                                                 |

### 5.1.13 show arp brief

This command displays the brief Address Resolution Protocol (ARP) table information for the default router.

**Format**            `show arp brief`

**Mode**             Privileged EXEC

| Parameter                           | Description                                                                                                     |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Age Time (seconds)                  | The time it takes for an ARP entry to age out. This value is configurable. Age time is measured in seconds.     |
| Response Time (seconds)             | The time it takes for an ARP request timeout. This value is configurable. Response time is measured in seconds. |
| Retries                             | The maximum number of times an ARP request is retried. This value is configurable.                              |
| Cache Size                          | The maximum number of entries in the ARP table. This value is configurable.                                     |
| Dynamic Renew Mode                  | Displays whether the ARP component automatically attempts to renew dynamic ARP entries when they age out.       |
| Total Entry Count<br>Current / Peak | The total entries in the ARP table and the peak entry count in the ARP table.                                   |
| Static Entry Count<br>Current / Max | The static entry count in the ARP table and maximum static entry count in the ARP table.                        |

### 5.1.14 show arp switch

This command displays the contents of the switch's Address Resolution Protocol (ARP) table.

**Format**            `show arp switch`

**Mode**             Privileged EXEC

| Parameter   | Description                                                          |
|-------------|----------------------------------------------------------------------|
| IP Address  | The IP address of a device on a subnet attached to the switch.       |
| MAC Address | The hardware MAC address of that device.                             |
| Interface   | The routing <i>slot/port</i> associated with the device's ARP entry. |

## 5.2 IP Routing Commands

This section describes the commands you use to enable and configure IP routing on the switch.

### 5.2.1 routing

This command enables IPv4 and IPv6 routing for an interface or range of interfaces. You can view the current value for this function with the `show ip brief` command. The value is labeled as "Routing Mode."

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | routing          |
| <b>Mode</b>    | Interface Config |

### 5.2.1.1 no routing

This command disables routing for an interface.

You can view the current value for this function with the `show ip brief` command. The value is labeled as "Routing Mode."

|               |                  |
|---------------|------------------|
| <b>Format</b> | no routing       |
| <b>Mode</b>   | Interface Config |

## 5.2.2 ip routing

This command enables the IP Router Admin Mode.

|               |                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------|
| <b>Format</b> | ip routing                                                                                         |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

### 5.2.2.1 no ip routing

This command disables the IP Router Admin Mode.

|               |               |
|---------------|---------------|
| <b>Format</b> | no ip routing |
| <b>Mode</b>   | Global Config |

## 5.2.3 ip address

This command configures an IP address on an interface or range of interfaces. You can also use this command to configure one or more secondary IP addresses on the interface. The command supports RFC 3021 and accepts using 31-bit prefixes on IPv4 point-to-point links. This command adds the label IP address in the [show ip interface](#) command.

**NOTE:** The 31-bit subnet mask is only supported on routing interfaces. The feature is not supported on network port and service port interfaces because FASTPATH acts as a host, not a router, on these management interfaces.

|               |                                                                                      |
|---------------|--------------------------------------------------------------------------------------|
| <b>Format</b> | ip address <i>ipaddr</i> { <i>subnetmask</i> / <i>masklen</i> } [ <i>secondary</i> ] |
| <b>Mode</b>   | Interface Config                                                                     |

| Parameter  | Description                                                                                                                                           |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| ipaddr     | The IP address of the interface.                                                                                                                      |
| subnetmask | A 4-digit dotted-decimal number which represents the subnet mask of the interface.                                                                    |
| masklen    | Implements RFC 3021. Using the / notation of the subnet mask, this is an integer that indicates the length of the subnet mask. Range is 5 to 32 bits. |

**Example:** The following example of the command shows the configuration of the subnet mask with an IP address in the dotted decimal format on interface 0/4/1.

```
(router1) #config
```

```
(router1) (Config)#interface 0/4/1
```

```
(router1) (Interface 0/4/1)#ip address 192.168.10.1 255.255.255.254
```

**Example:** The next example of the command shows the configuration of the subnet mask with an IP address in the / notation on interface 0/4/1.

```
(router1) #config
(router1) (Config)#interface 0/4/1
(router1) (Interface 0/4/1)#ip address 192.168.10.1 /31
```

### 5.2.3.1 no ip address

This command deletes an IP address from an interface. The value for *ipaddr* is the IP address of the interface in a.b.c.d format where the range for a, b, c, and d is 1 to 255. The value for *subnetmask* is a 4-digit dotted-decimal number which represents the Subnet Mask of the interface. To remove all of the IP addresses (primary and secondary) configured on the interface, enter the command `no ip address`.

**Format**            `no ip address [{ipaddr subnetmask [secondary]}]`  
**Mode**             Interface Config

### 5.2.4 ip address dhcp

This command enables the DHCPv4 client on an in-band interface so that it can acquire network information, such as the IP address, subnet mask, and default gateway, from a network DHCP server. When DHCP is enabled on the interface, the system automatically deletes all manually configured IPv4 addresses on the interface.

To enable the DHCPv4 client on an in-band interface and send DHCP client messages with the client identifier option, use the `ip address dhcp client-id` configuration command in interface configuration mode.

**Default**            disabled  
**Format**            `ip address dhcp [client-id]`  
**Mode**             Interface Config

**Example:** In the following example, DHCPv4 is enabled on interface 0/4/1.

```
(router1) #config
(router1) (Config)#interface 0/4/1
(router1) (Interface 0/4/1)#ip address dhcp
```

#### 5.2.4.1 no ip address dhcp

The `no ip address dhcp` command releases a leased address and disables DHCPv4 on an interface. The `no` form of the `ip address dhcp client-id` command removes the client-id option and also disables the DHCP client on the in-band interface.

**Format**            `no ip address dhcp [client-id]`  
**Mode**             Interface Config

### 5.2.5 ip default-gateway

This command manually configures a default gateway for the switch. Only one default gateway can be configured. If you invoke this command multiple times, each command replaces the previous value.

When the system does not have a more specific route to a packet's destination, it sends the packet to the default gateway. The system installs a default IPv4 route with the gateway address as the next hop address. The route preference is 253. A default gateway configured with this command is more preferred than a default gateway learned from a DHCP server.

**Format**            `ip default-gateway ipaddr`  
**Mode**             • Global Config  
                     • Virtual Router Config

| Parameter | Description                             |
|-----------|-----------------------------------------|
| ipaddr    | The IPv4 address of an attached router. |

**Example:** The following example sets the default gateway to 10.1.1.1.

```
(router1) #config
(router1) (Config)#ip default-gateway 10.1.1.1
```

### 5.2.5.1 no ip default-gateway

This command removes the default gateway address from the configuration.

**Format** no ip default-gateway *ipaddr*

**Mode** Interface Config

### 5.2.6 ip load-sharing

This command configures IP ECMP load balancing mode.

**Default** 6

**Format** ip load-sharing *mode* {inner | outer}

**Mode** Global Config

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mode      | Configures the load balancing or sharing mode for all EMCP groups. <ul style="list-style-type: none"> <li>1: Based on a hash using the Source IP address of the packet.</li> <li>2: Based on a hash using the Destination IP address of the packet.</li> <li>3: Based on a hash using the Source and Destination IP addresses of the packet.</li> <li>4: Based on a hash using the Source IP address and the Source TCP/UDP Port field of the packet.</li> <li>5: Based on a hash using the Destination IP address and the Destination TCP/UDP Port field of the packet.</li> <li>6: Based on a hash using the Source and Destination IP address, and the Source and Destination TCP/UDP Port fields of the packet.</li> </ul> |
| inner     | Use the inner IP header for tunneled packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| outer     | Use the outer IP header for tunneled packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

#### 5.2.6.1 no ip load-sharing

**Format** no ip load-sharing

**Mode** Global Config

### 5.2.7 ip ipsec-load-sharing spi

This command enables hashing on the Security Parameters Index (SPI) field in IPsec packets.

IPsec packets are IPv4 and IPv6 packets with the following IP protocols:

- IP protocol 50—Encapsulating Security Payload (ESP)
- IP protocol 51—Authentication Header (AH).

The ESP and AH protocols do not employ the IP source and destination port numbers, so the hardware does not use the IP port numbers for hashing the packets. The ESP and AH packet headers contain the SPI field, which is associated with packet flows and can be used for hashing IPsec packets.

|                |                                        |
|----------------|----------------------------------------|
| <b>Default</b> | enabled                                |
| <b>Format</b>  | <code>ip ipsec-load-sharing spi</code> |
| <b>Mode</b>    | Global Config                          |

### 5.2.7.1 no ip ipsec-load-sharing spi

This command disables the ECMP IPSEC hashing on the SPI field.

|               |                                           |
|---------------|-------------------------------------------|
| <b>Format</b> | <code>no ip ipsec-load-sharing spi</code> |
| <b>Mode</b>   | Global Config                             |

## 5.2.8 ip route

This command configures a static route in a specified router instance. The *ipaddr* parameter is a valid IP address, and *subnetmask* is a valid subnet mask. The *nexthopip* parameter is a valid IP address of the next hop router. Specifying `Null0` as nexthop parameter adds a static reject route. The optional *preference* parameter is an integer (value from 1 to 255) that allows you to specify the preference value (sometimes called "administrative distance") of an individual static route. Among routes to the same destination, the route with the lowest preference value is the route entered into the forwarding database. By specifying the preference of a static route, you control whether a static route is more or less preferred than routes from dynamic routing protocols. The preference also controls whether a static route is more or less preferred than other static routes to the same destination. A route with a preference of 255 cannot be used to forward traffic.

The *description* parameter allows a description of the route to be entered.

Use the *track object-number* to specify that the static route is installed only if the configured track object is up. When the track object is down the static route is removed from the Route Table. Use the no form of this command to delete the tracked static route. The *object-number* parameter is the object number representing the object to be tracked. The range is from 1 to 128. Only one track object can be associated with a specific static route. If you configure a different track object, the previously configured track object is replaced by the newly configured track object. To display the IPv4 static routes that being tracked by track objects, use the `show ip route track-table` command.

For the static routes to be visible, you must perform the following steps:

- Enable IP routing globally.
- Enable IP routing for the interface.
- Confirm that the associated link is also up.

|                |                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | preference—1                                                                                                                                               |
| <b>Format</b>  | <code>ip route ipaddr subnetmask { nexthopip   Null0   interface {slot/port   vlan-id} [preference] [description description] [track object-number]</code> |
| <b>Mode</b>    | Global Config                                                                                                                                              |

### 5.2.8.1 no ip route

This command deletes a single next hop to a destination static route. If you use the *nexthopip* parameter, the next hop is deleted.

|               |                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no ip route ipaddr subnetmask {nexthopip   NULL0   interface {slot/port   vlan vlan-id}}</code> |
| <b>Mode</b>   | Global Config                                                                                         |

## 5.2.9 ip route default

This command configures the default route. The value for *nexthopip* is a valid IP address of the next hop router. The *preference* is an integer value from 1 to 255. A route with a preference of 255 cannot be used to forward traffic.

**Default** preference—1  
**Format** ip route default *nexthopip* [*preference*]  
**Mode** Global Config

### 5.2.9.1 no ip route default

This command deletes all configured default routes. If the optional *nexthopip* parameter is designated, the specific next hop is deleted from the configured default route and if the optional preference value is designated, the preference of the configured default route is reset to its default.

**Format** no ip route default [{*nexthopip* | *preference*}]  
**Mode** Global Config

## 5.2.10 ip route distance

This command sets the default distance (preference) for static routes. Lower route distance values are preferred when determining the best route. The *ip route* and *ip route default* commands allow you to optionally set the distance (preference) of an individual static route. The default distance is used when no distance is specified in these commands. Changing the default distance does not update the distance of existing static routes, even if they were assigned the original default distance. The new default distance will only be applied to static routes created after invoking the *ip route distance* command.

**Default** 1  
**Format** ip route distance 1-255  
**Mode** Global Config

### 5.2.10.1 no ip route distance

This command sets the default static route preference value in the router. Lower route preference values are preferred when determining the best route.

**Format** no ip route distance  
**Mode** Global Config

## 5.2.11 ip route net-prototype

This command adds net prototype IPv4 routes to the hardware.

**Format** ip route net-prototype *prefix/prefix-length nexthopip num-routes*  
**Mode** Global Config

| Parameter            | Description                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| prefix/prefix-length | The destination network and mask for the route.                                                                              |
| nexthopip            | The next-hop ip address, It must belong to an active routing interface, but it does not need to be resolved.                 |
| num-routes           | The number of routes need to added into hardware starting from the given prefix argument and within the given prefix-length. |



### 5.2.11.1 no ip route net-prototype

This command deletes all the net prototype IPv4 routes added to the hardware.

**Format**            `ip route net-prototype prefix/prefix-length nexthopip num-routes`  
**Mode**             Global Config

### 5.2.12 ip route static bfd interface

This command sets up a BFD session between two directly connected neighbors specified by the local interface and the neighbor's IP address. The BFD session parameters can be set on the interface by using the existing command.

```
bfd interval milliseconds min_rx milliseconds multiplier interval-multiplier
```

This command is supported in IPv4 networks. The maximum number of IP static BFD sessions that can be supported is limited by the maximum BFD sessions configurable per DUT.

**Format**            `ip route static bfd interface unit/slot/port | vlan id neighbor ip address`  
**Mode**             Global Config

| Parameter           | Description                                                                  |
|---------------------|------------------------------------------------------------------------------|
| interface           | Specify the local interface either in unit/slot/port format or as a VLAN ID. |
| neighbor IP address | Specify the other end of the BFD session, peer address.                      |

#### Example:

```
(localhost) #configure
(localhost) (Config)#interface 0/29
(localhost) (Interface 0/29)#routing
(localhost) (Interface 0/29)#ip address 1.1.1.1 /24
(localhost) (Interface 0/29)#bfd interval 100 min_rx 100 multiplier 5
(localhost) (Interface 0/29)#exit
```

```
(localhost) (Config)#show running-config interface 0/29
```

```
!Current Configuration:
!
interface 0/29
no shutdown
routing
ip address 1.1.1.1 255.255.255.0
bfd interval 100 min_rx 100 multiplier 5
exit
```

```
(localhost) (Config)#ip route static bfd interface 0/29 1.1.1.2
```

### 5.2.13 ip netdirbcast

This command enables the forwarding of network-directed broadcasts on an interface or range of interfaces. When enabled, network directed broadcasts are forwarded. When disabled, they are dropped.

**Default**            disabled  
**Format**            `ip netdirbcast`  
**Mode**             Interface Config

### 5.2.13.1 no ip netdirbcast

This command disables the forwarding of network-directed broadcasts. When disabled, network directed broadcasts are dropped.

**Format** no ip netdirbcast

**Mode** Interface Config

### 5.2.14 ip mtu

This command sets the IP Maximum Transmission Unit (MTU) on a routing interface or range of interfaces. The IP MTU is the size of the largest IP packet that can be transmitted on the interface without fragmentation. Forwarded packets are dropped if they exceed the IP MTU of the outgoing interface.

Packets originated on the router, such as OSPF packets, may be fragmented by the IP stack.

OSPF advertises the IP MTU in the Database Description packets it sends to its neighbors during database exchange. If two OSPF neighbors advertise different IP MTUs, they will not form an adjacency. (unless OSPF has been instructed to ignore differences in IP MTU with the `ip ospf mtu-ignore` command.)

---

#### NOTICE

The IP MTU size refers to the maximum size of the IP packet (IP Header + IP payload). It does not include any extra bytes that may be required for Layer-2 headers. To receive and process packets, the Ethernet MTU (see the `mtu` command) must take into account the size of the Ethernet header

---

**Default** 1500 bytes

**Format** ip mtu *68-12270*

**Mode** Interface Config

#### 5.2.14.1 no ip mtu

This command resets the ip mtu to the default value.

**Format** no ip mtu

**Mode** Interface Config

### 5.2.15 release dhcp

Use this command to force the DHCPv4 client to release the leased address from the specified interface. The DHCP client sends a DHCP Release message telling the DHCP server that it no longer needs the IP address, and that the IP address can be reassigned to another.

**Format** release dhcp {*slot/port* | *vlan id*}

**Mode** Privileged EXEC

### 5.2.16 renew dhcp

Use this command to force the DHCPv4 client to immediately renew an IPv4 address lease on the specified interface.

---

#### NOTICE

This command can be used on in-band ports as well as the service or network (out-of-band) port.

---

**Format** renew dhcp {*slot/port* | *vlan id*}

**Mode** Privileged EXEC

### 5.2.17 renew dhcp network-port

Use this command to renew an IP address on a network port.

**Format**            renew dhcp network-port

**Mode**               Privileged EXEC

### 5.2.18 renew dhcp service-port

Use this command to renew an IP address on a service port.

**Format**            renew dhcp service-port

**Mode**               Privileged EXEC

### 5.2.19 encapsulation

This command configures the link layer encapsulation type for the packet on an interface or range of interfaces. The encapsulation type can be `ethernet` or `snap`.

**Default**            ethernet

**Format**            encapsulation {ethernet | snap}

**Mode**               Interface Config

---

Routed frames are always Ethernet encapsulated when a frame is routed to a VLAN.

#### **NOTICE**

### 5.2.20 show dhcp lease

This command displays a list of IPv4 addresses currently leased from a DHCP server on a specific in-band interface or all in-band interfaces. This command does not apply to service or network ports.

**Format**            show dhcp lease [interface {slot/port | vlan id}]

**Modes**             Privileged EXEC

| Parameter               | Description                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------|
| IP address, Subnet mask | The IP address and network mask leased from the DHCP server.                                                    |
| DHCP Lease server       | The IPv4 address of the DHCP server that leased the address.                                                    |
| State                   | State of the DHCPv4 Client on this interface.                                                                   |
| DHCP transaction ID     | The transaction ID of the DHCPv4 Client.                                                                        |
| Lease                   | The time (in seconds) that the IP address was leased by the server.                                             |
| Renewal                 | The time (in seconds) when the next DHCP renew Request is sent by DHCPv4 Client to renew the leased IP address. |
| Rebind                  | The time (in seconds) when the DHCP Rebind process starts.                                                      |
| Retry count             | Number of times the DHCPv4 client sends a DHCP REQUEST message before the server responds.                      |

## 5.2.21 show ip brief

This command displays the summary information of the IP global configurations for the specified virtual router, including the ICMP rate limit configuration and the global ICMP Redirect configuration. If no router is specified, information related to the default router is displayed.

- Format**            `show ip brief`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                  | Description                                                                                                                                                         |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Default Time to Live       | The computed TTL (Time to Live) of forwarding a packet from the local router to the final destination.                                                              |
| Routing Mode               | Shows whether the routing mode is enabled or disabled.                                                                                                              |
| Maximum Next Hops          | The maximum number of next hops the packet can travel.                                                                                                              |
| Maximum Routes             | The maximum number of routes the packet can travel.                                                                                                                 |
| Maximum Static Routes      | The maximum number of static routes that can be configured.                                                                                                         |
| ICMP Rate Limit Interval   | Shows how often the token bucket is initialized with burst-size tokens. Burst-interval is from 0 to 2147483647 milliseconds. The default burst-interval is 1000 ms. |
| ICMP Rate Limit Burst Size | Shows the number of ICMPv4 error messages that can be sent during one burst-interval. The range is from 1 to 200 messages. The default value is 100 messages.       |
| ICMP Echo Replies          | Shows whether ICMP Echo Replies are enabled or disabled.                                                                                                            |
| ICMP Redirects             | Shows whether ICMP Redirects are enabled or disabled.                                                                                                               |
| System uRPF Mode           | Shows whether unicast Reverse Path Forwarding (uRPF) is enabled.                                                                                                    |

**Example:** The following shows example CLI display output for the command.

(Switch) #show ip brief

```

Default Time to Live..... 64
Routing Mode..... Disabled
Maximum Next Hops..... 4
Maximum Routes..... 8160
Maximum Static Routes..... 64
ICMP Rate Limit Interval..... 1000 ms
ICMP Rate Limit Burst Size..... 100 messages
ICMP Echo Replies..... Enabled
ICMP Redirects..... Enabled
System uRPF Mode..... Disabled

```

## 5.2.22 show ip dhcp client statistics

Use this command to display the client-specific DHCP statistics on all interfaces or per interface.

- The `show ip dhcp client statistics` command shows the statistics on all the DHCP client-enabled interfaces.
- The `show ip dhcp client statistics interface <interface-name>` command shows the statistics on the interface specified only if the interface is DHCP-client enabled.

- Format**            `show ip dhcp client statistics [interface <interface-name>]`
- Mode**             Privileged EXEC

| Parameter      | Description                      |
|----------------|----------------------------------|
| interface-name | Identifies a specific interface. |

The command displays the following fields.

| Field         | Description                                              |
|---------------|----------------------------------------------------------|
| DHCP DISCOVER | The number of DHCP Discover packets sent by the client.  |
| DHCP REQUEST  | The number of DHCP Request packets sent by the client.   |
| DHCP RELEASE  | The number of DHCP Release packets sent by the client.   |
| DHCP INFORM   | The number of DHCP Inform packets sent by the client.    |
| DHCP REBIND   | The number of DHCP Rebind packets sent by the client.    |
| DHCP RENEW    | The number of DHCP Renew packets sent by the client.     |
| DHCP OFFER    | The number of DHCP Offer packets received by the client. |
| DHCP ACK      | The number of DHCP ACK packets received by the client.   |
| DHCP NACK     | The number of DHCP NACK packets received by the client.  |

**Example:** The following example shows the output from this command when the DHCP client is enabled on interface 0/5.

```
(Routing)#show ip dhcp client statistics interface 0/5
```

```
DHCP Client Statistics for Interface 0/5
```

```

Messages Sent

DHCP DISCOVER..... 1
DHCP REQUEST..... 0
DHCP RELEASE..... 0
DHCP INFORM..... 0
DHCP REBIND..... 0
DHCP RENEW..... 0

Messages Received

DHCP OFFER..... 0
DHCP ACK..... 0
DHCP NACK..... 0
```

**Example:** The following example of this command displays the client-specific DHCP statistics on all interfaces.

```
(Routing)#show ip dhcp client statistics
```

```
DHCP Client Statistics for Interface 0/5
```

```

Messages Sent

DHCP DISCOVER..... 4
DHCP REQUEST..... 0
DHCP RELEASE..... 0
DHCP INFORM..... 0
DHCP REBIND..... 0
DHCP RENEW..... 0

Messages Received

DHCP OFFER..... 0
DHCP ACK..... 0
DHCP NACK..... 0
```

```
DHCP Client Statistics for Interface 0/9
```

```

Messages Sent
----- -
DHCP DISCOVER..... 2
DHCP REQUEST..... 0
DHCP RELEASE..... 0
DHCP INFORM..... 0
DHCP REBIND..... 0
DHCP RENEW..... 0

Messages Received
----- -
DHCP OFFER..... 0
DHCP ACK..... 0
DHCP NACK..... 0

```

### 5.2.23 show ip interface

This command displays all pertinent information about the IP interface. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

**Format**            `show ip interface {slot/port/vlan 1-4093/Loopback 0-7}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                       | Description                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Routing Interface Status        | Determine the operational status of IPv4 routing Interface. The possible values are Up or Down.                                                                                                        |
| Primary IP Address              | The primary IP address and subnet masks for the interface. This value appears only if you configure it.                                                                                                |
| Method                          | Shows whether the IP address was configured manually or acquired from a DHCP server.                                                                                                                   |
| Secondary IP Address            | One or more secondary IP addresses and subnet masks for the interface. This value appears only if you configure it.                                                                                    |
| Helper IP Address               | The helper IP addresses configured by the <code>ip helper-address (Interface Config)</code> command.                                                                                                   |
| Routing Mode                    | The administrative mode of router interface participation. The possible values are enable or disable. This value is configurable.                                                                      |
| Administrative Mode             | The administrative mode of the specified interface. The possible values of this field are enable or disable. This value is configurable.                                                               |
| Forward Net Directed Broadcasts | Displays whether forwarding of network-directed broadcasts is enabled or disabled. This value is configurable.                                                                                         |
| Proxy ARP                       | Displays whether Proxy ARP is enabled or disabled on the system.                                                                                                                                       |
| Local Proxy ARP                 | Displays whether Local Proxy ARP is enabled or disabled on the interface.                                                                                                                              |
| Active State                    | Displays whether the interface is active or inactive. An interface is considered active if its link is up and it is in forwarding state.                                                               |
| Link Speed Data Rate            | An integer representing the physical link data rate of the specified interface. This is measured in megabits per second (Mb/s).                                                                        |
| MAC Address                     | The burned in physical address of the specified interface. The format is 6 two-digit hexadecimal numbers that are separated by colons.                                                                 |
| Encapsulation Type              | The encapsulation type for the specified interface. The types are: Ethernet or SNAP.                                                                                                                   |
| IP MTU                          | The maximum transmission unit (MTU) size of a frame, in bytes.                                                                                                                                         |
| Bandwidth                       | Shows the bandwidth of the interface.                                                                                                                                                                  |
| Destination Unreachables        | Displays whether ICMP Destination Unreachables may be sent (enabled or disabled).                                                                                                                      |
| ICMP Redirects                  | Displays whether ICMP Redirects may be sent (enabled or disabled).                                                                                                                                     |
| DHCP Client Identifier          | The client identifier is displayed in the output of the command only if DHCP is enabled with the <code>client-id</code> option on the in-band interface. See the <code>ip address dhcp</code> command. |

| Parameter                 | Description                                     |
|---------------------------|-------------------------------------------------|
| Interface Suppress Status | Identifies whether the interface is suppressed. |
| Interface Name            | The user-configured name of the interface.      |

**Example:** The following shows example CLI display output for the command.

```
(switch)#show ip interface 1/0/2
```

```
Routing Interface Status..... Down
Primary IP Address..... 1.2.3.4/255.255.255.0
Method..... Manual
Secondary IP Address(es)..... 21.2.3.4/255.255.255.0
..... 22.2.3.4/255.255.255.0
Helper IP Address..... 1.2.3.4
..... 1.2.3.5
Routing Mode..... Disable
Administrative Mode..... Enable
Forward Net Directed Broadcasts..... Disable
Proxy ARP..... Enable
Local Proxy ARP..... Disable
Active State..... Inactive
Link Speed Data Rate..... Inactive
MAC Address..... 00:10:18:82:0C:68
Encapsulation Type..... Ethernet
IP MTU..... 1500
Bandwidth..... 100000 kbps
Destination Unreachables..... Enabled
ICMP Redirects..... Enabled
Interface Suppress Status..... Unsuppressed
```

**Example:** In the following example the DHCP client is enabled on a VLAN routing interface.

```
(Routing) #show ip interface vlan 10
```

```
Routing Interface Status..... Up
Method..... DHCP
Routing Mode..... Enable
Administrative Mode..... Enable
Forward Net Directed Broadcasts..... Disable
Active State..... Inactive
Link Speed Data Rate..... 10 Half
MAC address..... 00:10:18:82:16:0E
Encapsulation Type..... Ethernet
IP MTU..... 1500
Bandwidth..... 10000 kbps
Destination Unreachables..... Enabled
ICMP Redirects..... Enabled
Interface Suppress Status..... Unsuppressed
DHCP Client Identifier..... 0fastpath-0010.1882.160E-v110
```

## 5.2.24 show ip interface brief

This command displays summary information about IP configuration settings for all ports in the router, and indicates how each IP address was assigned for the default router.

**Format** show ip interface [brief

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter  | Description                                                                                                                                                                                                                                          |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface  | Valid slot and port number separated by a forward slash.                                                                                                                                                                                             |
| State      | Routing operational state of the interface.                                                                                                                                                                                                          |
| IP Address | The IP address of the routing interface in 32-bit dotted decimal format.                                                                                                                                                                             |
| IP Mask    | The IP mask of the routing interface in 32-bit dotted decimal format.                                                                                                                                                                                |
| Method     | Indicates how each IP address was assigned. The field contains one of the following values: <ul style="list-style-type: none"> <li>DHCP - The address is leased from a DHCP server.</li> <li>Manual - The address is manually configured.</li> </ul> |

**Example:** The following shows example CLI display output for the command.

```
(alpha1) #show ip interface brief
```

```
Interface State IP Address IP Mask Method

1/0/17 Up 192.168.75.1 255.255.255.0 DHCP
```

### 5.2.25 show ip load-sharing

This command displays the currently configured IP ECMP load balancing mode and the IPSEC SPI hashing mode.

**Format** show ip load-sharing

**Mode** Privileged Exec

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip load-sharing
```

```
ip load-sharing 6 inner
IPSEC Security Parameter Index (SPI) Hashing is Enabled.
```

### 5.2.26 show ip protocols

This command lists a summary of the configuration and status for each unicast routing protocol running in the specified virtual router. The command lists routing protocols that are configured and enabled. If a protocol is selected on the command line, the display will be limited to that protocol. If no virtual router is specified, the configuration and status for the default router are displayed.

**Format** show ip protocols [ospf|rip]

**Mode** Privileged EXEC

| Parameter               | Description                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------|
| Routing Protocol        | OSPFv2.                                                                                              |
| Router ID               | The router ID configured for OSPFv2.                                                                 |
| OSPF Admin Mode         | Whether OSPF is enabled or disabled globally.                                                        |
| Maximum Paths           | The maximum number of next hops in an OSPF route.                                                    |
| Routing for Networks    | The address ranges configured with an OSPF network command.                                          |
| Distance                | The administrative distance (or "route preference") for intra-area, inter-area, and external routes. |
| Default Route Advertise | Whether OSPF is configured to originate a default route.                                             |
| Always                  | Whether default advertisement depends on having a default route in the common routing table.         |
| Metric                  | The metric configured to be advertised with the default route.                                       |



| Parameter               | Description                                                                                                                                                                                                                                                                                                            |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Metric Type             | The metric type for the default route.                                                                                                                                                                                                                                                                                 |
| Redist Source           | A type of routes that OSPF is redistributing.                                                                                                                                                                                                                                                                          |
| Metric                  | The metric to advertise for redistributed routes of this type.                                                                                                                                                                                                                                                         |
| Metric Type             | The metric type to advertise for redistributed routes of this type.                                                                                                                                                                                                                                                    |
| Subnets                 | Whether OSPF redistributes subnets of classful addresses, or only classful prefixes.                                                                                                                                                                                                                                   |
| Dist List               | A distribute list used to filter routes of this type. Only routes that pass the distribute list are redistributed.                                                                                                                                                                                                     |
| Number of Active Areas  | The number of OSPF areas with at least one interface running on this router. Also broken down by area type.                                                                                                                                                                                                            |
| ABR Status              | Whether the router is currently an area border router. A router is an area border router if it has interfaces that are up in more than one area.                                                                                                                                                                       |
| ASBR Status             | Whether the router is an autonomous system boundary router. The router is an ASBR if it is redistributing any routes or originating a default route.                                                                                                                                                                   |
| <b>RIP Section</b>      |                                                                                                                                                                                                                                                                                                                        |
| RIP Admin Mode          | Whether RIP is globally enabled.                                                                                                                                                                                                                                                                                       |
| Split Horizon Mode      | Whether RIP advertises routes on the interface where they were received.                                                                                                                                                                                                                                               |
| Default Metric          | The metric assigned to redistributed routes.                                                                                                                                                                                                                                                                           |
| Default Route Advertise | Whether this router is originating a default route.                                                                                                                                                                                                                                                                    |
| Distance                | The administrative distance for RIP routes.                                                                                                                                                                                                                                                                            |
| Redistribution          | A table showing information for each source protocol (connected, static and ospf). For each of these source the <code>distribution list</code> and <code>metric</code> are shown. Fields that are not configured are left blank. For <code>ospf</code> , configured <code>ospf match</code> parameters are also shown. |
| Interface               | The interfaces where RIP is enabled and the version sent and accepted on each interface.                                                                                                                                                                                                                               |

**Example:** The following shows example CLI display output for the command.

(Router) #show ip protocols

```

Routing Protocol..... OSPFv2
Router ID..... 6.6.6.6
OSPF Admin Mode..... Enable
Maximum Paths..... 32
Routing for Networks..... 172.24.0.0 0.0.255.255 area 0
 10.0.0.0 0.255.255.255 area 1
 192.168.75.0 0.0.0.255 area 2
Distance..... Intra 110 Inter 110 Ext 110

Default Route Advertise..... Disabled
Always..... FALSE
Metric..... Not configured
Metric Type..... External Type 2

Redist
Source Metric Metric Type Subnets Dist List

static default 2 Yes None
connected 10 2 Yes 1

Number of Active Areas..... 3 (3 normal, 0 stub, 0 nssa)
ABR Status..... Yes
ASBR Status..... Yes

Routing Protocol..... RIP
RIP Admin Mode..... Enable
Split Horizon Mode..... Simple

```

```

Default Metric..... Not configured
Default Route Advertise..... Disable
Distance..... 120

```

#### Redistribution:

```

Source Metric Dist List Match

```

```

connected 6
static 10 15
ospf 20 int ext1 ext2 nssa-ext1

```

```

Interface Send Recv

0/25 RIPv2 RIPv2

```

## 5.2.27 show ip route

This command displays the routing table for the default router. The *ip-address* specifies the network for which the route is to be displayed and displays the best matching best-route for the address. The *mask* specifies the subnet mask for the given *ip-address*. When you use the *longer-prefixes* keyword, the *ip-address* and *mask* pair becomes the prefix, and the command displays the routes to the addresses that match that prefix. Use the *protocol* parameter to specify the protocol that installed the routes. The value for *protocol* can be *connected*, *ospf*, *rip*, *static*,. Use the *all* parameter to display all routes including best and nonbest routes. If you do not use the *all* parameter, the command displays only the best route.

### NOTICE

- If you use the *connected* keyword for *protocol*, the *all* option is not available because there are no best or nonbest connected routes.
- If you use the *static* keyword for *protocol*, the *description* option is also available, for example: `show ip route ip-address static description`. This command shows the description configured with the specified static routes.

**Format** `show ip route [{ip-address [protocol] | {ip-address mask [longer-prefixes] [protocol] | protocol} [all] | all}]`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter   | Description                                                                           |
|-------------|---------------------------------------------------------------------------------------|
| Route Codes | The key for the routing protocol codes that might appear in the routing table output. |

The `show ip route` command displays the routing tables in the following format:

Code IP-Address/Mask [Preference/Metric] via Next-Hop, Route-Timestamp, Interface, Truncated

The columns for the routing table display the following information:

| Parameter       | Description                                                                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code            | The codes for the routing protocols that created the routes.                                                                                                      |
| Default Gateway | The IP address of the default gateway. When the system does not have a more specific route to a packet's destination, it sends the packet to the default gateway. |
| IP-Address/Mask | The IP-Address and mask of the destination network corresponding to this route.                                                                                   |
| Preference      | The administrative distance associated with this route. Routes with low values are preferred over routes with higher values.                                      |
| Metric          | The cost associated with this route.                                                                                                                              |
| via Next-Hop    | The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination.                                     |

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Route-Timestamp | The last updated time for dynamic routes. The format of Route-Timestamp is: <ul style="list-style-type: none"> <li>• Days:Hours:Minutes if days &gt; = 1</li> <li>• Hours:Minutes:Seconds if days &lt; 1</li> </ul>                                                                                                                                                                                                            |
| Interface       | The outgoing router interface to use when forwarding traffic to the next destination. For reject routes, the next hop interface would be Null0 interface.                                                                                                                                                                                                                                                                      |
| T               | A flag appended to a route to indicate that it is an ECMP route, but only one of its next hops has been installed in the forwarding table. The forwarding table may limit the number of ECMP routes or the number of ECMP groups. When an ECMP route cannot be installed because such a limit is reached, the route is installed with a single next hop. Such truncated routes are identified by a T after the interface name. |

To administratively control the traffic destined to a particular network and prevent it from being forwarded through the router, you can configure a static reject route on the router. Such traffic would be discarded and the ICMP destination unreachable message is sent back to the source. This is typically used for preventing routing loops. The reject route added in the RTO is of the type `OSPF Inter-Area`. Reject routes (routes of REJECT type installed by any protocol) are not redistributed by OSPF/RIP. Reject routes are supported in both OSPFv2 and OSPFv3.

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip route
```

```
Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
 B - BGP Derived, IA - OSPF Inter Area
 E1 - OSPF External Type 1, E2 - OSPF External Type 2
 N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
 L-Leaked Route K - Kernel P - Net Prototype
```

```
Default gateway is 1.1.1.2
```

```
C 1.1.1.0/24 [0/1] directly connected, 0/11
C 2.2.2.0/24 [0/1] directly connected, 0/1
C 5.5.5.0/24 [0/1] directly connected, 0/5
S 7.0.0.0/8 [1/0] directly connected, Null0
OIA 10.10.10.0/24 [110/6] via 5.5.5.2, 00h:00m:01s, 0/5
C 11.11.11.0/24 [0/1] directly connected, 0/11
S 12.0.0.0/8 [5/0] directly connected, Null0
S 23.0.0.0/8 [3/0] directly connected, Null0
C 1.1.1.0/24 [0/1] directly connected, 0/11
C 2.2.2.0/24 [0/1] directly connected, 0/1
C 5.5.5.0/24 [0/1] directly connected, 0/5
C 11.11.11.0/24 [0/1] directly connected, 0/11
S 10.3.2.0/24 [1/0] via 1.1.1.2, 0/11
```

**Example:** The following shows example CLI display output for the command to indicate a truncated route.

```
(router) #show ip route
```

```
Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
 B - BGP Derived, IA - OSPF Inter Area
 E1 - OSPF External Type 1, E2 - OSPF External Type 2
 N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
 L-Leaked Route K - Kernel P - Net Prototype
```

```
O E1 100.1.161.0/24 [110/10] via 172.20.11.100, 00h:00m:13s, 2/11 T
O E1 100.1.162.0/24 [110/10] via 172.20.11.100, 00h:00m:13s, 2/11 T
O E1 100.1.163.0/24 [110/10] via 172.20.11.100, 00h:00m:13s, 2/11 T
```

## 5.2.28 show ip route ecmp-groups

This command reports all current ECMP groups in the IPv4 routing table. An ECMP group is a set of two or more next hops used in one or more routes. The groups are numbered arbitrarily from 1 to n. The output indicates the number of next hops in the group and the number of routes that use the set of next hops. The output lists the IPv4 address and outgoing interface of each next hop in each group.

**Format** show ip route ecmp-groups  
**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(router) #show ip route ecmp-groups

ECMP Group 1 with 2 next hops (used by 1 route)
 172.20.33.100 on interface 2/33
 172.20.34.100 on interface 2/34

ECMP Group 2 with 3 next hops (used by 1 route)
 172.20.32.100 on interface 2/32
 172.20.33.100 on interface 2/33
 172.20.34.100 on interface 2/34

ECMP Group 3 with 4 next hops (used by 1 route)
 172.20.31.100 on interface 2/31
 172.20.32.100 on interface 2/32
 172.20.33.100 on interface 2/33
 172.20.34.100 on interface 2/34
```

## 5.2.29 show ip route hw-failure

Use this command to display the routes that failed to be added to the hardware due to hash errors or a table full condition.

**Format** show ip route hw-failure  
**Mode** Privileged EXEC

**Example:** The following example displays the command output.

```
(Routing) (Config)#ip route net-prototype 66.6.6.0/24 9.0.0.2 4

(Routing) #show ip route connected

Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
 B - BGP Derived, IA - OSPF Inter Area
 E1 - OSPF External Type 1, E2 - OSPF External Type 2
 N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
 S U - Unnumbered Peer, L - Leaked Route, K - Kernel
 P - Net Prototype

C 9.0.0.0/24 [0/0] directly connected, 0/1
C 8.0.0.0/24 [0/0] directly connected, 0/2

(Routing) #show ip route hw-failure

Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
 B - BGP Derived, IA - OSPF Inter Area
 E1 - OSPF External Type 1, E2 - OSPF External Type 2
 N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
 S U - Unnumbered Peer, L - Leaked Route, K - Kernel
 P - Net Prototype

P 66.6.6.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1 hw-failure
P 66.6.7.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1 hw-failure
P 66.6.8.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1 hw-failure
P 66.6.9.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1 hw-failure
```

### 5.2.30 show ip route net-prototype

This command displays the net-prototype routes. The net-prototype routes are displayed with a P.

**Format** show ip route net-prototype

**Modes** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing)#show ip route net-prototype
```

```
Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
 B - BGP Derived, IA - OSPF Inter Area
 E1 - OSPF External Type 1, E2 - OSPF External Type 2
 N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
 S U - Unnumbered Peer, L - Leaked Route, K - Kernel
 P - Net Prototype
```

```
P 56.6.6.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1
P 56.6.7.0/24 [1/1] via 9.0.0.2, 01d:22h:15m, 0/1
```

### 5.2.31 show ip route static bfd

This command displays information about the IPv4 static BFD configured parameters configured with the `ip route static bfd` command.

**Format** show ip route static bfd

**Modes** Privileged EXEC

**Example:** The following shows example command output.

```
(localhost)#show ip route static bfd
```

```
S 1.1.1.2 via 0/28 Up
```

### 5.2.32 show ip route summary

This command displays a summary of the state of the routing table. Use the optional `vrf` argument to filter and display the route summary belonging to the virtual router. In the absence of the `vrf-name` argument, the default router's route summary is displayed.

When the optional `all` keyword is given, some statistics, such as the number of routes from each source, include counts for alternate routes. An alternate route is a route that is not the most preferred route to its destination and therefore is not installed in the forwarding table. To include only the number of best routes, do not use the optional keyword.

**Format** show ip route [`vrf vrf-name`] summary [`all`]

**Modes**

- Privileged EXEC
- User EXEC

| Parameter              | Description                                                        |
|------------------------|--------------------------------------------------------------------|
| Connected Routes       | The total number of connected routes in the routing table.         |
| Static Routes          | Total number of static routes in the routing table.                |
| RIP Routes             | Total number of routes installed by RIP protocol.                  |
| OSPF Routes            | Total number of routes installed by OSPF protocol.                 |
| Intra Area Routes      | Total number of Intra Area routes installed by OSPF protocol.      |
| Inter Area Routes      | Total number of Inter Area routes installed by OSPF protocol.      |
| External Type-1 Routes | Total number of External Type-1 routes installed by OSPF protocol. |

| Parameter                  | Description                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| External Type-2 Routes     | Total number of External Type-2 routes installed by OSPF protocol.                                                                                                                                                                                                                                                                                               |
| Reject Routes              | Total number of reject routes installed by all protocols.                                                                                                                                                                                                                                                                                                        |
| Net Prototype Routes       | The number of net-prototype routes.                                                                                                                                                                                                                                                                                                                              |
| Total Routes               | Total number of routes in the routing table.                                                                                                                                                                                                                                                                                                                     |
| Best Routes (High)         | The number of best routes currently in the routing table. This number only counts the best route to each destination. The value in parentheses indicates the highest count of unique best routes since counters were last cleared.                                                                                                                               |
| Alternate Routes           | The number of alternate routes currently in the routing table. An alternate route is a route that was not selected as the best route to its destination.                                                                                                                                                                                                         |
| Route Adds                 | The number of routes that have been added to the routing table.                                                                                                                                                                                                                                                                                                  |
| Route Modifies             | The number of routes that have been changed after they were initially added to the routing table.                                                                                                                                                                                                                                                                |
| Route Deletes              | The number of routes that have been deleted from the routing table.                                                                                                                                                                                                                                                                                              |
| Unresolved Route Adds      | The number of route adds that failed because none of the route's next hops were on a local subnet. Note that static routes can fail to be added to the routing table at startup because the routing interfaces are not yet up. This counter gets incremented in this case. The static routes are added to the routing table when the routing interfaces come up. |
| Invalid Route Adds         | The number of routes that failed to be added to the routing table because the route was invalid. A log message is written for each of these failures.                                                                                                                                                                                                            |
| Failed Route Adds          | The number of routes that failed to be added to the routing table because of a resource limitation in the routing table.                                                                                                                                                                                                                                         |
| Hardware Failed Route Adds | The number of routes failed be inserted into the hardware due to hash error or a table full condition.                                                                                                                                                                                                                                                           |
| Reserved Locals            | The number of routing table entries reserved for a local subnet on a routing interface that is down. Space for local routes is always reserved so that local routes can be installed when a routing interface bounces.                                                                                                                                           |
| Unique Next Hops (High)    | The number of distinct next hops used among all routes currently in the routing table. These include local interfaces for local routes and neighbors for indirect routes. The value in parentheses indicates the highest count of unique next hops since counters were last cleared.                                                                             |
| Next Hop Groups (High)     | The current number of next hop groups in use by one or more routes. Each next hop group includes one or more next hops. The value in parentheses indicates the highest count of next hop groups since counters were last cleared.                                                                                                                                |
| ECMP Groups (High)         | The number of next hop groups with multiple next hops. The value in parentheses indicates the highest count of next hop groups since counters were last cleared.                                                                                                                                                                                                 |
| ECMP Groups                | The number of next hop groups with multiple next hops.                                                                                                                                                                                                                                                                                                           |
| ECMP Routes                | The number of routes with multiple next hops currently in the routing table.                                                                                                                                                                                                                                                                                     |
| Truncated ECMP Routes      | The number of ECMP routes that are currently installed in the forwarding table with just one next hop. The forwarding table may limit the number of ECMP routes or the number of ECMP groups. When an ECMP route cannot be installed because such a limit is reached, the route is installed with a single next hop.                                             |
| ECMP Retries               | The number of ECMP routes that have been installed in the forwarding table after initially being installed with a single next hop.                                                                                                                                                                                                                               |
| Routes with n Next Hops    | The current number of routes with each number of next hops.                                                                                                                                                                                                                                                                                                      |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip route summary
Connected Routes..... 7
Static Routes..... 1
RIP Routes..... 20
OSPF Routes..... 1004
 Intra Area Routes..... 4
 Inter Area Routes..... 1000
External Type-1 Routes..... 0
```

```

 External Type-2 Routes..... 0
 Reject Routes..... 0
 Net Prototype Routes..... 10004
 Total routes..... 1032

 Best Routes (High)..... 1032 (1032)
 Alternate Routes..... 0
 Route Adds..... 1010
 Route Modifies..... 1
 Route Deletes..... 10
 Unresolved Route Adds..... 0
 Invalid Route Adds..... 0
 Failed Route Adds..... 0
 Hardware Failed Route Adds..... 4
 Reserved Locals..... 0

 Unique Next Hops (High)..... 13 (13)
 Next Hop Groups (High)..... 13 (14)
 ECMP Groups (High)..... 2 (3)
 ECMP Routes..... 1001
 Truncated ECMP Routes..... 0
 ECMP Retries..... 0
 Routes with 1 Next Hop..... 31
 Routes with 2 Next Hops..... 1
 Routes with 4 Next Hops..... 1000

```

**Example:** The following displays an example route table summary for a virtual router instance. The example shows the route summary for the VRF VR-2. The output is divided into two sections: the first on route statistics and the second on ECMP statistics.

The route statistics display the total number of routes in the VRF. The splits for routes from individual route protocols are also displayed. There are statistics for the number of successful and route operations for debugging purposes.

The section on ECMP lists the total number of unique next hops or valid routing interfaces of the VRF to which routes point. The `Next Hop Groups` counter lists the total set of all route groups that contain both single and ECMP next hops. The `ECMP Groups` counter only counts the number of next hop groups that contain an ECMP next hop. The ECMP routes (that point to the ECMP next hop groups) are restricted to the maximum that are supported in the hardware. If ECMP routes exceed the hardware supported number, they are considered `Truncated ECMP Routes` that are shown in a counter.

```
(Routing) #show ip route vrf VR_2 summary
```

```

 Connected Routes..... 8
 Static Routes..... 62
 Unnumbered Peer Routes..... 0
 RIP Routes..... 0
 OSPF Routes..... 411
 Intra Area Routes..... 7
 Inter Area Routes..... 404
 External Type-1 Routes..... 0
 External Type-2 Routes..... 0
 Reject Routes..... 61
 Total routes..... 481

 Best Routes (High)..... 481 (481)
 Alternate Routes..... 0
 Leaked Routes..... 1
 Route Adds..... 481
 Route Modifies..... 222
 Route Deletes..... 0
 Unresolved Route Adds..... 4
 Invalid Route Adds..... 0
 Failed Route Adds..... 0
 Reserved Locals..... 0

 Unique Next Hops (High)..... 69 (69)

```

|                              |           |
|------------------------------|-----------|
| Next Hop Groups (High).....  | 279 (279) |
| ECMP Groups (High).....      | 260 (260) |
| ECMP Routes.....             | 256       |
| Truncated ECMP Routes.....   | 4         |
| ECMP Retries.....            | 0         |
| Routes with 0 Next Hops..... | 61        |
| Routes with 1 Next Hop.....  | 160       |
| Routes with 2 Next Hops..... | 260       |

### 5.2.33 clear ip route counters

The command resets to zero the IPv4 routing table counters reported in the [show ip route summary](#) command for the default router. The command only resets event counters. Counters that report the current state of the routing table, such as the number of routes of each type, are not reset.

**Format** clear ip route counters

**Mode** Privileged EXEC

### 5.2.34 show ip route preferences

This command displays detailed information about the route preferences for each type of route. Route preferences are used in determining the best route. Lower router preference values are preferred over higher router preference values. A route with a preference of 255 cannot be used to forward traffic.

**Format** show ip route preferences

**Modes**

- Privileged EXEC
- User EXEC

| Parameter                  | Description                                                                     |
|----------------------------|---------------------------------------------------------------------------------|
| Local                      | The local route preference value.                                               |
| Static                     | The static route preference value.                                              |
| OSPF Intra                 | The OSPF Intra route preference value.                                          |
| OSPF Inter                 | The OSPF Inter route preference value.                                          |
| OSPF External              | The OSPF External route preference value.                                       |
| RIP                        | The RIP route preference value.                                                 |
| Configured Default Gateway | The route preference value of the statically-configured default gateway         |
| DHCP Default Gateway       | The route preference value of the default gateway learned from the DHCP server. |

**Example:** The following shows example CLI display output for the command.

```
(alpha-stack) #show ip route preferences
```

```
Local..... 0
Static..... 1
OSPF Intra..... 110
OSPF Inter..... 110
OSPF External..... 110
RIP..... 120
Configured Default Gateway..... 253
DHCP Default Gateway..... 254
```



### 5.2.35 show ip stats

This command displays IP statistical information system-wide.

- Format**            `show ip stats`
- Modes**            • Privileged EXEC
- User EXEC

### 5.2.36 show routing heap summary

This command displays a summary of the memory allocation from the routing heap. The routing heap is a chunk of memory set aside when the system boots for use by the routing applications.

- Format**            `show routing heap summary`
- Mode**              Privileged EXEC

| Parameter                | Description                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heap Size                | The amount of memory, in bytes, allocated at startup for the routing heap.                                                                           |
| Memory In Use            | The number of bytes currently allocated.                                                                                                             |
| Memory on Free List      | The number of bytes currently on the free list. When a chunk of memory from the routing heap is freed, it is placed on a free list for future reuse. |
| Memory Available in Heap | The number of bytes in the original heap that have never been allocated.                                                                             |
| In Use High Water Mark   | The maximum memory in use since the system last rebooted.                                                                                            |

**Example:** The following shows example CLI display output for the command.

```
(Router) #show routing heap summary

Heap Size..... 95053184
Memory In Use..... 56998
Memory on Free List..... 47
Memory Available in Heap..... 94996170
In Use High Water Mark..... 57045
```

## 5.3 Policy-Based Routing Commands

Use the commands in this section to configure and view policy-based routing for IPv4.

For the commands to configure and view IPv6 policy-based routing, see [Section 5.4: "IPv6 Policy-Based Routing Commands"](#)

### 5.3.1 ip policy route-map

Use this command to identify a route map to use for policy-based routing on an interface specified by route-map-name. Policy-based routing is configured on the interface that receives the packets, not on the interface from which the packets are sent.

When a route-map applied on the interface is changed, that is, if new statements are added to the route-map or match/set terms are added to or removed from the route-map statement, and also if the route-map that is applied on an interface is removed, the route-map needs to be removed from the interface and added back again for the changed route-map configuration to take effect.

A route-map statement should contain eligible match/set conditions for policy-based routing to be applied to hardware.

- Valid match conditions: `match ip address acl`, `match mac-list`, `match length`
- Valid set conditions: `set ip next-hop`, `set ip default next-hop`, `set ip precedence`

A route-map statement should contain at least one match condition and one set condition as specified above for it to be eligible to be applied to hardware. If not, the route-map is not applied to hardware.

When a route-map is applied on a VLAN interface and a DiffServ policy is applied on a member port of the same VLAN interface, the port policy takes priority over the VLAN policy.

---

Route-map and DiffServ cannot work on the same interface.

---

## NOTICE

**Format**            `ip policy route-map-name`

**Mode**             Interface Config

**Example:** The following is an example of this command.

```
(Routing) (Config)#interface 1/0/1
(Routing) (Interface 1/0/1)#
(Broadcom FASTPATH Switching) (Interface 1/0/1)# #ip policy route-map equal-access
```

To disable policy based routing from an interface, use the `no` form of this command

**no ip policy route-map route-map-name**

When a route-map has both IPv4 and IPv6 statements provisioned and the user applies the route-map using IP policy command, the IPv6 statements in the route-map will not take effect. A message will be displayed to the user to indicate this.

**Example:** The following shows an example of the command.

```
(Routing) (Interface vlan 40)#ip policy route-map rm4
```

IPv6 statements in this route-map will not be applied using IPv4 Policy Based Routing.

## 5.3.2 route-map

To create a route map and enter Route Map Configuration mode, use the `route-map` command in Global Configuration mode. One use of a route map is to limit the redistribution of routes to a specified range of route prefixes. The redistribution command specifies a route map which refers to a prefix list. The prefix list identifies the prefixes that may be redistributed. FASTPATH accepts up to 64 route maps.

**Default**            No route maps are configured by default. If no permit or deny tag is given, permit is the default.

**Format**            `route-map map-tag [permit|deny] [sequence-number]`

**Mode**             Global Configuration

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| map-tag         | Text name of the route map. Route maps with the same name are grouped together in order of their sequence numbers. A route map name may be up to 32 characters long.                                                                                                                                                                             |
| permit          | (Optional) Permit routes that match all of the match conditions in the route map.                                                                                                                                                                                                                                                                |
| deny            | (Optional) Deny routes that match all of the match conditions in the route map.                                                                                                                                                                                                                                                                  |
| sequence-number | (Optional) An integer used to order the set of route maps with the same name. Route maps are ordered from lowest to greatest sequence number, with lower sequence numbers being considered first. If no sequence number is specified, the system assigns a value ten greater than the last statement in the route map. The range is 0 to 65,535. |

### 5.3.2.1 no route-map

To delete a route map or one of its statements, use the `no` form of this command.

**Format**            `no route-map map-tag [permit|deny] [sequence-number]`

**Mode**             Global Configuration

### 5.3.3 match ip address <access-list-number | access-list-name>

Use this command to configure a route map to match based on the match criteria configured in an IP access-list. Note that an IP ACL must be configured before it is linked to a route-map. Actions present in an IP ACL configuration are applied with other actions involved in route-map. If an IP ACL referenced by a route-map is removed or rules are added or deleted from that ACL, the configuration is rejected.

If there are a list of IP access-lists specified in this command and the packet matches at least one of these access-list match criteria, the corresponding set of actions in route-map are applied to packet.

If there are duplicate IP access-list numbers/names in this command, the duplicate configuration is ignored.

**Default** No match criteria are defined by default.

**Format** match ip address access-list-number | access-list-name [...access-list-number | name]

**Mode** Route Map Configuration

| Parameter          | Description                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access-list-number | The access-list number that identifies an access-list configured through access-list CLI configuration commands. This number is 1 to 99 for standard access list number. This number is 100 to 199 for extended access list number. |
| Access-list-name   | The access-list name that identifies named IP ACLs. Access-list name can be up to 31 characters in length. A maximum of 16 ACLs can be specified in this 'match' clause.                                                            |

**Example:** The following sequence shows creating a route-map with “match” clause on ACL number and applying that route-map on an interface.

```
(Routing) (config)#access-list 1 permit ip 10.1.0.0 0.0.255.255
(Routing) (config)#access-list 2 permit ip 10.2.0.0 0.0.255.255
(Routing) (config)#route-map equal-access permit 10
(Routing) (config-route-map)#match ip address 1
(Routing) (config-route-map)#set ip default next-hop 192.168.6.6
(Routing) (config-route-map)#route-map equal-access permit 20
(Routing) (config-route-map)#match ip address 2
(Routing) (config-route-map)#set ip default next-hop 172.16.7.7
(Routing) (config)#interface 1/0/1
(Routing) (Interface 1/0/1)#ip address 10.1.1.1 255.255.255.0
(Routing) (Interface 1/0/1)#ip policy route-map equal-access
(Routing) (config)#interface 1/0/2
(Routing) (Interface 1/0/2)#ip address 192.168.6.5 255.255.255.0
(Routing) (config)#interface 1/0/3
(Routing) (Interface 1/0/3)#ip address 172.16.7.6 255.255.255.0
```

The ip policy route-map equal-access command is applied to interface 1/0/1. All packets coming inside 1/0/1 are policy-routed.

Sequence number 10 in route map equal-access is used to match all packets sourced from any host in subnet 10.1.0.0. If there is a match, and if the router has no explicit route for the packet's destination, it is sent to next-hop address 192.168.6.6 .

Sequence number 20 in route map equal-access is used to match all packets sourced from any host in subnet 10.2.0.0. If there is a match, and if the router has no explicit route for the packet's destination, it is sent to next-hop address 172.16.7.7.

Rest all packets are forwarded as per normal L3 destination-based routing.

**Example:** This example illustrates the scenario where IP ACL referenced by a route-map is removed or rules are added or deleted from that ACL, this is how configuration is rejected:

```
(Routing) #show ip access-lists
```

ACL Counters: Enabled

Current number of ACLs: 9 Maximum number of ACLs: 100

```
ACL ID/Name Rules Direction Interfaces VLANs

1 1
```

```

2 1
3 1
4 1
5 1
madan 1

```

Broadcom FASTPATH Routing) #show mac access-lists

ACL Counters: Enabled

Current number of all ACLs: 9 Maximum number of all ACLs: 100

| MAC ACL Name | Rules | Direction | Interfaces | VLANs |
|--------------|-------|-----------|------------|-------|
| madan        | 1     |           |            |       |
| mohan        | 1     |           |            |       |
| goud         | 1     |           |            |       |

(Routing) #

(Routing) #

(Routing) #configure

(Routing) (Config)#route-map madan

(Routing) (route-map)#match ip address 1 2 3 4 5 madan

(Routing) (route-map)#match mac-list madan mohan goud

(Routing) (route-map)#exit

(Routing) (Config)#exit

(Routing) #show route-map

route-map madan permit 10

Match clauses:

ip address (access-lists) : 1 2 3 4 5 madan

mac-list (access-lists) : madan mohan goud

Set clauses:

(Routing) (Config)#access-list 2 permit every

Request denied. Another application using this ACL restricts the number of rules allowed.

(Routing) (Config)#ip access-list madan

(Routing) (Config-ipv4-acl)#permit udp any any

Request denied. Another application using this ACL restricts the number of rules allowed.

### 5.3.3.1 no match ip address

To delete a match statement from a route map, use the `no` form of this command.

**Format** no match ip address [*access-list-number* | *access-list-name*]

**Mode** Route Map Configuration

### 5.3.4 match length

Use this command to configure a route map to match based on the Layer 3 packet length between specified minimum and maximum values. `min` specifies the packet's minimum Layer 3 length, inclusive, allowed for a match. `max` specifies the packet's maximum Layer 3 length, inclusive, allowed for a match. Each route-map statement can contain one 'match' statement on packet length range.

**Default** No match criteria are defined by default.

**Format** match length *min max*

**Mode** Route Map Configuration

**Example:** The following shows an example of the command.

```
(Routing) (config-route-map)# match length 64 1500
```

### 5.3.4.1 no match length

Use this command to delete a match statement from a route map.

**Format**           no match length  
**Mode**             Route Map Configuration

### 5.3.5 match mac-list

Use this command to configure a route map to match based on the match criteria configured in an MAC access-list.

A MAC ACL is configured before it is linked to a route-map. Actions present in MAC ACL configuration are applied with other actions involved in route-map. When a MAC ACL referenced by a route-map is removed, the route-map rule is also removed and the corresponding rule is not effective. When a MAC ACL referenced by a route-map is removed or rules are added or deleted from that ACL, the configuration is rejected.

**Default**           No match criteria are defined by default.  
**Format**           match mac-list *mac-list-name* [*mac-list-name*]  
**Mode**             Route Map Configuration

| Parameter     | Description                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------|
| mac-list-name | The mac-list name that identifies MAC ACLs. MAC Access-list name can be up to 31 characters in length. |

**Example:** The following is an example of the command.

```
(Routing) (config-route-map)# match mac-list MacList1
```

Example 2:

This example illustrates the scenario where MAC ACL referenced by a route-map is removed or rules are added or deleted from that ACL, this is how configuration is rejected:

```
Broadcom FASTPATH Routing) #show mac access-lists
```

```
ACL Counters: Enabled
Current number of all ACLs: 9 Maximum number of all ACLs: 100
```

| MAC ACL Name | Rules | Direction | Interfaces | VLANs |
|--------------|-------|-----------|------------|-------|
| -----        | ----- | -----     | -----      | ----- |
| madan        | 1     |           |            |       |
| mohan        | 1     |           |            |       |
| goud         | 1     |           |            |       |

```
(Routing) #
(Routing) #
(Routing) #configure
```

```
(Routing) (Config)#route-map madan
```

```
(Routing) (route-map)#match mac-list madan mohan goud
```

```
(Routing) (route-map)#exit
```

```
(Routing) (Config)#exit
```

```
(Routing) #show route-map
```

```
route-map madan permit 10
 Match clauses:
 mac-list (access-lists) : madan mohan goud
 Set clauses:
```

```
(Routing) (Config)#mac access-list extended madan
```

```
(Routing) (Config-mac-access-list)#permit 00:00:00:00:00:01 ff:ff:ff:ff:ff:ff any
```

Request denied. Another application using this ACL restricts the number of rules allowed.

### 5.3.5.1 no match mac-list

To delete a match statement from a route map, use the `no` form of this command.

**Format**            `no match mac-list [mac-List-name]`

**Mode**             Route Map Configuration

### 5.3.6 match metric

This route-map match term matches on the route metric attribute if used by OSPF

**Format**            `match metric value`

**Mode**             Route Map Configuration

| Parameter | Description                                                  |
|-----------|--------------------------------------------------------------|
| value     | A metric value, from 0 to 4,294,267,295 (any 32bit integer). |

#### 5.3.6.1 no match metric

Use the `no` form of this command to disable on the route map match metric.

**Format**            `no match metric value`

**Mode**             Route Map Configuration

### 5.3.7 match metric-type

This route-map match term matches on the external LSA metric-type (type1 or type2) in OSPF.

**Format**            `match metric-type value`

**Mode**             Route Map Configuration

| Parameter | Description                               |
|-----------|-------------------------------------------|
| value     | External LSA Metric type (type1 or type2) |

#### 5.3.7.1 no match metric type

Use the `no` form of this command to disable matching on the external LSA metric-type (type1 or type2) in OSPF.

**Format**            `no match metric type value`

**Mode**             Route Map Configuration

### 5.3.8 match tag

This route-map match term matches the route tag value on the external LSA route in OSPF.

**Format**            `match tag value`  
**Mode**             Route Map Configuration

| Parameter | Description                                              |
|-----------|----------------------------------------------------------|
| value     | A tag value, from 0 to 4,294,267,295 (any 32bit integer) |

#### 5.3.8.1 no match tag

Use the *no* form of this command to disable matching the route tag on the external LSA route in OSPF.

**Format**            `no match tag value`  
**Mode**             Route Map Configuration

### 5.3.9 set interface

If network administrator does not want to revert to normal forwarding but instead want to drop a packet that does not match the specified criteria, a set statement needs to be configured to route the packets to interface null 0 as the last entry in the route-map. `set interface null0` needs to be configured in a separate statement. It should not be added along with any other statement having other match/set terms.

A route-map statement that is used for PBR is configured as permit or deny. If the statement is marked as deny, traditional destination-based routing is performed on the packet meeting the match criteria. If the statement is marked as permit, and if the packet meets all the match criteria, then set commands in the route-map statement are applied. If no match is found in the route-map, the packet is not dropped, instead the packet is forwarded using the routing decision taken by performing destination-based routing.

**Format**            `set interface null0`  
**Mode**             Route Map Configuration

### 5.3.10 set ip next-hop

Use this command to specify the adjacent next-hop router in the path toward the destination to which the packets should be forwarded. If more than one IP address is specified, the first IP address associated with a currently up-connected interface is used to route the packets.

This command affects all incoming packet types and is always used if configured. If configured next-hop is not present in the routing table, an ARP request is sent from the router.

In a route-map statement, 'set ip next-hop' and 'set ip default next-hop' terms are mutually exclusive. However, a 'set ip default next-hop' can be configured in a separate route-map statement.

**Format**            `set ip next-hop ip-address [...ip-address]`  
**Mode**             Route Map Configuration

| Parameter  | Description                                                                                                                                                                            |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ip-address | The IP address of the next hop to which packets are output. It must be the address of an adjacent router. A maximum of 16 next-hop IP addresses can be specified in this 'set' clause. |

### 5.3.10.1 no set ip next-hop

Use this command to remove a set command from a route map.

**Format**            `no set ip next-hop ip-address [...ip-address]`

**Mode**             Route Map Configuration

### 5.3.11 set ip default next-hop

Use this command to set a list of default next-hop IP addresses. If more than one IP address is specified, the first next hop specified that appears to be adjacent to the router is used. The optional specified IP addresses are tried in turn.

A packet is routed to the next hop specified by this command only if there is no explicit route for the packet's destination address in the routing table. A default route in the routing table is not considered an explicit route for an unknown destination address.

In a route-map statement, 'set ip next-hop' and 'set ip default next-hop' terms are mutually exclusive. However, a 'set ip next-hop' can be configured in a separate route-map statement

**Format**            `set ip default next-hop ip-address [...ip-address]`

**Mode**             Route Map Configuration

| Parameter  | Description                                                                                                                                                                            |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ip-address | The IP address of the next hop to which packets are output. It must be the address of an adjacent router. A maximum of 16 next-hop IP addresses can be specified in this 'set' clause. |

### 5.3.11.1 no set ip default next-hop

Use this command to remove a set command from a route map.

**Format**            `no set ip default next-hop ip-address [...ip-address]`

**Mode**             Route Map Configuration

### 5.3.12 set ip precedence

Use this command to set the three IP precedence bits in the IP packet header. With three bits, you have eight possible values for the IP precedence; values 0 through 7 are defined. This command is used when implementing QoS and can be used by other QoS services, such as weighted fair queuing (WFQ) and weighted random early detection (WRED).

**Format**            `set ip precedence 0-7`

**Mode**             Route Map Configuration

| Parameter | Description                              |
|-----------|------------------------------------------|
| 0         | Sets the routine precedence              |
| 1         | Sets the priority precedence             |
| 2         | Sets the immediate precedence            |
| 3         | Sets the Flash precedence                |
| 4         | Sets the Flash override precedence       |
| 5         | Sets the critical precedence             |
| 6         | Sets the internetwork control precedence |
| 7         | Sets the network control precedence      |



### 5.3.13 no set ip precedence

Use this command to reset the three IP precedence bits in the IP packet header to the default.

**Format**            no set ip precedence

**Mode**             Route Map Configuration

### 5.3.14 set tag

Use this command to set the external route tag value carried in the External LSA in OSPF. The tag value carried in the External LSA is used by the OSPF routers receiving them in filtering the routes before adding them to the route table.

**Format**            set tag value

**Mode**             Route Map Configuration

| Parameter | Description                                              |
|-----------|----------------------------------------------------------|
| value     | A tag value, from 0 to 4,294,267,295 (any 32bit integer) |

#### 5.3.14.1 no set tag

Use the no form of this command to remove a set tag command from the route map.

**Format**            no set tag

**Mode**             Route Map Configuration

### 5.3.15 show ip policy

This command lists the route map associated with each interface.

**Format**            show ip policy

**Mode**             Privileged EXEC

| Parameter | Description   |
|-----------|---------------|
| Interface | The interface |
| Route-map | The route map |

### 5.3.16 show route-map

To display a route map, use the show route-map command in Privileged EXEC mode.

**Format**            show route-map [map-name]

**Mode**             Privileged EXEC

| Parameter | Description                              |
|-----------|------------------------------------------|
| map-name  | (Optional) Name of a specific route map. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) # show route-map test
route-map test, permit, sequence 10
 Match clauses:
 ip address prefix-lists: orange
 Set clauses:
```

```
set metric 50
```

**Example:** The following example shows a route map, *test1*, that is configured with extended community attributes.

```
(R1) # show route-map test
route-map test1, permit, sequence 10
 Match clauses:
 extended community list1
 Set clauses:
 extended community RT:1:100 RT:2:200
```

**Example:** With the inclusion of policy-based routing, more *match* and *set* clauses are added. For each sequence number, match count is shown in terms of the number of packets and number of bytes. This counter displays match count in packets and bytes when the route-map is applied. When a route-map is created/removed from interface, this count is shown to be zero. The following example shows the behavior of counters along with how they are displayed when a route-map is applied and removed from an interface.

```
(Routing) #show route-map simplest

route-map simplest permit 10
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip next-hop 3.3.3.3
 ip precedence 3
Policy routing matches: 0 packets, 0 bytes
route-map simplest permit 20
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip default next-hop 4.4.4.4
 ip precedence 4
Policy routing matches: 0 packets, 0 bytes
route-map simplest permit 30
 Match clauses:
 Set clauses:
 interface null0
Policy routing matches: 0 packets, 0 bytes

(Routing) #
(Routing) #configure

(Routing) (Config)#interface 0/2

(Routing) (Interface 0/2)#ip policy simplest

(Routing) (Interface 0/2)#show route-map simplest

route-map simplest permit 10
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip next-hop 3.3.3.3
 ip precedence 3
Policy routing matches: 5387983 packets, 344831232 bytes
route-map simplest permit 20
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip default next-hop 4.4.4.4
 ip precedence 4
Policy routing matches: 0 packets, 0 bytes
route-map simplest permit 30
 Match clauses:
 Set clauses:
 interface null0
```

```

Policy routing matches: 0 packets, 0 bytes
(Routing) (Interface 0/2)#
(Routing) (Interface 0/2)#no ip policy simplest

(Routing) (Interface 0/2)#exit

(Routing) (Config)#exit

(Routing) #show route-map simplest

route-map simplest permit 10
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip next-hop 3.3.3.3
 ip precedence 3
Policy routing matches: 0 packets, 0 bytes
route-map simplest permit 20
 Match clauses:
 ip address (access-lists) : 1
 Set clauses:
 ip default next-hop 4.4.4.4
 ip precedence 4
Policy routing matches: 0 packets, 0 bytes
route-map simplest permit 30
 Match clauses:
 Set clauses:
 interface null0
Policy routing matches: 0 packets, 0 bytes

```

**Example:** The following output shows an example of the command when the specified route map is IPv6-based.

```

(dhcp-10-130-84-138)#show route-map

route-map rm6 permit 10
 Match clauses:
 ipv6 address (access-lists) : acl6
 Set clauses:
 ipv6 next-hop 3001::2 2001::2 5001::2 6001::2
 ipv6 next-hop interface fe80::200:6bff:fee4:35a, via 3/3
Policy routing matches: 0 packets, 0 bytes

route-map rmdef permit 10
 Match clauses:
 ipv6 address (access-lists) : acl6
 Set clauses:
 ipv6 default next-hop 1001::2
 ipv6 default next-hop interface fe80::200:6bff:fee4:35a, via 3/3
Policy routing matches: 0 packets, 0 bytes

```

### 5.3.17 clear ip prefix-list

To reset IP prefix-list counters, use the `clear ip prefix-list` command in Privileged EXEC mode. This command is used to clear prefix-list hit counters. The hit count is a value indicating the number of matches to a specific prefix list entry.

**Format**            `clear ip prefix-list [[prefix-list-name] [network/length]]`

**Mode**             Privileged EXEC

| Parameter        | Description                                                                                                                                                |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| prefix-list-name | (Optional) Name of the prefix list from which the hit count is to be cleared.                                                                              |
| network/length   | (Optional) Network number and length (in bits) of the network mask. If this option is specified, hit counters are only cleared for the matching statement. |

**Example:** The following shows an example of the command.

```
(Routing) # clear ip prefix-list orange 20.0.0.0/8
```

## 5.4 IPv6 Policy-Based Routing Commands

The following commands in [Section 5.3: "TPolicy-Based Routing Commands"](#) section for IPv4 traffic can also be used with IPv6 traffic.

- [Section 5.3.4: "match length"](#)
- [Section 5.3.5: "match mac-list"](#)
- [Section 5.3.9: "set interface"](#)

### 5.4.1 ipv6 policy

Use this command to identify a route map to use for policy-based IPv6 routing on an interface.

|

**Format**            ipv6 policy route-map *route-map-name*

**Mode**             Interface Config

| Parameter      | Description                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| route-map-name | The name of the route map to use for policy routing. It must match a map tag specified by a route-map command. If user tries to apply a route-map name that is not configured/created yet, an error is shown to user. |

#### Usage Guidelines:

A route-map statement should contain eligible match/set conditions for policy-based routing to be applied to hardware.

- Valid match conditions: `match ipv6 address acl`, `match mac-list`, `match length`
- Valid set conditions: `set ipv6 next-hop`, `set ipv6 default next-hop`, `set ipv6 precedence`

A route-map statement should contain at least one match condition and one set condition as specified above for it to be eligible to be applied to hardware. If not, the route-map is not applied to hardware.

---

Route-map and DiffServ cannot work on the same interface.

#### NOTICE

When a route-map is applied on a VLAN interface and a DiffServ policy is applied on a member port of the same VLAN interface, the port policy has priority over the VLAN policy.

The same route-map cannot be applied using both `ip policy` and `ipv6 policy` commands on an interface.

**Example:** The following shows an example of the command.

```
(Routing) (Interface vlan 40)#show ip policy
```

```
Interface Route-Map

3/4 rm6
```

```
(Routing) (Interface vlan 40)#ipv6 policy route-map rm6
```

```
Route-map is already in use for IPv6 based policy routing
```

When a route-map has both IPv4 and IPv6 statements provisioned and the user applies the route-map using the `ipv6 policy` command, then the IPv4 statements in the route-map will not take effect. A message will be displayed to the user to indicate this.

**Example:** The following shows an example of the command.

```
(Routing) (Interface vlan 40)#ipv6 policy route-map rm4
```

IPv4 statements in this route-map will not be applied using IPv6 Policy Based Routing

### 5.4.1.1 no ipv6 policy

Use this command to disable policy based routing from an interface.

**Format**            `no ipv6 policy route-map route-map-name`

**Mode**             Interface Config

### 5.4.2 ipv6 prefix-list

Use this command to create IPv6 prefix lists. An IPv6 prefix list can contain only IPv6 addresses. Prefix lists allow matching of route prefixes with those specified in the prefix list. Each prefix list includes a sequence of prefix list entries ordered by their sequence numbers. A router sequentially examines each prefix list entry to determine if the route's prefix matches that of the entry. For IPv6 routes, only IPv6 prefix lists are matched. An empty or nonexistent prefix list permits all prefixes. An implicit deny is assumed if a given prefix does not match any entries of a prefix list. Once a match or deny occurs the router does not go through the rest of the list. An IPv6 prefix list may be used within a route map to match a route's prefix using the `match ipv6 address` command. A route map may contain both IPv4 and IPv6 prefix lists. If a route being matched is an IPv6 route, only the IPv6 prefix lists are matched.

Up to 128 prefix lists may be configured. The maximum number of statements allowed in prefix list is 64. These numbers indicate only IPv6 prefix lists. IPv4 prefix lists may be configured in appropriate numbers independently.

**Default**            No prefix lists are configured by default. When neither the `ge` nor the `le` option is configured, the destination prefix must match the network/length exactly. If the `ge` option is configured without the `le` option, any prefix with a network mask greater than or equal to the `ge` value is considered a match. Similarly, if the `le` option is configured without the `ge` option, a prefix with a network mask less than or equal to the `le` value is considered a match.

**Format**            `ipv6 prefix-list list-name [seq seq-number] { {permit/deny} ipv6-prefix/prefix-length [ge ge-value] [le le-value] | description text | renumber renumber-interval first-statement-number}`

**Mode**             Global Configuration

| Parameter                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| list-name                 | The text name of the prefix list. Up to 32 characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| seq number                | (Optional) The sequence number for this prefix list statement. Prefix list statements are ordered from lowest sequence number to highest and applied in that order. If you do not specify a sequence number, the system will automatically select a sequence number five larger than the last sequence number in the list. Two statements may not be configured with the same sequence number. The value ranges from 1 to 4,294,967,294.                                                                       |
| permit                    | Permit routes whose destination prefix matches the statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| deny                      | Deny routes whose destination prefix matches the statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ipv6-prefix/prefix-length | Specifies the match criteria for routes being compared to the prefix list statement. The <code>ipv6-prefix</code> can be any valid IPv6 prefix where the address is specified in hexadecimal using 16-bit values between colons. The <code>prefix-length</code> is the The length of the IPv6 prefix, given as a decimal value that indicates how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the decimal value. |
| ge length                 | (Optional) If this option is configured, specifies a prefix length greater than or equal to the <code>ipv6-prefix/prefix-length</code> . It is the lowest value of a range of the length.                                                                                                                                                                                                                                                                                                                      |
| le length                 | (Optional) If this option is configured, specifies a prefix length less than or equal to the <code>ipv6-prefix/prefix-length</code> . It is the highest value of a range of the length.                                                                                                                                                                                                                                                                                                                        |
| Description               | A description of the prefix list. It can be up to 80 characters in length.                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Parameter | Description                                                                                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| renumber  | (Optional) Provides the option to renumber the sequence numbers of the IPv6 prefix list statements with a given interval starting from a particular sequence number. |

**Example:** The following example configures a prefix list that allows routes with one of two specific destination prefixes, 2001::/64 and 5F00::/48.

```
(R1)(config)# ipv6 prefix-list apple seq 10 permit 2001::/64
(R1)(config)# ipv6 prefix-list apple seq 20 permit 5F00::/48
```

### 5.4.2.1 no ipv6 prefix-list

Use this command to delete either the entire prefix list or an individual statement from a prefix list.

**Format**            `ipv6 prefix-list List-name`  
**Mode**                Global Configuration

#### NOTICE

The description must be removed using the `no ip prefix-list description` before using this command to delete an IPv6 Prefix List.

### 5.4.3 match ipv6 address

Use this command to configure a route map to match based on the match criteria configured in an IPv6 access-list.

If you specify a non-configured IPv6 ACL name/number to match, the CLI displays an error message. Make sure the IPv6 ACL is configured before it is linked to a route-map. Actions present in IPv6 ACL configuration are applied with other actions involved in the route-map. When an IPv6 ACL referenced by a route-map is removed or rules are added or deleted from that ACL, configuration is rejected. Adding ACLs to or removing ACLs from a route-map that is attached to an interface is allowed.

When a list of IPv6 access-lists is specified in this command, if packet matches at least one of these access-list match criteria, then the corresponding set actions in route-map are applied to packet.

If there are duplicate IPv6 access-list numbers/names in this command, the duplicate configuration is ignored.

**Default**            No match criteria are defined by default.  
**Format**            `match ipv6 address {access-list-number | access-list-name} [...access-list-number | access-list-name]`  
**Mode**                Route Map Configuration

| Parameter          | Description                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| access-list-number | The IPv6 access-list number that identifies an access-list configured through access-list CLI configuration commands. This number is 1 to 99 for standard access list number. This number is 100 to 199 for extended access list number. |
| access-list-name   | The IPv6 access-list name that identifies the named IPv6 ACL. The <code>access-list-name</code> can be up to 31 characters in length.<br>A maximum of four ACLs can be specified in this match clause.                                   |

**Example:** Following sequence shows how to create a route-map with a match clause on an ACL number and apply that route-map on an interface.

```
(Routing) (Config)#ipv6 access-list acl2
(Routing) (Config-ipv6-acl)#permit ipv6 1001::1 any
(Routing) (Config-ipv6-acl)#exit
(Routing) (Config)#route-map rm1 permit 40
(Routing) (route-map)#match ipv6 address acl2
```

```
(Routing) (config-route-map)#set ipv6 default next-hop 2001::2
(Routing) (config)#interface 0/1
(Routing) (Interface 0/1)#ip address 10.1.1.1 255.255.255.0
(Routing) (Interface 0/1)#ipv6 policy route-map rm1
```

The `ipv6 policy route-map rm1` command is applied to interface 0/1. All packets ingressing on 0/1 are policy-routed if a match is made as per the IPv6 access-list.

Sequence number 40 in route map `rm1` is used to match all packets sourced from host 1001::1. If there is a match, and if the router has no explicit route for the packet's destination, it is sent to next-hop address 2001::2.

The rest of the packets are forwarded as per normal L3 destination-based routing.

### 5.4.3.1 no match ipv6 address

Use this command to delete a match statement from a route map.

**Format**            `no match ipv6 address [...access-list-number | access-list-name]`

**Mode**             Route Map Configuration

### 5.4.4 set ipv6 next-hop

Use this command to specify the adjacent next-hop router in the path toward the destination to which the packets should be forwarded. If more than one IPv6 address is specified, the first IPv6 address associated with a currently up connected interface is used to route the packets.

```
|
Format set ipv6 next-hop [interface slot/port | vlan link-local address] ipv6-address
 [...ipv6-address]
```

**Mode**             Route Map Configuration

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ipv6-address | The global IPv6 address of the next hop to which packets are output. It must be the address of an adjacent router.                                                                                                                                                                                                                                         |
| interface    | Use the <code>interface</code> keyword to specify an IPv6 next hop using the link local address. You can then specify the link-local address along with the interface.<br>A maximum of four next-hop global IPv6 addresses and a link-local address can be specified in this set clause. The link-local next hop is prioritized over the global next-hops. |

#### Usage Guidelines

The `set ipv6 next-hop` command affects all incoming packet types and is always used if configured. A check is made in the NDP table to see if the next hop is resolved, if so packets are forwarded to the next-hop.

In a route-map statement, `set ipv6 next-hop` and `set ipv6 default next-hop` terms are mutually exclusive. However, a `set ipv6 default next-hop` can be configured in a separate route-map statement.

**Example:** The following shows an example of the command.

```
(Routing) (route-map)#set ipv6 next-hop 3333::2
```

### 5.4.4.1 no set ipv6 next-hop

Use this command to remove a set command from a route map.

**Format**            `no set ipv6 next-hop [interface slot/port | vlan link-local address] ipv6-address [...ipv6-address]`

**Mode**             Route Map Configuration

### 5.4.5 set ipv6 default next-hop

Use this command to set a list of default next-hop IPv6 addresses. If more than one IPv6 address is specified, the first next hop specified that appears to be adjacent to the router is used. The other specified IPv6 addresses are tried in turn.

**Format**            `set ipv6 default next-hop [interface slot/port | vlan Link-Local address] ipv6-address [...ipv6-address]`

**Mode**             Route Map Configuration

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ipv6-address | The Global IPv6 address of the next hop to which packets are output. It must be the address of an adjacent router.                                                                                                                                                                                                                                                                         |
| Interface    | When the user wants to specify an IPv6 next hop using the link local address - then the interface key word needs to be used. The user can then specify the link-local address along with the interface.<br>A maximum of 4 next-hop global IPv6 addresses and a link-local address can be specified in this 'set' clause. The link-local next hop is prioritized over the global next-hops. |

### Usage Guidelines

A packet is routed to the next hop specified by the `set ipv6 default next-hop` command only if there is no explicit route for the packet's destination address in the routing table. A default route in the routing table is not considered an explicit route for an unknown destination address.

In a route-map statement, `set ipv6 next-hop` and `set ipv6 default next-hop` terms are mutually exclusive. However, a `set ipv6 next-hop` can be configured in a separate route-map statement.

When a `set ipv6 default next-hop` is configured in a route-map and applied on an interface, if a default route is present in the system, it is expected that packets matching route-map rules are still policy route. This is because a default route is not considered explicit route to destination.

**Example:** The following shows an example of the command.

```
(Routing)(config-route-map)# set ipv6 default next-hop 2002::2
```

#### 5.4.5.1 no set ipv6 default next-hop

Use this command to remove a set command from a route map.

**Format**            `no set ipv6 default next-hop ip-address [...ip-address]`

**Mode**             Route Map Configuration

#### 5.4.6 set ipv6 precedence

Similar to IPv4, use this command to set the precedence in the IPv6 packet header. With 3 bits, there are 8 possible values for the IP precedence; values 0 through 7 are defined. This gives the administrator the ability to enable differentiated classes of service.

**Format**            `set ipv6 precedence 0-7`

**Mode**             Route Map Configuration

| Parameter | Description                              |
|-----------|------------------------------------------|
| 0         | Sets the routine precedence              |
| 1         | Sets the priority precedence             |
| 2         | Sets the immediate precedence            |
| 3         | Sets the Flash precedence                |
| 4         | Sets the Flash override precedence       |
| 5         | Sets the critical precedence             |
| 6         | Sets the internetwork control precedence |
| 7         | Sets the network control precedence      |



### 5.4.6.1 no set ipv6 precedence

Use this command to reset the three IPv6 precedence bits in the IP packet header to the default.

**Format** no set ipv6 precedence  
**Mode** Route Map Configuration

### 5.4.7 show ipv6 policy

Use this command to display the route maps used for policy routing on the router's interfaces.

**Format** show ipv6 policy  
**Mode** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) #show ipv6 policy
```

```
Interface Route-Map
```

```

```

```
0/24 rmapv6
```

## 5.5 Router Discovery Protocol Commands

This section describes the commands you use to view and configure Router Discovery Protocol settings on the switch. The Router Discovery Protocol enables a host to discover the IP address of routers on the subnet.

### 5.5.1 ip irdp

This command enables Router Discovery on an interface or range of interfaces.

**Default** disabled  
**Format** ip irdp  
**Mode** Interface Config

#### 5.5.1.1 no ip irdp

This command disables Router Discovery on an interface.

**Format** no ip irdp  
**Mode** Interface Config

### 5.5.2 ip irdp address

This command configures the address that the interface uses to send the router discovery advertisements. The valid values for *ipaddr* are 224.0.0.1, which is the all-hosts IP multicast address, and 255.255.255.255, which is the limited broadcast address.

**Default** 224.0.0.1  
**Format** ip irdp address *ipaddr*  
**Mode** Interface Config

### 5.5.2.1 no ip irdp address

This command configures the default address used to advertise the router for the interface.

**Format** no ip irdp address  
**Mode** Interface Config

### 5.5.3 ip irdp holdtime

This command configures the value, in seconds, of the holdtime field of the router advertisement sent from this interface. The holdtime range is the value of 4 to 9000 seconds.

**Default** 3 \* maxinterval  
**Format** ip irdp holdtime 4-9000  
**Mode** Interface Config

#### 5.5.3.1 no ip irdp holdtime

This command configures the default value, in seconds, of the holdtime field of the router advertisement sent from this interface.

**Format** no ip irdp holdtime  
**Mode** Interface Config

### 5.5.4 ip irdp maxadvertinterval

This command configures the maximum time, in seconds, allowed between sending router advertisements from the interface. The range for maxadvertinterval is 4 to 1800 seconds.

**Default** 600  
**Format** ip irdp maxadvertinterval 4-1800  
**Mode** Interface Config

#### 5.5.4.1 no ip irdp maxadvertinterval

This command configures the default maximum time, in seconds.

**Format** no ip irdp maxadvertinterval  
**Mode** Interface Config

### 5.5.5 ip irdp minadvertinterval

This command configures the minimum time, in seconds, allowed between sending router advertisements from the interface. The range for minadvertinterval is 3 to 1800.

**Default** 0.75 \* maxadvertinterval  
**Format** ip irdp minadvertinterval 3-1800  
**Mode** Interface Config

#### 5.5.5.1 no ip irdp minadvertinterval

This command sets the default minimum time to the default.

**Format** no ip irdp minadvertinterval  
**Mode** Interface Config

## 5.5.6 ip irdp multicast

This command configures the destination IP address for router advertisements as 224.0.0.1, which is the default address. The no form of the command configures the IP address as 255.255.255.255 to instead send router advertisements to the limited broadcast address.

**Format**            `ip irdp multicast ip address`  
**Mode**             Interface Config

### 5.5.6.1 no ip irdp multicast

By default, router advertisements are sent to 224.0.0.1. To instead send router advertisements to the limited broadcast address, 255.255.255.255, use the no form of this command.

**Format**            `no ip irdp multicast`  
**Mode**             Interface Config

## 5.5.7 ip irdp preference

This command configures the preferability of the address as a default router address, relative to other router addresses on the same subnet.

**Default**            0  
**Format**            `ip irdp preference -2147483648 to 2147483647`  
**Mode**             Interface Config

### 5.5.7.1 no ip irdp preference

This command configures the default preferability of the address as a default router address, relative to other router addresses on the same subnet.

**Format**            `no ip irdp preference`  
**Mode**             Interface Config

## 5.5.8 show ip irdp

This command displays the router discovery information for all interfaces, a specified interface, or specified VLAN. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a `slot/port` format.

**Format**            `show ip irdp {slot/port|vlan 1-4093|all}`  
**Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter    | Description                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Interface    | The <code>slot/port</code> that corresponds to a physical routing interface or vlan routing interface.                                   |
| vlan         | Use this keyword to specify the VLAN ID of the routing VLAN directly instead of in a <code>slot/port</code> format.                      |
| Ad Mode      | The advertise mode, which indicates whether router discovery is enabled or disabled on this interface.                                   |
| Dest Address | The destination IP address for router advertisements.                                                                                    |
| Max Int      | The maximum advertise interval, which is the maximum time, in seconds, allowed between sending router advertisements from the interface. |
| Min Int      | The minimum advertise interval, which is the minimum time, in seconds, allowed between sending router advertisements from the interface. |

| Parameter  | Description                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------------------|
| Hold Time  | The amount of time, in seconds, that a system should keep the router advertisement before discarding it.          |
| Preference | The preference of the address as a default router address, relative to other router addresses on the same subnet. |

## 5.6 Virtual LAN Routing Commands

This section describes the commands you use to view and configure VLAN routing and to view VLAN routing status information.

### 5.6.1 vlan routing

This command enables routing on a VLAN. The *vlanid* value has a range from 1 to 4093. The [*interface ID*] value has a range from 1 to 128. Typically, you will not supply the interface ID argument, and the system automatically selects the interface ID. However, if you specify an interface ID, the interface ID becomes the port number in the *slot/port* for the VLAN routing interface. If you select an interface ID that is already in use, the CLI displays an error message and does not create the VLAN interface. For products that use text-based configuration, including the interface ID in the *vlan routing* command for the text configuration ensures that the *slot/port* for the VLAN interface stays the same across a restart. Keeping the *slot/port* the same ensures that the correct interface configuration is applied to each interface when the system restarts.

**Format**            `vlan routing vlanid [interface ID]`

**Mode**             VLAN Database

#### 5.6.1.1 no vlan routing

This command deletes routing on a VLAN.

**Format**            `no vlan routing vlanid`

**Mode**             VLAN Database

**Example:** Example 1 shows the command specifying a *vlanid* value. The interface ID argument is not used.

```
(Switch)(Vlan)#vlan 14
(Switch)(Vlan)#vlan routing 14 ?
<cr> Press enter to execute the command.
<1-24> Enter interface ID
```

Typically, you press <Enter> without supplying the Interface ID value; the system automatically selects the interface ID.

**Example:** In Example 2, the command specifies interface ID 51 for VLAN 14 interface. The interface ID becomes the port number in the *slot/port* for the VLAN routing interface. In this example, *slot/port* is 4/51 for VLAN 14 interface.

```
(Switch)(Vlan)#vlan 14 51
(Switch)(Vlan)#
(Switch)#show ip vlan
MAC Address used by Routing VLANs: 00:11:88:59:47:36
```

| VLAN ID | Logical   |             |                                                |
|---------|-----------|-------------|------------------------------------------------|
|         | Interface | IP Address  | Subnet Mask                                    |
| 10      | 4/1       | 172.16.10.1 | 255.255.255.0                                  |
| 11      | 4/50      | 172.16.11.1 | 255.255.255.0                                  |
| 12      | 4/3       | 172.16.12.1 | 255.255.255.0                                  |
| 13      | 4/4       | 172.16.13.1 | 255.255.255.0                                  |
| 14      | 4/51      | 0.0.0.0     | 0.0.0.0 <--u/s/p is 4/51 for VLAN 14 interface |

**Example:** In Example 3, you select an interface ID that is already in use. In this case, the CLI displays an error message and does not create the VLAN interface.

```
(Switch) #show ip vlan
```

MAC Address used by Routing VLANs: 00:11:88:59:47:36

| VLAN ID | Logical Interface | IP Address  | Subnet Mask   |
|---------|-------------------|-------------|---------------|
| 10      | 4/1               | 172.16.10.1 | 255.255.255.0 |
| 11      | 4/50              | 172.16.11.1 | 255.255.255.0 |
| 12      | 4/3               | 172.16.12.1 | 255.255.255.0 |
| 13      | 4/4               | 172.16.13.1 | 255.255.255.0 |
| 14      | 4/51              | 0.0.0.0     | 0.0.0.0       |

```
(Switch)#config
```

```
(Switch)(Config)#exit
```

```
(Switch)#vlan database
```

```
(Switch)(Vlan)#vlan 15
```

```
(Switch)(Vlan)#vlan routing 15 1
```

Interface ID 1 is already assigned to another interface

**Example:** The show running configuration command always lists the interface ID for each routing VLAN, as shown in Example 4.

```
(Switch) #show running-config
```

```
!!Current Configuration:
```

```
!
```

```
!System Description "Broadcom Trident 56846 Development System - 48xTenGig + 4 FortyGig , R.7.28.4, Linux 2.6.34.6"
```

```
!System Software Version "R.7.28.4"
```

```
!System Up Time "0 days 8 hrs 38 mins 3 secs"
```

```
!Cut-through mode is configured as disabled
```

```
!Additional Packages FASTPATH BGP-4,FASTPATH QOS,FASTPATH Multicast,FASTPATH IPv6,FASTPATH IPv6 Management,FASTPATH Metro,FASTPATH Routing,FASTPATH Data Center
```

```
!Current SNMP Synchronized Time: SNMP Client Mode Is Disabled
```

```
!
```

```
vlan database
```

```
exit
```

```
configure
```

```
no logging console
```

```
aaa authentication enable "enableNetList" none
```

```
line console
```

```
serial timeout 0
```

```
exit
```

```
line telnet
```

```
exit
```

```
line ssh
```

```
exit
```

```
!
```

```
router rip
```

```
exit
```

```
router ospf
```

```
exit
```

```
ipv6 router ospf
```

```
exit
```

```
exit
```

## 5.6.2 interface vlan

Use this command to enter Interface configuration mode for the specified VLAN. The `vlan-id` range is 1 to 4093.

**Format**            `interface vlan vlan-id`

**Mode**             Global Config

## 5.6.3 autostate

Autostate is enabled on all VLAN routing interfaces by default. In this mode, when all ports in the VLAN are down, the IP interface for that VLAN is also down.

**Default**            enabled

**Format**            `autostate`

**Mode**             VLAN Interface Config

### 5.6.3.1 no autostate

When the `no autostate` command is enabled on a VLAN interface, the VLAN routing interface will stay up, even if there are no ports that are members of the VLAN. The switch responds to the pings on that IP address.

**Format**            `no autostate`

**Mode**             VLAN Interface Config

## 5.6.4 show ip vlan

This command displays the VLAN routing information for all VLANs with routing enabled.

**Format**            `show ip vlan`

**Modes**            • Privileged EXEC  
• User EXEC

| Parameter                         | Description                                                                                                                                                                                    |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAC Address used by Routing VLANs | The MAC Address associated with the internal bridge-router interface (IBRI). The same MAC Address is used by all VLAN routing interfaces. It will be displayed above the per-VLAN information. |
| VLAN ID                           | The identifier of the VLAN.                                                                                                                                                                    |
| Logical Interface                 | The logical <i>slot/port</i> associated with the VLAN routing interface.                                                                                                                       |
| IP Address                        | The IP address associated with this VLAN.                                                                                                                                                      |
| Subnet Mask                       | The subnet mask that is associated with this VLAN.                                                                                                                                             |

## 5.7 Virtual Router Redundancy Protocol Commands

This section describes the commands you use to view and configure Virtual Router Redundancy Protocol (VRRP) and to view VRRP status information. VRRP helps provide failover and load balancing when you configure two devices as a VRRP pair.

### 5.7.1 ip vrrp (Global Config)

Use this command in Global Config mode to enable the administrative mode of VRRP on the router. This command enables VRRP (v2 or v3, whichever version is the configured version) and makes it operational. For information about how to enable VRRPv3, see the [fhrp version vrrp v3](#) command.

**Default** none  
**Format** ip vrrp  
**Mode** Global Config

### 5.7.1.1 no ip vrrp

Use this command in Global Config mode to disable the default administrative mode of VRRP on the router.

**Format** no ip vrrp  
**Mode** Global Config

## 5.7.2 ip vrrp (Interface Config)

Use this command in Interface Config mode to create a virtual router associated with the interface or range of interfaces. The parameter *vrid* is the virtual router ID, which has an integer value range from 1 to 255.

**Format** ip vrrp *vrid*  
**Mode** Interface Config

### 5.7.2.1 no ip vrrp

Use this command in Interface Config mode to delete the virtual router associated with the interface. The virtual Router ID, *vrid*, is an integer value that ranges from 1 to 255.

**Format** no ip vrrp *vrid*  
**Mode** Interface Config

## 5.7.3 ip vrrp mode

This command enables the virtual router configured on the specified interface. Enabling the status field starts a virtual router. The parameter *vrid* is the virtual router ID which has an integer value ranging from 1 to 255.

**Default** disabled  
**Format** ip vrrp *vrid* mode  
**Mode** Interface Config

### 5.7.3.1 no ip vrrp mode

This command disables the virtual router configured on the specified interface. Disabling the status field stops a virtual router.

**Format** no ip vrrp *vrid* mode  
**Mode** Interface Config

## 5.7.4 ip vrrp ip

This command sets the virtual router IP address value for an interface or range of interfaces. The value for *ipaddr* is the IP address which is to be configured on that interface for VRRP. The parameter *vrid* is the virtual router ID which has an integer value range from 1 to 255. You can use the optional [*secondary*] parameter to designate the IP address as a secondary IP address.

**Default** none  
**Format** ip vrrp *vrid* ip *ipaddr* [*secondary*]  
**Mode** Interface Config

### 5.7.4.1 no ip vrrp ip

Use this command in Interface Config mode to delete a secondary IP address value from the interface. To delete the pri-

mary IP address, you must delete the virtual router on the interface.

**Format**            `no ip vrrp vrid ipaddress secondary`

**Mode**             Interface Config

## 5.7.5        ip vrrp accept-mode

Use this command to allow the VRRP Master to accept ping packets sent to one of the virtual router's IP addresses.

### NOTICE

VRRP accept-mode allows only ICMP Echo Request packets. No other type of packet is allowed to be delivered to a VRRP address.

**Default**            disabled

**Format**            `ip vrrp vrid accept-mode`

**Mode**             Interface Config

### 5.7.5.1      no ip vrrp accept-mode

Use this command to prevent the VRRP Master from accepting ping packets sent to one of the virtual router's IP addresses.

**Format**            `no ip vrrp vrid accept-mode`

**Mode**             Interface Config

## 5.7.6        ip vrrp authentication

This command sets the authorization details value for the virtual router configured on a specified interface or range of interfaces. The parameter `{none | simple}` specifies the authorization type for virtual router configured on the specified interface. The parameter `[key]` is optional, it is only required when authorization type is simple text password. The parameter `vrid` is the virtual router ID which has an integer value ranges from 1 to 255.

**Default**            no authorization

**Format**            `ip vrrp vrid authentication {none | simple key}`

**Mode**             •     Interface Config

### 5.7.6.1      no ip vrrp authentication

This command sets the default authorization details value for the virtual router configured on a specified interface or range of interfaces.

**Format**            `no ip vrrp vrid authentication`

**Mode**             Interface Config

## 5.7.7        ip vrrp preempt

This command sets the preemption mode value for the virtual router configured on a specified interface or range of interfaces. The parameter `vrid` is the virtual router ID, which is an integer from 1 to 255.

**Default**            enabled

**Format**            `ip vrrp vrid preempt`

**Mode**             Interface Config



### 5.7.7.1 no ip vrrp preempt

This command sets the default preemption mode value for the virtual router configured on a specified interface or range of interfaces.

**Format** no ip vrrp *vrid* preempt

**Mode** Interface Config

### 5.7.8 ip vrrp priority

This command sets the priority of a router within a VRRP group. It can be used to configure an interface or a range of interfaces. Higher values equal higher priority. The range is from 1 to 254. The parameter *vrid* is the virtual router ID, whose range is from 1 to 255.

The router with the highest priority is elected master. If a router is configured with the address used as the address of the virtual router, the router is called the "address owner." The priority of the address owner is always 255 so that the address owner is always master. If the master has a priority less than 255 (it is not the address owner) and you configure the priority of another router in the group higher than the master's priority, the router will take over as master only if pre-empt mode is enabled.

**Default** 100 unless the router is the address owner, in which case its priority is automatically set to 255.

**Format** ip vrrp *vrid* priority 1-254

**Mode** Interface Config

#### 5.7.8.1 no ip vrrp priority

This command sets the default priority value for the virtual router configured on a specified interface or range of interfaces.

**Format** no ip vrrp *vrid* priority

**Mode** Interface Config

### 5.7.9 ip vrrp timers advertise

This command sets the frequency, in seconds, that an interface or range of interfaces on the specified virtual router sends a virtual router advertisement.

**Default** 1

**Format** ip vrrp *vrid* timers advertise 1-255

**Mode** Interface Config

#### 5.7.9.1 no ip vrrp timers advertise

This command sets the default virtual router advertisement value for an interface or range of interfaces.

**Format** no ip vrrp *vrid* timers advertise

**Mode** Interface Config

### 5.7.10 ip vrrp track interface

Use this command to alter the priority of the VRRP router based on the availability of its interfaces. This command is useful for tracking interfaces that are not configured for VRRP. Only IP interfaces are tracked. A tracked interface is up if the IP on that interface is up. Otherwise, the tracked interface is down. You can use this command to configure a single interface or range of interfaces. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

When the tracked interface is down or the interface has been removed from the router, the priority of the VRRP router will be decremented by the value specified in the *priority* argument. When the interface is up for IP protocol, the priority will be incremented by the *priority* value.

A VRRP configured interface can track more than one interface. When a tracked interface goes down, then the priority of

the router will be decreased by 10 (the default priority decrement) for each downed interface. The default priority decrement is changed using the *priority* argument. The default priority of the virtual router is 100, and the default decrement priority is 10. By default, no interfaces are tracked. If you specify just the interface to be tracked, without giving the optional priority, then the default priority will be set. The default priority decrement is 10.

**Default** priority: 10  
**Format** ip vrrp vrid track interface {slot/port/vlan 1-4093} [decrement priority]  
**Mode** Interface Config

### 5.7.10.1 no ip vrrp track interface

Use this command to remove the interface or range of interfaces from the tracked list or to restore the priority decrement to its default.

**Format** no ip vrrp vrid track interface {slot/port/vlan 1-4093} [decrement]  
**Mode** Interface Config

### 5.7.11 ip vrrp track ip route

Use this command to track the route reachability on an interface or range of interfaces. When the tracked route is deleted, the priority of the VRRP router will be decremented by the value specified in the *priority* argument. When the tracked route is added, the priority will be incremented by the same.

A VRRP configured interface can track more than one route. When a tracked route goes down, then the priority of the router will be decreased by 10 (the default priority decrement) for each downed route. By default no routes are tracked. If you specify just the route to be tracked, without giving the optional priority, then the default priority will be set. The default priority decrement is 10. The default priority decrement is changed using the *priority* argument.

**Default** priority: 10  
**Format** ip vrrp vrid track ip route ip-address/prefix-length [decrement priority]  
**Mode** Interface Config

#### 5.7.11.1 no ip vrrp track ip route

Use this command to remove the route from the tracked list or to restore the priority decrement to its default. When removing a tracked IP route from the tracked list, the priority should be incremented by the decrement value if the route is not reachable.

**Format** no ip vrrp vrid track interface slot/port [decrement]  
**Mode** Interface Config

### 5.7.12 clear ip vrrp interface stats

Use this command to clear VRRP statistical information for a given interface of the device within a Virtual Router Redundancy Protocol (VRRP) group.

**Format** clear ip vrrp interface stats {slot/port |vlan vlan-id}  
**Modes** Privileged EXEC

| Parameter | Description                                               |
|-----------|-----------------------------------------------------------|
| slot/port | The interface number to which the virtual router belongs. |
| vlan-id   | The VLAN number to which the virtual router belongs.      |

### 5.7.13 show ip vrrp interface stats

This command displays the statistical information about each virtual router configured on the switch. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify

the VLAN ID of the routing VLAN directly instead of a slot/port format.

- Format**            `show ip vrrp interface stats {slot/port/vlan 1-4093} vrid`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                      | Description                                                                                                                                       |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Uptime                         | The time that the virtual router has been up, in days, hours, minutes and seconds.                                                                |
| Protocol                       | The protocol configured on the interface.                                                                                                         |
| State Transitioned to Master   | The total number of times virtual router state has changed to MASTER.                                                                             |
| Advertisement Received         | The total number of VRRP advertisements received by this virtual router.                                                                          |
| Advertisement Interval Errors  | The total number of VRRP advertisements received for which advertisement interval is different than the configured value for this virtual router. |
| Authentication Failure         | The total number of VRRP packets received that do not pass the authentication check.                                                              |
| IP TTL errors                  | The total number of VRRP packets received by the virtual router with IP TTL (time to live) not equal to 255.                                      |
| Zero Priority Packets Received | The total number of VRRP packets received by virtual router with a priority of '0'.                                                               |
| Zero Priority Packets Sent     | The total number of VRRP packets sent by the virtual router with a priority of '0'.                                                               |
| Invalid Type Packets Received  | The total number of VRRP packets received by the virtual router with invalid 'type' field.                                                        |
| Address List Errors            | The total number of VRRP packets received for which address list does not match the locally configured list for the virtual router.               |
| Invalid Authentication Type    | The total number of VRRP packets received with unknown authentication type.                                                                       |
| Authentication Type Mismatch   | The total number of VRRP advertisements received for which 'auth type' not equal to locally configured one for this virtual router.               |
| Packet Length Errors           | The total number of VRRP packets received with packet length less than length of VRRP header.                                                     |

### 5.7.14 show ip vrrp

This command displays whether VRRP functionality is enabled or disabled on the switch. It also displays some global parameters that are required for monitoring. This command takes no options.

- Format**            `show ip vrrp`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter              | Description                                                                           |
|------------------------|---------------------------------------------------------------------------------------|
| VRRP Admin Mode        | The administrative mode for VRRP functionality on the switch.                         |
| Router Checksum Errors | The total number of VRRP packets received with an invalid VRRP checksum value.        |
| Router Version Errors  | The total number of VRRP packets received with Unknown or unsupported version number. |
| Router VRID Errors     | The total number of VRRP packets received with invalid VRID for this virtual router.  |

## 5.7.15 show ip vrrp interface

This command displays all configuration information and VRRP router statistics of a virtual router configured on a specific interface. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is the VLAN ID of the routing VLAN instead of in a slot/port format. Use the output of the command to verify the track interface and track IP route configurations.

**Format**            `show ip vrrp interface {slot/port/vlan 1-4093} vrid`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter              | Description                                                                                                                       |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| IP Address             | The configured IP address for the Virtual router.                                                                                 |
| VMAC address           | The VMAC address of the specified router.                                                                                         |
| Authentication type    | The authentication type for the specific virtual router.                                                                          |
| Priority               | The priority value for the specific virtual router, taking into account any priority decrements for tracked interfaces or routes. |
| Configured Priority    | The priority configured through the <code>ip vrrp vrid priority 1-254</code> command.                                             |
| Advertisement interval | The advertisement interval in seconds for the specific virtual router.                                                            |
| Pre-Empt Mode          | The preemption mode configured on the specified virtual router.                                                                   |
| Administrative Mode    | The status (Enable or Disable) of the specific router.                                                                            |
| Accept Mode            | When enabled, the VRRP Master can accept ping packets sent to one of the virtual router's IP addresses.                           |
| State                  | The state (Master/backup) of the virtual router.                                                                                  |

**Example:** The following shows example CLI display output for the command.

```
show ip vrrp interface <u/s/p> vrid

Primary IP Address..... 1.1.1.5
VMAC Address..... 00:00:5e:00:01:01
Authentication Type..... None
Priority..... 80
 Configured priority..... 100
Advertisement Interval (secs)..... 1
Pre-empt Mode..... Enable
Administrative Mode..... Enable
Accept Mode..... Enable
State..... Initialized
Track Interface State DecrementPriority

<1/0/1> down 10
TrackRoute (pfx/len) State DecrementPriority

10.10.10.1/255.255.0 down 10
```

## 5.7.16 show ip vrrp interface brief

This command displays information about each virtual router configured on the switch. This command takes no options. It displays information about each virtual router.

**Format**            `show ip vrrp interface brief`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter  | Description                                                  |
|------------|--------------------------------------------------------------|
| Interface  | slot/port                                                    |
| VRID       | The router ID of the virtual router.                         |
| IP Address | The virtual router IP address.                               |
| Mode       | Indicates whether the virtual router is enabled or disabled. |
| State      | The state (Master/backup) of the virtual router.             |

## 5.8 VRRPv3 Commands

VRRPv3 provides address redundancy for both IPv4 and IPv6 router addresses. VRRPv3 support in FASTPATH is similar to VRRP support. The following table provides a summary of the differences.

| VRRPv2                                                                       | VRRPv3                                                                |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Supports redundancy to IPv4 addresses                                        | Supports redundancy to IPv4 and IPv6 addresses                        |
| Supports authentication                                                      | Does not support authentication                                       |
| No concept of link-local address in IPv4 address space                       | For IPv6 addresses, VRRP IP contains the link-local IPv6 address too. |
| The interval time used for sending VRRP Advertisement packets is in seconds. | The interval time is in the order of centiseconds.                    |
| VRRP MAC address format is 00-00-5E-00-01-{VRID}                             | VRRP MAC address format for IPv6 VR IP is 00-00-5E-00-02-{VRID}       |
| SNMP MIB RFC according to 2787. The counters are 32-bit ones.                | SNMP MIB RFC as per RFC 6527. The counters are 64-bit ones.           |

### NOTICE

- To enable VRRP on the device, use the `ip vrrp` command. See the [ip vrrp \(Global Config\)](#) command). This command enables VRRP (v2 or v3, whichever version is the configured version) and makes it operational.
- A command is available to configure debugging for VRRP packets. For information, see the [debug ip vrrp](#) command.

### 5.8.1 fhrp version vrrp v3

To enable Virtual Router Redundancy Protocol version 3 (VRRPv3) configuration on a device, use the `fhrp version vrrp v3` command in global configuration mode.

When VRRPv3 is in use, VRRP version 2 (VRRPv2) is unavailable. If you invoke `no fhrp version vrrp v3`, VRRPv3 is disabled and VRRPv2 is enabled. Also, operational data is reset, and the VRRPv2 configuration is applied. The same guidelines apply when VRRPv2 is in use and the `no ip vrrp` command is issued.

|                 |                                   |
|-----------------|-----------------------------------|
| <b>Defaults</b> | disabled                          |
| <b>Format</b>   | <code>fhrp version vrrp v3</code> |
| <b>Mode</b>     | Global Config                     |

#### 5.8.1.1 no fhrp version vrrp v3

Use this command to disable the VRRPv3 and enable VRRPv2 on the device.

|               |                                      |
|---------------|--------------------------------------|
| <b>Format</b> | <code>no fhrp version vrrp v3</code> |
| <b>Mode</b>   | Global Config                        |

## 5.8.2 snmp-server enable traps vrrp

Use this command to enable the two SNMP traps defined in the VRRPv2 and VRRPv3 MIB standards.

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | enabled                       |
| <b>Format</b>   | snmp-server enable traps vrrp |
| <b>Mode</b>     | Global Config                 |

### 5.8.2.1 no snmp-server enable traps vrrp

Use this command to disable the two SNMP traps defined in the VRRPv2 and VRRPv3 MIB standards.

|                 |                                  |
|-----------------|----------------------------------|
| <b>Defaults</b> | enabled                          |
| <b>Format</b>   | no snmp-server enable traps vrrp |
| <b>Mode</b>     | Global Config                    |

## 5.8.3 vrrp

Use the `vrrp` command to create a VRRPv3 group and enter VRRPv3 group configuration mode.

|               |                                                   |
|---------------|---------------------------------------------------|
| <b>Format</b> | vrrp <i>group-id</i> address-family {ipv4   ipv6} |
| <b>Mode</b>   | Interface Config                                  |

| Parameter      | Description                                              |
|----------------|----------------------------------------------------------|
| group-id       | Virtual router group number. The range is from 1 to 255. |
| address-family | Specifies the address-family for this VRRP group.        |
| ipv4           | (Optional) Specifies IPv4 address.                       |
| ipv6           | (Optional) Specifies IPv6 address.                       |

### 5.8.3.1 no vrrp

Use the `no vrrp` command to remove the specified VRRPv3 group. Before you can use this command, you must disable Virtual Router using the `shutdown` command in the appropriate VRRP Config mode.

|               |                                                      |
|---------------|------------------------------------------------------|
| <b>Format</b> | no vrrp <i>group-id</i> address-family {ipv4   ipv6} |
| <b>Mode</b>   | Interface Config                                     |

## 5.8.4 preempt

Use this command to configure the device to take over as master virtual router for a VRRP group if it has higher priority than the current master virtual route.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | Enabled with default delay value of 0.   |
| <b>Format</b>  | preempt [ <i>delay minimum seconds</i> ] |
| <b>Mode</b>    | VRRPv3 Config                            |

| Parameter     | Description                                                                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| delay minimum | Number of seconds that the device will delay before issuing an advertisement claiming master ownership. The default delay is 0 seconds. The valid range is 0 to 3600 seconds. |

### 5.8.5 no preempt

Use this command to prevent device from taking over as master virtual router for a VRRP group if it has higher priority than the current master virtual route.

**Format** no preempt  
**Mode** VRRPv3 Config

### 5.8.6 accept-mode

Use this command to control whether a virtual router in master state will accept packets addressed to the address owner's virtual IP address as its own if it is not the virtual IP address owner.

**Default** disabled  
**Format** accept-mode  
**Mode** VRRPv3 Config

#### 5.8.6.1 no accept-mode

Use this command to reset the accept mode to the default value.

**Format** no accept-mode  
**Mode** VRRPv3 Config

### 5.8.7 priority

Use this command to set the priority level of the device within a VRRPv3 group. The priority level controls which device becomes the master virtual router.

**Default** 100  
**Format** priority *level*  
**Mode** VRRPv3 Config

| Parameter | Description                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------|
| level     | Priority of the device within the VRRP group. The range is from 1 to 254. The default is 100. |

#### 5.8.7.1 no priority

Use this command to reset the priority level of the device to the default value.

**Format** priority  
**Mode** VRRPv3 Config

### 5.8.8 timers advertise

Use this command to configure the interval between successive advertisements by the master virtual router in a VRRP group. To restore the default value, use the `no` form of this command.

The advertisements being sent by the master virtual router communicate the advertisement interval, state, and priority of the current master virtual router. The VRRP `timers advertise` command configures the time between successive advertisement packets and the time before other routers declare the master router to be down. VRRP backup routers learn timer values from the master router advertisements. The timers configured on the master router always override any other timer settings that are used for calculating the master down time interval on VRRP backup routers.

|                |                                            |
|----------------|--------------------------------------------|
| <b>Default</b> | 100                                        |
| <b>Format</b>  | <code>timers advertise centiseconds</code> |
| <b>Mode</b>    | VRRPv3 Config                              |

| Parameter    | Description                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| centiseconds | Time interval between successive advertisements by the master virtual router. The unit of the interval is in centiseconds. The valid range is 1 to 4095 centiseconds. |

### 5.8.8.1 no timers advertise

Use this command to reset the advertisement interval of the device to the default value.

|               |                                  |
|---------------|----------------------------------|
| <b>Format</b> | <code>no timers advertise</code> |
| <b>Mode</b>   | VRRPv3 Config                    |

### 5.8.9 shutdown

Use the `shutdown` command to disable the VRRP group configuration.

|               |                       |
|---------------|-----------------------|
| <b>Format</b> | <code>shutdown</code> |
| <b>Mode</b>   | VRRPv3 Config         |

### 5.8.9.1 no shutdown

Enter the `no shutdown` command to update the virtual router state after completing configuration.

|               |                          |
|---------------|--------------------------|
| <b>Format</b> | <code>no shutdown</code> |
| <b>Mode</b>   | VRRPv3 Config            |

### 5.8.10 address

Use this command to set the primary or secondary IP address of the device within a VRRPv3 group. To remove the secondary address, use the `no` form of this command.

If the primary or secondary option is not specified, the specified IP address is set as the primary. The Virtual IPv6 primary address should be a link-local address only. When a global IPv6 address is given as a primary address for the VRRP IP then the config fails with the following error message – “Error! Primary virtual IPv6 address should be a link-local address only.” Also the removing of the primary virtual IP (IPv4 or IPv6) is not allowed. The primary virtual IP of a virtual router can only be modified. The secondary virtual IP can be removed using the `no` form of the this command. Also, VRRPv3 for IPv6 requires that a primary virtual link-local IPv6 address is configured to allow the group to operate. After the primary link-local IPv6 address is established on the group, you can add the secondary global addresses.

|               |                                                       |
|---------------|-------------------------------------------------------|
| <b>Format</b> | <code>address ip-address [primary   secondary]</code> |
| <b>Mode</b>   | VRRPv3 Config                                         |

| Parameter  | Description                                                                                                                                                                                 |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ip-address | IPv4 or IPv6 address, it can be specified in one of the following format: <code>ipv4-address</code> , <code>ipv6-link-local-address</code> , <code>ipv6-address&gt;/&lt;prefix-len</code> . |
| primary    | (Optional) Set primary IP address of the VRRPv3 group.                                                                                                                                      |
| secondary  | (Optional) Set additional IP address of the VRRPv3 group.                                                                                                                                   |



### 5.8.10.1 no address

Use this command to remove the configured secondary IP or IPv6 address. The primary address can only be modified, not removed.

**Format**           no address *ip-address* secondary

**Mode**             VRRPv3 Config

### 5.8.11 track interface

Use this command to configure tracking of the interface for the device within a VRRPv3 group. Use the `bfdneighbor` option to track the reachability to the uplink next hop address. Once interface tracking is configured, the VRRPv3 feature receives notifications when the interface changes state. If BFD tracking is enabled with `bfdneighbor` config, then a BFD session is created with the BFD destination IP as that of the given BFD neighbor IP address, VRRPv3 receives notification when the BFD session state changes. The `decrement` option can be set to decrease the priority of the device within a VRRPv3 group by the specified value when the interface goes down, or the associated BFD session goes down. Similarly, the priority is increased by the same specified value when the interface comes up or the associated BFD session comes up. If the `decrement` value is not set, then the default decrement value used is 10. The overall state of a track interface object is considered as up only when both of the events (interface up event and BFD session up event) are received. The decrement or increment of priority is done based on the overall state of the track interface object.

**Default**           enabled

**Format**           track interface {*slot/port* | *vlan vlan-id*} [*bfdneighbor IP-address*][*decrement number*]

**Mode**             VRRPv3 Config

| Parameter        | Description                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| slot/port        | The interface to track.                                                                                                                                  |
| vlan-id          | The VLAN to track.                                                                                                                                       |
| bfdneighbor      | (Optional) BFD neighbor tracking.                                                                                                                        |
| IP-address       | (Optional) IPv4 or IPv6 address of BFD neighbor to be tracked for reachability using a BFD session.                                                      |
| decrement number | (Optional) Specify the VRRP priority decrement for the tracked object. The number is the amount by which priority is decremented. The range is 1 to 254. |

### 5.8.11.1 no track interface

Use this command to disable tracking of the interface for the device within a VRRPv3 group.

**Default**           enabled

**Format**           track interface {*slot/port* | *vlan vlan-id*} [*bfdneighbor IP-address*] [*decrement number*]

**Mode**             VRRPv3 Config

### 5.8.12 track ip route

Use this command to configure tracking of the IP route for the device within a Virtual Router Redundancy Protocol (VRRPv3) group. Once IP route tracking is configured, the VRRPv3 feature receives notifications when IP route changes state. The `decrement` option can be set to decrease the priority of the device within a VRRPv3 group by the specified value when the route becomes unavailable.

**Default**           disabled

**Format**           track ip route *ip-address/prefix-len* [*decrement number*]

**Mode**             VRRPv3 Config

| Parameter             | Description                                                                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| ip-address/prefix-len | Prefix and prefix length of the route to be tracked.                                                                                                    |
| decrement number      | (Optional) Specify the VRRP priority decrement for the tracked route. The number is the amount by which priority is decremented. The range is 1 to 254. |

### 5.8.12.1 no track ip route

Use this command to disable object tracking.

**Format** no track ip route *ip-address/prefix-len* [*decrement number*]

**Mode** VRRPv3 Config

### 5.8.13 clear vrrp statistics

Use this command to clear VRRP statistical information for given interface of the device within a VRRPv3 group and IP address family. If this command is issued without the optional arguments then the global statistics and all virtual routers (both IPv4 and IPv6) are reset.

If the optional arguments are specified, the statistics are reset for the virtual router corresponding to the given (IP address family, interface and VR-id) combination.

**Format** clear vrrp statistics [{*ipv4* | *ipv6*} {*slot/port* | *vlan vlan-id*} *vr-id*]

**Mode** Privileged Exec

| Parameter | Description                                                                    |
|-----------|--------------------------------------------------------------------------------|
| ipv4      | (Optional) indicates the Virtual router group belongs to IPv4 address family.  |
| ipv6      | (Optional) indicates the Virtual router group belongs to IPv6 address family.  |
| slot/port | (Optional) indicates the interface number to which the Virtual router belongs. |
| vlan-id   | (Optional) indicates the VLAN number to which the Virtual router belongs.      |
| vr-id     | (Optional) Virtual router group number. The range is from 1 to 255.            |

### 5.8.14 show vrrp

This command displays information for all active VRRPv3 groups (no optional parameters), all active VRRPv3 groups configured in an IPv4 or IPv6 address family, or the active VRRPv3 groups configured in an IPv4 or IPv6 address family for the specified interface.

**Format** show vrrp [{*ipv4* | *ipv6*}] [{*slot/port* | *vlan vlan-id*} *vr-id*]

**Mode** Privileged Exec

| Parameter | Description                                                                    |
|-----------|--------------------------------------------------------------------------------|
| ipv4      | (Optional) indicates the Virtual router group belongs to IPv4 address family.  |
| ipv6      | (Optional) indicates the Virtual router group belongs to IPv6 address family.  |
| slot/port | (Optional) indicates the interface number to which the Virtual router belongs. |
| vlan-id   | (Optional) indicates the VLAN number to which the Virtual router belongs.      |
| vr-id     | (Optional) Virtual router group number. The range is from 1 to 255.            |

**Example:** This example shows command output when no parameters are specified.

```
(Routing)#show vrrp
```

```
Admin Mode..... Enable
```

```
1/0/2 - VRID 1 - Address-Family IPv4
```

```

Virtual IP address..... 1.1.1.9
Secondary IP Address(es)..... 1.1.1.4
..... 1.1.1.5
..... 1.1.1.6
Virtual MAC Address..... 00:00:5e:00:01:01
Priority..... 0
Configured Priority..... 111
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1.1.1.3 (local) / 100
Master Advertisement interval..... 120 centisec
Master Down interval..... 360 centisec

```

```

Track Interface State DecrementPriority BFD-Neighbor

1/0/9 Down 222 23.10.8.6

```

```

Track Route(pfx/len) Reachable DecrementPriority

14.14.14.0/24 True 14

```

#### 1/0/3 - VRID 2 - Address-Family IPv4

```

Virtual IP address..... 3.3.2.9
Secondary IP Address(es)..... 3.3.2.4
..... 3.3.2.5
..... 3.3.2.6
Virtual MAC Address..... 00:00:5e:00:01:06
Priority..... 0
Configured Priority..... 130
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1.1.1.3 (local) / 100
Master Advertisement interval..... 120 centisec
Master Down interval..... 360 centisec

```

```

Track Interface State DecrementPriority BFD-Neighbor

1/0/7 Down 125 55.16.27.8

```

```

Track Route(pfx/len) Reachable DecrementPriority

14.14.14.0/24 True 30

```

#### 1/0/12 - VRID 3 - Address-Family IPv6

```

Virtual IP address..... 4001::2
Secondary IP Address(es)..... 4001::5
..... 4001::6
..... 4001::7
Virtual MAC Address..... 00:00:5e:00:01:06
Priority..... 0
Configured Priority..... 130
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable

```

```

Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 4001::3 (local) / 100
Master Advertisement interval..... 120 centisec
Master Down interval..... 360 centisec

```

```

Track Interface State DecrementPriority BFD-Neighbor

1/0/2 Down 250 5001::3

```

```

Track Route(pfx/len) Reachable DecrementPriority

4004::3/32 True 20

```

**Example:** This example shows command output when the IPv4 parameter is specified.

```
(Routing)#show vrrp ipv4
```

```
Admin Mode..... Enable
```

```
1/0/2 - VRID 1 - Address-Family IPv4
```

```

Virtual IP address..... 1.1.1.9
Secondary IP Address(es)..... 1.1.1.4
..... 1.1.1.5
..... 1.1.1.6
Virtual MAC Address..... 00:00:5e:00:01:01
Priority..... 0
Configured Priority..... 111
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1.1.1.3 (local) / 100
Master Advertisement interval..... 120 centisec
Master Down interval..... 360 centisec

```

```

Track Interface State DecrementPriority

1/0/9 Down 222

```

```

Track Route(pfx/len) Reachable DecrementPriority

14.14.14.0/24 True 14

```

```
1/0/3 - VRID 2 - Address-Family IPv4
```

```

Virtual IP address..... 3.3.2.9
Secondary IP Address(es)..... 3.3.2.4
..... 3.3.2.5
..... 3.3.2.6
Virtual MAC Address..... 00:00:5e:00:01:06
Priority..... 0
Configured Priority..... 130
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1.1.1.3 (local) / 100
Master Advertisement interval..... 120 centisecsec
Master Down interval..... 360

```

```
Track Interface State DecrementPriority

1/0/7 Down 125
```

```
Track Route(pfx/len) Reachable DecrementPriority

14.14.14.0/24 True 30
```

**Example:** This example shows command output when the IPv6 parameter is specified.

```
(Routing)#show vrrp ipv6
```

```
Admin Mode..... Enable
```

```
1/0/2 - VRID 1 - Address-Family IPv6
```

```
Virtual IP address..... 1001::8
Secondary IP Address(es)..... 1001::5
..... 1001::6
..... 1001::7
Virtual MAC Address..... 00:00:5e:00:01:01
Priority..... 0
Configured Priority..... 100
Advertisement Interval..... 100 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1001::1 (local) / 100
Master Advertisement interval..... 100 centisec
Master Down interval..... 300 centisec
```

```
Track Interface State DecrementPriority

1/0/9 Down 222
```

```
Track Route(pfx/len) Reachable DecrementPriority

2001::2/32 True 14
```

```
1/0/12 - VRID 3 - Address-Family IPv6
```

```
Virtual IP address..... 4001::2
Secondary IP Address(es)..... 4001::5
..... 4001::6
..... 4001::7
Virtual MAC Address..... 00:00:5e:00:01:06
Priority..... 130
Configured Priority..... 130
Advertisement Interval..... 120 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Master
Master Router IP / Priority..... 4001::3 (local) / 130
Master Advertisement interval..... 120 centisec
Master Down interval..... 360 centisec
```

```
Track Interface State DecrementPriority

1/0/24 Down 320
```

```
Track Route(pfx/len) Reachable DecrementPriority

003::4/32 True 50
```

**Example:** The following shows example command output.

```
(Routing)#show vrrp ipv4 1/0/3 1
```

```
Virtual IP address..... 1.1.1.9
Secondary IP Address(es)..... 1.1.1.4
..... 1.1.1.5
..... 1.1.1.6
Virtual MAC Address..... 00:00:5e:00:01:01
Priority..... 0
Configured Priority..... 111
Advertisement Interval..... 222 centisec
Pre-empt Mode..... Enable
Accept Mode..... Enable
Administrative Mode..... Enable
State..... Initialized
Master Router IP / Priority..... 1.1.1.3 (local) / 100
Master Advertisement interval..... 1000 centisec
Master Down interval..... 3000 centisec
```

```
Track Interface State Decrement-Priority

```

```
0/9 Down 222
```

```
Track Route(pfx/len) Reachable Decrement-Priority

14.14.14.0/24 True 14
```

### 5.8.15 show vrrp brief

This command displays brief information for all active VRRPv3 groups.

**Format** show vrrp brief

**Mode** Privileged Exec

| Parameter     | Description                                                                    |
|---------------|--------------------------------------------------------------------------------|
| Interface     | Interface on which VRRP is configured.                                         |
| VR            | ID of the virtual router.                                                      |
| A-F           | IP address family type (IPv4 or Ipv6) to which this Virtual Router belongs.    |
| Pri           | Priority range of the virtual router.                                          |
| AdvIntvl      | Advertisement interval configured for this virtual router.                     |
| Pre           | Preemption state of the virtual router.                                        |
| Acc           | Accept Mode of the virtual router.                                             |
| State         | VRRP group state. The state can be one of the following: Init, Backup, Master. |
| VR IP address | Virtual IP address for a VRRP group.                                           |

**Example:** The following shows example command output.

```
(Routing)#show vrrp brief
```

```
Interface VRID A-F Pri AdvIntvl Pre Acc State VR IP Address

0/1 1 IPv4 100 200s Y Y Init 192.0.1.10
0/3 2 IPv4 200 200s Y Y Init 124.0.3.17
```

```
0/1 7 IPv6 100 200s Y Y Backup 5002::1
0/5 2 IPV6 20 200s Y Y Master 2001::2
```

## 5.8.16 show vrrp statistics

This command displays statistical information for a given VRRPv3 group or displays the global statistics. If this command is issued without the optional arguments then the global statistics are displayed.

If the optional arguments are specified, the statistics are displayed for the virtual router corresponding to the given (IP address family, interface and VR-id) combination.

**Format**            show vrrp statistics [{ipv4| ipv6}] {slot/port | vlan vlan-id} vrid]

**Mode**             Privileged Exec

| Parameter | Description                                                                    |
|-----------|--------------------------------------------------------------------------------|
| ipv4      | (Optional) indicates the Virtual router group belongs to IPv4 address family.  |
| ipv6      | (Optional) indicates the Virtual router group belongs to IPv6 address family.  |
| slot/port | (Optional) indicates the interface number to which the Virtual router belongs. |
| vlan-id   | (Optional) indicates the VLAN number to which the Virtual router belongs.      |
| vr-id     | (Optional) Virtual router group number. The range is from 1 to 255.            |

**Example:** The following shows example command output.

```
(Routing)#show vrrp statistics ipv6 1/0/1 2
```

```
Master Transitions..... 2
New Master Reason..... Priority
Advertisements Received..... 64
Advertisements Sent..... 12
Advertisement Interval Errors..... 0
IP TTL Errors..... 1
Last Protocol Error Reason..... Version Error
Zero Priority Packets Received..... 0
Zero Priority Packets Sent..... 1
Invalid Type Packets Received..... 0
Address List Errors..... 2
Packet Length Errors..... 4
Row Discontinuity Time..... 0 days 0 hrs 0 mins 0 secs
Refresh Rate (in milliseconds)..... 0
```

```
(Routing)#show vrrp statistics
```

```
Router Checksum Errors..... 2
Router Version Errors..... 3
Router VRID Errors..... 4
Global Statistics Discontinuity Time..... 0 days 0 hrs 0 mins 0 secs
```

## 5.9 DHCP and BOOTP Relay Commands

This section describes the commands you use to configure BootP/DHCP Relay on the switch. A DHCP relay agent operates at Layer 3 and forwards DHCP requests and replies between clients and servers when they are not on the same physical subnet.

## 5.9.1 bootpdhcprelay cidoptmode

This command enables the circuit ID option mode for BootP/DHCP Relay on the system.

|                |                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                           |
| <b>Format</b>  | <code>bootpdhcprelay cidoptmode</code>                                                             |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

### 5.9.1.1 no bootpdhcprelay cidoptmode

This command disables the circuit ID option mode for BootP/DHCP Relay on the system.

|               |                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no bootpdhcprelay cidoptmode</code>                                                          |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

## 5.9.2 bootpdhcprelay maxhopcount

This command configures the maximum allowable relay agent hops for BootP/DHCP Relay on the system. The *hops* parameter has a range of 1 to 16.

|                |                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------|
| <b>Default</b> | 4                                                                                                  |
| <b>Format</b>  | <code>bootpdhcprelay maxhopcount 1-16</code>                                                       |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

### 5.9.2.1 no bootpdhcprelay maxhopcount

This command configures the default maximum allowable relay agent hops for BootP/DHCP Relay on the system.

|               |                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no bootpdhcprelay maxhopcount</code>                                                         |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

## 5.9.3 bootpdhcprelay minwaittime

This command configures the minimum wait time in seconds for BootP/DHCP Relay on the system. When the BOOTP relay agent receives a BOOTREQUEST message, it MAY use the seconds-since-client-began-booting field of the request as a factor in deciding whether to relay the request or not. The parameter has a range of 0 to 100 seconds.

|                |                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                                  |
| <b>Format</b>  | <code>bootpdhcprelay minwaittime 0-100</code>                                                      |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |

### 5.9.3.1 no bootpdhcprelay minwaittime

This command configures the default minimum wait time in seconds for BootP/DHCP Relay on the system.

|               |                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no bootpdhcprelay minwaittime</code>                                                         |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul> |



## 5.9.4 bootpdhcprelay serverip

This command configures the server IP address of the BootP/DHCP Relay on the system. The `ipaddr` parameter is the IP address of the server.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | 0.0.0.0                                     |
| <b>Format</b>  | <code>bootpdhcprelay serverip ipaddr</code> |
| <b>Mode</b>    | Global Config                               |

### 5.9.4.1 no bootpdhcprelay serverip

This command returns the server IP address of the BootP/DHCP Relay on the system to the default value of 0.0.0.0.

|               |                                         |
|---------------|-----------------------------------------|
| <b>Format</b> | <code>no bootpdhcprelay serverip</code> |
| <b>Mode</b>   | Global Config                           |

## 5.9.5 bootpdhcprelay enable

Use this command to enable the relay of DHCP packets.

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | disabled                           |
| <b>Format</b>  | <code>bootpdhcprelay enable</code> |
| <b>Mode</b>    | Global Config                      |

### 5.9.5.1 no bootpdhcprelay enable

Use this command to disable the relay of DHCP packets.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | disabled                              |
| <b>Format</b>  | <code>no bootpdhcprelay enable</code> |
| <b>Mode</b>    | Global Config                         |

## 5.9.6 bootpdhcprelay server-override

Use this command to enable the addition of sub-option 5 (link selection) and sub-option 11 (server ID override) in option 82 of the DHCP packet received from the DHCP Client. The command can be used in both Global Config mode and Interface Config mode.

The `bootpdhcprelay server-override` command, when issued in Global Config mode, enables the server-override globally. All routing interfaces then have the feature enabled. Any DHCP packet received from a DHCP client will have sub-option 5 and sub-option 11 for option 82 added to the packet.

When this command is issued in Interface Config mode, `server-override` is enabled for that interface only.

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | server-override is disabled globally and on all interfaces                                    |
| <b>Format</b>  | <code>bootpdhcprelay server-override</code>                                                   |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

**Example:** The following example enables server-override globally.

```
(Routing)#configure
(Routing)(Config)#bootpdhcprelay server-override
(Routing)(Config)#
```

**Example:** The following example enables server-override on interface 0/26.

```
(Routing)#configure
(Routing)(Config)#interface 0/26
(Routing)(Interface 0/26)#bootpdhcprelay server-override
```

(Routing)(Interface 0/26)#

### 5.9.6.1 no bootpdhcprelay server-override

Use the `no` version of the command to disable the server-override feature.

**Format**            `no bootpdhcprelay server-override`  
**Mode**             • Global Config  
                      • Interface Config

### 5.9.7 bootpdhcprelay source-interface

Use this command to set the source interface value for any given routing interface. If specified, the source interface value is used to get the relay agent IP address. The `bootpdhcprelay source-interface` command is used to specify an interface whose IP address is passed as a relay agent IP address. When the command is used in Global Config mode, the source interface is set globally. When the command is used in Interface Config mode, the source interface is set for the specified interface.

If the source interface is set in Interface Config mode, that value takes precedence over the globally set value.

**Default**            source-interface is disabled globally and per interface  
**Format**            `bootpdhcprelay source-interface interface { <u/s/p> | vlan <vlanId> | loopback <LoopbackId> }`  
**Mode**             • Global Config  
                      • Interface Config

**Example:** The following examples set the source interface globally.

1. (Routing)(Config)#`bootpdhcprelay source-interface interface 0/30`
2. (Routing)(Config)#`bootpdhcprelay source-interface interface vlan 10`
3. (Routing)(Config)#`bootpdhcprelay source-interface interface loopback 2`

**Example:** The following examples set the source interface for interface 0/26.

1. (Routing)(Interface 0/26)#`bootpdhcprelay source-interface interface 0/30`
2. (Routing)(Interface 0/26)#`bootpdhcprelay source-interface interface vlan 10`
3. (Routing)(Interface 0/26)#`bootpdhcprelay source-interface interface loopback 2`

#### 5.9.7.1 no bootpdhcprelay source-interface

Use the `no` version of the command to disable the feature and clear the `source-interface` entry.

**Format**            `no bootpdhcprelay source-interface`  
**Mode**             • Global Config  
                      • Interface Config

### 5.9.8 show bootpdhcprelay

This command displays the BootP/DHCP Relay information about the configured server-override mode and source information. The inner/sub configuration option is named `interface` under this command tree. The sub configuration `interface` shows the server-override mode and the configured source interface for the specified interface.

The command also displays the BootP/DHCP Relay information for the default router .

**Default**            Displays the DHCP relay configuration  
**Format**            `show bootpdhcprelay [vinterface u/s/p]`  
**Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter                   | Description                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------|
| Maximum Hop Count           | The maximum allowable relay agent hops.                                                        |
| Minimum Wait Time (Seconds) | The minimum wait time.                                                                         |
| Admin Mode                  | Indicates whether relaying of requests is enabled or disabled.                                 |
| Circuit Id Option Mode      | The DHCP circuit Id option which may be enabled or disabled.                                   |
| Server Override Mode        | Indicates whether the server-override mode for the specified interface is enabled or disabled. |
| Source Interface            | Displays the configured source interface for the specified interface.                          |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show bootpdhcrelay
```

```
Maximum Hop Count..... 4
Minimum Wait Time(Seconds)..... 0
Admin Mode..... Enable
Circuit Id option mode..... Enable
Server Override Mode..... Enable
Source Interface..... loopback 2
```

**Example:** The following example shows the DHCP relay configuration for interface 0/26.

```
(Routing)#show bootpdhcrelay interface 0/26
```

```
Server Override Mode..... Enable
Source Interface..... 4/1
```

## 5.10 IP Helper Commands

This section describes the commands to configure and monitor the IP Helper agent. IP Helper relays DHCP and other broadcast UDP packets from a local client to one or more servers that are not on the same network at the client.

The IP Helper feature provides a mechanism that allows a router to forward certain configured UDP broadcast packets to a particular IP address. This allows various applications to reach servers on nonlocal subnets, even if the application was designed to assume a server is always on a local subnet and uses broadcast packets (with either the limited broadcast address 255.255.255.255, or a network directed broadcast address) to reach the server.

The network administrator can configure relay entries both globally and on routing interfaces. Each relay entry maps an ingress interface and destination UDP port number to a single IPv4 address (the helper address). The network administrator may configure multiple relay entries for the same interface and UDP port, in which case the relay agent relays matching packets to each server address. Interface configuration takes priority over global configuration. That is, if a packet's destination UDP port matches any entry on the ingress interface, the packet is handled according to the interface configuration. If the packet does not match any entry on the ingress interface, the packet is handled according to the global IP helper configuration.

The network administrator can configure discard relay entries, which direct the system to discard matching packets. Discard entries are used to discard packets received on a specific interface when those packets would otherwise be relayed according to a global relay entry. Discard relay entries may be configured on interfaces, but are not configured globally.

In addition to configuring the server addresses, the network administrator also configures which UDP ports are forwarded. Certain UDP port numbers can be specified by name in the UI as a convenience, but the network administrator can configure a relay entry with any UDP port number. The network administrator may configure relay entries that do not specify a destination UDP port. The relay agent relays assume these entries match packets with the UDP destination ports listed in [Table 11](#). This is the list of default ports.

Table 11: Default Ports - UDP Port Numbers Implied by Wildcard

| Protocol                              | UDP Port Number |
|---------------------------------------|-----------------|
| IEN-116 Name Service                  | 42              |
| DNS                                   | 53              |
| NetBIOS Name Server                   | 137             |
| NetBIOS Datagram Server               | 138             |
| TACACS Server                         | 49              |
| Time Service                          | 37              |
| DHCP                                  | 67              |
| Trivial File Transfer Protocol (TFTP) | 69              |

The system limits the number of relay entries to four times the maximum number of routing interfaces. The network administrator can allocate the relay entries as he likes. There is no limit to the number of relay entries on an individual interface, and no limit to the number of servers for a given {interface, UDP port} pair.

The relay agent relays DHCP packets in both directions. It relays broadcast packets from the client to one or more DHCP servers, and relays to the client packets that the DHCP server unicasts back to the relay agent. For other protocols, the relay agent only relays broadcast packets from the client to the server. Packets from the server back to the client are assumed to be unicast directly to the client. Because there is no relay in the return direction for protocols other than DHCP, the relay agent retains the source IP address from the original client packet. The relay agent uses a local IP address as the source IP address of relayed DHCP client packets.

When a switch receives a broadcast UDP packet on a routing interface, the relay agent checks if the interface is configured to relay the destination UDP port. If so, the relay agent unicasts the packet to the configured server IP addresses. Otherwise, the relay agent checks if there is a global configuration for the destination UDP port. If so, the relay agent unicasts the packet to the configured server IP addresses. Otherwise the packet is not relayed. Note that if the packet matches a discard relay entry on the ingress interface, then the packet is not forwarded, regardless of the global configuration.

The relay agent only relays packets that meet the following conditions:

- The destination MAC address must be the all-ones broadcast address (FF:FF:FF:FF:FF:FF)
- The destination IP address must be the limited broadcast address (255.255.255.255) or a directed broadcast address for the receive interface.
- The IP time-to-live (TTL) must be greater than 1.
- The protocol field in the IP header must be UDP (17).
- The destination UDP port must match a configured relay entry.

### 5.10.1 clear ip helper statistics

Use this command to reset to zero the statistics displayed in the `show ip helper statistics` command for the default router.

**Format** clear ip helper statistics

**Mode** Privileged EXEC

**Example:** The following shows an example of the command.

```
(switch) #clear ip helper statistics
```

### 5.10.2 ip helper-address (Global Config)

Use this command to configure the relay of certain UDP broadcast packets received on any interface. This command can be invoked multiple times, either to specify multiple server addresses for a given UDP port number or to specify multiple UDP port numbers handled by a specific server.

|                |                                                                                                                                                                                             |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | No helper addresses are configured.                                                                                                                                                         |
| <b>Format</b>  | <code>ip helper-address server-address [dest-udp-port   dhcp   domain   isakmp   mobile-ip   nameserver   netbios-dgm   netbios-ns   ntp   pim-auto-rp   rip   tacacs   tftp   time]</code> |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Virtual Router Config</li> </ul>                                                                                          |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| server-address | The IPv4 unicast or directed broadcast address to which relayed UDP broadcast packets are sent. The server address cannot be an IP address configured on any interface of the local router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| dest-udp-port  | A destination UDP port number from 0 to 65535.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| port-name      | The destination UDP port may be optionally specified by its name. Whether a port is specified by its number or its name has no effect on behavior. The names recognized are as follows: <ul style="list-style-type: none"> <li>• dhcp (port 67)</li> <li>• domain (port 53)</li> <li>• isakmp (port 500)</li> <li>• mobile-ip (port 434)</li> <li>• nameserver (port 42)</li> <li>• netbios-dgm (port 138)</li> <li>• netbios-ns (port 137)</li> <li>• ntp (port 123)</li> <li>• pim-auto-rp (port 496)</li> <li>• rip (port 520)</li> <li>• tacacs (port 49)</li> <li>• tftp (port 69)</li> <li>• time (port 37)</li> </ul> Other ports must be specified by number. |

**Example:** To relay DHCP packets received on any interface to two DHCP servers, 10.1.1.1 and 10.1.2.1, use the following commands.

```
(switch)#config
(switch)(config)#ip helper-address 10.1.1.1 dhcp
(switch)(config)#ip helper-address 10.1.2.1 dhcp
```

**Example:** To relay UDP packets received on any interface for all default ports to the server at 20.1.1.1, use the following commands.

```
(switch)#config
(switch)(config)#ip helper-address 20.1.1.1
```

### 5.10.2.1 no ip helper-address (Global Config)

Use the `no` form of the command to delete an IP helper entry. The command `no ip helper-address` with no arguments clears all global IP helper addresses.

**Format** `no ip helper-address [server-address [dest-udp-port | dhcp | domain | isakmp | mobile-ip | nameserver | netbios-dgm | netbios-ns | ntp | pim-auto-rp | rip | tacacs | tftp | time]]`

**Mode** Global Config

### 5.10.3 ip helper-address (Interface Config)

Use this command to configure the relay of certain UDP broadcast packets received on a specific interface or range of interfaces. This command can be invoked multiple times on a routing interface, either to specify multiple server addresses for a given port number or to specify multiple port numbers handled by a specific server.

|                |                                                                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | No helper addresses are configured.                                                                                                                                                                     |
| <b>Format</b>  | <code>ip helper-address {server-address   discard} [dest-udp-port   dhcp   domain   isakmp   mobile ip   nameserver   netbios-dgm   netbios-ns   ntp   pim-auto-rp   rip   tacacs   tftp   time]</code> |
| <b>Mode</b>    | Interface Config                                                                                                                                                                                        |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| server-address | The IPv4 unicast or directed broadcast address to which relayed UDP broadcast packets are sent. The server address cannot be in a subnet on the interface where the relay entry is configured, and cannot be an IP address configured on any interface of the local router.                                                                                                                                                                                                                                                                                                                                                                                           |
| discard        | Matching packets should be discarded rather than relayed, even if a global ip helper-address configuration matches the packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| dest-udp-port  | A destination UDP port number from 0 to 65535.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| port-name      | The destination UDP port may be optionally specified by its name. Whether a port is specified by its number or its name has no effect on behavior. The names recognized are as follows: <ul style="list-style-type: none"> <li>• dhcp (port 67)</li> <li>• domain (port 53)</li> <li>• isakmp (port 500)</li> <li>• mobile-ip (port 434)</li> <li>• nameserver (port 42)</li> <li>• netbios-dgm (port 138)</li> <li>• netbios-ns (port 137)</li> <li>• ntp (port 123)</li> <li>• pim-auto-rp (port 496)</li> <li>• rip (port 520)</li> <li>• tacacs (port 49)</li> <li>• tftp (port 69)</li> <li>• time (port 37)</li> </ul> Other ports must be specified by number. |

**Example:** To relay DHCP packets received on interface 1/0/2 to two DHCP servers, 192.168.10.1 and 192.168.20.1, use the following commands.

```
(switch)#config
(switch)(config)#interface 1/0/2
(switch)(interface 1/0/2)#ip helper-address 192.168.10.1 dhcp
(switch)(interface 1/0/2)#ip helper-address 192.168.20.1 dhcp
```

**Example:** To relay both DHCP and DNS packets to 192.168.30.1, use the following commands.

```
(switch)#config
(switch)(config)#interface 1/0/2
(switch)(interface 1/0/2)#ip helper-address 192.168.30.1 dhcp
(switch)(interface 1/0/2)#ip helper-address 192.168.30.1 dns
```

**Example:** This command takes precedence over an `ip helper-address` command given in global configuration mode. With the following configuration, the relay agent relays DHCP packets received on any interface other than 1/0/2 and 1/0/17 to 192.168.40.1, relays DHCP and DNS packets received on 1/0/2 to 192.168.40.2, relays SNMP traps (port 162) received on interface 1/0/17 to 192.168.23.1, and drops DHCP packets received on 1/0/17:

```
(switch)#config
(switch)(config)#ip helper-address 192.168.40.1 dhcp
(switch)(config)#interface 1/0/2
(switch)(interface 1/0/2)#ip helper-address 192.168.40.2 dhcp
(switch)(interface 1/0/2)#ip helper-address 192.168.40.2 domain
(switch)(interface 1/0/2)#exit
(switch)(config)#interface 1/0/17
(switch)(interface 1/0/17)#ip helper-address 192.168.23.1 162
(switch)(interface 1/0/17)#ip helper-address discard dhcp
```

### 5.10.3.1 no ip helper-address (Interface Config)

Use this command to delete a relay entry on an interface. The `no` command with no arguments clears all helper addresses on the interface.

**Format**            `no ip helper-address [server-address | discard ][dest-udp-port | dhcp | domain | isakmp | mobile ip | nameserver | netbios-dgm | netbios-ns | ntp | pim-auto-rp | rip | tacacs | tftp | time]`

**Mode**             Interface Config

### 5.10.4 ip helper enable

Use this command to enable relay of UDP packets. This command can be used to temporarily disable IP helper without deleting all IP helper addresses. This command replaces the `bootpdhcprelay enable` command, but affects not only relay of DHCP packets, but also relay of any other protocols for which an IP helper address has been configured.

**Default**            disabled

**Format**            `ip helper enable`

**Mode**

- Global Config
- Virtual Router Config

**Example:** The following shows an example of the command.

```
(switch)(config)#ip helper enable
```

#### 5.10.4.1 no ip helper enable

Use the `no` form of this command to disable relay of all UDP packets.

**Format**            `no ip helper enable`

**Mode**             Global Config

### 5.10.5 show ip helper-address

Use this command to display the IP helper address configuration the default router. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format.

**Format**            `show ip helper-address [{slot/port|vlan 1-4093}]`

**Mode**             Privileged EXEC

| Parameter | Description                                                                                                                                                                                                       |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| interface | The relay configuration is applied to packets that arrive on this interface. This field is set to <code>any</code> for global IP helper entries.                                                                  |
| UDP Port  | The relay configuration is applied to packets whose destination UDP port is this port. Entries whose UDP port is identified as <code>any</code> are applied to packets with the destination UDP ports listed in . |

| Parameter      | Description                                                                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discard        | If Yes, packets arriving on the given interface with the given destination UDP port are discarded rather than relayed. Discard entries are used to override global IP helper address entries which otherwise might apply to a packet. |
| Hit Count      | The number of times the IP helper entry has been used to relay or discard a packet.                                                                                                                                                   |
| Server Address | The IPv4 address of the server to which packets are relayed.                                                                                                                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ip helper-address
```

IP helper is enabled

| Interface | UDP Port | Discard | Hit Count | Server Address               |
|-----------|----------|---------|-----------|------------------------------|
| 1/0/1     | dhcp     | No      | 10        | 10.100.1.254<br>10.100.2.254 |
| 1/0/17    | any      | Yes     | 2         |                              |
| any       | dhcp     | No      | 0         | 10.200.1.254                 |

## 5.10.6 show ip helper statistics

Use this command to display the number of DHCP and other UDP packets processed and relayed by the UDP relay agent of the default router.

**Format** show ip helper statistics

**Mode** Privileged EXEC

| Parameter                                     | Description                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DHCP client messages received                 | The number of valid messages received from a DHCP client. The count is only incremented if IP helper is enabled globally, the ingress routing interface is up, and the packet passes a number of validity checks, such as having a TTL>1 and having valid source and destination IP addresses.                                                   |
| DHCP client messages relayed                  | The number of DHCP client messages relayed to a server. If a message is relayed to multiple servers, the count is incremented once for each server.                                                                                                                                                                                              |
| DHCP server messages received                 | The number of DHCP responses received from the DHCP server. This count only includes messages that the DHCP server unicasts to the relay agent for relay to the client.                                                                                                                                                                          |
| DHCP server messages relayed                  | The number of DHCP server messages relayed to a client.                                                                                                                                                                                                                                                                                          |
| UDP clients messages received                 | The number of valid UDP packets received. This count includes DHCP messages and all other protocols relayed. Conditions are similar to those for the first statistic in this table.                                                                                                                                                              |
| UDP clients messages relayed                  | The number of UDP packets relayed. This count includes DHCP messages relayed as well as all other protocols. The count is incremented for each server to which a packet is sent.                                                                                                                                                                 |
| DHCP message hop count exceeded max           | The number of DHCP client messages received whose hop count is larger than the maximum allowed. The maximum hop count is a configurable value listed in show bootpdhcrelay. A log message is written for each such failure. The DHCP relay agent does not relay these packets.                                                                   |
| DHCP message with secs field below min        | The number of DHCP client messages received whose secs field is less than the minimum value. The minimum secs value is a configurable value and is displayed in show bootpdhcrelay. A log message is written for each such failure. The DHCP relay agent does not relay these packets.                                                           |
| DHCP message with giaddr set to local address | The number of DHCP client messages received whose gateway address, giaddr, is already set to an IP address configured on one of the relay agent's own IP addresses. In this case, another device is attempting to spoof the relay agent's address. The relay agent does not relay such packets. A log message gives details for each occurrence. |
| Packets with expired TTL                      | The number of packets received with TTL of 0 or 1 that might otherwise have been relayed.                                                                                                                                                                                                                                                        |



| Parameter                            | Description                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------------------|
| Packets that matched a discard entry | The number of packets ignored by the relay agent because they match a discard relay entry. |

**Example:** The following shows example CLI display output for the command.

```
(switch)#show ip helper statistics
```

```
DHCP client messages received..... 8
DHCP client messages relayed..... 2
DHCP server messages received..... 2
DHCP server messages relayed..... 2
UDP client messages received..... 8
UDP client messages relayed..... 2
DHCP message hop count exceeded max..... 0
DHCP message with secs field below min..... 0
DHCP message with giaddr set to local address.. 0
Packets with expired TTL..... 0
Packets that matched a discard entry..... 0
```

## 5.11 Open Shortest Path First Commands

This section describes the commands you use to view and configure Open Shortest Path First (OSPF), which is a link-state routing protocol that you use to route traffic within a network.

### General OSPF Commands

#### 5.11.1 router ospf

Use this command to enable OSPF routing and to enter Router OSPF mode. OSPF routing is enabled in the default router.

**Format** router ospf  
**Mode** Global Config

#### 5.11.2 enable (OSPF)

This command resets the default administrative mode of OSPF in the router (active).

**Default** enabled  
**Format** enable  
**Mode** Router OSPF Config

#### 5.11.2.1 no enable (OSPF)

This command sets the administrative mode of OSPF in the router to inactive.

**Format** no enable  
**Mode** Router OSPF Config

#### 5.11.3 network area (OSPF)

Use this command to enable OSPFv2 on an interface and set its area ID if the IP address of an interface is covered by this network command.

**Default** disabled  
**Format** network *ip-address wildcard-mask* area *area-id*  
**Mode** Router OSPF Config

### 5.11.3.1 no network area (OSPF)

Use this command to disable the OSPFv2 on a interface if the IP address of an interface was earlier covered by this network command.

**Format** no network *ip-address wildcard-mask area area-id*

**Mode** Router OSPF Config

### 5.11.4 1583compatibility

This command enables OSPF 1583 compatibility.

---

#### **NOTICE**

1583 compatibility mode is enabled by default. If all OSPF routers in the routing domain are capable of operating according to RFC 2328, OSPF 1583 compatibility mode should be disabled.

---

**Default** enabled

**Format** 1583compatibility

**Mode** Router OSPF Config

#### 5.11.4.1 no 1583compatibility

This command disables OSPF 1583 compatibility.

**Format** no 1583compatibility

**Mode** Router OSPF Config

### 5.11.5 area default-cost (OSPF)

This command configures the default cost for the stub area. You must specify the area ID and an integer value between 1 to 16777215.

**Format** area *areaid* default-cost *1-16777215*

**Mode** Router OSPF Config

### 5.11.6 area nssa (OSPF)

This command configures the specified areaid to function as an NSSA.

**Format** area *areaid* nssa

**Mode** Router OSPF Config

#### 5.11.6.1 no area nssa

This command disables nssa from the specified area id.

**Format** no area *areaid* nssa

**Mode** Router OSPF Config

### 5.11.7 area nssa default-info-originate (OSPF)

This command configures the metric value and type for the default route advertised into the NSSA. The optional metric parameter specifies the metric of the default route and is to be in a range of 1 to 16777214. If no metric is specified, the default value is \*\*\*\*. The metric type can be comparable (nssa-external 1) or noncomparable (nssa-external 2).

**Format** area *areaid* nssa default-info-originate [*metric*] [{*comparable* | *non-comparable*}]

**Mode** Router OSPF Config

### 5.11.7.1 no area nssa default-info-originate (OSPF)

This command disables the default route advertised into the NSSA.

**Format** no area *areaid* nssa default-info-originate [*metric*] [{comparable | non-comparable}]  
**Mode** Router OSPF Config

### 5.11.8 area nssa no-redistribute (OSPF)

This command configures the NSSA Area Border router (ABR) so that learned external routes will not be redistributed to the NSSA.

**Format** area *areaid* nssa no-redistribute  
**Mode** Router OSPF Config

#### 5.11.8.1 no area nssa no-redistribute (OSPF)

This command disables the NSSA ABR so that learned external routes are redistributed to the NSSA.

**Format** no area *areaid* nssa no-redistribute  
**Mode** Router OSPF Config

### 5.11.9 area nssa no-summary (OSPF)

This command configures the NSSA so that summary LSAs are not advertised into the NSSA.

**Format** area *areaid* nssa no-summary  
**Mode** Router OSPF Config

#### 5.11.9.1 no area nssa no-summary (OSPF)

This command disables nssa from the summary LSAs.

**Format** no area *areaid* nssa no-summary  
**Mode** Router OSPF Config

### 5.11.10 area nssa translator-role (OSPF)

This command configures the translator role of the NSSA. A value of *always* causes the router to assume the role of the translator the instant it becomes a border router and a value of *candidate* causes the router to participate in the translator election process when it attains border router status.

**Format** area *areaid* nssa translator-role {*always* | *candidate*}  
**Mode** Router OSPF Config

#### 5.11.10.1 no area nssa translator-role (OSPF)

This command disables the nssa translator role from the specified area id.

**Format** no area *areaid* nssa translator-role {*always* | *candidate*}  
**Mode** Router OSPF Config

### 5.11.11 area nssa translator-stab-intv (OSPF)

This command configures the translator *stabilityinterval* of the NSSA. The *stabilityinterval* is the period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router.

**Format** area *areaid* nssa translator-stab-intv *stabilityinterval*  
**Mode** Router OSPF Config

### 5.11.11.1 no area nssa translator-stab-intv (OSPF)

This command disables the nssa translator's *stabilityinterval* from the specified area id.

**Format** no area *areaid* nssa translator-stab-intv *stabilityinterval*

**Mode** Router OSPF Config

### 5.11.12 area range (OSPF)

Use the area range command in Router Configuration mode to configure a summary prefix that an area border router advertises for a specific area.

**Default** No area ranges are configured by default. No cost is configured by default.

**Format** area *areaid* range *ip-address netmask* {summarylink | nssaexternallink} [advertise | not-advertise] [cost *cost*]

**Mode** OSPFv2 Router Configuration

| Parameter        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| area-id          | The area identifier for the area whose networks are to be summarized.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| prefix netmask   | The summary prefix to be advertised when the ABR computes a route to one or more networks within this prefix in this area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| summarylink      | When this keyword is given, the area range is used when summarizing prefixes advertised in type 3 summary LSAs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| nssaexternallink | When this keyword is given, the area range is used when translating type 7 LSAs to type 5 LSAs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| advertise        | [Optional] When this keyword is given, the summary prefix is advertised when the area range is active. This is the default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| not-advertise    | [Optional] When this keyword is given, neither the summary prefix nor the contained prefixes are advertised when the area range is active. When the not-advertise option is given, any static cost previously configured is removed from the system configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| cost             | [Optional] If an optional cost is given, OSPF sets the metric field in the summary LSA to the configured value rather than setting the metric to the largest cost among the networks covered by the area range. A static cost may only be configured if the area range is configured to advertise the summary. The range is 0 to 16,777,215. If the cost is set to 16,777,215 for type 3 summarization, a type 3 summary LSA is not advertised, but contained networks are suppressed. This behavior is equivalent to specifying the not-advertise option. If the range is configured for type 7 to type 5 translation, a type 5 LSA is sent if the metric is set to 16,777,215; however, other routers will not compute a route from a type 5 LSA with this metric. |

#### 5.11.12.1 no area range

The no form of this command deletes a specified area range or reverts an option to its default.

**Format** no area *areaid* range *prefix netmask* {summarylink | nssaexternallink} [advertise | not-advertise] [cost]

**Mode** OSPFv2 Router Configuration

**Example:** The following shows an example of the command.

```
!! Create area range
(Router) (Config-router)#area 1 range 10.0.0.0 255.0.0.0 summarylink
!! Delete area range
(Router) (Config-router)#no area 1 range 10.0.0.0 255.0.0.0 summarylink
```

The no form may be used to revert the [advertise | not-advertise] option to its default without deleting the area range. Deleting and recreating the area range would cause OSPF to temporarily advertise the prefixes contained within the range. Note that using either the advertise or not-advertise keyword reverts the configuration to the default.

For example:

```
!! Create area range. Suppress summary.
(Router) (Config-router)#area 1 range 10.0.0.0 255.0.0.0 summarylink not-advertise
!! Advertise summary.
(Router) (Config-router)#no area 1 range 10.0.0.0 255.0.0.0 summarylink not-advertise
```

The `no` form may be use to remove a static area range cost, so that OSPF sets the cost to the largest cost among the contained routes.

```
!! Create area range with static cost.
(Router) (Config-router)#area 1 range 10.0.0.0 255.0.0.0 summarylink cost 1000
!! Remove static cost.
(Router) (Config-router)#no area 1 range 10.0.0.0 255.0.0.0 summarylink cost
```

### 5.11.13 area stub (OSPF)

This command creates a stub area for the specified area ID. A stub area is characterized by the fact that AS External LSAs are not propagated into the area. Removing AS External LSAs and Summary LSAs can significantly reduce the link state database of routers within the stub area.

**Format**            area *areaid* stub  
**Mode**             Router OSPF Config

#### 5.11.13.1 no area stub

This command deletes a stub area for the specified area ID.

**Format**            no area *areaid* stub  
**Mode**             Router OSPF Config

### 5.11.14 area stub no-summary (OSPF)

This command configures the Summary LSA mode for the stub area identified by *areaid*. Use this command to prevent LSA Summaries from being sent.

**Default**           disabled  
**Format**            area *areaid* stub no-summary  
**Mode**             Router OSPF Config

#### 5.11.14.1 no area stub no-summary

This command configures the default Summary LSA mode for the stub area identified by *areaid*.

**Format**            no area *areaid* stub no-summary  
**Mode**             Router OSPF Config

### 5.11.15 area virtual-link (OSPF)

This command creates the OSPF virtual interface for the specified *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format**            area *areaid* virtual-link *neighbor*  
**Mode**             Router OSPF Config

#### 5.11.15.1 no area virtual-link

This command deletes the OSPF virtual interface from the given interface, identified by *areaid* and *neighbor*. The

*neighbor* parameter is the Router ID of the neighbor.

**Format**           no area *areaid* virtual-link *neighbor*  
**Mode**             Router OSPF Config

### 5.11.16 area virtual-link authentication

This command configures the authentication type and key for the OSPF virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The value for *type* is either none, simple, or encrypt. The *key* is composed of standard displayable, noncontrol keystrokes from a Standard 101/102-key keyboard. The authentication key must be 8 bytes or less if the authentication type is simple. If the type is encrypt, the key may be up to 16 bytes. Unauthenticated interfaces do not need an authentication key. If the type is encrypt, a key id in the range of 0 and 255 must be specified. The default value for authentication type is none. Neither the default password key nor the default key id are configured.

**Default**           none  
**Format**           area *areaid* virtual-link *neighbor* authentication {none | {simple *key*} |  
                      {encrypt *key* *keyid*}}  
**Mode**             Router OSPF Config

#### 5.11.16.1 no area virtual-link authentication

This command configures the default authentication type for the OSPF virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format**           no area *areaid* virtual-link *neighbor* authentication  
**Mode**             Router OSPF Config

### 5.11.17 area virtual-link dead-interval (OSPF)

This command configures the dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for seconds is 1 to 65535.

**Default**           40  
**Format**           area *areaid* virtual-link *neighbor* dead-interval *seconds*  
**Mode**             Router OSPF Config

#### 5.11.17.1 no area virtual-link dead-interval

This command configures the default dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format**           no area *areaid* virtual-link *neighbor* dead-interval  
**Mode**             Router OSPF Config

### 5.11.18 area virtual-link hello-interval (OSPF)

This command configures the hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for *seconds* is 1 to 65535.

**Default**           10  
**Format**           area *areaid* virtual-link *neighbor* hello-interval 1-65535  
**Mode**             Router OSPF Config

### 5.11.18.1 no area virtual-link hello-interval

This command configures the default hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* hello-interval  
**Mode** Router OSPF Config

### 5.11.19 area virtual-link retransmit-interval (OSPF)

This command configures the retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for seconds is 0 to 3600.

**Default** 5  
**Format** area *areaid* virtual-link *neighbor* retransmit-interval *seconds*  
**Mode** Router OSPF Config

#### 5.11.19.1 no area virtual-link retransmit-interval

This command configures the default retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* retransmit-interval  
**Mode** Router OSPF Config

### 5.11.20 area virtual-link transmit-delay (OSPF)

This command configures the transmit delay for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for seconds is 0 to 3600 (1 hour).

**Default** 1  
**Format** area *areaid* virtual-link *neighbor* transmit-delay *seconds*  
**Mode** Router OSPF Config

#### 5.11.20.1 no area virtual-link transmit-delay

This command resets the default transmit delay for the OSPF virtual interface to the default value.

**Format** no area *areaid* virtual-link *neighbor* transmit-delay  
**Mode** Router OSPF Config

### 5.11.21 auto-cost (OSPF)

By default, OSPF computes the link cost of each interface from the interface bandwidth. Faster links have lower metrics, making them more attractive in route selection. The configuration parameters in the `auto-cost reference bandwidth` and `bandwidth` commands give you control over the default link cost. You can configure for OSPF an interface bandwidth that is independent of the actual link speed. A second configuration parameter allows you to control the ratio of interface bandwidth to link cost. The link cost is computed as the ratio of a reference bandwidth to the interface bandwidth ( $\text{ref\_bw}/\text{interface bandwidth}$ ), where interface bandwidth is defined by the `bandwidth` command. Because the default reference bandwidth is 100 megabits per second (Mb/s), OSPF uses the same default link cost for all interfaces whose bandwidth is 100 Mb/s or greater. Use the `auto-cost` command to change the reference bandwidth, specifying the reference bandwidth in Mb/s. The reference bandwidth range is 1 to 4294967 Mb/s.

**Default** 100 Mb/s  
**Format** `auto-cost reference-bandwidth 1-4294967`  
**Mode** Router OSPF Config

#### 5.11.21.1 no auto-cost reference-bandwidth (OSPF)

Use this command to set the reference bandwidth to the default value.

**Format** `no auto-cost reference-bandwidth`  
**Mode** Router OSPF Config

### 5.11.22 capability opaque

Use this command to enable Opaque Capability on the Router. The information contained in Opaque LSAs may be used directly by OSPF or indirectly by an application wanting to distribute information throughout the OSPF domain. FASTPATH supports the storing and flooding of Opaque LSAs of different scopes. The default value of `enabled` means that OSPF will forward opaque LSAs by default. If you want to upgrade from a previous release, where the default was disabled, opaque LSA forwarding will be enabled. If you want to disable opaque LSA forwarding, then you should enter the command `no capability opaque` in OSPF router configuration mode after the software upgrade.

**Default** enabled  
**Format** `capability opaque`  
**Mode** Router Config

#### 5.11.22.1 no capability opaque

Use this command to disable opaque capability on the router.

**Format** `no capability opaque`  
**Mode** Router Config

### 5.11.23 clear ip ospf

Use this command to disable and re-enable OSPF for the default router.

**Format** `clear ip ospf`  
**Mode** Privileged EXEC

### 5.11.24 clear ip ospf configuration

Use this command to reset the OSPF configuration to factory defaults for the default router.

**Format** `clear ip ospf configuration`  
**Mode** Privileged EXEC



### 5.11.25 clear ip ospf counters

Use this command to reset global and interface statistics for the specified virtual router. If no virtual router is specified, the global and interface statistics are reset for the default router.

**Format** clear ip ospf counters  
**Mode** Privileged EXEC

### 5.11.26 clear ip ospf neighbor

Use this command to drop the adjacency with all OSPF neighbors for the specified router. On each neighbor's interface, send a one-way hello. Adjacencies may then be re-established. To drop all adjacencies with a specific router ID, specify the neighbor's Router ID using the optional parameter [neighbor-id].

**Format** clear ip ospf neighbor [neighbor-id]  
**Mode** Privileged EXEC

### 5.11.27 clear ip ospf neighbor interface

To drop adjacency with all neighbors on a specific interface, use the optional parameter [slot/port]. To drop adjacency with a specific router ID on a specific interface, use the optional parameter [neighbor-id].

**Format** clear ip ospf neighbor interface [slot/port] [neighbor-id]  
**Mode** Privileged EXEC

### 5.11.28 clear ip ospf redistribution

Use this command to flush all self-originated external LSAs for the specified virtual router. If no router is specified, the command is executed for the default router. Reapply the redistribution configuration and reoriginate prefixes as necessary.

**Format** clear ip ospf redistribution  
**Mode** Privileged EXEC

### 5.11.29 default-information originate (OSPF)

Use this command to control the advertisement of default routes.

**Default**

- metric—unspecified
- type—2

**Format** default-information originate [always] [metric 0-16777214] [metric-type {1 | 2}]  
**Mode** Router OSPF Config

#### 5.11.29.1 no default-information originate (OSPF)

Use this command to control the advertisement of default routes.

**Format** no default-information originate [metric] [metric-type]  
**Mode** Router OSPF Config

### 5.11.30 default-metric (OSPF)

Use this command to set a default for the metric of distributed routes.

**Format** default-metric 1-16777214  
**Mode** Router OSPF Config

### 5.11.30.1 no default-metric (OSPF)

Use this command to set a default for the metric of distributed routes.

**Format** no default-metric  
**Mode** Router OSPF Config

### 5.11.31 distance ospf (OSPF)

This command sets the route preference value of OSPF in the router. Lower route preference values are preferred when determining the best route. The type of OSPF route can be *intra*, *inter*, or *external*. All the external type routes are given the same preference value. The range of *preference* value is 1 to 255.

**Default** 110  
**Format** distance ospf {intra-area 1-255 | inter-area 1-255 | external 1-255}  
**Mode** Router OSPF Config

#### 5.11.31.1 no distance ospf

This command sets the default route preference value of OSPF routes in the router. The type of OSPF can be *intra*, *inter*, or *external*. All the external type routes are given the same preference value.

### 5.11.32 distance ospf (OSPF)

**Format** no distance ospf {intra-area | inter-area | external}  
**Mode** Router OSPF Config

This command sets the route preference value of OSPF in the router. Lower route preference values are preferred when determining the best route. The type of OSPF route can be *intra*, *inter*, or *external*. All the external type routes are given the same preference value. The range of *preference* value is 1 to 255.

**Default** 110  
**Format** distance ospf {intra-area 1-255 | inter-area 1-255 | external 1-255}  
**Mode** Router OSPF Config

#### 5.11.32.1 no distance ospf

This command sets the default route preference value of OSPF routes in the router. The type of OSPF can be *intra*, *inter*, or *external*. All the external type routes are given the same preference value.

**Format** no distance ospf {intra-area | inter-area | external}  
**Mode** Router OSPF Config

### 5.11.33 distribute-list route-map in (OSPF)

This command uses a route-map to prevent the incoming OSPF routes from being added to the routing table. The route-maps used can match on one or more attributes of the OSPF route.

**Format** distribute-list route-map *route-map-name* in  
**Mode** Router OSPF Config

#### 5.11.33.1 no distribute-list route-map in

Use this command to unconfigure the route-map configured for filtering incoming OSPF routes.

**Format** no distribute-list *route-map* in  
**Mode** Router OSPF Config

### 5.11.34 exit-overflow-interval (OSPF)

This command configures the exit overflow interval for OSPF. It describes the number of seconds after entering overflow state that a router will wait before attempting to leave the overflow state. This allows the router to again originate nondefault AS-external-LSAs. When set to 0, the router will not leave overflow state until restarted. The range for seconds is 0 to 2,147,483,647 seconds.

**Default** 0  
**Format** exit-overflow-interval *seconds*  
**Mode** Router OSPF Config

#### 5.11.34.1 no exit-overflow-interval

This command configures the default exit overflow interval for OSPF.

**Format** no exit-overflow-interval  
**Mode** Router OSPF Config

### 5.11.35 external-lsdb-limit (OSPF)

This command configures the external LSDB limit for OSPF. If the value is -1, then there is no limit. When the number of nondefault AS-external-LSAs in a router's link-state database reaches the external LSDB limit, the router enters overflow state. The router never holds more than the external LSDB limit nondefault AS-external-LSAs in its database. The external LSDB limit MUST be set identically in all routers attached to the OSPF backbone and/or any regular OSPF area. The range for limit is -1 to 2147483647.

**Default** -1  
**Format** external-lsdb-limit *limit*  
**Mode** Router OSPF Config

#### 5.11.35.1 no external-lsdb-limit

This command configures the default external LSDB limit for OSPF.

**Format** no external-lsdb-limit  
**Mode** Router OSPF Config

### 5.11.36 log-adjacency-changes

To enable logging of OSPFv2 neighbor state changes, use the log-adjacency-changes command in router configuration mode. State changes are logged with INFORMATIONAL severity.

**Default** Adjacency state changes are logged, but without the detail option.  
**Format** log-adjacency-changes [*detail*]  
**Mode** OSPFv2 Router Configuration

| Parameter | Description                                                                                                                                                                    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| detail    | (Optional) When this keyword is specified, all adjacency state changes are logged. Otherwise, OSPF only logs transitions to FULL state and when a backwards transition occurs. |

#### 5.11.36.1 no log-adjacency-changes

Use the no form of the command to disable state change logging.

**Format**        `no log-adjacency-changes [detail]`  
**Mode**         OSPFv2 Router Configuration

### 5.11.37 prefix-suppression (Router OSPF Config)

This command suppresses the advertisement of all the IPv4 prefixes except for prefixes that are associated with secondary IPv4 addresses, loopbacks, and passive interfaces from the OSPFv2 router advertisements.

To suppress a loopback or passive interface, use the `ip ospf prefix-suppression` command in interface configuration mode. Prefixes associated with secondary IPv4 addresses can never be suppressed.

**Default**        Prefix suppression is disabled.  
**Format**        `prefix-suppression`  
**Mode**         Router OSPF Config

#### 5.11.37.1 no prefix-suppression

This command disables prefix-suppression. No prefixes are suppressed from getting advertised.

**Format**        `no prefix-suppression`  
**Mode**         Router OSPF Config

### 5.11.38 prefix-suppression (Router OSPFv3 Config)

This command suppresses the advertisement of all the IPv6 prefixes except for prefixes that are associated with secondary IPv6 addresses, loopbacks, and passive interfaces from the OSPFv3 router advertisements.

To suppress a loopback or passive interface, use the `ipv6 ospf prefix-suppression` command in interface configuration mode. Prefixes associated with secondary IPv6 addresses can never be suppressed.

**Default**        Prefix suppression is disabled.  
**Format**        `prefix-suppression`  
**Mode**         Router OSPFv3 Config

#### 5.11.38.1 no prefix-suppression

This command disables prefix-suppression. No prefixes are suppressed from getting advertised.

**Format**        `no prefix-suppression`  
**Mode**         Router OSPFv3 Config

### 5.11.39 router-id (OSPF)

This command sets a 4-digit dotted-decimal number uniquely identifying the router ospf id. The *ipaddress* is a configured value.

**Format**        `router-id ipaddress`  
**Mode**         Router OSPF Config

### 5.11.40 redistribute (OSPF)

This command configures OSPF protocol to allow redistribution of routes from the specified source protocol/routers.

Use the command in Router OSPF Config mode to take the optional *route-map* parameter to set OSPF attributes on a matching set of redistributed routes from other protocols.

When the metric, metric-type and tag are configured along with the *route-map* parameter, the overlapping set actions for metric, metric-type and tag within the matching route-map statement take precedence over them for the matching set of routes.

|                |                                                                                                                                             |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | <ul style="list-style-type: none"> <li>metric—unspecified</li> <li>type—2</li> <li>tag—0</li> </ul>                                         |
| <b>Format</b>  | redistribute {rip   static   connected} [metric 0-16777214] [metric-type {1   2}] [tag 0-4294967295] [route-map <route-map-name>] [subnets] |
| <b>Mode</b>    | Router OSPF Config                                                                                                                          |

#### 5.11.40.1 no redistribute

This command configures OSPF protocol to prohibit redistribution of routes from the specified source protocol/routers.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | no redistribute {rip   static   connected} [metric] [metric-type] [tag] [route-map] [subnets] |
| <b>Mode</b>   | Router OSPF Config                                                                            |

#### 5.11.41 maximum-paths (OSPF)

This command sets the number of paths that OSPF can report for a given destination where *maxpaths* is platform dependent.

|                |                               |
|----------------|-------------------------------|
| <b>Default</b> | 4                             |
| <b>Format</b>  | maximum-paths <i>maxpaths</i> |
| <b>Mode</b>    | Router OSPF Config            |

#### 5.11.41.1 no maximum-paths

This command resets the number of paths that OSPF can report for a given destination back to its default value.

|               |                    |
|---------------|--------------------|
| <b>Format</b> | no maximum-paths   |
| <b>Mode</b>   | Router OSPF Config |

#### 5.11.42 passive-interface default (OSPF)

Use this command to enable global passive mode by default for all interfaces. It overrides any interface level passive mode. OSPF will not form adjacencies over a passive interface.

|                |                           |
|----------------|---------------------------|
| <b>Default</b> | disabled                  |
| <b>Format</b>  | passive-interface default |
| <b>Mode</b>    | Router OSPF Config        |

#### 5.11.42.1 no passive-interface default

Use this command to disable the global passive mode by default for all interfaces. Any interface previously configured to be passive reverts to nonpassive mode.

|               |                              |
|---------------|------------------------------|
| <b>Format</b> | no passive-interface default |
| <b>Mode</b>   | Router OSPF Config           |

#### 5.11.43 passive-interface (OSPF)

Use this command to set the interface as passive. It overrides the global passive mode that is currently effective on the interface. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format.

**Default** disabled  
**Format** `passive-interface {slot/port/vlan 1-4093}`  
**Mode** Router OSPF Config

### 5.11.43.1 no passive-interface

Use this command to set the interface as nonpassive. It overrides the global passive mode that is currently effective on the interface.

**Format** `no passive-interface {slot/port/vlan 1-4093}`  
**Mode** Router OSPF Config

### 5.11.44 timers pacing flood

To adjust the rate at which OSPFv2 sends LS Update packets, use the `timers pacing flood` command in router OSPFv2 global configuration mode. OSPF distributes routing information in Link State Advertisements (LSAs), that are bundled into Link State Update (LS Update) packets. To reduce the likelihood of sending a neighbor more packets than it can buffer, OSPF rate limits the transmission of LS Update packets. By default, OSPF sends up to 30 updates per second on each interface (1/the pacing interval). Use this command to adjust this packet rate.

**Default** 33 milliseconds  
**Format** `timers pacing flood milliseconds`  
**Mode** OSPFv2 Router Configuration

| Parameter    | Description                                                                                                         |
|--------------|---------------------------------------------------------------------------------------------------------------------|
| milliseconds | The average time between transmission of LS Update packets. The range is from 5 ms to 100 ms. The default is 33 ms. |

#### 5.11.44.1 no timers pacing flood

To revert LSA transmit pacing to the default rate, use the `no timers pacing flood` command.

**Format** `no timers pacing flood`  
**Mode** OSPFv2 Router Configuration

### 5.11.45 timers pacing lsa-group

To adjust how OSPF groups LSAs for periodic refresh, use the `timers pacing lsa-group` command in OSPFv2 Router Configuration mode. OSPF refreshes self-originated LSAs approximately once every 30 minutes. When OSPF refreshes LSAs, it considers all self-originated LSAs whose age is from 1800 to 1800 plus the pacing group size. Grouping LSAs for refresh allows OSPF to combine refreshed LSAs into a minimal number of LS Update packets. Minimizing the number of Update packets makes LSA distribution more efficient.

When OSPF originates a new or changed LSA, it selects a random refresh delay for the LSA. When the refresh delay expires, OSPF refreshes the LSA. By selecting a random refresh delay, OSPF avoids refreshing a large number of LSAs at one time, even if a large number of LSAs are originated at one time.

**Default** 60 seconds  
**Format** `timers pacing lsa-group seconds`  
**Mode** OSPFv2 Router Configuration

| Parameter | Description                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------|
| seconds   | Width of the window in which LSAs are refreshed. The range for the pacing group window is from 10 to 1800 seconds. |

### 5.11.46 timers spf

Use this command to configure the SPF delay time and hold time. The valid range for both parameters is 0 to 65535 seconds.

|                |                                                                                          |
|----------------|------------------------------------------------------------------------------------------|
| <b>Default</b> | <ul style="list-style-type: none"> <li>• delay-time—5</li> <li>• hold-time—10</li> </ul> |
| <b>Format</b>  | <code>timers spf <i>delay-time hold-time</i></code>                                      |
| <b>Mode</b>    | Router OSPF Config                                                                       |

### 5.11.47 trapflags (OSPF)

Use this command to enable individual OSPF traps, enable a group of trap flags at a time, or enable all the trap flags at a time. The different groups of trapflags, and each group's specific trapflags to enable or disable, are listed in [Table 12](#).

Table 12: Trapflags Groups

| Group        | Flags                                                                                                                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| errors       | <ul style="list-style-type: none"> <li>• authentication-failure</li> <li>• bad-packet</li> <li>• config-error</li> <li>• virt-authentication-failure</li> <li>• virt-bad-packet</li> <li>• virt-config-error</li> </ul> |
| lsa          | <ul style="list-style-type: none"> <li>• lsa-maxage</li> <li>• lsa-originate</li> </ul>                                                                                                                                 |
| overflow     | <ul style="list-style-type: none"> <li>• lsdb-overflow</li> <li>• lsdb-approaching-overflow</li> </ul>                                                                                                                  |
| retransmit   | <ul style="list-style-type: none"> <li>• packets</li> <li>• virt-packets</li> </ul>                                                                                                                                     |
| state-change | <ul style="list-style-type: none"> <li>• if-state-change</li> <li>• neighbor-state-change</li> <li>• virtif-state-change</li> <li>• virtneighbor-state-change</li> </ul>                                                |

- To enable the individual flag, enter the group name followed by that particular flag.
- To enable all the flags in that group, give the group name followed by `all`.
- To enable all the flags, give the command as `trapflags all`.

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Format</b>  | <pre>trapflags { all   errors {all   authentication-failure   bad-packet   config-error   virt- authentication-failure   virt-bad-packet   virt-config-error}   lsa {all   lsa-maxage   lsa-originate}   overflow {all   lsdb-overflow   lsdb-approaching-overflow}   retransmit {all   packets   virt-packets}   state-change {all   if-state-change   neighbor-state-change   virtif-state- change   virtneighbor-state-change} }</pre> |
| <b>Mode</b>    | Router OSPF Config                                                                                                                                                                                                                                                                                                                                                                                                                        |

### 5.11.47.1 no trapflags

Use this command to revert to the default reference bandwidth.

- To disable the individual flag, enter the `group` name followed by that particular flag.
- To disable all the flags in that group, give the group name followed by `all`.
- To disable all the flags, give the command as `trapflags all`.

**Format**            `no trapflags {  
all |  
errors {all | authentication-failure | bad-packet | config-error | virt-  
authentication-failure | virt-bad-packet | virt-config-error} |  
lsa {all | lsa-maxage | lsa-originate} |  
overflow {all | lsdb-overflow | lsdb-approaching-overflow} |  
retransmit {all | packets | virt-packets} |  
state-change {all | if-state-change | neighbor-state-change | virtif-state-  
change | virtneighbor-state-change}  
}`

**Mode**             Router OSPF Config

## OSPF Interface Commands

### 5.11.48 ip ospf area

Use this command to enable OSPFv2 and set the area ID of an interface or range of interfaces. The `area-id` is an IP address formatted as a 4-digit dotted-decimal number or a decimal value in the range of 0 to 4294967295. This command supersedes the effects of the `network area` command. It can also be used to configure the advertiseability of the secondary addresses on this interface into the OSPFv2 domain.

**Default**            disabled

**Format**            `ip ospf area area-id [secondaries none]`

**Mode**             Interface Config

#### 5.11.48.1 no ip ospf area

Use this command to disable OSPF on an interface.

**Format**            `no ip ospf area [secondaries none]`

**Mode**             Interface Config

### 5.11.49 bandwidth

By default, OSPF computes the link cost of an interface as the ratio of the reference bandwidth to the interface bandwidth. Reference bandwidth is specified with the `auto-cost` command. For the purpose of the OSPF link cost calculation, use the `bandwidth` command to specify the interface bandwidth. The bandwidth is specified in kilobits per second (Kb/s). If no bandwidth is configured, the bandwidth defaults to the actual interface bandwidth for port-based routing interfaces and to 10 Mb/s for VLAN routing interfaces. This command does not affect the actual speed of an interface. You can use this command to configure a single interface or a range of interfaces.

**Default**            actual interface bandwidth

**Format**            `bandwidth 1-10000000`

**Mode**             Interface Config

#### 5.11.49.1 no bandwidth

Use this command to set the interface bandwidth to its default value.



**Format**           no bandwidth  
**Mode**             Interface Config

### 5.11.50 ip ospf authentication

This command sets the OSPF Authentication Type and Key for the specified interface or range of interfaces. The value of *type* is either none, simple or encrypt. The *key* is composed of standard displayable, noncontrol keystrokes from a Standard 101/102-key keyboard. The authentication key must be 8 bytes or less if the authentication type is simple. If the type is encrypt, the key may be up to 16 bytes. If the type is encrypt a *keyid* in the range of 0 and 255 must be specified. Unauthenticated interfaces do not need an authentication key or authentication key ID. There is no default value for this command.

**Format**           ip ospf authentication {none | {simple *key*} | {encrypt *key keyid*}}  
**Mode**             Interface Config

#### 5.11.50.1 no ip ospf authentication

This command sets the default OSPF Authentication Type for the specified interface.

**Format**           no ip ospf authentication  
**Mode**             Interface Config

### 5.11.51 ip ospf cost

This command configures the cost on an OSPF interface or range of interfaces. The *cost* parameter has a range of 1 to 65535.

**Default**          10  
**Format**           ip ospf cost 1-65535  
**Mode**             Interface Config

#### 5.11.51.1 no ip ospf cost

This command configures the default cost on an OSPF interface.

**Format**           no ip ospf cost  
**Mode**             Interface Config

### 5.11.52 ip ospf database-filter all out

Use the `ip ospf database-filter all out` command in Interface Configuration mode to disable OSPFv2 LSA flooding on an interface.

**Default**          disabled  
**Format**           ip ospf database-filter all out  
**Mode**             Interface Configuration

#### 5.11.52.1 no ip ospf database-filter all out

Use the `no ip ospf database-filter all out` command in Interface Configuration mode to enable OSPFv2 LSA flooding on an interface.

**Default**          disabled  
**Format**           ip ospf database-filter all out  
**Mode**             Interface Configuration

### 5.11.53 ip ospf dead-interval

This command sets the OSPF dead interval for the specified interface or range of interfaces. The value for *seconds* (range: 1 to 65535) is a valid positive integer, which represents the length of time in seconds that a router's Hello packets have not been seen before its neighbor routers declare that the router is down. The value for the length of time must be the same for all routers attached to a common network. This value should be some multiple of the Hello Interval (that is, 4). Valid values range in seconds from 1 to 65535.

**Default** 40  
**Format** ip ospf dead-interval *seconds*  
**Mode** Interface Config

#### 5.11.53.1 no ip ospf dead-interval

This command sets the default OSPF dead interval for the specified interface.

**Format** no ip ospf dead-interval  
**Mode** Interface Config

### 5.11.54 ip ospf hello-interval

This command sets the OSPF hello interval for the specified interface or range of interfaces. The value for seconds is a valid positive integer, which represents the length of time in seconds. The value for the length of time must be the same for all routers attached to a network. Valid values range from 1 to 65535.

**Default** 10  
**Format** ip ospf hello-interval *seconds*  
**Mode** Interface Config

#### 5.11.54.1 no ip ospf hello-interval

This command sets the default OSPF hello interval for the specified interface.

**Format** no ip ospf hello-interval  
**Mode** Interface Config

### 5.11.55 ip ospf network

Use this command to configure OSPF to treat an interface or range of interfaces as a point-to-point rather than broadcast interface. The *broadcast* option sets the OSPF network type to broadcast. The *point-to-point* option sets the OSPF network type to point-to-point. OSPF treats interfaces as broadcast interfaces by default. (Loopback interfaces have a special loopback network type, which cannot be changed.) When there are only two routers on the network, OSPF can operate more efficiently by treating the network as a point-to-point network. For point-to-point networks, OSPF does not elect a designated router or generate a network link state advertisement (LSA). Both endpoints of the link must be configured to operate in point-to-point mode.

**Default** broadcast  
**Format** ip ospf network {broadcast | point-to-point}  
**Mode** Interface Config

#### 5.11.55.1 no ip ospf network

Use this command to return the OSPF network type to the default.

**Format** no ip ospf network  
**Mode** Interface Config

### 5.11.56 ip ospf prefix-suppression

This command suppresses the advertisement of the IPv4 prefixes that are associated with an interface, except for those associated with secondary IPv4 addresses. This command takes precedence over the global configuration. If this configuration is not specified, the global prefix-suppression configuration applies.

Prefix-suppression can be disabled at the interface level by using the `disable` option. The `disable` option is useful for excluding specific interfaces from performing prefix-suppression when the feature is enabled globally.

Note that the `disable` option `disable` is not equivalent to not configuring the interface specific prefix-suppression. If prefix-suppression is not configured at the interface level, the global prefix-suppression configuration is applicable for the IPv4 prefixes associated with the interface.

**Default** Prefix-suppression is not configured.  
**Format** `ip ospf prefix-suppression [disable]`  
**Mode** Interface Config

#### 5.11.56.1 no ip ospf prefix-suppression

This command removes prefix-suppression configurations at the interface level. When the `no ip ospf prefix-suppression` command is used, global prefix-suppression applies to the interface. Not configuring the command is not equal to disabling interface level prefix-suppression.

**Format** `no ip ospf prefix-suppression`  
**Mode** Interface Config

### 5.11.57 ip ospf priority

This command sets the OSPF priority for the specified router interface or range of interfaces. The priority of the interface is a priority integer from 0 to 255. A value of 0 indicates that the router is not eligible to become the designated router on this network.

**Default** 1  
**Format** `ip ospf priority 0-255`  
**Mode** Interface Config

#### 5.11.57.1 no ip ospf priority

This command sets the default OSPF priority for the specified router interface.

**Format** `no ip ospf priority`  
**Mode** Interface Config

### 5.11.58 ip ospf retransmit-interval

This command sets the OSPF retransmit Interval for the specified interface or range of interfaces. The retransmit interval is specified in seconds. The value for *seconds* is the number of seconds between link-state advertisement retransmissions for adjacencies belonging to this router interface. This value is also used when retransmitting database description and link-state request packets. Valid values range from 0 to 3600 (1 hour).

**Default** 5  
**Format** `ip ospf retransmit-interval 0-3600`  
**Mode** Interface Config

### 5.11.58.1 no ip ospf retransmit-interval

This command sets the default OSPF retransmit Interval for the specified interface.

**Format** no ip ospf retransmit-interval  
**Mode** Interface Config

### 5.11.59 ip ospf transmit-delay

This command sets the OSPF Transit Delay for the specified interface or range of interfaces. The transmit delay is specified in seconds. In addition, it sets the estimated number of seconds it takes to transmit a link state update packet over this interface. Valid values for *seconds* range from 1 to 3600 (1 hour).

**Default** 1  
**Format** ip ospf transmit-delay 1-3600  
**Mode** Interface Config

#### 5.11.59.1 no ip ospf transmit-delay

This command sets the default OSPF Transit Delay for the specified interface.

**Format** no ip ospf transmit-delay  
**Mode** Interface Config

### 5.11.60 ip ospf mtu-ignore

This command disables OSPF maximum transmission unit (MTU) mismatch detection on an interface or range of interfaces. OSPF Database Description packets specify the size of the largest IP packet that can be sent without fragmentation on the interface. When a router receives a Database Description packet, it examines the MTU advertised by the neighbor. By default, if the MTU is larger than the router can accept, the Database Description packet is rejected and the OSPF adjacency is not established.

**Default** enabled  
**Format** ip ospf mtu-ignore  
**Mode** Interface Config

#### 5.11.60.1 no ip ospf mtu-ignore

This command enables the OSPF MTU mismatch detection.

**Format** no ip ospf mtu-ignore  
**Mode** Interface Config

## IP Event Dampening Commands

### 5.11.61 dampening

Use this command to enable IP event dampening on a routing interface.

**Format** dampening [*half-life period*] [*reuse-threshold suppress-threshold max-suppress-time*]  
 [*restart restart-penalty*]  
**Mode** Interface Config

| Parameter          | Description                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Half-life period   | The number of seconds it takes for the penalty to reduce by half. The configurable range is 1 to 30 seconds. Default value is 5 seconds.                                                                                                                                                                |
| Reuse Threshold    | The value of the penalty at which the dampened interface is restored. The configurable range is 1 to 20,000. Default value is 1000.                                                                                                                                                                     |
| Suppress Threshold | The value of the penalty at which the interface is dampened. The configurable range is 1 to 20,000. Default value is 2000.                                                                                                                                                                              |
| Max Suppress Time  | The maximum amount of time (in seconds) an interface can be in suppressed state after it stops flapping. The configurable range is 1 to 255 seconds. The default value is four times of half-life period. If half-period value is allowed to default, the maximum suppress time defaults to 20 seconds. |
| Restart Penalty    | Penalty applied to the interface after the device reloads. The configurable range is 1 to 20,000. Default value is 2000.                                                                                                                                                                                |

### 5.11.61.1 no dampening

This command disables IP event dampening on a routing interface.

**Format**           no dampening  
**Mode**             Interface Config

### 5.11.62 show dampening interface

This command summarizes the number of interfaces configured with dampening and the number of interfaces being suppressed.

**Format**           show dampening interface  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Router)# show dampening interface
2 interfaces are configured with dampening.
1 interface is being suppressed.
```

### 5.11.63 show interface dampening

This command displays the status and configured parameters of the interfaces configured with dampening.

**Format**           show interface dampening  
**Mode**             Privileged EXEC

| Parameter | Description                                                              |
|-----------|--------------------------------------------------------------------------|
| Flaps     | The number times the link state of an interface changed from UP to DOWN. |
| Penalty   | Accumulated Penalty.                                                     |
| Supp      | Indicates if the interface is suppressed or not.                         |
| ReuseTm   | Number of seconds until the interface is allowed to come up again.       |
| HalfL     | Configured half-life period.                                             |
| ReuseV    | Configured reuse-threshold.                                              |
| SuppV     | Configured suppress threshold.                                           |
| MaxSTm    | Configured maximum suppress time in seconds.                             |
| MaxP      | The maximum possible penalty.                                            |
| Restart   | Configured restart penalty.                                              |

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                              | Description |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Note:</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |             |
| <ul style="list-style-type: none"> <li>The <code>clear counters</code> CLI command resets the flap count to zero.</li> <li>The <code>no shutdown</code> interface CLI command resets the suppressed state to <code>False</code>.</li> <li>Any change in the dampening configuration resets the current penalty, reuse time and suppressed state to their default values, meaning 0, 0, and <code>FALSE</code> respectively.</li> </ul> |             |

**Example:** The following shows example CLI display output for the command.

```
Router# show interface dampening
```

```
Interface 0/2
Flaps Penalty Supp ReuseTm HalfL ReuseV SuppV MaxSTm MaxP Restart
0 0 FALSE 0 5 1000 2000 20 16000 0
Interface 0/3
Flaps Penalty Supp ReuseTm HalfL ReuseV SuppV MaxSTm MaxP Restart
6 1865 TRUE 18 20 1000 2001 30 2828 1500
```

## OSPF Graceful Restart Commands

The OSPF protocol can be configured to participate in the checkpointing service, so that these protocols can execute a graceful restart when the management unit fails. In a graceful restart, the hardware continues forwarding IPv4 packets using OSPF routes while a backup switch takes over management unit responsibility.

Graceful restart uses the concept of helpful neighbors. A fully adjacent router enters helper mode when it receives a link state announcement (LSA) from the restarting management unit indicating its intention of performing a graceful restart. In helper mode, a switch continues to advertise to the rest of the network that they have full adjacencies with the restarting router, thereby avoiding announcement of a topology change and the potential for flooding of LSAs and shortest-path-first (SPF) runs (which determine OSPF routes). Helpful neighbors continue to forward packets through the restarting router. The restarting router relearns the network topology from its helpful neighbors.

Graceful restart can be enabled for either planned or unplanned restarts, or both. A planned restart is initiated by the operator through the management command `initiate failover`. The operator may initiate a failover to take the management unit out of service (for example, to address a partial hardware failure), to correct faulty system behavior which cannot be corrected through less severe management actions, or other reasons. An unplanned restart is an unexpected failover caused by a fatal hardware failure of the management unit or the software stops responding or crashes on the management unit.

### 5.11.64 nsf

Use this command to enable the OSPF graceful restart functionality on an interface. To disable graceful restart, use the `no` form of the command.

|                |                                        |
|----------------|----------------------------------------|
| <b>Default</b> | disabled                               |
| <b>Format</b>  | <code>nsf [ietf] [planned-only]</code> |
| <b>Modes</b>   | OSPF Router Configuration              |

| Parameter                 | Description                                                                                                   |
|---------------------------|---------------------------------------------------------------------------------------------------------------|
| <code>ietf</code>         | This keyword is accepted but not required.                                                                    |
| <code>planned-only</code> | This optional keyword indicates that OSPF should only perform a graceful restart when the restart is planned. |

#### 5.11.64.1 no nsf

Use this command to disable graceful restart for all restarts.

### 5.11.65 `nsf restart-interval`

Use this command to configure the number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. This is referred to as the grace period. The restarting router includes the grace period in its grace LSAs. For planned restarts (using the `initiate failover` command), the grace LSAs are sent prior to restarting the management unit, whereas for unplanned restarts, they are sent after reboot begins.

The grace period must be set long enough to allow the restarting router to reestablish all of its adjacencies and complete a full database exchange with each of those neighbors.

**Default** 120 seconds  
**Format** `nsf [ietf] restart-interval 1-1800`  
**Modes** OSPF Router Configuration

| Parameter            | Description                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <code>ietf</code>    | This keyword is accepted but not required.                                                                                                   |
| <code>seconds</code> | The number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. The range is from 1 to 1800 seconds. |

#### 5.11.65.1 `no nsf restart-interval`

Use this command to revert the grace period to its default value.

**Format** `no [ietf] nsf restart-interval`  
**Modes** OSPF Router Configuration

### 5.11.66 `nsf helper`

Use this command to enable helpful neighbor functionality for the OSPF protocol. You can enable this functionality for planned or unplanned restarts, or both.

**Default** OSPF may act as a helpful neighbor for both planned and unplanned restarts.  
**Format** `nsf helper [planned-only]`  
**Modes** OSPF Router Configuration

| Parameter                 | Description                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------|
| <code>planned-only</code> | This optional keyword indicates that OSPF should only help a restarting router performing a planned restart. |

#### 5.11.66.1 `no nsf helper`

Use this command to disable helpful neighbor functionality for OSPF.

**Format** `no nsf helper`  
**Modes** OSPF Router Configuration

### 5.11.67 `nsf ietf helper disable`

Use this command to disable helpful neighbor functionality for OSPF.

#### **NOTICE**

The commands `no nsf helper` and `nsf ietf helper disable` are functionally equivalent. The command `nsf ietf helper disable` is supported solely for compatibility with other network software CLI.

**Format**            `nsf ietf helper disable`  
**Modes**            OSPF Router Configuration

### 5.11.68    `nsf helper strict-lsa-checking`

The restarting router is unable to react to topology changes. In particular, the restarting router will not immediately update its forwarding table; therefore, a topology change may introduce forwarding loops or black holes that persist until the graceful restart completes. By exiting the graceful restart on a topology change, a router tries to eliminate the loops or black holes as quickly as possible by routing around the restarting router. A helpful neighbor considers a link down with the restarting router to be a topology change, regardless of the strict LSA checking configuration.

Use this command to require that an OSPF helpful neighbor exit helper mode whenever a topology change occurs.

**Default**            enabled  
**Format**            `nsf [ietf] helper strict-lsa-checking`  
**Modes**            OSPF Router Configuration

| Parameter         | Description                                |
|-------------------|--------------------------------------------|
| <code>ietf</code> | This keyword is accepted but not required. |

#### 5.11.68.1   `no nsf [ietf] helper strict-lsa-checking`

Use this command to allow OSPF to continue as a helpful neighbor in spite of topology changes.

**Default**            enabled  
**Format**            `nsf [ietf] helper strict-lsa-checking`  
**Modes**            OSPF Router Configuration

## OSPFv2 Stub Router Commands

### 5.11.69    `max-metric router-lsa`

To configure OSPF to enter stub router mode, use this command in Router OSPF Global Configuration mode. When OSPF is in stub router mode, as defined by RFC 3137, OSPF sets the metric in the nonstub links in its router LSA to LsInfinity. Other routers therefore compute very long paths through the stub router, and prefer any alternate path. Doing so eliminates all transit traffic through the stub router, when alternate routes are available. Stub router mode is useful when adding or removing a router from a network or to avoid transient routes when a router reloads.

You can administratively force OSPF into stub router mode. OSPF remains in stub router mode until you take OSPF out of stub router mode. Alternatively, you can configure OSPF to start in stub router mode for a configurable period of time after the router boots up.

If you set the summary LSA metric to 16,777,215, other routers will skip the summary LSA when they compute routes.

If you have configured the router to enter stub router mode on startup (`max-metric router-lsa on-startup`), and then enter `max-metric router-lsa`, there is no change. If OSPF is administratively in stub router mode (the `max-metric router-lsa` command has been given), and you configure OSPF to enter stub router mode on startup (`max-metric router-lsa on-startup`), OSPF exits stub router mode (assuming the startup period has expired) and the configuration is updated.

**Default**            OSPF is not in stub router mode by default.  
**Format**            `max-metric router-lsa [on-startup seconds] [summary-lsa {metric}]`  
**Mode**            OSPFv2 Router Configuration

| Parameter               | Description                                                |
|-------------------------|------------------------------------------------------------|
| <code>on-startup</code> | (Optional) OSPF starts in stub router mode after a reboot. |



| Parameter   | Description                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| seconds     | (Required if on-startup) The number of seconds that OSPF remains in stub router mode after a reboot. The range is 5 to 86,400 seconds. There is no default value. |
| summary-lsa | (Optional) Set the metric in type 3 and type 4 summary LSAs to LsInfinity (0xFFFFFFFF).                                                                           |
| metric      | (Optional) Metric to send in summary LSAs when in stub router mode. The range is 1 to 16,777,215. The default is 16,711,680 (0xFF0000).                           |

### 5.11.69.1 no max-metric router-lsa

Use this command in OSPFv2 Router Configuration mode to disable stub router mode. The command clears either type of stub router mode (always or on-startup) and resets the `summary-lsa` option. If OSPF is configured to enter global configuration mode on startup, and during normal operation you want to immediately place OSPF in stub router mode, issue the command `no max-metric router-lsa on-startup`. The command `no max-metric router-lsa summary-lsa` causes OSPF to send summary LSAs with metrics computed using normal procedures defined in RFC 2328.

**Format** `no max-metric router-lsa [on-startup] [summary-lsa]`

**Mode** OSPFv2 Router Configuration

### 5.11.70 clear ip ospf stub-router

Use the `clear ip ospf stub-router` command in Privileged EXEC mode to force OSPF to exit stub router mode for the default router when it has automatically entered stub router mode because of a resource limitation. OSPF only exits stub router mode if it entered stub router mode because of a resource limitation or if it is in stub router mode at startup. This command has no effect if OSPF is configured to be in stub router mode permanently.

**Format** `clear ip ospf stub-router`

**Mode** Privileged EXEC

## OSPF Show Commands

### 5.11.71 show ip ospf

This command displays OSPF global configuration information for the default router.

Route-map information displays if configured for redistributing other protocol routes into OSPF. The route-map name is displayed in the command output

**Format** `show ip ospf`

**Mode** Privileged EXEC

---

Some of the following information displays only if you enable OSPF and configure certain features.

#### **NOTICE**

| Parameter              | Description                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Router ID              | A 32-bit integer in dotted decimal format identifying the router, about which information is displayed. This is a configured value. |
| OSPF Admin Mode        | Shows whether the administrative mode of OSPF in the router is enabled or disabled. This is a configured value.                     |
| RFC 1583 Compatibility | Indicates whether 1583 compatibility is enabled or disabled. This is a configured value.                                            |
| External LSDB Limit    | The maximum number of nondefault AS-external-LSA (link state advertisement) entries that can be stored in the link-state database.  |
| Exit Overflow Interval | The number of seconds that, after entering overflow state, a router will attempt to leave overflow state.                           |

| Parameter                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spf Delay Time                     | The number of seconds between two subsequent changes of LSAs, during which time the routing table calculation is delayed.                                                                                                                                                                                                                                                                                                                                                 |
| Spf Hold Time                      | The number of seconds between two consecutive spf calculations.                                                                                                                                                                                                                                                                                                                                                                                                           |
| Flood Pacing Interval              | The average time, in milliseconds, between LS Update packet transmissions on an interface. This is the value configured with the <code>timers pacing flood</code> command.                                                                                                                                                                                                                                                                                                |
| LSA Refresh Group Pacing Time      | The size in seconds of the LSA refresh group window. This is the value configured with the <code>timers pacing lsa-group</code> command.                                                                                                                                                                                                                                                                                                                                  |
| Opaque Capability                  | Shows whether the router is capable of sending Opaque LSAs. This is a configured value.                                                                                                                                                                                                                                                                                                                                                                                   |
| Autocost Ref BW                    | Shows the value of auto-cost reference bandwidth configured on the router.                                                                                                                                                                                                                                                                                                                                                                                                |
| Default Passive Setting            | Shows whether the interfaces are passive by default.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Maximum Paths                      | The maximum number of paths that OSPF can report for a given destination.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Default Metric                     | Default value for redistributed routes.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Stub Router Configuration          | When OSPF runs out of resources to store the entire link state database, or any other state information, OSPF goes into stub router mode. As a stub router, OSPF reoriginates its own router LSAs, setting the cost of all nonstub interfaces to infinity. Use this field to set stub router configuration to one of <code>Always</code> , <code>Startup</code> , <code>None</code> .                                                                                     |
| Stub Router Startup Time           | Configured value in seconds. This row is only listed if OSPF is configured to be a stub router at startup.                                                                                                                                                                                                                                                                                                                                                                |
| Summary LSA Metric Override        | One of <code>Enabled (met)</code> , <code>Disabled</code> , where <code>met</code> is the metric to be sent in summary LSAs when in stub router mode.                                                                                                                                                                                                                                                                                                                     |
| BFD Enabled                        | Displays the BFD status.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Default Route Advertise            | Indicates whether the default routes received from other source protocols are advertised or not.                                                                                                                                                                                                                                                                                                                                                                          |
| Always                             | Shows whether default routes are always advertised.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Metric                             | The metric of the routes being redistributed. If the metric is not configured, this field is blank.                                                                                                                                                                                                                                                                                                                                                                       |
| Metric Type                        | Shows whether the routes are External Type 1 or External Type 2.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Number of Active Areas             | The number of active OSPF areas. An "active" OSPF area is an area with at least one interface up.                                                                                                                                                                                                                                                                                                                                                                         |
| ABR Status                         | Shows whether the router is an OSPF Area Border Router.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| ASBR Status                        | Reflects whether the ASBR mode is enabled or disabled. Enable implies that the router is an autonomous system border router. The router automatically becomes an ASBR when it is configured to redistribute routes learned from other protocols. The possible values for the ASBR status is <code>enabled</code> (if the router is configured to redistribute routes learned by other protocols) or <code>disabled</code> (if the router is not configured for the same). |
| Stub Router Status                 | One of <code>Active</code> , <code>Inactive</code> .                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Stub Router Reason                 | One of <code>Configured</code> , <code>Startup</code> , <code>Resource Limitation</code> .<br><b>Note:</b> The row is only listed if stub router is active.                                                                                                                                                                                                                                                                                                               |
| Stub Router Startup Time Remaining | The remaining time, in seconds, until OSPF exits stub router mode. This row is only listed if OSPF is in startup stub router mode.                                                                                                                                                                                                                                                                                                                                        |
| Stub Router Duration               | The time elapsed since the router last entered the stub router mode. The row is only listed if stub router is active and the router entered stub mode because of a resource limitation. The duration is displayed in DD:HH:MM:SS format.                                                                                                                                                                                                                                  |
| External LSDB Overflow             | When the number of nondefault external LSAs exceeds the configured limit, External LSDB Limit, OSPF goes into LSDB overflow state. In this state, OSPF withdraws all of its self-originated nondefault external LSAs. After the Exit Overflow Interval, OSPF leaves the overflow state, if the number of external LSAs has been reduced.                                                                                                                                  |
| External LSA Count                 | The number of external (LS type 5) link-state advertisements in the link-state database.                                                                                                                                                                                                                                                                                                                                                                                  |
| External LSA Checksum              | The sum of the LS checksums of external link-state advertisements contained in the link-state database.                                                                                                                                                                                                                                                                                                                                                                   |
| AS_OPAQUE LSA Count                | Shows the number of AS Opaque LSAs in the link-state database.                                                                                                                                                                                                                                                                                                                                                                                                            |

| Parameter                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AS_OPAQUE LSA Checksum               | Shows the sum of the LS Checksums of AS Opaque LSAs contained in the link-state database.                                                                                                                                                                                                                                                                                                                                                                            |
| New LSAs Originated                  | The number of new link-state advertisements that have been originated.                                                                                                                                                                                                                                                                                                                                                                                               |
| LSAs Received                        | The number of link-state advertisements received determined to be new instantiations.                                                                                                                                                                                                                                                                                                                                                                                |
| LSA Count                            | The total number of link state advertisements currently in the link state database.                                                                                                                                                                                                                                                                                                                                                                                  |
| Maximum Number of LSAs               | The maximum number of LSAs that OSPF can store.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| LSA High Water Mark                  | The maximum size of the link state database since the system started.                                                                                                                                                                                                                                                                                                                                                                                                |
| AS Scope LSA Flood List Length       | The number of LSAs currently in the global flood queue waiting to be flooded through the OSPF domain. LSAs with AS flooding scope, such as type 5 external LSAs and type 11 Opaque LSAs.                                                                                                                                                                                                                                                                             |
| Retransmit List Entries              | The total number of LSAs waiting to be acknowledged by all neighbors. An LSA may be pending acknowledgment from more than one neighbor.                                                                                                                                                                                                                                                                                                                              |
| Maximum Number of Retransmit Entries | The maximum number of LSAs that can be waiting for acknowledgment at any given time.                                                                                                                                                                                                                                                                                                                                                                                 |
| Retransmit Entries High Water Mark   | The maximum number of LSAs on all neighbors' retransmit lists at any given time.                                                                                                                                                                                                                                                                                                                                                                                     |
| NSF Support                          | Indicates whether nonstop forwarding (NSF) is enabled for the OSPF protocol for planned restarts, unplanned restarts or both ("Always").                                                                                                                                                                                                                                                                                                                             |
| NSF Restart Interval                 | The user-configurable grace period during which a neighboring router will be in the helper state after receiving notice that the management unit is performing a graceful restart.                                                                                                                                                                                                                                                                                   |
| NSF Restart Status                   | The current graceful restart status of the router. <ul style="list-style-type: none"> <li>• Not Restarting</li> <li>• Planned Restart</li> <li>• Unplanned Restart</li> </ul>                                                                                                                                                                                                                                                                                        |
| NSF Restart Age                      | Number of seconds until the graceful restart grace period expires.                                                                                                                                                                                                                                                                                                                                                                                                   |
| NSF Restart Exit Reason              | Indicates why the router last exited the last restart: <ul style="list-style-type: none"> <li>• None— Graceful restart has not been attempted.</li> <li>• In Progress— Restart is in progress.</li> <li>• Completed— The previous graceful restart completed successfully.</li> <li>• Timed Out— The previous graceful restart timed out.</li> <li>• Topology Changed— The previous graceful restart terminated prematurely because of a topology change.</li> </ul> |
| NSF Help Support                     | Indicates whether helpful neighbor functionality has been enabled for OSPF for planned restarts, unplanned restarts, or both (Always).                                                                                                                                                                                                                                                                                                                               |
| NSF help Strict LSA checking         | Indicates whether strict LSA checking has been enabled. If enabled, then an OSPF helpful neighbor will exit helper mode whenever a topology change occurs. If disabled, an OSPF neighbor will continue as a helpful neighbor in spite of topology changes.                                                                                                                                                                                                           |
| Prefix-suppression                   | Displays whether prefix-suppression is enabled or disabled.                                                                                                                                                                                                                                                                                                                                                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(alpha3) #show ip ospf
```

```
Router ID..... 3.3.3.3
OSPF Admin Mode..... Enable
RFC 1583 Compatibility..... Enable
External LSDB Limit..... No Limit
Exit Overflow Interval..... 0
Spf Delay Time..... 5
Spf Hold Time..... 10
Flood Pacing Interval..... 33 ms
LSA Refresh Group Pacing Time..... 60 sec
```

```

Opaque Capability..... Enable
AutoCost Ref BW..... 100 Mb/s
Default Passive Setting..... Disabled
Maximum Paths..... 4
Default Metric..... Not configured
Stub Router Configuration..... <val>
Stub Router Startup Time..... <val> seconds
Summary LSA Metric Override..... Enabled (<met>)

Default Route Advertise..... Disabled
Always..... FALSE
Metric..... Not configured
Metric Type..... External Type 2

Number of Active Areas..... 1 (1 normal, 0 stub, 0 nssa)
ABR Status..... Disable
ASBR Status..... Disable
Stub Router..... FALSE
Stub Router Status..... Inactive
Stub Router Reason..... <reason>
Stub Router Startup Time Remaining..... <duration> seconds
Stub Router Duration..... <duration>
External LSDB Overflow..... FALSE
External LSA Count..... 0
External LSA Checksum..... 0
AS_OPAQUE LSA Count..... 0
AS_OPAQUE LSA Checksum..... 0
New LSAs Originated..... 55
LSAs Received..... 82
LSA Count..... 1
Maximum Number of LSAs..... 24200
LSA High Water Mark..... 9
AS Scope LSA Flood List Length..... 0
Retransmit List Entries..... 0
Maximum Number of Retransmit Entries..... 96800
Retransmit Entries High Water Mark..... 1
NSF Helper Support..... Always
NSF Helper Strict LSA Checking..... Enabled
Prefix-suppression..... Disabled

```

### 5.11.72 show ip ospf abr

This command displays the internal OSPF routing table entries to Area Border Routers (ABR) for the default router.

**Format**            show ip ospf abr

**Mode**             • Privileged EXEC

                     • User EXEC

| Parameter     | Description                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type          | The type of the route to the destination. It can be either: <ul style="list-style-type: none"> <li>• intra — Intra-area route</li> <li>• inter — Inter-area route</li> </ul> |
| Router ID     | Router ID of the destination.                                                                                                                                                |
| Cost          | Cost of using this route.                                                                                                                                                    |
| Area ID       | The area ID of the area from which this route is learned.                                                                                                                    |
| Next Hop      | Next hop toward the destination.                                                                                                                                             |
| Next Hop Intf | The outgoing router interface to use when forwarding traffic to the next hop.                                                                                                |

### 5.11.73 show ip ospf area

This command displays information about the area for the default router. The *areaid* identifies the OSPF area that is being displayed.

**Format**            show ip ospf area *areaid*

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| AreaID                   | The area id of the requested OSPF area.                                                                                            |
| External Routing         | A number representing the external routing capabilities for this area.                                                             |
| Spf Runs                 | The number of times that the intra-area route table has been calculated using this area's link-state database.                     |
| Area Border Router Count | The total number of area border routers reachable within this area.                                                                |
| Area LSA Count           | Total number of link-state advertisements in this area's link-state database, excluding AS External LSA's.                         |
| Area LSA Checksum        | A number representing the Area LSA Checksum for the specified AreaID excluding the external (LS type 5) link-state advertisements. |
| Flood List Length        | The number of LSAs waiting to be flooded within the area.                                                                          |
| Import Summary LSAs      | Shows whether to import summary LSAs.                                                                                              |
| OSPF Stub Metric Value   | The metric value of the stub area. This field displays only if the area is a configured as a stub area.                            |

The following OSPF NSSA specific information displays only if the area is configured as an NSSA.

| Parameter                     | Description                                                                                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Import Summary LSAs           | Shows whether to import summary LSAs into the NSSA.                                                                                                              |
| Redistribute into NSSA        | Shows whether to redistribute information into the NSSA.                                                                                                         |
| Default Information Originate | Shows whether to advertise a default route into the NSSA.                                                                                                        |
| Default Metric                | The metric value for the default route advertised into the NSSA.                                                                                                 |
| Default Metric Type           | The metric type for the default route advertised into the NSSA.                                                                                                  |
| Translator Role               | The NSSA translator role of the ABR, which is always or candidate.                                                                                               |
| Translator Stability Interval | The amount of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router. |
| Translator State              | Shows whether the ABR translator state is disabled, always, or elected.                                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(R1) #show ip ospf area 1
```

```
AreaID..... 0.0.0.1
External Routing..... Import External LSAs
Spf Runs..... 10
Area Border Router Count..... 0
Area LSA Count..... 3004
Area LSA Checksum..... 0x5e0abed
Flood List Length..... 0
Import Summary LSAs..... Enable
```

### 5.11.74 show ip ospf asbr

This command displays the internal OSPF routing table entries to Autonomous System Boundary Routers (ASBR) for the default router.

- Format**            `show ip ospf asbr`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter     | Description                                                                                                                              |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Type          | The type of the route to the destination. It can be one of the following values:<br>intra — Intra-area route<br>inter — Inter-area route |
| Router ID     | Router ID of the destination.                                                                                                            |
| Cost          | Cost of using this route.                                                                                                                |
| Area ID       | The area ID of the area from which this route is learned.                                                                                |
| Next Hop      | Next hop toward the destination.                                                                                                         |
| Next Hop Intf | The outgoing router interface to use when forwarding traffic to the next hop.                                                            |

### 5.11.75 show ip ospf database

This command displays information about the link state database when OSPF is enabled for the default router. If you do not enter any parameters, the command displays the LSA headers for all areas. Use the optional *areaid* parameter to display database information about a specific area. Use the optional parameters to specify the type of link state advertisements to display.

| Parameter      | Description                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| vrf-name       | Specifies the virtual router for which to display information.                                                                                    |
| asbr-summary   | Use <i>asbr-summary</i> to show the autonomous system boundary router (ASBR) summary LSAs.                                                        |
| external       | Use <i>external</i> to display the external LSAs.                                                                                                 |
| network        | Use <i>network</i> to display the network LSAs.                                                                                                   |
| nssa-external  | Use <i>nssa-external</i> to display NSSA external LSAs.                                                                                           |
| opaque-area    | Use <i>opaque-area</i> to display area opaque LSAs.                                                                                               |
| opaque-as      | Use <i>opaque-as</i> to display AS opaque LSAs.                                                                                                   |
| opaque-link    | Use <i>opaque-link</i> to display link opaque LSAs.                                                                                               |
| router         | Use <i>router</i> to display router LSAs.                                                                                                         |
| summary        | Use <i>summary</i> to show the LSA database summary information.                                                                                  |
| lsid           | Use <i>lsid</i> to specify the link state ID (LSID). The value of <i>lsid</i> can be an IP address or an integer in the range of 0 to 4294967295. |
| adv-router     | Use <i>adv-router</i> to show the LSAs that are restricted by the advertising router.                                                             |
| self-originate | Use <i>self-originate</i> to display the LSAs in that are self originated. The information below is only displayed if OSPF is enabled             |

The information below is only displayed if OSPF is enabled.

- Format**            `show ip ospf [areaid] database [{database-summary | [{asbr-summary | external | network | nssa-external | opaque-area | opaque-as | opaque-link | router | summary}]} [lsid] [{adv-router [ipaddr] | self-originate}]}`
- Mode**
- Privileged EXEC
  - User EXEC

For each link-type and area, the following information is displayed.

| Parameter | Description                                                                                                                |
|-----------|----------------------------------------------------------------------------------------------------------------------------|
| Link ID   | A number that uniquely identifies an LSA that a router originates from all other self originated LSAs of the same LS type. |

| Parameter  | Description                                                                                          |
|------------|------------------------------------------------------------------------------------------------------|
| Adv Router | The Advertising Router. Is a 32-bit dotted decimal number representing the LSDB interface.           |
| Age        | A number representing the age of the link state advertisement in seconds.                            |
| Sequence   | A number that represents which LSA is more recent.                                                   |
| Checksum   | The total number LSA checksum.                                                                       |
| Options    | This is an integer. It indicates that the LSA receives special handling during routing calculations. |
| Rtr Opt    | Router Options are valid for router links only.                                                      |

### 5.11.76 show ip ospf database database-summary

Use this command to display the number of each type of LSA in the database for each area and for the router. The command also displays the total number of LSAs in the database.

**Format**            `show ip ospf database database-summary`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter              | Description                                                                       |
|------------------------|-----------------------------------------------------------------------------------|
| Router                 | Total number of router LSAs in the OSPF link state database.                      |
| Network                | Total number of network LSAs in the OSPF link state database.                     |
| Summary Net            | Total number of summary network LSAs in the database.                             |
| Summary ASBR           | Number of summary ASBR LSAs in the database.                                      |
| Type-7 Ext             | Total number of Type-7 external LSAs in the database.                             |
| Self-Originated Type-7 | Total number of self originated AS external LSAs in the OSPF link state database. |
| Opaque Link            | Number of opaque link LSAs in the database.                                       |
| Opaque Area            | Number of opaque area LSAs in the database.                                       |
| Subtotal               | Number of entries for the identified area.                                        |
| Opaque AS              | Number of opaque AS LSAs in the database.                                         |
| Total                  | Number of entries for all areas.                                                  |

### 5.11.77 show ip ospf interface

This command displays the information for the IFO object or virtual interface tables. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format.

**Format**            `show ip ospf interface {slot/port/vlan 1-4093 | loopback Loopback-id}`

**Mode**

- Privileged EXEC
- User EXEC

| Parameter              | Description                                                                      |
|------------------------|----------------------------------------------------------------------------------|
| IP Address             | The IP address for the specified interface.                                      |
| Subnet Mask            | A mask of the network and host portion of the IP address for the OSPF interface. |
| Secondary IP Addresses | The secondary IP addresses if any are configured on the interface.               |
| OSPF Admin Mode        | States whether OSPF is enabled or disabled on a router interface.                |
| OSPF Area ID           | The OSPF Area ID for the specified interface.                                    |
| OSPF Network Type      | The type of network on this interface that the OSPF is running on.               |
| Router Priority        | A number representing the OSPF Priority for the specified interface.             |
| Retransmit Interval    | A number representing the OSPF Retransmit Interval for the specified interface.  |

| Parameter           | Description                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------|
| Hello Interval      | A number representing the OSPF Hello Interval for the specified interface.                               |
| Dead Interval       | A number representing the OSPF Dead Interval for the specified interface.                                |
| LSA Ack Interval    | A number representing the OSPF LSA Acknowledgment Interval for the specified interface.                  |
| Transmit Delay      | A number representing the OSPF Transmit Delay Interval for the specified interface.                      |
| Authentication Type | The OSPF Authentication Type for the specified interface are: none, simple, and encrypt.                 |
| Metric Cost         | The cost of the OSPF interface.                                                                          |
| Passive Status      | Shows whether the interface is passive or not.                                                           |
| OSPF MTU-ignore     | Indicates whether to ignore MTU mismatches in database descriptor packets sent from neighboring routers. |
| Flood Blocking      | Indicates whether flood blocking is enabled on the interface.                                            |

The information below will only be displayed if OSPF is enabled.

| Parameter                | Description                                                                                                                     |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| OSPF Interface Type      | Broadcast LANs, such as Ethernet and IEEE 802.5, take the value <i>broadcast</i> . The OSPF Interface Type will be 'broadcast'. |
| State                    | The OSPF Interface States are: down, loopback, waiting, point-to-point, designated router, and backup designated router.        |
| Designated Router        | The router ID representing the designated router.                                                                               |
| Backup Designated Router | The router ID representing the backup designated router.                                                                        |
| Number of Link Events    | The number of link events.                                                                                                      |
| Local Link LSAs          | The number of Link Local Opaque LSAs in the link-state database.                                                                |
| Local Link LSA Checksum  | The sum of LS Checksums of Link Local Opaque LSAs in the link-state database.                                                   |
| Prefix-suppression       | Displays whether prefix-suppression is enabled, disabled, or unconfigured on the given interface.                               |

**Example:** The following shows example CLI display output for the command when the OSPF Admin Mode is disabled.

```
(Routing) >show ip ospf interface 1/0/1
```

```
IP Address..... 0.0.0.0
Subnet Mask..... 0.0.0.0
Secondary IP Address(es).....
OSPF Admin Mode..... Disable
OSPF Area ID..... 0.0.0.0
OSPF Network Type..... Broadcast
Router Priority..... 1
Retransmit Interval..... 5
Hello Interval..... 10
Dead Interval..... 40
LSA Ack Interval..... 1
Transmit Delay..... 1
Authentication Type..... None
Metric Cost..... 1 (computed)
Passive Status..... Non-passive interface
OSPF Mtu-ignore..... Disable
Flood Blocking..... Disable
```

OSPF is not enabled on this interface.

```
(Routing) #
```



### 5.11.78 show ip ospf interface brief

This command displays brief information for the IFO object or virtual interface tables for the default router.

- Format**            `show ip ospf interface brief`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------|
| Interface                | slot/port                                                                               |
| OSPF Admin Mode          | States whether OSPF is enabled or disabled on a router interface.                       |
| OSPF Area ID             | The OSPF Area Id for the specified interface.                                           |
| Router Priority          | A number representing the OSPF Priority for the specified interface.                    |
| Cost                     | The metric cost of the OSPF interface.                                                  |
| Hello Interval           | A number representing the OSPF Hello Interval for the specified interface.              |
| Dead Interval            | A number representing the OSPF Dead Interval for the specified interface.               |
| Retransmit Interval      | A number representing the OSPF Retransmit Interval for the specified interface.         |
| Interface Transmit Delay | A number representing the OSPF Transmit Delay for the specified interface.              |
| LSA Ack Interval         | A number representing the OSPF LSA Acknowledgment Interval for the specified interface. |

### 5.11.79 show ip ospf interface stats

This command displays the statistics for a specific interface. The information below will only be displayed if OSPF is enabled. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan o` specifies the VLAN ID of the routing VLAN directly instead of a slot/port format.

- Format**            `show ip ospf interface stats {slot/port/vlan 1-4093}`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPF Area ID             | The area id of this OSPF interface.                                                                                                            |
| Area Border Router Count | The total number of area border routers reachable within this area. This is initially zero, and is calculated in each SPF pass.                |
| AS Border Router Count   | The total number of Autonomous System border routers reachable within this area.                                                               |
| Area LSA Count           | The total number of link-state advertisements in this area's link-state database, excluding AS External LSAs.                                  |
| IP Address               | The IP address associated with this OSPF interface.                                                                                            |
| OSPF Interface Events    | The number of times the specified OSPF interface has changed its state, or an error has occurred.                                              |
| Virtual Events           | The number of state changes or errors that occurred on this virtual link.                                                                      |
| Neighbor Events          | The number of times this neighbor relationship has changed state, or an error has occurred.                                                    |
| Sent Packets             | The number of OSPF packets transmitted on the interface.                                                                                       |
| Received Packets         | The number of valid OSPF packets received on the interface.                                                                                    |
| Discards                 | The number of received OSPF packets discarded because of an error in the packet or an error in processing the packet.                          |
| Bad Version              | The number of received OSPF packets whose version field in the OSPF header does not match the version of the OSPF process handling the packet. |

| Parameter                     | Description                                                                                                                                                                                                                               |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Not On Local Subnet    | The number of received packets discarded because the source IP address is not within a subnet configured on a local interface.<br><b>Note:</b> This field applies only to OSPFv2.                                                         |
| Virtual Link Not Found        | The number of received OSPF packets discarded where the ingress interface is in a non-backbone area and the OSPF header identifies the packet as belonging to the backbone, but OSPF does not have a virtual link to the packet's sender. |
| Area Mismatch                 | The number of OSPF packets discarded because the area ID in the OSPF header is not the area ID configured on the ingress interface.                                                                                                       |
| Invalid Destination Address   | The number of OSPF packets discarded because the packet's destination IP address is not the address of the ingress interface and is not the AllDrRouters or AllSpfRouters multi-cast addresses.                                           |
| Wrong Authentication Type     | The number of packets discarded because the authentication type specified in the OSPF header does not match the authentication type configured on the ingress interface.<br><b>Note:</b> This field applies only to OSPFv2.               |
| Authentication Failure        | The number of OSPF packets dropped because the sender is not an existing neighbor or the sender's IP address does not match the previously recorded IP address for that neighbor.<br><b>Note:</b> This field applies only to OSPFv2.      |
| No Neighbor at Source Address | The number of OSPF packets dropped because the sender is not an existing neighbor or the sender's IP address does not match the previously recorded IP address for that neighbor.<br><b>Note:</b> Does not apply to Hellos.               |
| Invalid OSPF Packet Type      | The number of OSPF packets discarded because the packet type field in the OSPF header is not a known type.                                                                                                                                |
| Hellos Ignored                | The number of received Hello packets that were ignored by this router from the new neighbors after the limit has been reached for the number of neighbors on an interface or on the system as a whole.                                    |

Table 13 lists the number of OSPF packets of each type sent and received on the interface.

Table 13: Type of OSPF Packets Sent and Received on the Interface

| Packet Type          | Sent | Received |
|----------------------|------|----------|
| Hello                | 6960 | 6960     |
| Database Description | 3    | 3        |
| LS Request           | 1    | 1        |
| LS Update            | 141  | 42       |
| LS Acknowledgment    | 40   | 135      |

### 5.11.80 show ip ospf lsa-group

This command displays the number of self-originated LSAs within each LSA group for the default router.

**Format**            show ip ospf lsa-group

**Modes**

- Privileged EXEC
- User EXEC

| Parameter                  | Description                                                                                                                                                                                                                |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total self-originated LSAs | The number of LSAs the router is currently originating.                                                                                                                                                                    |
| Average LSAs per group     | The number of self-originated LSAs divided by the number of LSA groups. The number of LSA groups is the refresh interval (1800 seconds) divided by the pacing interval (configured with timers pacing lsa-group) plus two. |
| Pacing group limit         | The maximum number of self-originated LSAs in one LSA group. If the number of LSAs in a group exceeds this limit, OSPF redistributes LSAs throughout the refresh interval to achieve better balance.                       |
| Groups                     | For each LSA pacing group, the output shows the range of LSA ages in the group and the number of LSAs in the group.                                                                                                        |

### 5.11.81 show ip ospf neighbor

This command displays information about OSPF neighbors for the default router. If you do not specify a neighbor IP address, the output displays summary information in a table. If you specify an interface or tunnel, only the information for that interface or tunnel displays, if the interface is a physical routing interface and vlan format if the interface is a routing vlan. The *ip-address* is the IP address of the neighbor, and when you specify this, detailed information about the neighbor displays. The information below only displays if OSPF is enabled and the interface has a neighbor.

**Format** show ip ospf neighbor [interface {slot/port|vlan 1-4093}] [ip-address]

- Modes**
- Privileged EXEC
  - User EXEC

If you do not specify an IP address, a table with the following columns displays for all neighbors or the neighbor associated with the interface that you specify:

| Parameter  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router ID  | The 4-digit dotted-decimal number of the neighbor router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Priority   | The OSPF priority for the specified interface. The priority of an interface is a priority integer from 0 to 255. A value of '0' indicates that the router is not eligible to become the designated router on this network.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| IP Address | The IP address of the neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Interface  | The interface of the local router in <i>slot/port</i> format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| State      | The state of the neighboring routers. Possible values are: <ul style="list-style-type: none"> <li>• Down—Initial state of the neighbor conversation; no recent information has been received from the neighbor.</li> <li>• Attempt—No recent information has been received from the neighbor but a more concerted effort should be made to contact the neighbor.</li> <li>• Init—An Hello packet has recently been seen from the neighbor, but bidirectional communication has not yet been established.</li> <li>• 2 way—Communication between the two routers is bidirectional.</li> <li>• Exchange start—The first step in creating an adjacency between the two neighboring routers, the goal is to decide which router is the master and to decide upon the initial DD sequence number.</li> <li>• Exchange—The router is describing its entire link state database by sending Database Description packets to the neighbor.</li> <li>• Loading—Link State Request packets are sent to the neighbor asking for the more recent LSAs that have been discovered (but not yet received) in the Exchange state.</li> <li>• Full—The neighboring routers are fully adjacent and they will now appear in router-LSAs and network-LSAs.</li> </ul> |
| Dead Time  | The amount of time, in seconds, to wait before the router assumes the neighbor is unreachable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

If you specify an IP address for the neighbor router, the following fields display:

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                   | slot/port                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Neighbor IP Address         | The IP address of the neighbor router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Interface Index             | The interface ID of the neighbor router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Area ID                     | The area ID of the OSPF area associated with the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Options                     | An integer value that indicates the optional OSPF capabilities supported by the neighbor. The neighbor's optional OSPF capabilities are also listed in its Hello packets. This enables received Hello Packets to be rejected (that is, neighbor relationships will not even start to form) if there is a mismatch in certain crucial OSPF capabilities.                                                                                                                                                                                                                                                                                               |
| Router Priority             | The OSPF priority for the specified interface. The priority of an interface is a priority integer from 0 to 255. A value of '0' indicates that the router is not eligible to become the designated router on this network.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Dead Timer Due              | The amount of time, in seconds, to wait before the router assumes the neighbor is unreachable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Up Time                     | Neighbor uptime; how long since the adjacency last reached the Full state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| State                       | The state of the neighboring routers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Events                      | The number of times this neighbor relationship has changed state, or an error has occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Retransmitted LSAs          | The number of LSAs retransmitted to this neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Retransmission Queue Length | An integer representing the current length of the retransmission queue of the specified neighbor router Id of the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Restart Helper Status       | Indicates the status of this router as a helper during a graceful restart of the router specified in the command line: <ul style="list-style-type: none"> <li>Helping—This router is acting as a helpful neighbor to this neighbor. A helpful neighbor does not report an adjacency change during graceful restart, but continues to advertise the restarting router as a FULL adjacency. A helpful neighbor continues to forward data packets to the restarting router, trusting that the restarting router's forwarding table is maintained during the restart.</li> <li>Not Helping—This router is not a helpful neighbor at this time.</li> </ul> |
| Restart Reason              | When this router is in helpful neighbor mode, this indicates the reason for the restart as provided by the restarting router: <ul style="list-style-type: none"> <li>Unknown (0)</li> <li>Software restart (1)</li> <li>Software reload/upgrade (2)</li> <li>Switch to redundant control processor (3)</li> <li>Unrecognized - a value not defined in RFC 3623</li> </ul> When FASTPATH sends a grace LSA, it sets the Restart Reason to Software Restart on a planned warm restart (when the <code>initiate failover</code> command is invoked), and to Unknown on an unplanned warm restart.                                                        |
| Remaining Grace Time        | The number of seconds remaining in the current graceful restart interval. This is displayed only when this router is currently acting as a helpful neighbor for the router specified in the command.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Restart Helper Exit Reason  | Indicates the reason that the specified router last exited a graceful restart. <ul style="list-style-type: none"> <li>None—Graceful restart has not been attempted</li> <li>In Progress—Restart is in progress</li> <li>Completed—The previous graceful restart completed successfully</li> <li>Timed Out—The previous graceful restart timed out</li> <li>Topology Changed—The previous graceful restart terminated prematurely because of a topology change</li> </ul>                                                                                                                                                                              |

**Example:** The following shows example CLI display output for the command.

```
(alpha1) #show ip ospf neighbor 170.1.1.50
```

```
Interface.....0/17
Neighbor IP Address.....170.1.1.50
Interface Index.....17
Area Id.....0.0.0.2
Options.....0x2
Router Priority.....1
Dead timer due in (secs).....15
Up Time.....0 days 2 hrs 8 mins 46 secs
State.....Full/BACKUP-DR
Events.....4
Retransmitted LSAs.....32
Retransmission Queue Length.....0
Restart Helper Status..... Helping
Restart Reason..... Software Restart (1)
Remaining Grace Time..... 10 sec
Restart Helper Exit Reason..... In Progress
```

### 5.11.82 show ip ospf range

This command displays the set of OSPFv2 area ranges configured for a given area for the default router.

**Format** show ip ospf range *areaid*

**Modes** Privileged EXEC

| Parameter   | Description                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prefix      | The summary prefix.                                                                                                                                               |
| Subnet Mask | The subnetwork mask of the summary prefix.                                                                                                                        |
| Type        | S (Summary Link) or E (External Link)                                                                                                                             |
| Action      | Advertise or Suppress                                                                                                                                             |
| Cost        | Metric to be advertised when the range is active. If a static cost is not configured, the field displays Auto. If the action is Suppress, the field displays N/A. |
| Active      | Whether the range is currently active. Y or N.                                                                                                                    |

**Example:** The following shows example CLI display output for the command.

```
(R1) #show ip ospf range 0
```

```
 Prefix Subnet Mask Type Action Cost Active
 10.1.0.0 255.255.0.0 S Advertise Auto N
 172.20.0.0 255.255.0.0 S Advertise 500 Y
```

### 5.11.83 show ip ospf statistics

This command displays information about recent Shortest Path First (SPF) calculations for the default router. The SPF is the OSPF routing table calculation. The output lists the number of times the SPF has run for each OSPF area. A table follows this information. For each of the 15 most recent SPF runs, the command shows statistics for how long ago the SPF ran, how long the SPF took, the reasons why the SPF was scheduled, the individual components of the routing table calculation time and to show the RIB update time. The most recent statistics are displayed at the end of the table.

**Format** show ip ospf statistics

**Modes** Privileged EXEC

| Parameter | Description                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------|
| Delta T   | The time since the routing table was computed. The time is in the format hours, minutes, and seconds (hh:mm:ss). |

| Parameter  | Description                                                                                                                                                                                                                                                                                 |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intra      | The time taken to compute intra-area routes, in milliseconds.                                                                                                                                                                                                                               |
| Summ       | The time taken to compute inter-area routes, in milliseconds.                                                                                                                                                                                                                               |
| Ext        | The time taken to compute external routes, in milliseconds.                                                                                                                                                                                                                                 |
| SPF Total  | The total time to compute routes, in milliseconds. The total may exceed the sum of the Intra, Summ, and Ext times.                                                                                                                                                                          |
| RIB Update | The time from the completion of the routing table calculation until all changes have been made in the common routing table [the Routing Information Base (RIB)], in milliseconds.                                                                                                           |
| Reason     | The event or events that triggered the SPF. Reason codes are as follows: <ul style="list-style-type: none"> <li>• R - new router LSA</li> <li>• N - new network LSA</li> <li>• SN - new network summary LSA</li> <li>• SA - new ASBR summary LSA</li> <li>• X - new external LSA</li> </ul> |

**Example:** The following shows example CLI display output for the command.

```
(Router) #show ip ospf statistics
```

```
Area 0.0.0.0: SPF algorithm executed 15 times
```

| Delta T  | Intra | Summ | Ext | SPF Total | RIB Update | Reason   |
|----------|-------|------|-----|-----------|------------|----------|
| 00:05:33 | 0     | 0    | 0   | 0         | 0          | R        |
| 00:05:30 | 0     | 0    | 0   | 0         | 0          | R        |
| 00:05:19 | 0     | 0    | 0   | 0         | 0          | N, SN    |
| 00:05:15 | 0     | 10   | 0   | 10        | 0          | R, N, SN |
| 00:05:11 | 0     | 0    | 0   | 0         | 0          | R        |
| 00:04:50 | 0     | 60   | 0   | 60        | 460        | R, N     |
| 00:04:46 | 0     | 90   | 0   | 100       | 60         | R, N     |
| 00:03:42 | 0     | 70   | 10  | 90        | 160        | R        |
| 00:03:39 | 0     | 70   | 40  | 120       | 240        | X        |
| 00:03:36 | 0     | 60   | 60  | 130       | 160        | X        |
| 00:01:28 | 0     | 60   | 50  | 130       | 240        | X        |
| 00:01:25 | 0     | 30   | 50  | 110       | 310        | SN       |
| 00:01:22 | 0     | 0    | 40  | 50        | 260        | SN       |
| 00:01:19 | 0     | 0    | 20  | 20        | 190        | X        |
| 00:01:16 | 0     | 0    | 0   | 0         | 110        | R, X     |

### 5.11.84 show ip ospf stub table

This command displays the OSPF stub table for the default router will be displayed. The information below will only be displayed if OSPF is initialized on the switch.

**Format**            show ip ospf stub table

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                                                                             |
|-----------------|-----------------------------------------------------------------------------------------|
| Area ID         | A 32-bit identifier for the created stub area.                                          |
| Type of Service | The type of service associated with the stub metric. FASTPATH only supports Normal TOS. |

| Parameter          | Description                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Metric Val         | The metric value is applied based on the TOS. It defaults to the least metric of the type of service among the interfaces to other areas. The OSPF cost for a route is a function of the metric value. |
| Import Summary LSA | Controls the import of summary LSAs into stub areas.                                                                                                                                                   |

### 5.11.85 show ip ospf traffic

This command displays OSPFv2 packet and LSA statistics and OSPFv2 message queue statistics for the default router will be displayed. Packet statistics count packets and LSAs since OSPFv2 counters were last cleared (using the [clear ip ospf counters](#) command).

The [clear ip ospf counters](#) command does not clear the message queue high water marks.

#### NOTICE

**Format** show ip ospf traffic

**Modes** Privileged EXEC

| Parameter                  | Description                                                                                                                                                                                                        |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPFv2 Packet Statistics   | The number of packets of each type sent and received since OSPF counters were last cleared.                                                                                                                        |
| LSAs Retransmitted         | The number of LSAs retransmitted by this router since OSPF counters were last cleared.                                                                                                                             |
| LS Update Max Receive Rate | The maximum rate of LS Update packets received during any 5-second interval since OSPF counters were last cleared. The rate is in packets per second.                                                              |
| LS Update Max Send Rate    | The maximum rate of LS Update packets transmitted during any 5-second interval since OSPF counters were last cleared. The rate is in packets per second.                                                           |
| Number of LSAs Received    | The number of LSAs of each type received since OSPF counters were last cleared.                                                                                                                                    |
| OSPFv2 Queue Statistics    | For each OSPFv2 message queue, the current count, the high water mark, the number of packets that failed to be enqueued, and the queue limit. The high water marks are not cleared when OSPF counters are cleared. |

**Example:** The following shows example CLI display output for the command.

```
(Router) #show ip ospf traffic
```

```
Time Since Counters Cleared: 4000 seconds
```

```
OSPFv2 Packet Statistics
```

```

 Hello Database Desc LS Request LS Update LS ACK Total
Recd: 500 10 20 50 20 600
Sent: 400 8 16 40 16 480
```

```

LSAs Retransmitted.....0
LS Update Max Receive Rate.....20 pps
LS Update Max Send Rate.....10 pps
```

```
Number of LSAs Received
```

```

T1 (Router).....10
T2 (Network).....0
T3 (Net Summary).....300
T4 (ASBR Summary).....15
T5 (External).....20
T7 (NSSA External).....0
```

```
T9 (Link Opaque).....0
T10 (Area Opaque).....0
T11 (AS Opaque).....0
Total.....345
```

#### OSPFv2 Queue Statistics

|       | Current | Max | Drops | Limit |
|-------|---------|-----|-------|-------|
| Hello | 0       | 10  | 0     | 500   |
| ACK   | 2       | 12  | 0     | 1680  |
| Data  | 24      | 47  | 0     | 500   |
| Event | 1       | 8   | 0     | 1000  |

### 5.11.86 show ip ospf virtual-link

This command displays the OSPF Virtual Interface information for a specific area and neighbor for the default router will be displayed. The *areaid* parameter identifies the area and the *neighbor* parameter identifies the neighbor's Router ID.

**Format**            `show ip ospf virtual-link areaid neighbor`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area ID                  | The area id of the requested OSPF area.                                                                                                                           |
| Neighbor Router ID       | The input neighbor Router ID.                                                                                                                                     |
| Hello Interval           | The configured hello interval for the OSPF virtual interface.                                                                                                     |
| Dead Interval            | The configured dead interval for the OSPF virtual interface.                                                                                                      |
| Interface Transmit Delay | The configured transmit delay for the OSPF virtual interface.                                                                                                     |
| Retransmit Interval      | The configured retransmit interval for the OSPF virtual interface.                                                                                                |
| Authentication Type      | The configured authentication type of the OSPF virtual interface.                                                                                                 |
| State                    | The OSPF Interface States are: down, loopback, waiting, point-to-point, designated router, and backup designated router. This is the state of the OSPF interface. |
| Neighbor State           | The neighbor state.                                                                                                                                               |

### 5.11.87 show ip ospf virtual-link brief

This command displays the OSPF Virtual Interface information for all areas in the system.

**Format**            `show ip ospf virtual-link brief`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter           | Description                                                        |
|---------------------|--------------------------------------------------------------------|
| Area ID             | The area id of the requested OSPF area.                            |
| Neighbor            | The neighbor interface of the OSPF virtual interface.              |
| Hello Interval      | The configured hello interval for the OSPF virtual interface.      |
| Dead Interval       | The configured dead interval for the OSPF virtual interface.       |
| Retransmit Interval | The configured retransmit interval for the OSPF virtual interface. |
| Transmit Delay      | The configured transmit delay for the OSPF virtual interface.      |



## 5.12 Routing Information Protocol Commands

This section describes the commands you use to view and configure Routing Information Protocol (RIP), which is a distance-vector routing protocol that you use to route traffic within a small network.

### 5.12.1 router rip

Use this command to enter Router RIP mode.

**Format**            router rip  
**Mode**             Global Config

### 5.12.2 enable (RIP)

This command resets the default administrative mode of RIP in the router (active).

**Default**            enabled  
**Format**            enable  
**Mode**             Router RIP Config

#### 5.12.2.1 no enable (RIP)

This command sets the administrative mode of RIP in the router to inactive.

**Format**            no enable  
**Mode**             Router RIP Config

### 5.12.3 ip rip

This command enables RIP on a router interface or range of interfaces.

**Default**            disabled  
**Format**            ip rip  
**Mode**             Interface Config

#### 5.12.3.1 no ip rip

This command disables RIP on a router interface.

**Format**            no ip rip  
**Mode**             Interface Config

### 5.12.4 auto-summary

This command enables the RIP auto-summarization mode.

**Default**            disabled  
**Format**            auto-summary  
**Mode**             Router RIP Config

#### 5.12.4.1 no auto-summary

This command disables the RIP auto-summarization mode.

**Format**            no auto-summary  
**Mode**             Router RIP Config

### 5.12.5 default-information originate (RIP)

This command is used to control the advertisement of default routes.

**Format** default-information originate

**Mode** Router RIP Config

#### 5.12.5.1 no default-information originate (RIP)

This command is used to control the advertisement of default routes.

**Format** no default-information originate

**Mode** Router RIP Config

### 5.12.6 default-metric (RIP)

This command is used to set a default for the metric of distributed routes.

**Format** default-metric 0-15

**Mode** Router RIP Config

#### 5.12.6.1 no default-metric (RIP)

This command is used to reset the default metric of distributed routes to its default value.

**Format** no default-metric

**Mode** Router RIP Config

### 5.12.7 distance rip

This command sets the route preference value of RIP in the router. Lower route preference values are preferred when determining the best route. A route with a preference of 255 cannot be used to forward traffic.

**Default** 15

**Format** distance rip 1-255

**Mode** Router RIP Config

#### 5.12.7.1 no distance rip

This command sets the default route preference value of RIP in the router.

**Format** no distance rip

**Mode** Router RIP Config

### 5.12.8 distribute-list out (RIP)

This command is used to specify the access list to filter routes received from the source protocol.

**Default** 0

**Format** distribute-list 1-199 out {ospf static | connected}

**Mode** Router RIP Config

### 5.12.8.1 no distribute-list out

This command is used to specify the access list to filter routes received from the source protocol.

**Format**            no distribute-list 1-199 out {ospf | static | connected}  
**Mode**             Router RIP Config

### 5.12.9 ip rip authentication

This command sets the RIP Version 2 Authentication Type and Key for the specified interface or range of interfaces. The value of *type* is either *none*, *simple*, or *encrypt*. The value for authentication key [*key*] must be 16 bytes or less. The [*key*] is composed of standard displayable, noncontrol keystrokes from a Standard 101/102-key keyboard. If the value of *type* is *encrypt*, a *keyid* in the range of 0 and 255 must be specified. Unauthenticated interfaces do not need an authentication key or authentication key ID.

**Default**           none  
**Format**            ip rip authentication {none | {simple key} | {encrypt key keyid}}  
**Mode**             Interface Config

#### 5.12.9.1 no ip rip authentication

This command sets the default RIP Version 2 Authentication Type for an interface.

**Format**            no ip rip authentication  
**Mode**             Interface Config

### 5.12.10 ip rip receive version

This command configures an interface or range of interfaces to allow RIP control packets of the specified versions to be received.

The value for *mode* is one of: *rip1* to receive only RIP version 1 formatted packets, *rip2* for RIP version 2, *both* to receive packets from either format, or *none* to not allow any RIP control packets to be received.

**Default**           both  
**Format**            ip rip receive version {rip1 | rip2 | both | none}  
**Mode**             Interface Config

#### 5.12.10.1 no ip rip receive version

This command configures the interface to allow RIP control packets of the default versions to be received.

**Format**            no ip rip receive version  
**Mode**             Interface Config

### 5.12.11 ip rip send version

This command configures an interface or range of interfaces to allow RIP control packets of the specified version to be sent. The value for *mode* is one of: *rip1* to broadcast RIP version 1 formatted packets, *rip1c* (RIP version 1 compatibility mode) which sends RIP version 2 formatted packets using broadcast, *rip2* for sending RIP version 2 using multicast, or *none* to not allow any RIP control packets to be sent.

**Default**           rip2  
**Format**            ip rip send version {rip1 | rip1c | rip2 | none}  
**Mode**             Interface Config

### 5.12.11.1 no ip rip send version

This command configures the interface to allow RIP control packets of the default version to be sent.

**Format** no ip rip send version  
**Mode** Interface Config

### 5.12.12 hostroutesaccept

This command enables the RIP hostroutesaccept mode.

**Default** enabled  
**Format** hostroutesaccept  
**Mode** Router RIP Config

### 5.12.12.1 no hostroutesaccept

This command disables the RIP hostroutesaccept mode.

**Format** no hostroutesaccept  
**Mode** Router RIP Config

### 5.12.13 split-horizon

This command sets the RIP split horizon mode. Split horizon is a technique for avoiding problems caused by including routes in updates sent to the router from which the route was originally learned. The options are:

- None - no special processing for this case.
- Simple - a route will not be included in updates sent to the router from which it was learned.
- Poisoned reverse - a route will be included in updates sent to the router from which it was learned, but the metric will be set to infinity.

**Default** simple  
**Format** split-horizon {none | simple | poison}  
**Mode** Router RIP Config

### 5.12.13.1 no split-horizon

This command sets the default RIP split horizon mode.

**Format** no split-horizon  
**Mode** Router RIP Config

### 5.12.14 redistribute (RIP)

This command configures RIP protocol to redistribute routes from the specified source protocol/routers. There are five possible match options. When you submit the command `redistribute ospf match match-type`, the match-type or types specified are added to any match types presently being redistributed. Internal routes are redistributed by default.

**Default**

- metric—not-configured
- match—internal

**Format for OSPF as source protocol** redistribute ospf [metric 0-15] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]

**Format for other source protocol** redistribute {static | connected} [metric 0-15]

**Mode** Router RIP Config

### 5.12.14.1 no redistribute

This command de-configures RIP protocol to redistribute routes from the specified source protocol/routers.

**Format** no redistribute {ospf | static | connected} [metric] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]

**Mode** Router RIP Config

### 5.12.15 show ip rip

This command displays information relevant to the RIP router.

**Format** show ip rip

**Modes**

- Privileged EXEC
- User EXEC

| Parameter               | Description                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RIP Admin Mode          | Enable or disable.                                                                                                                                         |
| Split Horizon Mode      | None, simple or poison reverse.                                                                                                                            |
| Auto Summary Mode       | Enable or disable. If enabled, groups of adjacent routes are summarized into single entries, to reduce the total number of entries. The default is enable. |
| Host Routes Accept Mode | Enable or disable. If enabled the router accepts host routes. The default is enable.                                                                       |
| Global Route Changes    | The number of route changes made to the IP Route Database by RIP. This does not include the refresh of a route's age.                                      |
| Global queries          | The number of responses sent to RIP queries from other systems.                                                                                            |
| Default Metric          | The default metric of redistributed routes if one has already been set, or blank if not configured earlier. The valid values are 1 to 15.                  |
| Default Route Advertise | The default route.                                                                                                                                         |

### 5.12.16 show ip rip interface brief

This command displays general information for each RIP interface. For this command to display successful results routing must be enabled per interface (that is, ip rip).

**Format** show ip rip interface brief

**Modes**

- Privileged EXEC
- User EXEC

| Parameter       | Description                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------|
| Interface       | slot/port                                                                                                            |
| IP Address      | The IP source address used by the specified RIP interface.                                                           |
| Send Version    | The RIP versions used when sending updates on the specified interface. The types are none, RIP-1, RIP-1c, RIP-2      |
| Receive Version | The RIP versions allowed when receiving updates from the specified interface. The types are none, RIP-1, RIP-2, Both |

| Parameter  | Description                                                            |
|------------|------------------------------------------------------------------------|
| RIP Mode   | The administrative mode of router RIP operation (enabled or disabled). |
| Link State | The mode of the interface (up or down).                                |

### 5.12.17 show ip rip interface

This command displays information related to a particular RIP interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format.

**Format**            `show ip rip interface {slot/port/vlan 1-4093}`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter           | Description                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface           | <code>slot/port</code> This is a configured value.                                                                                                |
| IP Address          | The IP source address used by the specified RIP interface. This is a configured value.                                                            |
| Send Version        | The RIP versions used when sending updates on the specified interface. The types are none, RIP-1, RIP-1c, RIP-2. This is a configured value.      |
| Receive Version     | The RIP versions allowed when receiving updates from the specified interface. The types are none, RIP-1, RIP-2, Both. This is a configured value. |
| RIP Admin Mode      | RIP administrative mode of router RIP operation; enable activates, disable de-activates it. This is a configured value.                           |
| Link State          | Indicates whether the RIP interface is up or down. This is a configured value.                                                                    |
| Authentication Type | The RIP Authentication Type for the specified interface. The types are none, simple, and encrypt. This is a configured value.                     |

The following information will be invalid if the link state is down.

| Parameter            | Description                                                                                                      |
|----------------------|------------------------------------------------------------------------------------------------------------------|
| Bad Packets Received | The number of RIP response packets received by the RIP process which were subsequently discarded for any reason. |
| Bad Routes Received  | The number of routes contained in valid RIP packets that were ignored for any reason.                            |
| Updates Sent         | The number of triggered RIP updates actually sent on this interface.                                             |

## 5.13 ICMP Throttling Commands

This section describes the commands you use to configure options for the transmission of various types of ICMP messages.

### 5.13.1 ip unreachable

Use this command to enable the generation of ICMP Destination Unreachable messages on an interface or range of interfaces. By default, the generation of ICMP Destination Unreachable messages is enabled.

**Default**            enable

**Format**            `ip unreachable`

**Mode**                Interface Config

### 5.13.1.1 no ip unreachablees

Use this command to prevent the generation of ICMP Destination Unreachable messages.

**Format**            no ip unreachablees  
**Mode**             Interface Config

### 5.13.2 ip redirects

Use this command to enable the generation of ICMP Redirect messages by the router. By default, the generation of ICMP Redirect messages is enabled. You can use this command to configure an interface, a range of interfaces, or all interfaces.

**Default**           enable  
**Format**           ip redirects  
**Mode**

- Global Config
- Interface Config
- Virtual Router Config

#### 5.13.2.1 no ip redirects

Use this command to prevent the generation of ICMP Redirect messages by the router.

**Format**           no ip redirects  
**Mode**

- Global Config
- Interface Config

### 5.13.3 ipv6 redirects

Use this command to enable the generation of ICMPv6 Redirect messages by the router. By default, the generation of ICMP Redirect messages is enabled. You can use this command to configure an interface, a range of interfaces, or all interfaces.

**Default**           enable  
**Format**           ipv6 redirects  
**Mode**             Interface Config

#### 5.13.3.1 no ipv6 redirects

Use this command to prevent the generation of ICMPv6 Redirect messages by the router.

**Format**           no ipv6 redirects  
**Mode**             Interface Config

### 5.13.4 ip icmp echo-reply

Use this command to enable the generation of ICMP Echo Reply messages by the router. By default, the generation of ICMP Echo Reply messages is enabled.

**Default**           enable  
**Format**           ip icmp echo-reply  
**Mode**             Global Config

### 5.13.4.1 no ip icmp echo-reply

Use this command to prevent the generation of ICMP Echo Reply messages by the router.

**Format**           no ip icmp echo-reply  
**Mode**             Global Config

### 5.13.5 ip icmp error-interval

Use this command to limit the rate at which IPv4 ICMP error messages are sent. The rate limit is configured as a token bucket, with two configurable parameters, *burst-size* and *burst-interval*.

The *burst-interval* specifies how often the token bucket is initialized with *burst-size* tokens. *burst-interval* is from 0 to 2147483647 milliseconds (ms). The *burst-size* is the number of ICMP error messages that can be sent during one *burst-interval*. The range is from 1 to 200 messages. To disable ICMP rate limiting, set *burst-interval* to zero (0).

**Default**           • burst-interval of 1000 ms  
                   • burst-size of 100 messages  
**Format**           ip icmp error-interval *burst-interval* [*burst-size*]  
**Mode**             Global Config

#### 5.13.5.1 no ip icmp error-interval

Use the *no* form of the command to return *burst-interval* and *burst-size* to their default values.

**Format**           no ip icmp error-interval  
**Mode**             Global Config

## 5.14 Bidirectional Forwarding Detection Commands

Bidirectional Forwarding Detection (BFD) verifies bidirectional connectivity between forwarding engines, which can be a single or multi-hop away. The protocol works over any underlying transmission mechanism and protocol layer with a wide range of detection times, especially in scenarios where fast failure detection is required in data plane level for multiple concurrent sessions.

Use the following commands to configure Bidirectional Forwarding Detection.

### 5.14.1 feature bfd

This command enables BFD on the device. Note that BFD must be enabled to configure other protocol and interface parameters.

**Default**           disabled  
**Format**           *feature bfd*  
**Mode**             Global Config

#### 5.14.1.1 no feature bfd

Disables BFD globally and removes runtime session data. Static configurations are retained.

**Format**           *no feature bfd*  
**Mode**             Global Config

**Example:** The following shows an example of the command.

```
(Router)# configure
(Router) (Config)# feature bfd
(Router) (Config)# exit
```



## 5.14.2 bfd

This command enables BFD on all interfaces associated with the OSPF process. BFD must be enabled on the individual interface to trigger BFD on that interface.

**Default** disabled  
**Format** *bfd*  
**Mode** Router OSPF Config

**Example:** Do the following to trigger BFD processing through OSPF globally on all the interfaces that are associated with it.

```
(Router) (Config)# router ospf
(Router) (Config-router)# bfd
(Router) (Config-router)# exit
```

### 5.14.2.1 no bfd

This command disables BFD globally on all interfaces associated with the OSPF process.

**Format** *no bfd*  
**Mode** Router OSPF Config

## 5.14.3 bfd echo

This command enables BFD echo mode on an IP interface.

**Default** disabled  
**Format** *bfd echo*  
**Mode** Interface Config

**Example:** The following shows an example of the command.

```
(Router) (Config)# interface 1/0/1
(Router) (Interface 1/0/1)# no bfd echo
(Router) (Interface 1/0/1)# exit
```

### 5.14.3.1 no bfd echo

This command disables BFD echo mode on an IP interface.

**Format** *no bfd echo*  
**Mode** Interface Config

## 5.14.4 bfd interval

This command configures the BFD session parameters for all available interfaces on the device (Global Config mode) or IP interface (Interface Config mode). It overwrites any BFD configurations present on individual interfaces (Global Config mode) or globally configured BFD session parameters (Interface Config).

**Default** none  
**Format** *bfd interval transmit-interval min\_rx minimum-receive-interval multiplier  
detection-time-multiplier*  
**Mode**

- Global Config
- Interface Config

| Parameters                | Description                                                                                                                                                                                                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transmit-interval         | The desired minimum transmit interval, which is the minimum interval that the user wants to use while transmitting BFD control packets. It is represented in milliseconds. Its range is 100 ms to 1000 ms (with a change granularity of 100) a with default value of 100 ms. |
| minimum-receive-interval  | The required minimum receive interval, which is the minimum interval at which the system can receive BFD control packets. It is represented in milliseconds. Its range is 100 ms to 1000 ms (with a change granularity of 100) with a default value of 100 ms.               |
| detection-time-multiplier | The number of BFD control packets that must be missed in a row to declare a session down. Its range is 1 to 50 with default value of 3.                                                                                                                                      |

**Example:** The following steps configure BFD session parameters on the device, in Privileged EXEC mode.

```
(Router)# configure
(Router) (Config)# bfd interval 100 min_rx 200 multiplier 5
(Router) (Config)# exit
```

**Example:** The following steps configure BFD session parameters on an interface (for example, 1/0/1).

```
(Router) (Config)# interface 1/0/1
(Router) (Interface 1/0/1)# bfd interval 100 min_rx 200 multiplier 5
(Router) (Interface 1/0/1)# exit
```

#### 5.14.4.1 no bfd interval

In Global Config mode, this command resets the BFD session parameters for all available interfaces on the device to their default values. In Interface Config mode, this command resets the BFD session parameters for all sessions on an IP interface to their default values.

**Format**           no bfd interval

**Mode**            • Global Config

                  • Interface Config

#### 5.14.5 bfd slow-timer

This command sets up the required echo receive interval preference value. This value determines the interval the asynchronous sessions use for BFD control packets the when echo function is enabled. The slow-timer value is used as the new control packet interval, while the echo packets use the configured BFD intervals.

**Default**           2000

**Format**           bfd slow-timer *echo-receive-interval*

**Mode**            Global Config

| Parameters            | Description                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| echo-receive-interval | The value is represented in milliseconds. Its range is 1000 ms to 30000 ms (with a change granularity of 100) with default value of 2000 ms. |

**Example:** The following shows an example of the command.

```
(Router)# configure
(Router) (Config)# bfd slow-timer 10000
(Router) (Config)# exit
```

#### 5.14.5.1 no bfd slow-timer

This command resets the BFD slow-timer preference value to its default.

**Format**           no bfd slow-timer

**Mode**            Global Config

## 5.14.6 ip ospf bfd

This command enables BFD on interfaces associated with the OSPF process.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | ip ospf bfd      |
| <b>Mode</b>    | Interface Config |

### 5.14.6.1 ip ospf bfd

This command disables BFD on interfaces associated with the OSPF process.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | no ip ospf bfd   |
| <b>Mode</b>    | Interface Config |

## 5.14.7 show bfd neighbors

This command displays the BFD adjacency list showing the active BFD neighbors.

|               |                              |
|---------------|------------------------------|
| <b>Format</b> | show bfd neighbors [details] |
| <b>Mode</b>   | Privileged EXEC              |

| Parameters | Description                                                                                                                         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------|
| details    | Provides additional details with the routing protocol BFD has registered and displays the Admin Mode status as Enabled or Disabled. |

The following information is displayed.

| Parameters                    | Description                                                                                                                     |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Our IP address                | The current IP address.                                                                                                         |
| Neighbor IP address           | The IP address of the active BFD neighbor.                                                                                      |
| State                         | The current state, either Up or Down.                                                                                           |
| Interface                     | The current interface.                                                                                                          |
| Uptime                        | The amount of time the interface has been up.                                                                                   |
| Registered Protocol           | The protocol from which the BFD session was initiated and that is registered to receive events from BFD.                        |
| Local Diag                    | The diagnostic state specifying the reason for the most recent change in the local session state.                               |
| Demand mode                   | Indicates if the system wants to use Demand mode.<br><b>Note: Demand mode is not supported in the current FASTPATH release.</b> |
| Minimum transmit interval     | The minimum interval to use when transmitting BFD control packets.                                                              |
| Actual TX Interval            | The transmitting interval being used for control packets.                                                                       |
| Actual TX Echo interval       | The transmitting interval being used for echo packets.                                                                          |
| Minimum receive interval      | The minimum interval at which the system can receive BFD control packets.                                                       |
| Detection interval multiplier | The number of BFD control packets that must be missed in a row to declare a session down.                                       |
| My discriminator              | Unique Session Identifier for Local BFD Session.                                                                                |
| Your discriminator            | Unique Session Identifier for Remote BFD Session.                                                                               |
| Tx Count                      | The number of transmitted BFD packets.                                                                                          |

| Parameters | Description                         |
|------------|-------------------------------------|
| Rx Count   | The number of received BFD packets. |
| Drop Count | The number of dropped packets.      |

**Example:** The following shows example command output.

```
(Router)# show bfd neighbors
```

```
Admin Mode: Enabled
```

| OurAddr      | NeighAddr    | State | Interface | Uptime    |
|--------------|--------------|-------|-----------|-----------|
| 192.168.20.1 | 192.168.20.2 | Up    | 1/0/77    | 0:0:21:30 |
| 2001::1      | 2001::2      | Up    | 1/0/78    | 0:0:0:18  |

```
(Router)# show bfd neighbors details
```

```
Admin Mode: Enabled
```

```
Our IP address..... 2.1.1.1
Neighbor IP address..... 2.1.1.2
State..... Up
Interface..... 0/15
Uptime..... 0:0:0:10
Registered Protocol..... BGP
Local Diag..... None
Demand mode..... FALSE
Minimum transmit interval..... 100
Minimum receive interval..... 100
Actual tx interval..... 100
Actual tx echo interval..... 0
Detection interval multiplier..... 3
My discriminator..... 1
Your discriminator..... 1
Tx Count..... 105
Rx Count..... 107
Drop Count..... 0
```

### 5.14.8 debug bfd event

This command displays BFD state transition information.

**Format** debug bfd event

**Mode** Privileged EXEC

### 5.14.9 debug bfd packet

This command displays BFD control packet debugging information.

**Format** debug bfd packet

**Mode** Privileged EXEC

## 5.15 IP Service Level Agreement Commands

The IP service-level agreement (SLA) feature allows users to monitor network performance between routers or from a router to a remote IP device. FASTPATH supports the following measurement capabilities:

- Remote IP reachability tracking.
- Round-trip-time threshold monitoring

These metrics are collected by measuring ICMP response time and connectivity. This feature is deployed mostly in Enterprise networks on multi-homed customer edge devices, where there is a need to automatically switch to the next priority ISP in case of reachability issues with the current ISP.

## 5.15.1 ip sla

Use this command to start configuring an IP Service Level Agreements (SLAs) operation and enter the IP SLA configuration mode.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | No IP SLA operation is configured.          |
| <b>Format</b>  | <code>ip sla <i>operation-number</i></code> |
| <b>Mode</b>    | Global Config                               |

| Parameters       | Description                                                                    |
|------------------|--------------------------------------------------------------------------------|
| operation-number | Identifies the IP SLAs operation being configured. The range is from 1 to 128. |

### Usage Guidelines

Start configuring an IP SLA operation by using the `ip sla` command. This command specifies an identification number for the operation to be configured. Once this command is entered, the router enters IP SLA configuration mode.

This command is supported in IPv4 networks and also for IPv6 networks where IPv6 addresses are supported.

The maximum number of IP SLAs supported is 128 (IPv4 and IPv6 combined).

Once an operation is configured it needs to be scheduled to be started. Refer to the `ip sla schedule` global configuration command for more details on scheduling of an operation.

#### NOTICE

The configuration of an operation cannot be modified after an operation has been scheduled to start. For modifying the configuration of the operation after it is scheduled, the operation must either be stopped or must be deleted first (using the `no ip sla` command) and then reconfigured with new operation parameters.

To display the current operational state of an IP SLA operation, use the `show ip sla configuration` command in user EXEC or privileged EXEC mode.

**Example:** The following example shows an operation 55 being configured as an ICMP Echo operation in an IPv4 network and being scheduled to start. In the below example the `ip sla` command being used in an IPv4 network is shown.

```
(Routing)(config)# ip sla 55
(Routing)(config-ip-sla)#icmp-echo 172.16.1.175
(Routing) (config-ip-sla-echo)#exit
(Routing)(config-ip-sla)#exit
(Routing)(config)# ip sla schedule 55
```

#### NOTICE

In case the operation 55 is already configured and has not been scheduled, the command line interface will enter IP SLA configuration mode for operation 55. If the operation already exists and has been scheduled, this command will fail.

### 5.15.1.1 no ip sla

Use this command to remove all the configuration information of an IP SLA operation, which also includes removing the schedule of the operation.

|               |                                                |
|---------------|------------------------------------------------|
| <b>Format</b> | <code>no ip sla <i>operation-number</i></code> |
| <b>Mode</b>   | Global Config                                  |

## 5.15.2 ip sla schedule

After configuring an IP SLA operation, the IP SLA is in pending state and needs to be started using the `ip sla schedule` global configuration command. To stop the operation and place it in the default state (pending), use the `no` form of this command.

|                |                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | By default the operation is put in a pending state. In the pending state the operation is enabled but does not actively probe and collect information. |
| <b>Format</b>  | <code>ip sla schedule operation-number</code>                                                                                                          |
| <b>Mode</b>    | Global Config                                                                                                                                          |

| Parameters       | Description                                                                    |
|------------------|--------------------------------------------------------------------------------|
| operation-number | Identifies the IP SLAs operation being configured. The range is from 1 to 128. |

### Usage Guidelines

By default IP SLAs are not scheduled to start. Once an IP SLA object is created using the `ip sla` global configuration command it needs to be started (with a lifetime of forever) by using the `ip sla schedule` CLI configuration command. When an `ip sla schedule` command is issued, the ip sla operation transitions from pending state to active and immediately begins probing and collecting information. The IP SLA probes can be stopped by unconfiguring the IP SLA schedule config by using the `no ip sla schedule` command.

This command is supported in IPv4 networks and also for IPv6 networks where IPv6 addresses are supported.

### NOTICE

After you schedule an operation, you cannot modify the configuration of the operation. To modify the configuration of the operation after it is scheduled, you must first stop the operation by using the `no ip schedule` command and then modify the configuration. Or else you must first delete the IP SLAs operation (using the `no ip sla` command) and then reconfigure the operation with the new operation parameters.

To display the current configuration settings of the operation, use the `show ip sla configuration` command in user EXEC or privileged EXEC mode.

**Example:** In the following example, operation 55 is configured as a ICMP Echo operation in an IPv4 network and is scheduled to start. The example shows the `ip sla schedule` command being used in an IPv4 network.

```
(Routing)(config)# ip sla 55
(Routing)(config-ip-sla)# icmp-echo 172.16.1.175
(Routing) (config-ip-sla-echo)#exit
(Routing)(config-ip-sla)#exit
(Routing)(config)# ip sla schedule 55
```

### 5.15.2.1 no ip sla schedule

Use this command to stop the operation and place it in the default state (pending).

|               |                                                  |
|---------------|--------------------------------------------------|
| <b>Format</b> | <code>no ip sla schedule operation-number</code> |
| <b>Mode</b>   | Global Config                                    |

### 5.15.3 track ip sla

Use this command to track the state of an IP Service Level Agreements (SLAs) operation and to enter tracking configuration mode.

|                |                                                                                 |
|----------------|---------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                        |
| <b>Format</b>  | <code>track object-number ip sla operation-number [reachability   state]</code> |
| <b>Mode</b>    | Global Config                                                                   |

| Parameters    | Description                                                      |
|---------------|------------------------------------------------------------------|
| object-number | Identifies the object to be tracked. The range is from 1 to 128. |

| Parameters       | Description                                     |
|------------------|-------------------------------------------------|
| operation-number | Identifies the IP SLAs operation to be tracked. |
| reachability     | Tracks whether the route is reachable.          |
| state            | Tracks the operation return code.               |

### Usage Guidelines

An operation return-code value is maintained by every IP SLAs operation. This return code is interpreted by the tracking process. The return code may return OK, OverThreshold, and Timeout.

Two facets of an IP SLAs operation can be tracked: reachability and state. The acceptance of the OverThreshold return code is the difference between these facets. Table 14 shows the comparison between the reachability and state facets of IP SLAs operations that can be tracked.

Table 14: Comparison of Reachability and State Operations

| Tracking     | Return Code                    | Track State |
|--------------|--------------------------------|-------------|
| Reachability | OK or OverThreshold<br>Timeout | Up<br>Down  |
| State        | OK<br>Timeout, OverThreshold   | Up<br>Down  |

Tracking of a maximum of 128 (IPv4 and IPv6 combined) track objects is supported. If neither of the optional keywords (`reachability` or `state`) is specified in a configured `track ip sla` CLI command, then the default tracking type value `reachability` gets configured.

**Example:** In the following example, the tracking process is configured to track the *state* of IP SLAs operation 5.

```
(Routing)(config)# track 2 ip sla 5 state
```

In the following example, the tracking process is configured to track the reachability of IP SLAs operation 6.

```
(Routing)(config)# track 3 ip sla 6 reachability
```

#### 5.15.3.1 no track ip sla

Use this command to remove the tracking.

**Format**           no track object-number

**Mode**             Global Config

## 5.16 Track Configuration Mode Commands

### 5.16.1 delay

To configure a delay for acting upon a track object reachability state changes, use the `delay` command in Track configuration mode.

**Default**           none

**Format**           delay {up seconds [down seconds] | [down seconds] up seconds}

**Mode**             Track Config

| Parameters   | Description                                                                                                            |
|--------------|------------------------------------------------------------------------------------------------------------------------|
| up seconds   | Time to delay the notification of an up event. Delay value, in seconds. The range is from 0 to 180. The default is 0.  |
| down seconds | Time to delay the notification of a down event. Delay value, in seconds. The range is from 0 to 180. The default is 0. |

### Usage Guidelines

To minimize flapping of the reachability state (Up/Down), use the `delay` command to introduce a nonzero delay in seconds between the UP and DOWN state transitions per Track object.

Delay time specifies the hold interval for an (UP/DOWN) state before taking action on the associated static routes.

**Example:** In the following example, Track object 10 is created and is associated with the IP SLAs operation 11 and then an up delay of 5 seconds and a down delay of 3 seconds is configured.

```
(Routing)(config)#track 10 ip sla 11
(Routing)(config-track)#delay up 5 down 3
```

#### 5.16.1.1 no delay

Use this command to reset the delay for acting upon a track object reachability state changes to the default value.

**Format**           no delay  
**Mode**             Track Config

## 5.17 IP SLA Configuration Mode Commands

### 5.17.1 icmp-echo

Use this command in IP SLA configuration mode, to configure an IP Service Level Agreements (SLAs) Internet Control Message Protocol (ICMP) echo operation.

**Default**           No IP SLAs operation type is configured for the operation being configured.  
**Format**           icmp-echo *destination-ip-address* [*source-interface* {*interface-name* | *vlan vlan-id*}]  
**Mode**             IP SLA Config

| Parameters                                       | Description                                             |
|--------------------------------------------------|---------------------------------------------------------|
| destination-ip-address                           | Destination IPv4 or IPv6 address.                       |
| source-interface {interface-name   vlan vlan-id} | Used to specify the source interface for the operation. |

### Usage Guidelines

You must configure the type of IP SLAs operation (ICMP echo) before you can configure any of the other parameters of the operation. To change the operation values (*destination-ip-address* or *source-interface-name*) of an existing scheduled IP SLAs ICMP echo operation, you must stop the IP SLA operation by using the `no ip sla schedule operation-number`. Or else you must first delete the IP SLAs operation (using the `no ip sla global configuration` command) and then reconfigure the operation with the new operation values.

IP SLAs ICMP echo operations support both IPv4 and IPv6 addresses.

**Example:** In the following example, IP SLAs operation 12 is created and configured as an echo operation using the ICMP protocol and the destination IPv4 address 143.1.16.125.

```
(Routing)(config)#ip sla 12
(Routing)(config-ip-sla)#icmp-echo 143.1.16.125
```



In the following example, IP SLAs operation 13 is created and configured as an echo operation using the ICMP protocol and the destination IPv6 address 3001:CD6:200::1.

```
(Routing)(config)#ip sla 13
(Routing)(config-ip-sla)#icmp-echo 3001:CD6:200::1
```

## 5.18 IP SLA ICMP ECHO Configuration Mode Commands

### 5.18.1 frequency

Use this command to set the rate at which a specified IP Service Level Agreements (SLAs) operation repeats in the ICMP echo configuration sub-mode of IP SLA configuration mode.

|                |                          |
|----------------|--------------------------|
| <b>Default</b> | 60 seconds               |
| <b>Format</b>  | frequency <i>seconds</i> |
| <b>Mode</b>    | IP SLA ICMP ECHO Config  |

| Parameters | Description                                                           |
|------------|-----------------------------------------------------------------------|
| seconds    | Number of seconds between the IP SLAs operations. Range is 1 to 3600. |

#### Usage Guidelines

A single IP SLAs operation will repeat at a given frequency for the lifetime of the operation. For example, the ICMP Echo operation with a frequency of 60 sends an ICMP Echo Request packet once every 60 seconds, for the lifetime of the operation. This packet is sent when the operation is started, then is sent again 60 seconds later.

If an individual IP SLAs operation takes longer to execute than the specified frequency value, a statistics counter called "busy" is incremented rather than immediately repeating the operation.

Following are the recommended guidelines for configuring the `frequency`, `timeout` and `threshold` commands of the IP SLAs ICMP Echo operation:

```
(frequency seconds) ? (timeout milliseconds) ? (threshold milliseconds)
```

#### NOTICE

It is recommended to not to set the frequency value to less than 60 seconds because the potential overhead from numerous active operations could significantly affect network performance.

This command is supported in IPv4 networks and also for IPv6 networks where IPv6 addresses are supported.

**Example:** The following example shows how to configure an IP SLAs ICMP echo operation (operation 11) to repeat every 80 seconds. This example shows the `frequency` (IP SLA) command being used in an IPv4 network in ICMP echo configuration mode within IP SLA configuration mode:

```
(Routing)(config)#ip sla 11
(Routing)(config-ip-sla)#icmp-echo 152.15.10.145
(Routing)(config-ip-sla-echo)#frequency 80
```

#### 5.18.1.1 no frequency

Use this command to return the frequency to the default value.

|               |                         |
|---------------|-------------------------|
| <b>Format</b> | no frequency            |
| <b>Mode</b>   | IP SLA ICMP ECHO Config |

### 5.18.2 timeout

Use this command to set the amount of time an IP Service Level Agreements (SLAs) operation waits for a response from

its request packet. This command is available in the ICMP echo configuration sub-mode of IP SLA configuration mode.

**Default** 5000 milliseconds  
**Format** timeout *milliseconds*  
**Mode** IP SLA ICMP ECHO Config

| Parameters   | Description                                                                                                                                                                                                                                                                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| milliseconds | Length of time the operation waits to receive a response from its request packet, in milliseconds (ms). The range is 50 to 300000.<br>The value of the milliseconds argument should be based on the sum of both the maximum round-trip time (RTT) value for the packets and the processing time of the IP SLAs operation. |

### Usage Guidelines

It is recommended that the value of the milliseconds argument be based on the sum of both the maximum round-trip time (RTT) value for the packets and the processing time of the IP SLAs operation.

Use the `timeout` (IP SLA) command to set how long the operation waits to receive a response from its request packet, and use the `frequency` (IP SLA) command to set the rate at which the IP SLAs operation restarts. The value specified for the `timeout` (IP SLA) command cannot be greater than the value specified for the `frequency` (IP SLA) command.

Following are the recommended guidelines for configuring the `frequency`, `timeout` and `threshold` commands of the IP SLAs ICMP Echo operation:

(frequency *seconds*) ? (timeout *milliseconds*) ? (threshold *milliseconds*)

This command is supported in IPv4 networks and also for IPv6 networks where IPv6 addresses are supported.

**Example:** In the following example, the timeout value for an IP SLAs operation 11 is set for 2500 ms.

```
(Routing)(config)#ip sla 11
(Routing)(config-ip-sla)#icmp-echo 152.17.10.145
(Routing)(config-ip-sla-echo)#timeout 2500
```

### 5.18.2.1 no timeout

Use this command to return the timeout to the default value.

**Format** timeout *milliseconds*  
**Mode** IP SLA ICMP ECHO Config

### 5.18.3 threshold

Use this command in the ICMP echo configuration sub-mode of IP SLA configuration to set the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.

**Default** 5000 milliseconds  
**Format** threshold *milliseconds*  
**Mode** IP SLA ICMP ECHO Config

| Parameters   | Description                                                                                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------|
| milliseconds | Length of the time in milliseconds, required for a rising threshold to be declared. Range is 50 to 60000. Default is 5000. |

### Usage Guidelines

The value specified for this command must not be greater than the value specified for the `timeout` command. The threshold value configured by this command is used only to calculate network monitoring statistics created by an IP SLAs operation.

For the IP SLAs ICMP Echo operation, the `threshold` (IP SLA) command sets the upper threshold value for the round-trip time (RTT) measurement.

Following are the recommended guidelines for configuring the `frequency`, `timeout` and `threshold` commands of the IP SLAs ICMP Echo operation:

```
(frequency seconds) ? (timeout milliseconds) ? (threshold milliseconds)
```

This command is supported in IPv4 networks and also for IPv6 networks where IPv6 addresses are supported.

**Example:** The following example shows how to configure the threshold of the IP SLAs ICMP echo operation to 3500. This example shows the `threshold` (IP SLA) command being used in an IPv4 network in ICMP echo configuration mode within IP SLA configuration mode.

```
(Routing)(config)#ip sla 11
(Routing)(config-ip-sla)#icmp-echo 152.17.10.145
(Routing)(config-ip-sla-echo)#threshold 3500
```

### 5.18.3.1 no threshold

Use this command to reset the threshold to the default value.

**Format**            no threshold  
**Mode**               IP SLA ICMP ECHO Config

## 5.19 Clear Commands

### 5.19.1 clear ip sla statistics

Use this command to clear IP SLA statistical information for given IP SLA operation or all IP SLAs.

**Format**            clear ip sla statistics [*operation-number*]  
**Mode**               Privileged Exec

| Parameters       | Description                                                                 |
|------------------|-----------------------------------------------------------------------------|
| operation-number | IP SLA number of a specific operation whose statistics needs to be cleared. |

## 5.20 Show Commands

### 5.20.1 show ip sla configuration

Use this command in user EXEC or privileged EXEC mode to see the configuration values (including all defaults) for a specified IP SLAs operation or all operations.

**Format**            show ip sla configuration [*operation-number*]  
**Mode**               Privileged Exec

| Parameters       | Description                                                                      |
|------------------|----------------------------------------------------------------------------------|
| operation-number | IP SLA number of a specific operation associated with the statistics to display. |

**Example:** IP SLAs Internet Control Message Protocol (ICMP) echo operations support both IPv4 and IPv6 addresses. The sample outputs from the `show ip sla configuration` command for different IP SLAs operations in IPv4 and IPv6 networks are shown below.

```
(Routing)#show ip sla configuration 3
```

```
Entry number: 3
```

```
Type of operation: echo
Target address/Source address: 1.1.1.1/0.0.0.0
Operation timeout (milliseconds): 5000
Vrf Name:
Schedule:
 Next Scheduled Start Time: Start Time already passed
 Operation frequency (seconds): 60
 Life: Forever
Threshold (milliseconds): 5000
```

In the following example the output from the `show ip sla configuration` command when the specified operation is an ICMP echo operation in an IPv6 network is shown.

```
(Routing)#show ip sla configuration 5

Entry number: 3
Type of operation: echo
Target address/Source address: 2001:DB8:100::1/2001:0DB8:200::FFFE
Operation timeout (milliseconds): 5000
Vrf Name:
Schedule:
 Next Scheduled Start Time: Pending Trigger
 Operation frequency (seconds): 60
 Life: Forever
Threshold (milliseconds): 5000
```

## 5.20.2 show ip sla statistics

Use this command in user EXEC or privileged EXEC mode to see the statistics and the current operational status of a specified IP SLA operation or of all operations.

**Format**            `show ip sla statistics [operation-number] [details]`

**Mode**             Privileged Exec

| Parameters       | Description                                                                             |
|------------------|-----------------------------------------------------------------------------------------|
| operation-number | IP SLA operation number for which statistics and the operational status are displayed.  |
| details          | Include this option to display statistics and the operational status in greater detail. |

### Usage Guidelines

This command shows the current state of IP SLAs operations, including whether the operation is active and also the monitoring data returned for the last (most recently completed) operation.

**Example:** The following shows example command output.

```
(Routing)# show ip sla statistics details

Round Trip Time (RTT) for Index 1
Type of operation: icmp-echo
 Latest RTT: 1 ms
Latest operation start time: 47 milliseconds
Latest operation return code: OK
Over thresholds occurred: FALSE
Number of successes: 14
Number of failures: 0
Operation time to live: Forever
Operational state of entry: Active
```

### 5.20.3 show ip route track-table

This command displays information for all tracked IPv4 static routes for a given VRF or the default the VRF.

**Format** show ip route [vrf *vrf-name*] track-table

**Mode** Privileged Exec

| Parameters          | Description                                                        |
|---------------------|--------------------------------------------------------------------|
| vrf <i>vrf-name</i> | Displays all tracked static routes associated with a specific VRF. |

**Example:** The following shows example command output.

```
(Routing)#show ip route track-table

ip route 0.0.0.0 0.0.0.0 10.130.167.129 track 10 state is [up]
```

### 5.20.4 show ipv6 route track-table

This command displays information about all IPv6 static routes being tracked.

**Format** show ipv6 route track-table

**Mode** Privileged Exec

**Example:** The following shows example command output.

```
(Routing)#show ipv6 route track-table

ipv6 route 2001:866::/32 4001::1 track 15 state is [up]
```

### 5.20.5 show track

This command is used display detailed information for all track objects or for a specific track-object. This command is also used to display brief information for all track objects or for track-objects associated with a given IP SLA operation.

**Format** show track [brief | *track-number* | {ip sla *operation-number*}]

**Mode** Privileged Exec

| Parameters                       | Description                                                                                                |
|----------------------------------|------------------------------------------------------------------------------------------------------------|
| brief                            | Displays brief information for all track objects.                                                          |
| <i>track-number</i>              | The track object's number with the detailed information to display.                                        |
| ip sla <i>operation-number</i> > | IP SLA operation number of whose associated track-objects related brief information needs to be displayed. |

**Example:** The following example shows detailed information for all track objects.

```
(Routing)#show track

Track 10
 IP SLA 1 reachability
 Reachability is Up
 1 change, last change 01:12:36
 Delay up 5 secs, down 5 secs
 Latest operation return code: OK
 Latest RTT (millisecs) 1500

Track 11
 IP SLA 2 state
```

```

State is Up
 1 change, last change 00:41:55
Delay up 10 secs, down 10 secs
Latest operation return code: OK
Latest RTT (milliseconds) 1000

```

```

Track 13
IP SLA 1 state
State is Up
 1 change, last change 00:34:08
Delay up 5 secs, down 5 secs
Latest operation return code: OK
Latest RTT (milliseconds) 1500

```

**Example:** The following example shows detailed information for track object 10.

```
(Routing)#show track 10
```

```

Track 10
IP SLA 1 reachability
Reachability is Up
 1 change, last change 01:12:36
Delay up 5 secs, down 5 secs
Latest operation return code: OK
Latest RTT (milliseconds) 1500

```

**Example:** The following example shows brief information for all track objects associated with IP SLA operation 1.

```
(Routing)#show track ip sla 1
```

| Track | Object   | Parameter    | Value | Last Change |
|-------|----------|--------------|-------|-------------|
| 10    | ip sla 1 | reachability | Up    | 01:12:36    |
| 13    | ip sla 1 | state        | Up    | 00:34:08    |

**Example:** The following example shows brief information for all track objects.

```
(Routing)#show track brief
```

| Track | Object   | Parameter    | Value | Last Change |
|-------|----------|--------------|-------|-------------|
| 10    | ip sla 1 | reachability | Up    | 01:12:36    |
| 11    | ip sla 2 | state        | Up    | 00:41:55    |
| 13    | ipsla 1  | state        | Up    | 00:34:08    |

## 6/ IPv6 Management Commands

This chapter describes the IPv6 commands available in the FASTPATH CLI.

### NOTICE

The commands in this chapter are in one of three functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Clear commands clear some or all of the settings to factory defaults.

## 6.1 IPv6 Management Commands

IPv6 Management commands allow a device to be managed using an IPv6 address in a switch or IPv4 routing (that is, independent from the IPv6 Routing package). For Routing/IPv6 builds of FASTPATH dual IPv4/IPv6 operation over the service port is enabled. FASTPATH has capabilities such as:

- Static assignment of IPv6 addresses and gateways for the service/network ports.
- The ability to ping an IPv6 link-local address over the service/network port.
- Using IPv6 Management commands, you can send SNMP traps and queries using the service/network port.
- The user can manage a device using the network port (in addition to a Routing Interface or the Service port).

### 6.1.1 serviceport ipv6 enable

Use this command to enable IPv6 operation on the service port. By default, IPv6 operation is enabled on the service port.

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | enabled                 |
| <b>Format</b>  | serviceport ipv6 enable |
| <b>Mode</b>    | Privileged EXEC         |

#### 6.1.1.1 no serviceport ipv6 enable

Use this command to disable IPv6 operation on the service port.

|               |                            |
|---------------|----------------------------|
| <b>Format</b> | no serviceport ipv6 enable |
| <b>Mode</b>   | Privileged EXEC            |

### 6.1.2 network ipv6 enable

Use this command to enable IPv6 operation on the network port. By default, IPv6 operation is enabled on the network port.

|                |                     |
|----------------|---------------------|
| <b>Default</b> | enabled             |
| <b>Format</b>  | network ipv6 enable |
| <b>Mode</b>    | Privileged EXEC     |

#### 6.1.2.1 no network ipv6 enable

Use this command to disable IPv6 operation on the network port.

|               |                        |
|---------------|------------------------|
| <b>Format</b> | no network ipv6 enable |
| <b>Mode</b>   | Privileged EXEC        |

### 6.1.3 serviceport ipv6 address

Use the options of this command to manually configure IPv6 global address, enable/disable stateless global address autoconfiguration and to enable/disable dhcpv6 client protocol information on the service port.

---

Multiple IPv6 prefixes can be configured on the service port.

---

#### NOTICE

**Format**            `serviceport ipv6 address {address/prefix-length [eui64] | autoconfig | dhcp}`  
**Mode**             Privileged EXEC

| Parameter     | Description                                                      |
|---------------|------------------------------------------------------------------|
| address       | IPv6 prefix in IPv6 global address format.                       |
| prefix-length | IPv6 prefix length value.                                        |
| eui64         | Formulate IPv6 address in eui64 address format.                  |
| autoconfig    | Configure stateless global address autoconfiguration capability. |
| dhcp          | Configure dhcpv6 client protocol.                                |

#### 6.1.3.1 no serviceport ipv6 address

Use the command `no serviceport ipv6 address` to remove all configured IPv6 prefixes on the service port interface.

Use the command with the `address` option to remove the manually configured IPv6 global address on the network port interface.

Use the command with the `autoconfig` option to disable the stateless global address autoconfiguration on the service port.

Use the command with the `dhcp` option to disable the dhcpv6 client protocol on the service port.

**Format**            `no serviceport ipv6 address {address/prefix-length [eui64] | autoconfig | dhcp}`  
**Mode**             Privileged EXEC

### 6.1.4 serviceport ipv6 gateway

Use this command to configure IPv6 gateway (that is, Default routers) information for the service port.

**NOTE:** Only a single IPv6 gateway address can be configured for the service port. There may be a combination of IPv6 prefixes and gateways that are explicitly configured and those that are set through auto-address configuration with a connected IPv6 router on their service port interface.

**Format**            `serviceport ipv6 gateway gateway-address`  
**Mode**             Privileged EXEC

| Parameter       | Description                                                  |
|-----------------|--------------------------------------------------------------|
| gateway-address | Gateway address in IPv6 global or link-local address format. |

#### 6.1.4.1 no serviceport ipv6 gateway

Use this command to remove IPv6 gateways on the service port interface.

**Format**            `no serviceport ipv6 gateway`  
**Mode**             Privileged EXEC



## 6.1.5 serviceport ipv6 neighbor

Use this command to manually add IPv6 neighbors to the IPv6 neighbor table for the service port. If an IPv6 neighbor already exists in the neighbor table, the entry is automatically converted to a static entry. Static entries are not modified by the neighbor discovery process. They are, however, treated the same for IPv6 forwarding. Static IPv6 neighbor entries are applied to the kernel stack and to the hardware when the corresponding interface is operationally active.

**Format**            `serviceport ipv6 neighbor ipv6-address macaddr`

**Mode**             Privileged EXEC

| Parameter    | Description                                    |
|--------------|------------------------------------------------|
| ipv6-address | The IPv6 address of the neighbor or interface. |
| macaddr      | The link-layer address.                        |

### 6.1.5.1 no serviceport ipv6 neighbor

Use this command to remove IPv6 neighbors from the IPv6 neighbor table for the service port.

**Format**            `no serviceport ipv6 neighbor ipv6-address macaddr`

**Mode**             Privileged EXEC

## 6.1.6 network ipv6 address

Use the options of this command to manually configure IPv6 global address, enable/disable stateless global address autoconfiguration and to enable/disable dhcpv6 client protocol information for the network port. Multiple IPv6 addresses can be configured on the network port.

**Format**            `network ipv6 address {address/prefix-length [eui64] | autoconfig | dhcp}`

**Mode**             Privileged EXEC

| Parameter     | Description                                                      |
|---------------|------------------------------------------------------------------|
| address       | IPv6 prefix in IPv6 global address format.                       |
| prefix-length | IPv6 prefix length value.                                        |
| eui64         | Formulate IPv6 address in eui64 format.                          |
| autoconfig    | Configure stateless global address autoconfiguration capability. |
| dhcp          | Configure dhcpv6 client protocol.                                |

### 6.1.6.1 no network ipv6 address

The command `no network ipv6 address` removes all configured IPv6 prefixes.

Use this command with the `address` option to remove the manually configured IPv6 global address on the network port interface.

Use this command with the `autoconfig` option to disable the stateless global address autoconfiguration on the network port.

Use this command with the `dhcp` option disables the dhcpv6 client protocol on the network port.

**Format**            `no network ipv6 address {address/prefix-length [eui64] | autoconfig | dhcp}`

**Mode**             Privileged EXEC

## 6.1.7 network ipv6 gateway

Use this command to configure IPv6 gateway (that is, default routers) information for the network port.

**Format**            `network ipv6 gateway gateway-address`

**Mode**             Privileged EXEC

| Parameter       | Description                                                  |
|-----------------|--------------------------------------------------------------|
| gateway-address | Gateway address in IPv6 global or link-local address format. |

### 6.1.7.1 no network ipv6 gateway

Use this command to remove IPv6 gateways on the network port interface.

**Format**            `no network ipv6 gateway`

**Mode**             Privileged EXEC

## 6.1.8 network ipv6 neighbor

Use this command to manually add IPv6 neighbors to the IPv6 neighbor table for this network port. If an IPv6 neighbor already exists in the neighbor table, the entry is automatically converted to a static entry. Static entries are not modified by the neighbor discovery process. They are, however, treated the same for IPv6 forwarding. Static IPv6 neighbor entries are applied to the kernel stack and to the hardware when the corresponding interface is operationally active.

**Format**            `network ipv6 neighbor ipv6-address macaddr`

**Mode**             Privileged EXEC

| Parameter    | Description                                    |
|--------------|------------------------------------------------|
| ipv6-address | The IPv6 address of the neighbor or interface. |
| macaddr      | The link-layer address.                        |

### 6.1.8.1 no network ipv6 neighbor

Use this command to remove IPv6 neighbors from the neighbor table.

**Format**            `no network ipv6 neighbor ipv6-address macaddr`

**Mode**             Privileged EXEC

## 6.1.9 show network ipv6 neighbors

Use this command to display the information about the IPv6 neighbor entries cached on the network port. The information is updated to show the type of the entry.

**Default**           none

**Format**            `show network ipv6 neighbors`

**Mode**             Privileged EXEC

| Parameter    | Description                                                                                     |
|--------------|-------------------------------------------------------------------------------------------------|
| IPv6 Address | The IPv6 address of the neighbor.                                                               |
| MAC Address  | The MAC Address of the neighbor.                                                                |
| isRtr        | Shows if the neighbor is a router. If TRUE, the neighbor is a router; FALSE it is not a router. |

| Parameter      | Description                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------|
| Neighbor State | The state of the neighbor cache entry. Possible values are: Incomplete, Reachable, Stale, Delay, Probe, and Unknown     |
| Age            | The time in seconds that has elapsed since an entry was added to the cache.                                             |
| Last Updated   | The time in seconds that has elapsed since an entry was added to the cache.                                             |
| Type           | The type of neighbor entry. The type is Static if the entry is manually configured and Dynamic if dynamically resolved. |

**Example:** The following is an example of the command.

```
(Routing) #show network ipv6 neighbors
```

```

IPv6 Address MAC Address isRtr Neighbor Age
 5c:26:0a:bd:85:2c FALSE Reachable 0

FE80::5E26:AFF:FEBD:852C 5c:26:0a:bd:85:2c FALSE Reachable 0 Static

```

### 6.1.10 show serviceport ipv6 neighbors

Use this command to displays information about the IPv6 neighbor entries cached on the service port. The information is updated to show the type of the entry.

**Default**           none  
**Format**            show serviceport ipv6 neighbors  
**Mode**              Privileged EXEC

| Parameter      | Description                                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------------------------|
| IPv6 Address   | The IPv6 address of the neighbor.                                                                                        |
| MAC Address    | The MAC Address of the neighbor.                                                                                         |
| isRtr          | Shows if the neighbor is a router. If TRUE, the neighbor is a router; if FALSE, it is not a router.                      |
| Neighbor State | The state of the neighbor cache entry. The possible values are: Incomplete, Reachable, Stale, Delay, Probe, and Unknown. |
| Age            | The time in seconds that has elapsed since an entry was added to the cache.                                              |
| Type           | The type of neighbor entry. The type is Static if the entry is manually configured and Dynamic if dynamically resolved.  |

**Example:** The following is an example of the command.

```
(Routing) #show serviceport ipv6 neighbors
```

```

IPv6 Address MAC Address isRtr Neighbor Age
 5c:26:0a:bd:85:2c FALSE Reachable 0

FE80::5E26:AFF:FEBD:852C 5c:26:0a:bd:85:2c FALSE Reachable 0 Dynamic

```

### 6.1.11 ping ipv6 interface

Use this command to determine whether another computer is on the network. To use the command, configure the switch for network (in-band) connection. The source and target devices must have the ping utility enabled and running on top of TCP/IP. The switch can be pinged from any IP workstation with which the switch is connected through the default VLAN (VLAN 1), as long as there is a physical path between the switch and the workstation. The terminal interface sends three pings to the target station. Use the `interface` keyword to ping an interface by using the link-local address or the global IPv6 address of the interface. You can use a loopback, network port, serviceport, tunnel, or physical interface as the source. Use the optional `size` keyword to specify the size of the ping packet. The `ipv6-address` is the link local IPv6 address of the device you want to query. Use the `outgoing-interface` option to specify the outgoing interface for a multicast IP/IPv6 ping.

**Format** ping ipv6 interface {*slot/port* | loopback *Loopback-id* |network |serviceport |tunnel *tunnel-id*} {link-local-address *Link-Local-address* | ipv6-address} [size *datagram-size*] [outgoing-interface {*slot/port* | vlan 1-4093 | serviceport | network}]

- Modes**
- Privileged EXEC
  - User EXEC

| Keyword      | Description                                                                                                                        |
|--------------|------------------------------------------------------------------------------------------------------------------------------------|
| interface    | Use the <i>interface</i> keyword to ping an interface by using the link-local address or the global IPv6 address of the interface. |
| size         | Use the optional <i>size</i> keyword to specify the size of the ping packet.                                                       |
| ipv6-address | The link local IPv6 address of the device you want to query.                                                                       |

## 6.2 Loopback Interface Commands

The commands in this section describe how to create, delete, and manage loopback interfaces. A loopback interface is always expected to be up. This interface can provide the source address for sent packets and can receive both local and remote packets. The loopback interface is typically used by routing protocols.

To assign an IP address to the loopback interface, see the `ip` command. To assign an IPv6 address to the loopback interface, see the `ipv6 address` command.

### 6.2.1 interface loopback

Use this command to enter the Interface Config mode for a loopback interface. The range of the loopback ID is 0 to 7.

**Format** interface loopback *Loopback-id*

**Mode** Global Config

#### 6.2.1.1 no interface loopback

This command removes the loopback interface and associated configuration parameters for the specified loopback interface.

**Format** no interface loopback *Loopback-id*

**Mode** Global Config

### 6.2.2 show interface loopback

This command displays information about configured loopback interfaces.

**Format** show interface loopback [*Loopback-id*]

**Mode** Privileged EXEC

If you do not specify a loopback ID, the following information appears for each loopback interface on the system.

| Parameter   | Description                                                             |
|-------------|-------------------------------------------------------------------------|
| Loopback ID | The loopback ID associated with the rest of the information in the row. |
| Interface   | The interface name.                                                     |
| IP Address  | The IPv4 address of the interface.                                      |

If you specify a loopback ID, the following information appears.

| Parameter             | Description                           |
|-----------------------|---------------------------------------|
| Interface Link Status | Shows whether the link is up or down. |

| Parameter  | Description                                                            |
|------------|------------------------------------------------------------------------|
| IP Address | The IPv4 address of the interface.                                     |
| MTU size   | The maximum transmission size for packets on this interface, in bytes. |

## 6.3 IPv6 Routing Commands

This section describes the IPv6 commands you use to configure IPv6 on the system and on the interfaces. This section also describes IPv6 management commands and show commands.

### 6.3.1 ipv6 hop-limit

This command defines the unicast hop count used in ipv6 packets originated by the node. The value is also included in router advertisements. Valid values for *hops* are 1 to 255 inclusive. The default not configured means that a value of zero is sent in router advertisements and a value of 64 is sent in packets originated by the node. Note that this is not the same as configuring a value of 64.

|                |                            |
|----------------|----------------------------|
| <b>Default</b> | not configured             |
| <b>Format</b>  | ipv6 hop-limit <i>hops</i> |
| <b>Mode</b>    | Global Config              |

#### 6.3.1.1 no ipv6 hop-limit

This command returns the unicast hop count to the default.

|               |                   |
|---------------|-------------------|
| <b>Format</b> | no ipv6 hop-limit |
| <b>Mode</b>   | Global Config     |

### 6.3.2 ipv6 unicast-routing

Use this command to enable the forwarding of IPv6 unicast datagrams.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | disabled             |
| <b>Format</b>  | ipv6 unicast-routing |
| <b>Mode</b>    | Global Config        |

### 6.3.2.1 no ipv6 unicast-routing

Use this command to disable the forwarding of IPv6 unicast datagrams.

**Format**           no ipv6 unicast-routing  
**Mode**             Global Config

### 6.3.3 ipv6 enable

Use this command to enable IPv6 routing on an interface or range of interfaces, including tunnel and loopback interfaces, that has not been configured with an explicit IPv6 address. When you use this command, the interface is automatically configured with a link-local address. You do not need to use this command if you configured an IPv6 global address on the interface.

**Default**           disabled  
**Format**            ipv6 enable  
**Mode**             Interface Config

#### 6.3.3.1 no ipv6 enable

Use this command to disable IPv6 routing on an interface.

**Format**           no ipv6 enable  
**Mode**             Interface Config

### 6.3.4 ipv6 address

Use this command to configure an IPv6 address on an interface or range of interfaces, including tunnel and loopback interfaces, and to enable IPv6 processing on this interface. You can assign multiple globally reachable addresses to an interface by using this command. You do not need to assign a link-local address by using this command since one is automatically created. The *prefix* field consists of the bits of the address to be configured. The *prefix\_length* designates how many of the high-order contiguous bits of the address make up the prefix.

You can express IPv6 addresses in eight blocks. Also of note is that instead of a period, a colon now separates each block. For simplification, leading zeros of each 16 bit block can be omitted. One sequence of 16 bit blocks containing only zeros can be replaced with a double colon "::", but not more than one at a time (otherwise it is no longer a unique representation).

- Dropping zeros: 3ffe:ffff:100:f101:0:0:0:1 becomes 3ffe:ffff:100:f101::1
- Local host: 0000:0000:0000:0000:0000:0000:0000:0001 becomes ::1
- Any host: 0000:0000:0000:0000:0000:0000:0000:0000 becomes ::

The hexadecimal letters in the IPv6 addresses are not case-sensitive. An example of an IPv6 prefix and prefix length is 3ffe:1::1234/64.

The optional [*link-local*] field configures the provided IPv6 address as the link-local address on an interface. Configuring the link-local address overwrites the automatically generated link-local address on an interface.

The optional [*eui-64*] field designates that IPv6 processing on the interfaces was enabled using an EUI-64 interface ID in the low order 64 bits of the address. If you use this option, the value of *prefix\_length* must be 64 bits.

**Format**            ipv6 address *prefix/prefix\_length* [*link-local*] [*eui64*]  
**Mode**             Interface Config

#### 6.3.4.1 no ipv6 address

Use this command to remove all IPv6 addresses on an interface or specified IPv6 address. The *prefix* parameter consists of the bits of the address to be configured. The *prefix\_length* designates how many of the high-order contiguous bits of the address comprise the prefix. The optional [*eui-64*] field designates that IPv6 processing on the interfaces was enabled using an EUI-64 interface ID in the low order 64 bits of the address.

If you do not supply any parameters, the command deletes all the IPv6 addresses on an interface.

**Format**           no ipv6 address [*prefix/prefix\_length*] [*eui64*]  
**Mode**             Interface Config

### 6.3.5        ipv6 address autoconfig

Use this command to allow an in-band interface to acquire an IPv6 address through IPv6 Neighbor Discovery Protocol (NDP) and through the use of Router Advertisement messages.

**Default**           disabled  
**Format**            ipv6 address autoconfig  
**Mode**             Interface Config

#### 6.3.5.1     no ipv6 address autoconfig

This command the IPv6 autoconfiguration status on an interface to the default value.

**Format**           no ipv6 address autoconfig  
**Mode**             Interface Config

### 6.3.6        ipv6 address dhcp

This command enables the DHCPv6 client on an in-band interface so that it can acquire network information, such as the IPv6 address, from a network DHCP server.

**Default**           disabled  
**Format**            ipv6 address dhcp  
**Mode**             Interface Config

#### 6.3.6.1     no ipv6 address dhcp

This command releases a leased address and disables DHCPv6 on an interface.

**Format**           no ipv6 address dhcp  
**Mode**             Interface Config

### 6.3.7        ipv6 route

Use this command to configure an IPv6 static route.

The *ipv6-prefix* is the IPv6 network that is the destination of the static route. The *prefix\_length* is the length of the IPv6 prefix — a decimal value (usually 0 to 64) that shows how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the *prefix\_length*. The *next-hop-address* is the IPv6 address of the next hop that can be used to reach the specified network. Specifying `Null0` as nexthop parameter adds a static reject route. The *preference* parameter is a value the router uses to compare this route with routes from other route sources that have the same destination. The range for *preference* is 1 to 255, and the default value is 1. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. You can specify a *slot/port* or *vlan id* or *tunnel tunnel\_id* interface to identify direct static routes from point-to-point and broadcast interfaces. The interface must be specified when using a link-local address as the next hop. A route with a preference of 255 cannot be used to forward traffic.

Use the `track object-number` to specify that the static route is installed only if the configured track object is up. When the track object is down the static route is removed from the Route Table. Use the `no` form of this command to delete the tracked static route. The *object-number* parameter is the object number representing the object to be tracked. The range is from 1 to 128. Only one track object can be associated with a specific static route. If you configure a different track object, the previously configured track object is replaced by the newly configured track object. To display the IPv6 static routes that being tracked by track objects, use the `show ipv6 route track-table` command.

|                |                                                                                                                                                                                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                                                                                                                                       |
| <b>Format</b>  | <code>ipv6 route <i>ipv6-prefix/prefix_length</i> {<i>next-hop-address</i>   Null0  <br/>interface {<i>slot/port/vlan 1-4093</i> <i>tunnel tunnel_id</i>} <i>next-hop-address</i>} [<i>preference</i>]<br/>[<i>track object-number</i>]</code> |
| <b>Mode</b>    | Global Config                                                                                                                                                                                                                                  |

| Parameter           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ipv6-prefix         | The <code>ipv6-prefix</code> is the IPv6 network that is the destination of the static route.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| prefix_length       | The <code>prefix_length</code> is the length of the IPv6 prefix—a decimal value (usually 0 to 64) that shows how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the <code>prefix_length</code> .                                                                                                                                                                                                                                                                                                                                                                                       |
| next-hop-address    | The <code>next-hop-address</code> is the IPv6 address of the next hop that can be used to reach the specified network. Specifying Null0 as nexthop parameter adds a static reject route.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| preference          | The <code>preference</code> parameter is a value the router uses to compare this route with routes from other route sources that have the same destination. The range for <code>preference</code> is 1 to 255, and the default value is 1. A route with a <code>preference</code> of 255 cannot be used to forward traffic.                                                                                                                                                                                                                                                                                                                                                       |
| track object-number | Use the <code>track object-number</code> to specify that the static route is installed only if the configured track object is up. When the track object is down the static route is removed from the route table. The <code>object-number</code> parameter is the object number representing the object to be tracked. The range is from 1 to 128. Only one track object can be associated with a specific static route.<br><br>If you configure a different track object, the previously configured track object is replaced by the newly configured track object. To display the IPv6 static routes being tracked by track objects, use the <code>show ip route</code> command. |
| slot/port           | The argument <code>slot/port</code> corresponds to a physical routing interface or VLAN routing interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| vlan vlan-id        | The keyword <code>vlan</code> is used to specify the VLAN ID of the routing VLAN directly instead of a <code>slot/port</code> format. You can specify a <code>slot/port</code> or <code>vlan vlan-id</code> or <code>tunnel tunnel_id</code> interface to identify direct static routes from point-to-point and broadcast interfaces. The interface must be specified when using a link-local address as the next hop.                                                                                                                                                                                                                                                            |

**Example:** The following shows an example of the command.

```
(Routing) (Config)# ipv6 route red 3000 ::/64 2020
```

### 6.3.7.1 no ipv6 route

Use this command to delete an IPv6 static route. Use the command without the optional parameters to delete all static routes to the specified destination. Use the `preference` parameter to revert the preference of a route to the default preference.

|               |                                                                                                                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no ipv6 route <i>ipv6-prefix/prefix_length</i> [{<i>next-hop-address</i>   Null0  <br/>interface {<i>slot/port/vlan 1-4093</i> <i>tunnel tunnel_id</i>} <i>next-hop-address</i>   <i>preference</i>}]</code> |
| <b>Mode</b>   | Global Config                                                                                                                                                                                                      |

### 6.3.8 ipv6 route distance

This command sets the default distance (preference) for IPv6 static routes. Lower route distance values are preferred when determining the best route. The `ipv6 route` command allows you to optionally set the distance (preference) of an individual static route. The default distance is used when no distance is specified in this command.

Changing the default distance does not update the distance of existing static routes, even if they were assigned the original default distance. The new default distance will only be applied to static routes created after invoking the `ipv6 route distance` command.



**Default** 1  
**Format** `ipv6 route distance 1-255`  
**Mode** Global Config

### 6.3.8.1 no ipv6 route distance

This command resets the default static route preference. Lower route preference values are preferred when determining the best route.

**Format** `no ipv6 route distance`  
**Mode** Global Config

### 6.3.9 ipv6 route net-prototype

This command adds net prototype IPv6 routes to the hardware.

**Format** `ip route net-prototype prefix/prefix-length nexthopip num-routes`  
**Mode** Global Config

| Parameter            | Description                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| prefix/prefix-length | The destination network and mask for the route.                                                                              |
| nexthopip            | The next-hop ip address, It must belong to an active routing interface, but it does not need to be resolved.                 |
| num-routes           | The number of routes need to added into hardware starting from the given prefix argument and within the given prefix-length. |

#### 6.3.9.1 no ipv6 route net-prototype

This command deletes all the net prototype IPv6 routes added to the hardware.

**Format** `ip route net-prototype prefix/prefix-length nexthopip num-routes`  
**Mode** Global Config

#### 6.3.10 ipv6 route static bfd interface

This command sets up a BFD session between two directly connected neighbors specified by the local interface and the neighbor's IPv6 address. The IPv6 address can be a global or a link-local address. The BFD session parameters can be set on the interface by using the existing command

```
bfd interval milliseconds min_rx milliseconds multiplier interval-multiplier
```

This command is supported in IPv6 networks. The maximum number of IP static BFD sessions that can be supported is limited by the max BFD sessions configurable per DUT.

**Format** `ipv6 route static bfd interface unit/slot/port | vlan id neighbor ip address [global | link-local]`  
**Mode** Global Config

| Parameter             | Description                                                                  |
|-----------------------|------------------------------------------------------------------------------|
| interface             | Specify the local interface either in unit/slot/port format or as a VLAN ID. |
| neighbor IPv6 address | Specify the other end of the BFD session, peer address.                      |

**Example:**

```
(localhost) #configure
(localhost) (Config)#interface 0/29
(localhost) (Interface 0/29)#routing
(localhost) (Interface 0/29)#ipv6 address 2001::1/64
(localhost) (Interface 0/29)#bfd interval 100 min_rx 100 multiplier 5
(localhost) (Interface 0/29)#exit
```

```
(localhost) (Config)#show running-config interface 0/29
```

```
!Current Configuration:
```

```
!
interface 0/29
no shutdown
routing
ipv6 address 2001::1/64
bfd interval 100 min_rx 100 multiplier 5
exit
```

```
(localhost) (Config)#ipv6 route static bfd interface 0/29 2001::2
```

### 6.3.11 ipv6 mtu

This command sets the maximum transmission unit (MTU) size, in bytes, of IPv6 packets on an interface or range of interfaces. This command replaces the default or link MTU with a new MTU value.

---

The default MTU value for a tunnel interface is 1480. You cannot change this value.

**NOTICE**

|                |                                    |
|----------------|------------------------------------|
| <b>Default</b> | 0 or link speed (MTU value (1500)) |
| <b>Format</b>  | ipv6 mtu <i>1280-1500</i>          |
| <b>Mode</b>    | Interface Config                   |

#### 6.3.11.1 no ipv6 mtu

This command resets maximum transmission unit value to default value.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no ipv6 mtu      |
| <b>Mode</b>   | Interface Config |

### 6.3.12 ipv6 nd dad attempts

This command sets the number of duplicate address detection probes transmitted on an interface or range of interfaces. Duplicate address detection verifies that an IPv6 address on an interface is unique.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | 1                                   |
| <b>Format</b>  | ipv6 nd dad attempts <i>0 - 600</i> |
| <b>Mode</b>    | Interface Config                    |

#### 6.3.12.1 no ipv6 nd dad attempts

This command resets to number of duplicate address detection value to default value.

|               |                         |
|---------------|-------------------------|
| <b>Format</b> | no ipv6 nd dad attempts |
| <b>Mode</b>   | Interface Config        |

### 6.3.13 ipv6 nd managed-config-flag

This command sets the managed address configuration flag in router advertisements on the interface or range of interfaces. When the value is true, end nodes use DHCPv6. When the value is false, end nodes automatically configure addresses.

**Default** false  
**Format** ipv6 nd managed-config-flag  
**Mode** Interface Config

#### 6.3.13.1 no ipv6 nd managed-config-flag

This command resets the managed address configuration flag in router advertisements to the default value.

**Format** no ipv6 nd managed-config-flag  
**Mode** Interface Config

### 6.3.14 ipv6 nd ns-interval

This command sets the interval between router advertisements for advertised neighbor solicitations, in milliseconds. An advertised value of 0 means the interval is unspecified. This command can configure a single interface or a range of interfaces.

**Default** 0  
**Format** ipv6 nd ns-interval {1000-4294967295 | 0}  
**Mode** Interface Config

#### 6.3.14.1 no ipv6 nd ns-interval

This command resets the neighbor solicit retransmission interval of the specified interface to the default value.

**Format** no ipv6 nd ns-interval  
**Mode** Interface Config

### 6.3.15 ipv6 nd other-config-flag

This command sets the other stateful configuration flag in router advertisements sent from the interface.

**Default** false  
**Format** ipv6 nd other-config-flag  
**Mode** Interface Config

#### 6.3.15.1 no ipv6 nd other-config-flag

This command resets the other stateful configuration flag back to its default value in router advertisements sent from the interface.

**Format** no ipv6 nd other-config-flag  
**Mode** Interface Config

### 6.3.16 ipv6 nd ra-interval

This command sets the transmission interval between router advertisements on the interface or range of interfaces.

**Default** 600  
**Format** ipv6 nd ra-interval-max 4-1800  
**Mode** Interface Config

#### 6.3.16.1 no ipv6 nd ra-interval

This command sets router advertisement interval to the default.

**Format** no ipv6 nd ra-interval-max  
**Mode** Interface Config

### 6.3.17 ipv6 nd ra-lifetime

This command sets the value, in seconds, that is placed in the Router Lifetime field of the router advertisements sent from the interface or range of interfaces. The *lifetime* value must be zero, or it must be an integer between the value of the router advertisement transmission interval and 9000. A value of zero means this router is not to be used as the default router.

**Default** 1800  
**Format** ipv6 nd ra-lifetime *lifetime*  
**Mode** Interface Config

#### 6.3.17.1 no ipv6 nd ra-lifetime

This command resets router lifetime to the default value.

**Format** no ipv6 nd ra-lifetime  
**Mode** Interface Config

### 6.3.18 ipv6 nd ra hop-limit unspecified

This command configures the router to send Router Advertisements on an interface with an unspecified (0) Current Hop Limit value. This tells the hosts on that link to ignore the Hop Limit from this Router.

**Default** disable  
**Format** ipv6 nd ra hop-limit unspecified  
**Mode** Interface Config

#### 6.3.18.1 no ipv6 nd ra hop-limit unspecified

This command configures the router to send Router Advertisements on an interface with the global configured Hop Limit value.

**Format** no ipv6 nd ra hop-limit unspecified  
**Mode** Interface Config

### 6.3.19 ipv6 nd reachable-time

This command sets the router advertisement time to consider a neighbor reachable after neighbor discovery confirmation. Reachable time is specified in milliseconds. A value of zero means the time is unspecified by the router. This command can configure a single interface or a range of interfaces.

**Default** 0  
**Format** ipv6 nd reachable-time 0-4294967295  
**Mode** Interface Config

#### 6.3.19.1 no ipv6 nd reachable-time

This command means reachable time is unspecified for the router.

**Format** no ipv6 nd reachable-time  
**Mode** Interface Config

### 6.3.20 ipv6 nd router-preference

Use this command to configure default router preferences that the interface advertises in router advertisement messages.

**Default** medium  
**Format** ipv6 nd router-preference { low | medium | high}  
**Mode** Interface Config

#### 6.3.20.1 no ipv6 nd router-preference

This command resets the router preference advertised by the interface to the default value.

**Format** no ipv6 nd router-preference  
**Mode** Interface Config

### 6.3.21 ipv6 nd suppress-ra

This command suppresses router advertisement transmission on an interface or range of interfaces.

**Default** disabled  
**Format** ipv6 nd suppress-ra  
**Mode** Interface Config

#### 6.3.21.1 no ipv6 nd suppress-ra

This command enables router transmission on an interface.

**Format** no ipv6 nd suppress-ra  
**Mode** Interface Config

### 6.3.22 ipv6 nd prefix

Use the `ipv6 nd prefix` command to configure parameters associated with prefixes the router advertises in its router advertisements. The first optional parameter is the valid lifetime of the router, in seconds. You can specify a value or indicate that the lifetime value is infinite. The second optional parameter is the preferred lifetime of the router.

This command can be used to configure a single interface or a range of interfaces.

The router advertises its global IPv6 prefixes in its router advertisements (RAs). An RA only includes the prefixes of the IPv6 addresses configured on the interface where the RA is transmitted. Addresses are configured using the `ipv6 address` interface configuration command. Each prefix advertisement includes information about the prefix, such as its lifetime values and whether hosts should use the prefix for on-link determination or address auto-configuration. Use the `ipv6 nd prefix` command to configure these values.

The `ipv6 nd prefix` command allows you to preconfigure RA prefix values before you configure the associated interface address. For the prefix to be included in RAs, you must configure an address that matches the prefix using the `ipv6 address` command. Prefixes specified using `ipv6 nd prefix` without associated interface address will not be included in RAs and will not be committed to the device configuration.

|                |                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | <ul style="list-style-type: none"> <li>valid-lifetime—2592000</li> <li>preferred-lifetime— 604800</li> <li>autoconfig—enabled</li> <li>on-link—enabled</li> </ul> |
| <b>Format</b>  | <code>ipv6 nd prefix <i>prefix/prefix_Length</i> [{0-4294967295   infinite} {0-4294967295   infinite}] [no-autoconfig off-link]</code>                            |
| <b>Mode</b>    | Interface Config                                                                                                                                                  |

#### 6.3.22.1 no ipv6 nd prefix

This command sets prefix configuration to default values.

|               |                                                            |
|---------------|------------------------------------------------------------|
| <b>Format</b> | <code>no ipv6 nd prefix <i>prefix/prefix_Length</i></code> |
| <b>Mode</b>   | Interface Config                                           |

### 6.3.23 ipv6 neighbor

Configures a static IPv6 neighbor with the given IPv6 address and MAC address on a routing or host interface.

|               |                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>ipv6 neighbor <i>ipv6address</i> {<i>sSlot/port</i> <i>vlan 1-4093</i>} <i>macaddr</i></code> |
| <b>Mode</b>   | Global Config                                                                                       |

| Parameter                | Description                                    |
|--------------------------|------------------------------------------------|
| <code>ipv6address</code> | The IPv6 address of the neighbor.              |
| <code>slot/port</code>   | The <code>sSlot/port</code> for the interface. |
| <code>vlan</code>        | The VLAN for the interface.                    |
| <code>macaddr</code>     | The MAC address for the neighbor.              |

#### 6.3.23.1 no ipv6 neighbor

Removes a static IPv6 neighbor with the given IPv6 address on a routing or host interface.

|               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no ipv6 neighbor <i>ipv6address</i> {<i>sSlot/port</i> <i>vlan 1-4093</i>}</code> |
| <b>Mode</b>   | Global Config                                                                           |

### 6.3.24 ipv6 neighbors dynamicrenew

Use this command to automatically renew the IPv6 neighbor entries. Enables/disables the periodic NUD (neighbor unreachability detection) to be run on the existing IPv6 neighbor entries based on the activity of the entries in the hardware. If the setting is disabled, only those entries that are actively used in the hardware are triggered for NUD at the end of STALE timeout of 1200 seconds. If the setting is enabled, periodically every 40 seconds a set of 300 entries are triggered for NUD irrespective of their usage in the hardware.

**Default** disabled  
**Format** ipv6 neighbors dynamicrenew  
**Mode** Global Config

#### 6.3.24.1 no ipv6 neighbors dynamicrenew

Disables automatic renewing of IPv6 neighbor entries.

**Format** no ipv6 neighbors dynamicrenew  
**Mode** Global Config

### 6.3.25 ipv6 nud

Use this command to configure Neighbor Unreachability Detection (NUD). NUD verifies that communication with a neighbor exists.

**Format** ipv6 nud {backoff-multiple | max-multicast-solicits | max-unicast-solicits}  
**Mode** Global Config

| Parameter              | Description                                                                                                                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| backoff-multiple       | Sets the exponential backoff multiple to calculate time outs in NS transmissions during NUD. The value ranges from 1 to 5. 1 is the default. The next timeout value is limited to a maximum value of 60 seconds if the value with exponential backoff calculation is greater than 60 seconds. |
| max-multicast-solicits | Sets the maximum number of multicast solicits sent during Neighbor Unreachability Detection. The value ranges from 3 to 255. 3 is the default.                                                                                                                                                |
| max-unicast-solicits   | Sets the maximum number of unicast solicits sent during Neighbor Unreachability Detection. The value ranges from 3 to 10. 3 is the default.                                                                                                                                                   |

### 6.3.26 ipv6 prefix-list

To create a prefix list or add a prefix list entry, use the `ipv6 prefix-list` command in Global Configuration mode. Prefix lists allow matching of route prefixes with those specified in the prefix list. Each prefix list includes a sequence of prefix list entries ordered by their sequence numbers. A router sequentially examines each prefix list entry to determine if the route's prefix matches that of the entry. An empty or nonexistent prefix list permits all prefixes. An implicit deny is assumed if a given prefix does not match any entries of a prefix list. Once a match or deny occurs the router does not go through the rest of the list.

Up to 128 prefix lists may be configured. The maximum number of statements allowed in prefix list is 64.

**Default** No prefix lists are configured by default. When neither the `ge` nor the `le` option is configured, the destination prefix must match the network/length exactly. If the `ge` option is configured without the `le` option, any prefix with a network mask greater than or equal to the `ge` value is considered a match. Similarly, if the `le` option is configured without the `ge` option, a prefix with a network mask less than or equal to the `le` value is considered a match.

**Format** `ipv6 prefix-list list-name` [{seq number} {permit | deny} *ipv6-prefix/prefix-length* [*ge length*] [*le length*] | `renumber renumber-interval first-statement-number`}

**Mode** Global Configuration

| Parameter                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| list-name                 | The text name of the prefix list. Up to 32 characters.                                                                                                                                                                                                                                                                                                                                                                                   |
| seq number                | (Optional) The sequence number for this prefix list statement. Prefix list statements are ordered from lowest sequence number to highest and applied in that order. If you do not specify a sequence number, the system will automatically select a sequence number five larger than the last sequence number in the list. Two statements may not be configured with the same sequence number. The value ranges from 1 to 4,294,967,294. |
| permit                    | Permit routes whose destination prefix matches the statement.                                                                                                                                                                                                                                                                                                                                                                            |
| deny                      | Deny routes whose destination prefix matches the statement.                                                                                                                                                                                                                                                                                                                                                                              |
| ipv6-prefix/prefix-length | Specifies the match criteria for routes being compared to the prefix list statement. The ipv6-prefix can be any valid IP prefix. The length is any IPv6 prefix length from 0 to 32.                                                                                                                                                                                                                                                      |
| ge length                 | (Optional) If this option is configured, then a prefix is only considered a match if its network mask length is greater than or equal to this value. This value must be longer than the network length and less than or equal to 32.                                                                                                                                                                                                     |
| le length                 | (Optional) If this option is configured, then a prefix is only considered a match if its network mask length is less than or equal to this value. This value must be longer than the ge length and less than or equal to 32.                                                                                                                                                                                                             |
| renumber                  | (Optional) Provides the option to renumber the sequence numbers of the IP prefix list statements with a given interval starting from a particular sequence number. The valid range for <i>renumber-interval</i> is 1 to 100, and the valid range for <i>first-statement-number</i> is 1 to 1000.                                                                                                                                         |

### 6.3.26.1 no ipv6 prefix-list

To delete a prefix list or a statement in a prefix list, use the `no` form of this command. The command `no ip prefix-list list-name` deletes the entire prefix list. To remove an individual statement from a prefix list, you must specify the statement exactly, with all its options.

**Format**            `no ipv6 prefix-list list-name [seq number] {permit | deny} network/length [ge length] [le length]`

**Mode**             Global Configuration

### 6.3.27 ipv6 unreachable

Use this command to enable the generation of ICMPv6 Destination Unreachable messages on the interface or range of interfaces. By default, the generation of ICMPv6 Destination Unreachable messages is enabled.

**Default**            enable

**Format**            `ipv6 unreachable`

**Mode**             Interface Config

#### 6.3.27.1 no ipv6 unreachable

Use this command to prevent the generation of ICMPv6 Destination Unreachable messages.

**Format**            `no ipv6 unreachable`

**Mode**             Interface Config

### 6.3.28 ipv6 unresolved-traffic

Use this command to control the rate at which IPv6 data packets come into the CPU. By default, rate limiting is disabled. When enabled, the rate can range from 50 to 1024 packets per second.

**Default**            enable

**Format**            `ipv6 unresolved-traffic rate-limit <50-1024>`

**Mode**             Global Config



### 6.3.28.1 no ipv6 unresolved-traffic

Use this command to disable the rate limiting.

**Format**            no ipv6 unresolved-traffic rate-limit

**Mode**             Global Config

### 6.3.29 ipv6 icmp error-interval

Use this command to limit the rate at which ICMPv6 error messages are sent. The rate limit is configured as a token bucket, with two configurable parameters, burst-size and burst-interval.

The burst-interval specifies how often the token bucket is initialized with burst-size tokens. burst-interval is from 0 to 2147483647 milliseconds (ms).

The burst-size is the number of ICMPv6 error messages that can be sent during one burst-interval. The range is from 1 to 200 messages.

To disable ICMP rate limiting, set burst-interval to zero (0).

**Default**           • burst-interval of 1000 ms  
• burst-size of 100 messages

**Format**            ipv6 icmp error-interval *burst-interval* [*burst-size*]

**Mode**             Global Config

#### 6.3.29.1 no ipv6 icmp error-interval

Use the no form of the command to return burst-interval and burst-size to their default values.

**Format**            no ipv6 icmp error-interval

**Mode**             Global Config

### 6.3.30 show ipv6 brief

Use this command to display the IPv6 status of forwarding mode and IPv6 unicast routing mode.

**Format**            show ipv6 brief

**Mode**             Privileged EXEC

| Parameter                        | Description                                                                                                                                                                                                 |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IPv6 Forwarding Mode             | Shows whether the IPv6 forwarding mode is enabled.                                                                                                                                                          |
| IPv6 Unicast Routing Mode        | Shows whether the IPv6 unicast routing mode is enabled.                                                                                                                                                     |
| IPv6 Hop Limit                   | Shows the unicast hop count used in IPv6 packets originated by the node. For more information, see the <a href="#">ipv6 hop-limit</a> command.                                                              |
| ICMPv6 Rate Limit Error Interval | Shows how often the token bucket is initialized with burst-size tokens. For more information, see the <a href="#">ipv6 icmp error-interval</a> command.                                                     |
| ICMPv6 Rate Limit Burst Size     | Shows the number of ICMPv6 error messages that can be sent during one burst-interval. For more information, see the <a href="#">ipv6 icmp error-interval</a> command.                                       |
| Maximum Routes                   | Shows the maximum IPv6 route table size.                                                                                                                                                                    |
| IPv6 Unresolved Data Rate Limit  | Shows the rate in packets-per-second for the number of IPv6 data packets trapped to CPU when the packet fails to be forwarded in the hardware due to unresolved hardware address of the destined IPv6 node. |
| IPv6 Neighbors Dynamic Renew     | Shows the dynamic renewal mode for the periodic NUD (neighbor unreachability detection) run on the existing IPv6 neighbor entries based on the activity of the entries in the hardware.                     |



| Parameter                                    | Description                                                                                                                                                            |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Administrative Mode                          | Shows whether the interface administrative mode is enabled or disabled.                                                                                                |
| Bandwidth                                    | Shows bandwidth of the interface.                                                                                                                                      |
| Interface Maximum Transmission Unit          | The MTU size, in bytes.                                                                                                                                                |
| Router Duplicate Address Detection Transmits | The number of consecutive duplicate address detection probes to transmit.                                                                                              |
| Address Autoconfigure Mode                   | Shows whether the autoconfigure mode is enabled or disabled.                                                                                                           |
| Address DHCP Mode                            | Shows whether the DHCPv6 client is enabled on the interface.                                                                                                           |
| IPv6 Hop Limit Unspecified                   | Indicates if the router is configured on this interface to send Router Advertisements with unspecified (0) as the Current Hop Limit value.                             |
| Router Advertisement NS Interval             | The interval, in milliseconds, between router advertisements for advertised neighbor solicitations.                                                                    |
| Router Advertisement Lifetime                | Shows the router lifetime value of the interface in router advertisements.                                                                                             |
| Router Advertisement Reachable Time          | The amount of time, in milliseconds, to consider a neighbor reachable after neighbor discovery confirmation.                                                           |
| Router Advertisement Interval                | The frequency, in seconds, that router advertisements are sent.                                                                                                        |
| Router Advertisement Managed Config Flag     | Shows whether the managed configuration flag is set (enabled) for router advertisements on this interface.                                                             |
| Router Advertisement Other Config Flag       | Shows whether the other configuration flag is set (enabled) for router advertisements on this interface.                                                               |
| Router Advertisement Router Preference       | Shows the router preference.                                                                                                                                           |
| Router Advertisement Suppress Flag           | Shows whether router advertisements are suppressed (enabled) or sent (disabled).                                                                                       |
| IPv6 Destination Unreachables                | Shows whether ICMPv6 Destination Unreachable messages may be sent (enabled) or not (disabled). For more information, see the <a href="#">ipv6 unreachable</a> command. |
| ICMPv6 Redirect                              | Specifies if ICMPv6 redirect messages are sent back to the sender by the Router in the redirect scenario is enabled on this interface.                                 |

If an IPv6 prefix is configured on the interface, the following information also appears.

| Parameter          | Description                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------|
| IPv6 Prefix is     | The IPv6 prefix for the specified interface.                                                         |
| Preferred Lifetime | The amount of time the advertised prefix is a preferred prefix.                                      |
| Valid Lifetime     | The amount of time the advertised prefix is valid.                                                   |
| Onlink Flag        | Shows whether the onlink flag is set (enabled) in the prefix.                                        |
| Autonomous Flag    | Shows whether the autonomous address-configuration flag (autoconfig) is set (enabled) in the prefix. |

**Example:** The following shows example CLI display output for the command.

```
(alpha-stack) #show ipv6 interface brief
```

```

Interface Oper. IPv6 Address/Length
Mode

1/0/33 Enabled FE80::211:88FF:FE2A:3E3C/128
 2033::211:88FF:FE2A:3E3C/64
2/0/17 Enabled FE80::211:88FF:FE2A:3E3C/128
 2017::A42A:26DB:1049:43DD/128 [DHCP]
0/4/1 Enabled FE80::211:88FF:FE2A:3E3C/128
 2001::211:88FF:FE2A:3E3C/64 [AUTO]

```

0/4/2 Disabled FE80::211:88FF:FE2A:3E3C/128 [TENT]

**Example:** The following shows example CLI display output for the command.

(Switch) #show ipv6 interface 0/4/1

```
IPv6 is enabled
IPv6 Prefix is fe80::210:18ff:fe00:1105/128
 2001::1/64
Routing Mode..... Enabled
IPv6 Enable Mode..... Enabled
Administrative Mode..... Enabled
IPv6 Operational Mode..... Enabled
Bandwidth..... 10000 kbps
Interface Maximum Transmit Unit..... 1500
Router Duplicate Address Detection Transmits... 1
Address DHCP Mode..... Disabled
IPv6 Hop Limit Unspecified..... Enabled
Router Advertisement NS Interval..... 0
Router Advertisement Lifetime..... 1800
Router Advertisement Reachable Time..... 0
Router Advertisement Interval..... 600
Router Advertisement Managed Config Flag..... Disabled
Router Advertisement Other Config Flag..... Disabled
Router Advertisement Router Preference..... medium
Router Advertisement Suppress Flag..... Disabled
IPv6 Destination Unreachables..... Enabled
ICMPv6 Redirects..... Enabled

Prefix 2001::1/64
Preferred Lifetime..... 604800
Valid Lifetime..... 2592000
Onlink Flag..... Enabled
Autonomous Flag..... Enabled
```

### 6.3.32 show ipv6 interface vlan

Use the `show ipv6 interface vlan` in Privileged EXEC mode to show the usability status of IPv6 VLAN interfaces.

**Format** `show ipv6 interface vlan vlan-id [prefix]`

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter            | Description                               |
|----------------------|-------------------------------------------|
| <code>vlan-id</code> | Valid VLAN ID                             |
| <code>prefix</code>  | Display IPv6 Interface Prefix Information |

### 6.3.33 show ipv6 dhcp interface

This command displays a list of all IPv6 addresses currently leased from a DHCP server on a specific in-band interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a `slot/port` format.

**Format** `show ipv6 dhcp [interface {slot/port|vlan 1-4093}]`

**Modes** Privileged EXEC

| Parameter          | Description                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode               | Displays whether the specified interface is in Client mode or not.                                                                                                                        |
| State              | State of the DHCPv6 Client on this interface. The valid values are: INACTIVE, SOLICIT, REQUEST, ACTIVE, RENEW, REBIND, RELEASE.                                                           |
| Server DUID        | DHCPv6 Unique Identifier of the DHCPv6 Server on this interface.                                                                                                                          |
| T1 Time            | The T1 time specified by the DHCPv6 server. After the client has held the address for this length of time, the client tries to renew the lease.                                           |
| T2 Time            | The T2 time specified by the DHCPv6 server. If the lease renewal fails, then when the client has held the lease for this length of time, the client sends a Rebind message to the server. |
| Interface IAID     | An identifier for an identity association chosen by this client.                                                                                                                          |
| Leased Address     | The IPv6 address leased by the DHCPv6 Server for this interface.                                                                                                                          |
| Preferred Lifetime | The preferred lifetime of the IPv6 address, as defined in RFC 2462.                                                                                                                       |
| Valid Lifetime     | The valid lifetime of the IPv6 address, as defined by RFC 2462.                                                                                                                           |
| Renew Time         | The time until the client tries to renew the lease                                                                                                                                        |
| Expiry Time        | The time until the address expires.                                                                                                                                                       |

### 6.3.34 show ipv6 nd rguard policy

This command shows the status of IPv6 RA GUARD feature on the switch. It lists the ports/interfaces on which this feature is enabled and the associated device role.

**Format**            `show ipv6 nd rguard policy`

**Mode**             Privileged EXEC

| Parameter | Description                                          |
|-----------|------------------------------------------------------|
| Interface | The port/interface on which this feature is enabled. |
| Role      | The associated device role for the interface.        |

**Example:** The following shows example command output.

```
(Switching) # show ipv6 nd rguard policy
```

```
Configured Interfaces
```

```
Interface Role

Gi1/0/1 Host
```

### 6.3.35 show ipv6 neighbors

Use this command to display information about the IPv6 neighbors. The IPv6 neighbor information belonging to the default router is displayed.

**Format**            `show ipv6 neighbor [interface {slot/port | vlan 1-4093 | tunnel 0-7} | ipv6-address]`

**Mode**             Privileged EXEC

| Parameter    | Description                                                                                                                                                                                           |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface    | The interface in slot/port format.                                                                                                                                                                    |
| IPv6 Address | IPv6 address of neighbor or interface.                                                                                                                                                                |
| MAC Address  | Link-layer Address.                                                                                                                                                                                   |
| IsRtr        | Shows whether the neighbor is a router. If the value is TRUE, the neighbor is known to be a router, and FALSE otherwise. A value of FALSE might mean that routers are not always known to be routers. |

| Parameter      | Description                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Neighbor State | State of neighbor cache entry. Possible values are Incomplete, Reachable, Stale, Delay, Probe, and Unknown.                                       |
| Last Updated   | The time in seconds that has elapsed since an entry was added to the cache.                                                                       |
| Type           | The type of neighbor entry. The type is <code>Static</code> if the entry is manually configured and <code>Dynamic</code> if dynamically resolved. |

### 6.3.36 clear ipv6 neighbors

Use this command to clear all entries in an IPv6 neighbor table or an entry on a specific interface. The command clears the IPv6 neighbor information for the default router.

When a VLAN ID or port routing interface is provided, only the IPv6 neighbors learned on that VLAN or port routing interface are deleted.

Use the `slot/port` parameter to specify an interface, the `ipv6address` parameter to specify an IPv6 address, or the `vlan` parameter to specify a VLAN.

**Format** `clear ipv6 neighbors [{slot/port | ipv6address | vlan id}]`

**Mode** Privileged EXEC

### 6.3.37 show ipv6 protocols

This command lists a summary of the configuration and status for the active IPv6 routing protocols. The command lists routing protocols that are configured and enabled. If a protocol is selected on the command line, the display is limited to that protocol.

**Format** `show ipv6 protocols [ospf]`

**Mode** Privileged EXEC

| Parameter               | Description                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------|
| Routing Protocol        | OSPFv3.                                                                                      |
| Router ID               | The router ID configured for OSPFv3.                                                         |
| OSPF Admin Mode         | Whether OSPF is enabled or disabled globally.                                                |
| Maximum Paths           | The maximum number of next hops in an OSPF route.                                            |
| Default Route Advertise | Whether OSPF is configured to originate a default route.                                     |
| Always                  | Whether default advertisement depends on having a default route in the common routing table. |
| Metric                  | The metric configured to be advertised with the default route.                               |
| Metric Type             | The metric type for the default route.                                                       |

**Example:** The following shows example CLI display output for the command.

(Router) #show ipv6 protocols

```

Routing Protocol OSPFv3
Router ID 1.1.1.1
OSPF Admin Mode Enable
Maximum Paths 4
Distance Intra 110 Inter 110 Ext 110

Default Route Advertise Disabled
Always FALSE
Metric Not configured
Metric Type External Type 2

```

```

Number of Active Areas 0 (0 normal, 0 stub, 0 nssa)
ABR Status Disable
ASBR Status Disable

```

### 6.3.38 show ipv6 route

This command displays the IPv6 routing table for a virtual router instance. The *ipv6-address* specifies a specific IPv6 address for which the best-matching route would be displayed. The *ipv6-prefix/ipv6-prefix-length* specifies a specific IPv6 network for which the matching route would be displayed. The *interface* specifies that the routes with next-hops on the *interface* be displayed. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. The *protocol* specifies the protocol that installed the routes. The *protocol* is one of the following keywords: *connected*, *ospf*, *static*. The *all* specifies that all routes including best and nonbest routes are displayed. Otherwise, only the best routes are displayed.

NOTE: If you use the *connected* keyword for *protocol*, the *all* option is not available because there are no best or nonbest connected routes.

**Format**            `show ipv6 route [{ipv6-address [protocol] |`  
                       `{ipv6-prefix/ipv6-prefix-length | unit/slot/port/vlan 1-4093} [protocol]`  
                       `| protocol | summary] [all] | all}]`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter   | Description                                                                           |
|-------------|---------------------------------------------------------------------------------------|
| Route Codes | The key for the routing protocol codes that might appear in the routing table output. |

The `show ipv6 route` command displays the routing tables in the following format:

Codes: C - connected, S - static  
 0 - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2  
 ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, Truncated

The columns for the routing table display the following information:

| Parameter                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code                           | The code for the routing protocol that created this routing entry.                                                                                                                                                                                                                                                                                                                                                                   |
| Default Gateway                | The IPv6 address of the default gateway. When the system does not have a more specific route to a packet's destination, it sends the packet to the default gateway.                                                                                                                                                                                                                                                                  |
| IPv6-Prefix/IPv6-Prefix-Length | The IPv6-Prefix and prefix-length of the destination IPv6 network corresponding to this route.                                                                                                                                                                                                                                                                                                                                       |
| Preference/Metric              | The administrative distance (preference) and cost (metric) associated with this route. An example of this output is [1/0], where 1 is the preference and 0 is the metric.                                                                                                                                                                                                                                                            |
| Tag                            | The decimal value of the tag associated with a redistributed route, if it is not 0.                                                                                                                                                                                                                                                                                                                                                  |
| Next-Hop                       | The outgoing router IPv6 address to use when forwarding traffic to the next router (if any) in the path toward the destination.                                                                                                                                                                                                                                                                                                      |
| Route-Timestamp                | The last updated time for dynamic routes. The format of Route-Timestamp will be <ul style="list-style-type: none"> <li>• Days:Hours:Minutes if days &gt;= 1</li> <li>• Hours:Minutes:Seconds if days &lt; 1</li> </ul>                                                                                                                                                                                                               |
| Interface                      | The outgoing router interface to use when forwarding traffic to the next destination. For reject routes, the next hop interface would be Null0 interface.                                                                                                                                                                                                                                                                            |
| T                              | A flag appended to an IPv6 route to indicate that it is an ECMP route, but only one of its next hops has been installed in the forwarding table. The forwarding table may limit the number of ECMP routes or the number of ECMP groups. When an ECMP route cannot be installed because such a limit is reached, the route is installed with a single next hop. Such truncated routes are identified by a T after the interface name. |

To administratively control the traffic destined to a particular network and prevent it from being forwarded through the router, you can configure a static reject route on the router. Such traffic would be discarded and the ICMP destination unreachable message is sent back to the source. This is typically used for preventing routing loops. The reject route added in the RTO is of the type `OSPF Inter-Area`. Reject routes (routes of REJECT type installed by any protocol) are not redistributed by OSPF/RIP. Reject routes are supported in both OSPFv2 and OSPFv3.

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 route
```

```
IPv6 Routing Table - 3 entries
```

```
Codes: C - connected, S - static
```

```
0 - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
```

```
ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, P - Net Prototype
```

```
S 2001::/64 [10/0] directly connected, Null0
```

```
C 2003::/64 [0/0]
```

```
via ::, 0/11
```

```
S 2005::/64 [1/0]
```

```
via 2003::2, 0/11
```

```
C 5001::/64 [0/0]
```

```
via ::, 0/5
```

```
OE1 6001::/64 [110/1]
```

```
via fe80::200:42ff:fe7d:2f19, 00h:00m:23s, 0/5
```

```
OI 7000::/64 [110/6]
```

```
via fe80::200:4fff:fe35:c8bb, 00h:01m:47s, 0/11
```

**Example:** The following shows example CLI display output for the command to indicate a truncated route.

```
(router) #show ipv6 route
```

```
IPv6 Routing Table - 2 entries
```

```
Codes: C - connected, S - static, 6To4 - 6to4 Route
```

```
0 - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
```

```
ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2P - Net Prototype
```

```
C 2001:db9:1::/64 [0/0]
```

```
via ::, 0/1
```

```
OI 3000::/64 [110/1]
```

```
via fe80::200:e7ff:fe2e:ec3f, 00h:00m:11s, 0/1 T
```

**Example:** The following is an example of the CLI display output with a hardware failure.

```
(router) #
```

```
(router) #configure
```

```
(router) (Config)#interface 0/1
```

```
(router) (Interface 0/1)#routing
```

```
(router) (Interface 0/1)#ipv6 enable
```

```
(router) (Interface 0/1)#ipv6 address 2001::2/64
```

```
(router) (Interface 0/1)#exit
```

```
(router) (Config)#ipv6 route net-prototype 3001::/64 2001::4 1
```

```
(router) #show ipv6 route
```

```
IPv6 Routing Table - 1 entries
```

```
Codes: C - connected, S - static, 6To4 - 6to4 Route, B - BGP Derived
```

```
0 - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
```

```
ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, K - kernel
```

```
P - Net Prototype
```

```
C 2001::/128 [0/0]
```

```
via ::, 0/1
```

```
P 3001::/64 [0/1]
```

```
via 2001::4, 00h:00m:04s, 0/1 hw-failure
```

**Example:** The following shows example CLI output to display the IPv6 routing table for a virtual router instance.



### 6.3.39 show ipv6 route ecmp-groups

This command reports all current ECMP groups in the IPv6 routing table. An ECMP group is a set of two or more next hops used in one or more routes. The groups are numbered arbitrarily from 1 to n. The output indicates the number of next hops in the group and the number of routes that use the set of next hops. The output lists the IPv6 address and outgoing interface of each next hop in each group.

**Format** show ipv6 route ecmp-groups

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(router) #show ipv6 route ecmp-groups

ECMP Group 1 with 2 next hops (used by 1 route)
 2001:DB8:1::1 on interface 2/1
 2001:DB8:2::14 on interface 2/2

ECMP Group 2 with 3 next hops (used by 1 route)
 2001:DB8:4::15 on interface 2/32
 2001:DB8:7::12 on interface 2/33
 2001:DB8:9::45 on interface 2/34
```

### 6.3.40 show ipv6 route hw-failure

Use this command to display the routes that failed to be added to the hardware due to hash errors or a table full condition.

**Format** show ipv6 route hw-failure

**Mode** Privileged EXEC

**Example:** The following example displays the command output.

```
(Routing) #show ipv6 route connected

IPv6 Routing Table - 2 entries

Codes: C - connected, S - static, 6To4 - 6to4 Route, B - BGP Derived
 O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
 ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, K - kernel
P - Net Prototype

C 2001::/128 [0/0]
 via ::, 0/1
C 2005::/128 [0/0]
 via ::, 0/2

(Routing) #show ipv6 route hw-failure

IPv6 Routing Table - 4 entries

Codes: C - connected, S - static, 6To4 - 6to4 Route, B - BGP Derived
 O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
 ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, K - kernel
P - Net Prototype

P 3001::/64 [0/1]
 via 2001::4, 00h:00m:04s, 0/1 hw-failure
P 3001:0:0:1::/64 [0/1]
 via 2001::4, 00h:00m:04s, 0/1 hw-failure
P 3001:0:0:2::/64 [0/1]
 via 2001::4, 00h:00m:04s, 0/1 hw-failure
P 3001:0:0:3::/64 [0/1]
```

```
via 2001::4, 00h:00m:04s, 0/1 hw-failure
```

### 6.3.41 show ipv6 route net-prototype

This command displays the net-prototype routes. The net-prototype routes are displayed with a P.

**Format** show ipv6 route net-prototype

**Modes** Privileged EXEC

**Example:** The following shows example command output.

```
(Routing) #show ipv6 route net-prototype
IPv6 Routing Table - 2 entries
```

```
Codes: C - connected, S - static, 6To4 - 6to4 Route, B - BGP Derived
 O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2 - OSPF Ext 2
 ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2, K - kernel
 P - Net Prototype
```

```
P 3001::/64 [0/1]
 via 2001::4, 00h:00m:04s, 0/1
P 3001:0:0:1::/64 [0/1]
 via 2001::4, 00h:00m:04s, 0/1
```

### 6.3.42 show ipv6 route preferences

Use this command to show the preference value associated with the type of route. Lower numbers have a greater preference. A route with a preference of 255 cannot be used to forward traffic.

**Format** show ipv6 route preferences

**Mode** Privileged EXEC

| Parameter     | Description                                                             |
|---------------|-------------------------------------------------------------------------|
| Local         | Preference of directly-connected routes.                                |
| Static        | Preference of static routes.                                            |
| OSPF Intra    | Preference of routes within the OSPF area.                              |
| OSPF Inter    | Preference of routes to other OSPF routes that are outside of the area. |
| OSPF External | Preference of OSPF external routes.                                     |

**Example:** The following shows example command output.

```
(l6m) #show ipv6 route preferences
```

```
Local..... 0
Static..... 1
OSPF Intra..... 110
OSPF Inter..... 110
OSPF External..... 110
```

### 6.3.43 show ipv6 route static bfd

This command displays information about the IPv6 static BFD configured parameters configured with the `ipv6 route static bfd` command.

**Format** show ipv6 route static bfd

**Modes** Privileged EXEC

**Example:** The following shows example command output.

```
(localhost) (Config)#show ipv6 route static bfd
S 1001::2 via 0/28 Up
S 3001::2 via 4/1 Up
```

### 6.3.44 show ipv6 route summary

This command displays a summary of the state of the routing table. The default router's route summary is displayed.

When the optional `all` keyword is given, some statistics, such as the number of routes from each source, include counts for alternate routes. An alternate route is a route that is not the most preferred route to its destination and therefore is not installed in the forwarding table. To include only the number of best routes, do not use the optional keyword.

**Format**            `show ipv6 route summary [all]`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                  | Description                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connected Routes           | Total number of connected routes in the routing table.                                                                                                                                                                                                                                                                                                           |
| Static Routes              | Total number of static routes in the routing table.                                                                                                                                                                                                                                                                                                              |
| BGP Routes                 | Total number of routes installed by the BGP protocol.                                                                                                                                                                                                                                                                                                            |
| External                   | The number of external BGP routes.                                                                                                                                                                                                                                                                                                                               |
| Internal                   | The number of internal BGP routes.                                                                                                                                                                                                                                                                                                                               |
| Local                      | The number of local BGP routes.                                                                                                                                                                                                                                                                                                                                  |
| OSPF Routes                | Total number of routes installed by OSPFv3 protocol.                                                                                                                                                                                                                                                                                                             |
| Reject Routes              | Total number of reject routes installed by all protocols.                                                                                                                                                                                                                                                                                                        |
| Net Prototype Routes       | The total number of net-prototype routes.                                                                                                                                                                                                                                                                                                                        |
| Number of Prefixes         | Summarizes the number of routes with prefixes of different lengths.                                                                                                                                                                                                                                                                                              |
| Total Routes               | The total number of routes in the routing table.                                                                                                                                                                                                                                                                                                                 |
| Best Routes                | The number of best routes currently in the routing table. This number only counts the best route to each destination.                                                                                                                                                                                                                                            |
| Alternate Routes           | The number of alternate routes currently in the routing table. An alternate route is a route that was not selected as the best route to its destination.                                                                                                                                                                                                         |
| Route Adds                 | The number of routes that have been added to the routing table.                                                                                                                                                                                                                                                                                                  |
| Route Modifies             | The number of routes that have been changed after they were initially added to the routing table.                                                                                                                                                                                                                                                                |
| Route Deletes              | The number of routes that have been deleted from the routing table.                                                                                                                                                                                                                                                                                              |
| Unresolved Route Adds      | The number of route adds that failed because none of the route's next hops were on a local subnet. Note that static routes can fail to be added to the routing table at startup because the routing interfaces are not yet up. This counter gets incremented in this case. The static routes are added to the routing table when the routing interfaces come up. |
| Invalid Route Adds         | The number of routes that failed to be added to the routing table because the route was invalid. A log message is written for each of these failures.                                                                                                                                                                                                            |
| Failed Route Adds          | The number of routes that failed to be added to the routing table because of a resource limitation in the routing table.                                                                                                                                                                                                                                         |
| Hardware Failed Route Adds | The number of routes that failed to be inserted into the hardware due to a hash error or a table full condition.                                                                                                                                                                                                                                                 |
| Reserved Locals            | The number of routing table entries reserved for a local subnet on a routing interface that is down. Space for local routes is always reserved so that local routes can be installed when a routing interface bounces.                                                                                                                                           |
| Unique Next Hops           | The number of distinct next hops used among all routes currently in the routing table. These include local interfaces for local routes and neighbors for indirect routes.                                                                                                                                                                                        |

| Parameter                   | Description                                                                                                                                                                                                                                                                                                          |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unique Next Hops High Water | The highest count of unique next hops since counters were last cleared.                                                                                                                                                                                                                                              |
| Next Hop Groups             | The current number of next hop groups in use by one or more routes. Each next hop group includes one or more next hops.                                                                                                                                                                                              |
| Next Hop Groups High Water  | The highest count of next hop groups since counters were last cleared.                                                                                                                                                                                                                                               |
| ECMP Groups                 | The number of next hop groups with multiple next hops.                                                                                                                                                                                                                                                               |
| ECMP Routes                 | The number of routes with multiple next hops currently in the routing table.                                                                                                                                                                                                                                         |
| Truncated ECMP Routes       | The number of ECMP routes that are currently installed in the forwarding table with just one next hop. The forwarding table may limit the number of ECMP routes or the number of ECMP groups. When an ECMP route cannot be installed because such a limit is reached, the route is installed with a single next hop. |
| ECMP Retries                | The number of ECMP routes that have been installed in the forwarding table after initially being installed with a single next hop.                                                                                                                                                                                   |
| Routes with n Next Hops     | The current number of routes with each number of next hops.                                                                                                                                                                                                                                                          |

**Example:** The following shows example CLI display output for the command.

(Routing) #show ipv6 route summary

```

Connected Routes..... 4
Static Routes..... 0
6To4 Routes..... 0
BGP Routes..... 10
 External..... 0
 Internal..... 10
 Local..... 0
OSPF Routes..... 13
 Intra Area Routes..... 0
 Inter Area Routes..... 13
 External Type-1 Routes..... 0
 External Type-2 Routes..... 0
Reject Routes..... 0
Net Prototype Routes..... 10004
Total routes..... 17

Best Routes (High)..... 17 (17)
Alternate Routes..... 0
Route Adds..... 44
Route Deletes..... 27
Unresolved Route Adds..... 0
Invalid Route Adds..... 0
Failed Route Adds..... 0
Hardware Failed Route Adds..... 4
Reserved Locals..... 0

Unique Next Hops (High)..... 8 (8)
Next Hop Groups (High)..... 8 (8)
ECMP Groups (High)..... 3 (3)
ECMP Routes..... 12
Truncated ECMP Routes..... 0
ECMP Retries..... 0
Routes with 1 Next Hop..... 5
Routes with 2 Next Hops..... 1
Routes with 3 Next Hops..... 1
Routes with 4 Next Hops..... 10

Number of Prefixes:
/64: 17

```

**Example:** The following example displays the route table summary for a virtual router instance.

```
(Routing) #show ipv6 route summary vrf Red

Connected Routes..... 0
Static Routes..... 0
Kernel Routes..... 0
6To4 Routes..... 0
BGP Routes..... 0
 External..... 0
 Internal..... 0
 Local..... 0
OSPF Routes..... 0
 Intra Area Routes..... 0
 Inter Area Routes..... 0
 External Type-1 Routes..... 0
 External Type-2 Routes..... 0
Reject Routes..... 0
MPLS routes..... 0
Net Prototype Routes..... 0
Total routes..... 0

Best Routes (High)..... 0 (0)
Alternate Routes..... 0
Route Adds..... 0
Route Modifies..... 0
Route Deletes..... 0
Unresolved Route Adds..... 0
Invalid Route Adds..... 0
Failed Route Adds..... 0
Kernel Failed Route Adds..... 0
Hardware Failed Route Adds..... 0
Reserved Locals..... 0

Unique Next Hops (High)..... 0 (0)
Next Hop Groups (High)..... 0 (0)
ECMP Groups (High)..... 0 (0)
ECMP Routes..... 0
Truncated ECMP Routes..... 0
ECMP Retries..... 0
```

Number of Prefixes:

### 6.3.45 show ipv6 snooping counters

This command displays the counters associated with IPv6 RA GUARD feature. The number of router advertisement and router redirect packets dropped by the switch globally due to RA GUARD feature are displayed in the command output.

**Format**            show ipv6 snooping counters

**Modes**            • Privileged EXEC

                     • Global Config

**Example:** The following shows example command output.

```
(Switching) # show ipv6 snooping counters

IPv6 Dropped Messages

RA(Router Advertisement - ICMP type 134)

REDIR(Router Redirect - ICMP type 137)

RA Redir
```

```

0 0
```

### 6.3.46 show ipv6 vlan

This command displays IPv6 VLAN routing interface addresses.

**Format**            show ipv6 vlan

**Modes**            • Privileged EXEC

                     • User EXEC

| Parameter                         | Description            |
|-----------------------------------|------------------------|
| MAC Address used by Routing VLANs | Shows the MAC address. |

The rest of the output for this command is displayed in a table with the following column headings.

| Column Headings            | Description                                                                   |
|----------------------------|-------------------------------------------------------------------------------|
| VLAN ID                    | The VLAN ID of a configured VLAN.                                             |
| Logical Interface          | The interface in <i>slot/port</i> format that is associated with the VLAN ID. |
| IPv6 Address/Prefix Length | The IPv6 prefix and prefix length associated with the VLAN ID.                |

### 6.3.47 show ipv6 traffic

Use this command to show traffic and statistics for IPv6 and ICMPv6. Specify a logical, loopback, or tunnel interface to view information about traffic on a specific interface. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. If you do not specify an interface, the command displays information about traffic on all interfaces.

**Format**            show ipv6 traffic [{*slot/port/vlan 1-4093* | *loopback loopback-id* | *tunnel tunnel-id*}]

**Mode**             Privileged EXEC

| Parameter                                         | Description                                                                                                                                                                                                                                                                              |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Datagrams Received                          | Total number of input datagrams received by the interface, including those received in error.                                                                                                                                                                                            |
| Received Datagrams Locally Delivered              | Total number of datagrams successfully delivered to IPv6 user-protocols (including ICMP). This counter increments at the interface to which these datagrams were addressed, which might not necessarily be the input interface for some of the datagrams.                                |
| Received Datagrams Discarded Due To Header Errors | Number of input datagrams discarded due to errors in their IPv6 headers, including version number mismatch, other format errors, hop count exceeded, errors discovered in processing their IPv6 options, etc.                                                                            |
| Received Datagrams Discarded Due To MTU           | Number of input datagrams that could not be forwarded because their size exceeded the link MTU of outgoing interface.                                                                                                                                                                    |
| Received Datagrams Discarded Due To No Route      | Number of input datagrams discarded because no route could be found to transmit them to their destination.                                                                                                                                                                               |
| Received Datagrams With Unknown Protocol          | Number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol. This counter increments at the interface to which these datagrams were addressed, which might not be necessarily the input interface for some of the datagrams. |

| Parameter                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Received Datagrams Discarded Due To Invalid Address | Number of input datagrams discarded because the IPv6 address in their IPv6 header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, ::0) and unsupported addresses (for example, addresses with unallocated prefixes). For entities that are not IPv6 routers and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address. |
| Received Datagrams Discarded Due To Truncated Data  | Number of input datagrams discarded because datagram frame did not carry enough data.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Received Datagrams Discarded Other                  | Number of input IPv6 datagrams for which no problems were encountered to prevent their continue processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include datagrams discarded while awaiting re-assembly.                                                                                                                                                                                                                 |
| Received Datagrams Reassembly Required              | Number of IPv6 fragments received which needed to be reassembled at this interface. Note that this counter increments at the interface to which these fragments were addressed, which might not be necessarily the input interface for some of the fragments.                                                                                                                                                                                                                         |
| Datagrams Successfully Reassembled                  | Number of IPv6 datagrams successfully reassembled. Note that this counter increments at the interface to which these datagrams were addressed, which might not be necessarily the input interface for some of the fragments.                                                                                                                                                                                                                                                          |
| Datagrams Failed To Reassemble                      | Number of failures detected by the IPv6 reassembly algorithm (for whatever reason: timed out, errors, etc.). Note that this is not necessarily a count of discarded IPv6 fragments since some algorithms (notably the algorithm in by combining them as they are received. This counter increments at the interface to which these fragments were addressed, which might not be necessarily the input interface for some of the fragments.                                            |
| Datagrams Forwarded                                 | Number of output datagrams which this entity received and forwarded to their final destinations. In entities which do not act as IPv6 routers, this counter will include only those packets which were Source-Routed using this entity, and the Source-Route processing was successful. Note that for a successfully forwarded datagram the counter of the outgoing interface increments.                                                                                             |
| Datagrams Locally Transmitted                       | Total number of IPv6 datagrams which local IPv6 user-protocols (including ICMP) supplied to IPv6 in requests for transmission. Note that this counter does not include any datagrams counted in ipv6IfStatsOutForwDatagrams.                                                                                                                                                                                                                                                          |
| Datagrams Transmit Failed                           | Number of output IPv6 datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space). Note that this counter would include datagrams counted in ipv6IfStatsOutForwDatagrams if any such packets met this (discretionary) discard criterion.                                                                                                                                      |
| Fragments Created                                   | Number of output datagram fragments that have been generated as a result of fragmentation at this output interface.                                                                                                                                                                                                                                                                                                                                                                   |
| Datagrams Successfully Fragmented                   | Number of IPv6 datagrams that have been successfully fragmented at this output interface.                                                                                                                                                                                                                                                                                                                                                                                             |
| Datagrams Failed To Fragment                        | Number of IPv6 datagrams that have been discarded because they needed to be fragmented at this output interface but could not be.                                                                                                                                                                                                                                                                                                                                                     |
| Fragments Created                                   | The number of fragments that were created.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Multicast Datagrams Received                        | Number of multicast packets received by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Multicast Datagrams Transmitted                     | Number of multicast packets transmitted by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Total ICMPv6 messages received                      | Total number of ICMP messages received by the interface which includes all those counted by ipv6IfIcmpInErrors. Note that this interface is the interface to which the ICMP messages were addressed which may not be necessarily the input interface for the messages.                                                                                                                                                                                                                |
| ICMPv6 Messages with errors                         | Number of ICMP messages which the interface received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).                                                                                                                                                                                                                                                                                                                                            |
| ICMPv6 Destination Unreachable Messages Received    | Number of ICMP Destination Unreachable messages received by the interface.                                                                                                                                                                                                                                                                                                                                                                                                            |

| Parameter                                               | Description                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICMPv6 Messages Prohibited Administratively Received    | Number of ICMP destination unreachable/communication administratively prohibited messages received by the interface.                                                                                                                                                                                                                                               |
| ICMPv6 Time Exceeded Messages Received                  | Number of ICMP Time Exceeded messages received by the interface.                                                                                                                                                                                                                                                                                                   |
| ICMPv6 Parameter Problem Messages Received              | Number of ICMP Parameter Problem messages received by the interface.                                                                                                                                                                                                                                                                                               |
| ICMPv6 Packet Too Big Messages Received                 | Number of ICMP Packet Too Big messages received by the interface.                                                                                                                                                                                                                                                                                                  |
| ICMPv6 Echo Request Messages Received                   | Number of ICMP Echo (request) messages received by the interface.                                                                                                                                                                                                                                                                                                  |
| ICMPv6 Echo Reply Messages Received                     | Number of ICMP Echo Reply messages received by the interface.                                                                                                                                                                                                                                                                                                      |
| ICMPv6 Router Solicit Messages Received                 | Number of ICMP Router Solicit messages received by the interface.                                                                                                                                                                                                                                                                                                  |
| ICMPv6 Router Advertisement Messages Received           | Number of ICMP Router Advertisement messages received by the interface.                                                                                                                                                                                                                                                                                            |
| ICMPv6 Neighbor Solicit Messages Received               | Number of ICMP Neighbor Solicit messages received by the interface.                                                                                                                                                                                                                                                                                                |
| ICMPv6 Neighbor Advertisement Messages Received         | Number of ICMP Neighbor Advertisement messages received by the interface.                                                                                                                                                                                                                                                                                          |
| ICMPv6 Redirect Messages Received                       | Number of Redirect messages received by the interface.                                                                                                                                                                                                                                                                                                             |
| ICMPv6 Group Membership Query Messages Received         | Number of ICMPv6 Group Membership Query messages received by the interface.                                                                                                                                                                                                                                                                                        |
| ICMPv6 Group Membership Response Messages Received      | Number of ICMPv6 Group Membership response messages received by the interface.                                                                                                                                                                                                                                                                                     |
| ICMPv6 Group Membership Reduction Messages Received     | Number of ICMPv6 Group Membership reduction messages received by the interface.                                                                                                                                                                                                                                                                                    |
| Total ICMPv6 Messages Transmitted                       | Total number of ICMP messages which this interface attempted to send. Note that this counter includes all those counted by icmpOutErrors.                                                                                                                                                                                                                          |
| ICMPv6 Messages Not Transmitted Due To Error            | Number of ICMP messages which this interface did not send due to problems discovered within ICMP such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IPv6 to route the resultant datagram. In some implementations there may be no types of error which contribute to this counter's value. |
| ICMPv6 Destination Unreachable Messages Transmitted     | Number of ICMP Destination Unreachable messages sent by the interface.                                                                                                                                                                                                                                                                                             |
| ICMPv6 Messages Prohibited Administratively Transmitted | Number of ICMP destination unreachable/communication administratively prohibited messages sent.                                                                                                                                                                                                                                                                    |
| ICMPv6 Time Exceeded Messages Transmitted               | Number of ICMP Time Exceeded messages sent by the interface.                                                                                                                                                                                                                                                                                                       |
| ICMPv6 Parameter Problem Messages Transmitted           | Number of ICMP Parameter Problem messages sent by the interface.                                                                                                                                                                                                                                                                                                   |



| Parameter                                              | Description                                                                                                       |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| ICMPv6 Packet Too Big Messages Transmitted             | Number of ICMP Packet Too Big messages sent by the interface.                                                     |
| ICMPv6 Echo Request Messages Transmitted               | Number of ICMP Echo (request) messages sent by the interface. ICMP echo messages sent.                            |
| ICMPv6 Echo Reply Messages Transmitted                 | Number of ICMP Echo Reply messages sent by the interface.                                                         |
| ICMPv6 Router Solicit Messages Transmitted             | Number of ICMP Router Solicitation messages sent by the interface.                                                |
| ICMPv6 Router Advertisement Messages Transmitted       | Number of ICMP Router Advertisement messages sent by the interface.                                               |
| ICMPv6 Neighbor Solicit Messages Transmitted           | Number of ICMP Neighbor Solicitation messages sent by the interface.                                              |
| ICMPv6 Neighbor Advertisement Messages Transmitted     | Number of ICMP Neighbor Advertisement messages sent by the interface.                                             |
| ICMPv6 Redirect Messages Received                      | Number of Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects. |
| ICMPv6 Group Membership Query Messages Transmitted     | Number of ICMPv6 Group Membership Query messages sent.                                                            |
| ICMPv6 Group Membership Response Messages Transmitted  | Number of ICMPv6 Group Membership Response messages sent.                                                         |
| ICMPv6 Group Membership Reduction Messages Transmitted | Number of ICMPv6 Group Membership Reduction messages sent.                                                        |
| ICMPv6 Duplicate Address Detects                       | Number of duplicate addresses detected by the interface.                                                          |

### 6.3.48 clear ipv6 route counters

The command resets to zero the IPv6 routing table counters reported in the [show ipv6 route summary](#) command. The command only resets event counters. Counters that report the current state of the routing table, such as the number of routes of each type, are not reset. The command clears the statistics for the default router.

**Format**            `clear ipv6 route counters`

**Mode**             Privileged EXEC

### 6.3.49 clear ipv6 snooping counters

This command clears the counters associated with IPv6 RA GUARD feature.

**Format**            `clear ipv6 snooping counters`

**Mode**             • Privileged EXEC  
 • Global Config

### 6.3.50 clear ipv6 statistics

Use this command to clear IPv6 statistics for all interfaces or for a specific interface, including loopback, tunnel, and VLAN interfaces. IPv6 statistics display in the output of the `show ipv6 traffic` command. If you do not specify an interface, the counters for all IPv6 traffic statistics reset to zero.

**Format** `clear ipv6 statistics [{slot/port | loopback loopback-id | tunnel tunnel-id | vlan id}]`  
**Mode** Privileged EXEC

## 6.4 OSPFv3 Commands

This section describes the commands you use to configure OSPFv3, which is a link-state routing protocol that you use to route traffic within a network.

### Global OSPFv3 Commands

#### 6.4.1 ipv6 router ospf

Use this command to enter Router OSPFv3 Config mode.

**Format** `router ospf`  
**Mode** Global Config

#### 6.4.2 area default-cost (OSPFv3)

This command configures the monetary default cost for the stub area. The operator must specify the area id and an integer value between 1 to 16,777,215.

**Format** `area areaid default-cost 1-16777215`  
**Mode** Router OSPFv3 Config

#### 6.4.3 area nssa (OSPFv3)

This command configures the specified areaid to function as NSSA.

**Format** `area areaid nssa`  
**Mode** Router OSPFv3 Config

#### 6.4.3.1 no area nssa

This command disables NSSA from the specified area id.

**Format** `no area areaid nssa`  
**Mode** Router OSPFv3 Config

#### 6.4.4 area nssa default-info-originate (OSPFv3)

This command configures the metric value and type for the default route advertised into the NSSA. The optional metric parameter specifies the metric of the default route and is to be in a range of 1 to 16777214. If no metric is specified, the default value is 10. The metric type can be comparable (`nssa-external 1`) or noncomparable (`nssa-external 2`).

**Format** `area areaid nssa default-info-originate [metric] [{comparable | non-comparable}]`  
**Mode** Router OSPFv3 Config

#### 6.4.4.1 no area nssa default-info-originate (OSPFv3)

This command disables the default route advertised into the NSSA.

**Format** no area *areaid* nssa default-info-originate [*metric*] [{comparable | non-comparable}]  
**Mode** Router OSPFv3 Config

#### 6.4.5 area nssa no-redistribute (OSPFv3)

This command configures the NSSA ABR so that learned external routes will not be redistributed to the NSSA.

**Format** area *areaid* nssa no-redistribute  
**Mode** Router OSPFv3 Config

#### 6.4.5.1 no area nssa no-redistribute (OSPFv3)

This command disables the NSSA ABR so that learned external routes are redistributed to the NSSA.

**Format** no area *areaid* nssa no-redistribute  
**Mode** Router OSPFv3 Config

#### 6.4.6 area nssa no-summary (OSPFv3)

This command configures the NSSA so that summary LSAs are not advertised into the NSSA.

**Format** area *areaid* nssa no-summary  
**Mode** Router OSPFv3 Config

#### 6.4.6.1 no area nssa no-summary (OSPFv3)

This command disables nssa from the summary LSAs.

**Format** no area *areaid* nssa no-summary  
**Mode** Router OSPFv3 Config

#### 6.4.7 area nssa translator-role (OSPFv3)

This command configures the translator role of the NSSA. A value of *always* causes the router to assume the role of the translator the instant it becomes a border router and a value of *candidate* causes the router to participate in the translator election process when it attains border router status.

**Format** area *areaid* nssa translator-role {always | candidate}  
**Mode** Router OSPFv3 Config

#### 6.4.7.1 no area nssa translator-role (OSPFv3)

This command disables the nssa translator role from the specified area id.

**Format** no area *areaid* nssa translator-role {always | candidate}  
**Mode** Router OSPFv3 Config

## 6.4.8 area nssa translator-stab-intv (OSPFv3)

This command configures the translator *stabilityinterval* of the NSSA. The *stabilityinterval* is the period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposited by another router.

**Format**            area *areaid* nssa translator-stab-intv *stabilityinterval*  
**Mode**             Router OSPFv3 Config

### 6.4.8.1 no area nssa translator-stab-intv (OSPFv3)

This command disables the nssa translator's *stabilityinterval* from the specified area id.

**Format**            no area *areaid* nssa translator-stab-intv *stabilityinterval*  
**Mode**             Router OSPFv3 Config

## 6.4.9 area range (OSPFv3)

Use this command to configure a summary prefix that an area border router advertises for a specific area.

**Default**            No area ranges are configured by default. No cost is configured by default.  
**Format**            area *area-id* range *prefix netmask* {summarylink | nssaexternallink} [advertise | not-advertise] [cost *cost*]  
**Mode**             Router OSPFv3 Config

| Parameter        | Description                                                                                                                                                                                                                                                        |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| area-id          | The area identifier for the area whose networks are to be summarized.                                                                                                                                                                                              |
| prefix netmask   | The summary prefix to be advertised when the ABR computes a route to one or more networks within this prefix in this area.                                                                                                                                         |
| summarylink      | When this keyword is given, the area range is used when summarizing prefixes advertised in type 3 summary LSAs.                                                                                                                                                    |
| nssaexternallink | When this keyword is given, the area range is used when translating type 7 LSAs to type 5 LSAs.                                                                                                                                                                    |
| advertise        | [Optional] When this keyword is given, the summary prefix is advertised when the area range is active. This is the default.                                                                                                                                        |
| not-advertise    | [Optional] When this keyword is given, neither the summary prefix nor the contained prefixes are advertised when the area range is active. When the not-advertise option is given, any static cost previously configured is removed from the system configuration. |
| cost             | [Optional] If an optional cost is given, OSPF sets the metric field in the inter-area -prefix LSA to the configured value rather than setting the metric to the largest cost among the networks covered by the area range.                                         |

### 6.4.9.1 no area range

The `no` form of this command to delete a summary prefix or remove a static cost.

**Format**            no area *areaid* range *prefix netmask* {summarylink | nssaexternallink} cost  
**Mode**             Router OSPFv3 Config

## 6.4.10 area stub (OSPFv3)

This command creates a stub area for the specified area ID. A stub area is characterized by the fact that AS External LSAs are not propagated into the area. Removing AS External LSAs and Summary LSAs can significantly reduce the link state database of routers within the stub area.

**Format**            area *areaid* stub  
**Mode**             Router OSPFv3 Config

### 6.4.10.1 no area stub

This command deletes a stub area for the specified area ID.

**Format**            no area *areaid* stub  
**Mode**             Router OSPFv3 Config

## 6.4.11 area stub no-summary (OSPFv3)

This command disables the import of Summary LSAs for the stub area identified by *areaid*.

**Default**           enabled  
**Format**            area *areaid* stub no-summary  
**Mode**             Router OSPFv3 Config

### 6.4.11.1 no area stub no-summary

This command sets the Summary LSA import mode to the default for the stub area identified by *areaid*.

**Format**            no area *areaid* stub summarylsa  
**Mode**             Router OSPFv3 Config

## 6.4.12 area virtual-link (OSPFv3)

This command creates the OSPF virtual interface for the specified *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format**            area *areaid* virtual-link *neighbor*  
**Mode**             Router OSPFv3 Config

### 6.4.12.1 no area virtual-link

This command deletes the OSPF virtual interface from the given interface, identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format**            no area *areaid* virtual-link *neighbor*  
**Mode**             Router OSPFv3 Config

## 6.4.13 area virtual-link dead-interval (OSPFv3)

This command configures the dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for *seconds* is 1 to 65535.

**Default**           40  
**Format**            area *areaid* virtual-link *neighbor* dead-interval *seconds*  
**Mode**             Router OSPFv3 Config

### 6.4.13.1 no area virtual-link dead-interval

This command configures the default dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* dead-interval

**Mode** Router OSPFv3 Config

### 6.4.14 area virtual-link hello-interval (OSPFv3)

This command configures the hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for *seconds* is 1 to 65535.

**Default** 10

**Format** area *areaid* virtual-link *neighbor* hello-interval *seconds*

**Mode** Router OSPFv3 Config

#### 6.4.14.1 no area virtual-link hello-interval

This command configures the default hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* hello-interval

**Mode** Router OSPFv3 Config

### 6.4.15 area virtual-link retransmit-interval (OSPFv3)

This command configures the retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for *seconds* is 0 to 3600.

**Default** 5

**Format** area *areaid* virtual-link *neighbor* retransmit-interval *seconds*

**Mode** Router OSPFv3 Config

#### 6.4.15.1 no area virtual-link retransmit-interval

This command configures the default retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* retransmit-interval

**Mode** Router OSPFv3 Config

### 6.4.16 area virtual-link transmit-delay (OSPFv3)

This command configures the transmit delay for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor. The range for *seconds* is 0 to 3600 (1 hour).

**Default** 1

**Format** area *areaid* virtual-link *neighbor* transmit-delay *seconds*

**Mode** Router OSPFv3 Config

### 6.4.16.1 no area virtual-link transmit-delay

This command configures the default transmit delay for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*. The *neighbor* parameter is the Router ID of the neighbor.

**Format** no area *areaid* virtual-link *neighbor* transmit-delay

**Mode** Router OSPFv3 Config

### 6.4.17 auto-cost (OSPFv3)

By default, OSPF computes the link cost of each interface from the interface bandwidth. Faster links have lower metrics, making them more attractive in route selection. The configuration parameters in the `auto-cost reference bandwidth` and `bandwidth` commands give you control over the default link cost. You can configure for OSPF an interface bandwidth that is independent of the actual link speed. A second configuration parameter allows you to control the ratio of interface bandwidth to link cost. The link cost is computed as the ratio of a reference bandwidth to the interface bandwidth ( $\text{ref\_bw} / \text{interface bandwidth}$ ), where interface bandwidth is defined by the `bandwidth` command. Because the default reference bandwidth is 100 Mb/s, OSPF uses the same default link cost for all interfaces whose bandwidth is 100 megabits per second (Mb/s) or greater. Use the `auto-cost` command to change the reference bandwidth, specifying the reference bandwidth in Mb/s. The reference bandwidth range is 1 to 4,294,967 Mb/s.

**Default** 100 Mb/s

**Format** auto-cost reference-bandwidth *1-4294967*

**Mode** Router OSPFv3 Config

#### 6.4.17.1 no auto-cost reference-bandwidth (OSPFv3)

Use this command to set the reference bandwidth to the default value.

**Format** no auto-cost reference-bandwidth

**Mode** Router OSPFv3 Config

### 6.4.18 clear ipv6 ospf

Use this command to disable and reenables OSPF. OSPFv3 for the default router is disabled and reenables.

**Format** clear ipv6 ospf

**Mode** Privileged EXEC

### 6.4.19 clear ipv6 ospf configuration

Use this command to reset the OSPF configuration to factory defaults. The OSPFv3 configuration for the default router is reset to the factory defaults.

**Format** clear ipv6 ospf configuration

**Mode** Privileged EXEC

### 6.4.20 clear ipv6 ospf counters

Use this command to reset global and interface statistics. The OSPFv3 statistics for the default router are reset to the factory defaults.

**Format** clear ipv6 ospf counters

**Mode** Privileged EXEC

### 6.4.21 clear ipv6 ospf neighbor

Use this command to drop the adjacency with all OSPF neighbors. On each neighbor's interface, send a one-way hello. Adjacencies may then be re-established.

It drops the adjacency with all OSPFv3 neighbors for the default router.

To drop all adjacencies with a specific router ID, specify the neighbor's Router ID using the optional parameter *[neighbor-id]*.

**Format**            `clear ipv6 ospf neighbor [neighbor-id]`

**Mode**             Privileged EXEC

### 6.4.22 clear ipv6 ospf neighbor interface

To drop adjacency with all neighbors on a specific interface, use the optional parameter *[slot/port]*. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. To drop adjacency with a specific router ID on a specific interface, use the optional parameter *[neighbor-id]*.

**Format**            `clear ipv6 ospf neighbor interface [slot/port/vlan 1-4093] [neighbor-id]`

**Mode**             Privileged EXEC

### 6.4.23 clear ipv6 ospf redistribution

Use this command to flush all self-originated external LSAs. Reapply the redistribution configuration and re-originate prefixes as necessary. The command is executed for the default router.

**Format**            `clear ipv6 ospf redistribution`

**Mode**             Privileged EXEC

### 6.4.24 default-information originate (OSPFv3)

This command is used to control the advertisement of default routes.

**Default**            • `metric—unspecified`  
                      • `type—2`

**Format**            `default-information originate [always] [metric 0-16777214] [metric-type {1 | 2}]`

**Mode**             Router OSPFv3 Config

#### 6.4.24.1 no default-information originate (OSPFv3)

This command is used to control the advertisement of default routes.

**Format**            `no default-information originate [metric] [metric-type]`

**Mode**             Router OSPFv3 Config

### 6.4.25 default-metric (OSPFv3)

This command is used to set a default for the metric of distributed routes.

**Format**            `default-metric 1-16777214`

**Mode**             Router OSPFv3 Config



### 6.4.25.1 no default-metric (OSPFv3)

This command is used to set a default for the metric of distributed routes.

**Format** no default-metric  
**Mode** Router OSPFv3 Config

### 6.4.26 distance ospf (OSPFv3)

This command sets the route preference value of OSPF route types in the router. Lower route preference values are preferred when determining the best route. The type of OSPF route can be intra, inter, or external. All the external type routes are given the same preference value. The range of *preference* value is 1 to 255.

**Default** 110  
**Format** distance ospf {intra-area 1-255 | inter-area 1-255 | external 1-255}  
**Mode** Router OSPFv3 Config

#### 6.4.26.1 no distance ospf

This command sets the default route preference value of OSPF routes in the router. The type of OSPF route can be intra, inter, or external. All the external type routes are given the same preference value.

**Format** no distance ospf {intra-area | inter-area | external}  
**Mode** Router OSPFv3 Config

### 6.4.27 enable (OSPFv3)

This command resets the default administrative mode of OSPF in the router (active).

**Default** enabled  
**Format** enable  
**Mode** Router OSPFv3 Config

#### 6.4.27.1 no enable (OSPFv3)

This command sets the administrative mode of OSPF in the router to inactive.

**Format** no enable  
**Mode** Router OSPFv3 Config

### 6.4.28 exit-overflow-interval (OSPFv3)

This command configures the exit overflow interval for OSPF. It describes the number of seconds after entering Overflow state that a router will wait before attempting to leave the overflow state. This allows the router to again originate non-default AS-external-LSAs. When set to 0, the router will not leave overflow state until restarted. The range for *seconds* is 0 to 2147483647 seconds.

**Default** 0  
**Format** exit-overflow-interval seconds  
**Mode** Router OSPFv3 Config

### 6.4.28.1 no exit-overflow-interval

This command configures the default exit overflow interval for OSPF.

**Format** no exit-overflow-interval  
**Mode** Router OSPFv3 Config

### 6.4.29 external-lsdb-limit (OSPFv3)

This command configures the external LSDB limit for OSPF. If the value is -1, then there is no limit. When the number of nondefault AS-external-LSAs in a router's link-state database reaches the external LSDB limit, the router enters overflow state. The router never holds more than the external LSDB limit nondefault AS-external-LSAs in its database. The external LSDB limit MUST be set identically in all routers attached to the OSPF backbone and/or any regular OSPF area. The range for *limit* is -1 to 2147483647.

**Default** -1  
**Format** external-lsdb-limit *limit*  
**Mode** Router OSPFv3 Config

### 6.4.29.1 no external-lsdb-limit

This command configures the default external LSDB limit for OSPF.

**Format** no external-lsdb-limit  
**Mode** Router OSPFv3 Config

### 6.4.30 maximum-paths (OSPFv3)

This command sets the number of paths that OSPF can report for a given destination where *maxpaths* is platform dependent.

**Default** 4  
**Format** maximum-paths *maxpaths*  
**Mode** Router OSPFv3 Config

### 6.4.30.1 no maximum-paths

This command resets the number of paths that OSPF can report for a given destination back to its default value.

**Format** no maximum-paths  
**Mode** Router OSPFv3 Config

### 6.4.31 passive-interface default (OSPFv3)

Use this command to enable global passive mode by default for all interfaces. It overrides any interface level passive mode. OSPF shall not form adjacencies over a passive interface.

**Default** disabled  
**Format** passive-interface default  
**Mode** Router OSPFv3 Config

### 6.4.31.1 no passive-interface default

Use this command to disable the global passive mode by default for all interfaces. Any interface previously configured to be passive reverts to nonpassive mode.

**Format**           no passive-interface default  
**Mode**             Router OSPFv3 Config

### 6.4.32 passive-interface (OSPFv3)

Use this command to set the interface or tunnel as passive. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. It overrides the global passive mode that is currently effective on the interface or tunnel.

**Default**           disabled  
**Format**           passive-interface {*slot/port/vlan 1-4093*|*tunnel tunnel-id*}  
**Mode**             Router OSPFv3 Config

#### 6.4.32.1 no passive-interface

Use this command to set the interface or tunnel as nonpassive. It overrides the global passive mode that is currently effective on the interface or tunnel.

**Format**           no passive-interface {*slot/port/vlan 1-4093*|*tunnel tunnel-id*}  
**Mode**             Router OSPFv3 Config

### 6.4.33 redistribute (OSPFv3)

This command configures the OSPFv3 protocol to allow redistribution of routes from the specified source protocol/routers. If you use the `bgp` keyword to redistribute BGP routes into OSPFv3, only the external BGP routes are redistributed.

**Default**

- metric—unspecified
- type—2
- tag—0

  
**Format**           redistribute {*static | connected | bgp*} [*metric 0-16777214*] [*metric-type {1 | 2}*] [*tag 0-4294967295*]  
**Mode**             Router OSPFv3 Config

#### 6.4.33.1 no redistribute

This command configures OSPF protocol to prohibit redistribution of routes from the specified source protocol/routers.

**Format**           no redistribute {*static | connected | bgp*} [*metric*] [*metric-type*] [*tag*]  
**Mode**             Router OSPFv3 Config

### 6.4.34 router-id (OSPFv3)

This command sets a 4-digit dotted-decimal number uniquely identifying the router ospf id. The *ipaddress* is a configured value.

**Format**           router-id *ipaddress*  
**Mode**             Router OSPFv3 Config

### 6.4.35 timers pacing lsa-group

Use this command to adjust how OSPFv3 groups LSAs for periodic refresh. OSPFv3 refreshes self-originated LSAs approximately once every 30 minutes. When OSPFv3 refreshes LSAs, it considers all self-originated LSAs whose age is from 1800 to 1800 plus the pacing group size. Grouping LSAs for refresh allows OSPFv3 to combine refreshed LSAs into a minimal number of LS Update packets. Minimizing the number of Update packets makes LSA distribution more efficient.

When OSPFv3 originates a new or changed LSA, it selects a random refresh delay for the LSA. When the refresh delay expires, OSPFv3 refreshes the LSA. By selecting a random refresh delay, OSPFv3 avoids refreshing a large number of LSAs at one time, even if a large number of LSAs are originated at one time.

*seconds* is the width of the window in which LSAs are refreshed. The range for the pacing group window is from 10 to 1800 seconds.

**Default** 60 seconds  
**Format** `timers pacing lsa-group seconds`  
**Mode** Privileged EXEC

#### 6.4.35.1 no timers pacing lsa-group

This command returns the LSA Group Pacing parameter to the factory default value of 60 seconds.

**Format** `no timers pacing lsa-group`  
**Mode** Privileged EXEC

### 6.4.36 timers throttle spf

The initial "wait interval" is set to an amount of delay specified by the *spf-hold* value. If an SPF calculation is not scheduled during the current "wait interval", the next SPF calculation is scheduled at a delay of *spf-start*. If there has been an SPF calculation scheduled during the current "wait interval", the "wait interval" is set to two times the current "wait interval" until the "wait interval" reaches the maximum time in milliseconds as specified in *spf-maximum*. Subsequent wait times remain at the maximum until the values are reset or an LSA is received between SPF calculations.

**Default** *spf-start* = 2000 ms  
*spf-hold* = 5000 ms  
*spf-maximum* = 5000 ms  
**Format** `timers throttle spf spf-start spf-hold spf-maximum`  
**Mode** Privileged EXEC

| Parameter          | Description                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>spf-start</i>   | Indicates the SPF schedule delay in milliseconds when no SPF calculation has been scheduled during the current "wait interval". Value range is 1 to 600000 milliseconds. |
| <i>spf-hold</i>    | Indicates the initial SPF "wait interval" in milliseconds. Value range is 1 to 600,000 milliseconds.                                                                     |
| <i>spf-maximum</i> | Indicates the maximum SPF "wait interval" in milliseconds. Value range is 1 to 600,000 milliseconds.                                                                     |

#### 6.4.36.1 no timers throttle spf

This command returns the SPF throttling parameters to the factory default values.

**Format** `no timers throttle spf`  
**Mode** Privileged EXEC

## 6.4.37 trapflags (OSPFv3)

Use this command to enable individual OSPF traps, enable a group of trap flags at a time, or enable all the trap flags at a time. The different groups of trapflags, and each group's specific trapflags to enable or disable, are listed in [Table 15](#).

Table 15: Trapflag Groups (OSPFv3)

| Group               | Flags                                                                                                                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>errors</b>       | <ul style="list-style-type: none"> <li>• authentication-failure</li> <li>• bad-packet</li> <li>• config-error</li> <li>• virt-authentication-failure</li> <li>• virt-bad-packet</li> <li>• virt-config-error</li> </ul> |
| <b>lsa</b>          | <ul style="list-style-type: none"> <li>• lsa-maxage</li> <li>• lsa-originate</li> </ul>                                                                                                                                 |
| <b>overflow</b>     | <ul style="list-style-type: none"> <li>• lsdb-overflow</li> <li>• lsdb-approaching-overflow</li> </ul>                                                                                                                  |
| <b>retransmit</b>   | <ul style="list-style-type: none"> <li>• packets</li> <li>• virt-packets</li> </ul>                                                                                                                                     |
| <b>state-change</b> | <ul style="list-style-type: none"> <li>• if-state-change</li> <li>• neighbor-state-change</li> <li>• virtif-state-change</li> <li>• virtneighbor-state-change</li> </ul>                                                |

- To enable the individual flag, enter the `group` name followed by that particular flag.
- To enable all the flags in that group, give the group name followed by `all`.
- To enable all the flags, give the command as `trapflags all`.

**Default** disabled

**Format** `trapflags {all | errors {all | authentication-failure | bad-packet | config-error | virt-authentication-failure | virt-bad-packet | virt-config-error} | lsa {all | lsa-maxage | lsa-originate} | overflow {all | lsdb-overflow | lsdb-approaching-overflow} | retransmit {all | packets | virt-packets} | state-change {all | if-state-change | neighbor-state-change | virtif-state-change | virtneighbor-state-change}}`

**Mode** Router OSPFv3 Config

### 6.4.37.1 no trapflags

Use this command to revert to the default reference bandwidth.

- To disable the individual flag, enter the `group` name followed by that particular flag.
- To disable all the flags in that group, give the group name followed by `all`.
- To disable all the flags, give the command as `trapflags all`.

**Format** `no trapflags {all | errors {all | authentication-failure | bad-packet | config-error | virt-authentication-failure | virt-bad-packet | virt-config-error} | lsa {all | lsa-maxage | lsa-originate} | overflow {all | lsdb-overflow | lsdb-approaching-overflow} | retransmit {all | packets | virt-packets} | state-change {all | if-state-change | neighbor-state-change | virtif-state-change | virtneighbor-state-change}}`

**Mode** Router OSPFv3 Config

## OSPFv3 Interface Commands

### 6.4.38 ipv6 ospf area

This command sets the OSPF area to which the specified router interface or range of interfaces belongs. It also enables OSPF on the specified router interface or range of interfaces. The *area* is a 32-bit integer, formatted as a 4-digit dotted-decimal number or a decimal value in the range of 0 to 4294967295. The *area* uniquely identifies the area to which the interface connects. Assigning an area ID for an area that does not yet exist, causes the area to be created with default values.

**Format**            `ipv6 ospf area 0-4294967295`

**Mode**             Interface Config

### 6.4.39 ipv6 ospf bfd

Use this command to enable BFD on an interface associated with the OSPFv3 process.

**Default**            disabled

**Format**            `ipv6 ospf bfd`

**Mode**             Interface Config

**Example:** To trigger BFD processing through OSPFv3 on an interface associated with it, use the following steps.

```
(Routing) (Config)# interface 1/0/1
(Routing) (Interface 1/0/1)# ipv6 ospf bfd
(Routing) (Interface 1/0/1)# exit
```

#### 6.4.39.1 no ipv6 ospf bfd

Use this command to disable BFD on an interface associated with the OSPFv3 process.

**Format**            `ipv6 ospf bfd`

**Mode**             Interface Config

### 6.4.40 ipv6 ospf cost

This command configures the cost on an OSPF interface or range of interfaces. The *cost* parameter has a range of 1 to 65535.

**Default**            10

**Format**            `ipv6 ospf cost 1-65535`

**Mode**             Interface Config

#### 6.4.40.1 no ipv6 ospf cost

This command configures the default cost on an OSPF interface.

**Format**            `no ipv6 ospf cost`

**Mode**             Interface Config

### 6.4.41 ipv6 ospf dead-interval

This command sets the OSPF dead interval for the specified interface or range of interfaces. The value for *seconds* is a valid positive integer, which represents the length of time in seconds that a router's Hello packets have not been seen before its neighbor routers declare that the router is down. The value for the length of time must be the same for all routers attached to a common network. This value should be some multiple of the Hello Interval (that is, 4). Valid values range for *seconds* is from 1 to 2147483647.

---

Effective with FASTPATH 4.4.4 and later, valid values range in seconds from 1 to 65535.

---

## NOTICE

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**Default** 40  
**Format** `ipv6 ospf dead-interval 1-2147483647`  
**Mode** Interface Config

### 6.4.41.1 no ipv6 ospf dead-interval

This command sets the default OSPF dead interval for the specified interface or range of interfaces.

**Format** `no ipv6 ospf dead-interval`  
**Mode** Interface Config

### 6.4.42 ipv6 ospf hello-interval

This command sets the OSPF hello interval for the specified interface. The value for *seconds* is a valid positive integer, which represents the length of time in seconds. The value for the length of time must be the same for all routers attached to a network. Valid values for *seconds* range from 1 to 65535.

**Default** 10  
**Format** `ipv6 ospf hello-interval seconds`  
**Mode** Interface Config

### 6.4.42.1 no ipv6 ospf hello-interval

This command sets the default OSPF hello interval for the specified interface.

**Format** `no ipv6 ospf hello-interval`  
**Mode** Interface Config

### 6.4.43 ipv6 ospf link-lsa-suppression

Use this command to enable Link LSA Suppression on an interface. When Link LSA Suppression is enabled on a point-to-point (P2P) interface, no Link LSA protocol packets are originated (transmitted) on the interface. This configuration does not apply to non-P2P interfaces.

**Default** false  
**Format** `ipv6 ospf link-lsa-suppression`  
**Mode** Privileged EXEC

### 6.4.43.1 no ipv6 ospf link-lsa-suppression

This command returns Link LSA Suppression for the interface to disabled. When Link LSA Suppression is disabled, Link LSA protocol packets are originated (transmitted) on the P2P interface.

**Format** `no ipv6 ospf link-lsa-suppression`  
**Mode** Privileged EXEC

## 6.4.44 ipv6 ospf mtu-ignore

This command disables OSPF maximum transmission unit (MTU) mismatch detection on an interface or range of interfaces. OSPF Database Description packets specify the size of the largest IP packet that can be sent without fragmentation on the interface. When a router receives a Database Description packet, it examines the MTU advertised by the neighbor. By default, if the MTU is larger than the router can accept, the Database Description packet is rejected and the OSPF adjacency is not established.

|                |                      |
|----------------|----------------------|
| <b>Default</b> | enabled              |
| <b>Format</b>  | ipv6 ospf mtu-ignore |
| <b>Mode</b>    | Interface Config     |

### 6.4.44.1 no ipv6 ospf mtu-ignore

This command enables the OSPF MTU mismatch detection.

|               |                         |
|---------------|-------------------------|
| <b>Format</b> | no ipv6 ospf mtu-ignore |
| <b>Mode</b>   | Interface Config        |

## 6.4.45 ipv6 ospf network

This command changes the default OSPF network type for the interface or range of interfaces. Normally, the network type is determined from the physical IP network type. By default all Ethernet networks are OSPF type broadcast. Similarly, tunnel interfaces default to point-to-point. When an Ethernet port is used as a single large bandwidth IP network between two routers, the network type can be point-to-point since there are only two routers. Using point-to-point as the network type eliminates the overhead of the OSPF designated router election. It is normally not useful to set a tunnel to OSPF network type broadcast.

|                |                                                |
|----------------|------------------------------------------------|
| <b>Default</b> | broadcast                                      |
| <b>Format</b>  | ipv6 ospf network {broadcast   point-to-point} |
| <b>Mode</b>    | Interface Config                               |

### 6.4.45.1 no ipv6 ospf network

This command sets the interface type to the default value.

|               |                                                   |
|---------------|---------------------------------------------------|
| <b>Format</b> | no ipv6 ospf network {broadcast   point-to-point} |
| <b>Mode</b>   | Interface Config                                  |

## 6.4.46 ipv6 ospf prefix-suppression

This command suppresses the advertisement of the IPv6 prefixes that are associated with an interface, except for those associated with secondary IPv6 addresses. This command takes precedence over the global configuration. If this configuration is not specified, the global prefix-suppression configuration applies.

Prefix-suppression can be disabled at the interface level by using the `disable` option. The `disable` option is useful for excluding specific interfaces from performing prefix-suppression when the feature is enabled globally.

Note that the `disable` option is not equivalent to not configuring the interface specific prefix-suppression. If prefix-suppression is not configured at the interface level, the global prefix-suppression configuration is applicable for the IPv6 prefixes associated with the interface.

|                |                                                       |
|----------------|-------------------------------------------------------|
| <b>Default</b> | Prefix-suppression is not configured.                 |
| <b>Format</b>  | ipv6 ospf prefix-suppression [ <code>disable</code> ] |
| <b>Mode</b>    | Interface Config                                      |



### 6.4.46.1 no ipv6 ospf prefix-suppression

This command removes prefix-suppression configurations at the interface level. When the `no ipv6 ospf prefix-suppression` command is used, global prefix-suppression applies to the interface. Not configuring the command is not equal to disabling interface level prefix-suppression.

**Format**            `no ipv6 ospf prefix-suppression`  
**Mode**             Interface Config

### 6.4.47 ipv6 ospf priority

This command sets the OSPF priority for the specified router interface or range of interfaces. The priority of the interface is a priority integer from 0 to 255. A value of 0 indicates that the router is not eligible to become the designated router on this network.

**Default**            1, which is the highest router priority.  
**Format**            `ipv6 ospf priority 0-255`  
**Mode**             Interface Config

#### 6.4.47.1 no ipv6 ospf priority

This command sets the default OSPF priority for the specified router interface.

**Format**            `no ipv6 ospf priority`  
**Mode**             Interface Config

### 6.4.48 ipv6 ospf retransmit-interval

This command sets the OSPF retransmit Interval for the specified interface or range of interfaces. The retransmit interval is specified in seconds. The value for *seconds* is the number of seconds between link-state advertisement retransmissions for adjacencies belonging to this router interface. This value is also used when retransmitting database description and link-state request packets. Valid values range from 0 to 3600 (1 hour).

**Default**            5  
**Format**            `ipv6 ospf retransmit-interval seconds`  
**Mode**             Interface Config

#### 6.4.48.1 no ipv6 ospf retransmit-interval

This command sets the default OSPF retransmit Interval for the specified interface.

**Format**            `no ipv6 ospf retransmit-interval`  
**Mode**             Interface Config

### 6.4.49 ipv6 ospf transmit-delay

This command sets the OSPF Transit Delay for the specified interface or range of interfaces. The transmit delay is specified in seconds. In addition, it sets the estimated number of seconds it takes to transmit a link state update packet over this interface. Valid values for *seconds* range from 1 to 3600 (1 hour).

**Default**            1  
**Format**            `ipv6 ospf transmit-delay seconds`  
**Mode**             Interface Config

### 6.4.49.1 no ipv6 ospf transmit-delay

This command sets the default OSPF Transit Delay for the specified interface.

**Format**           no ipv6 ospf transmit-delay  
**Mode**             Interface Config

### OSPFv3 Graceful Restart Commands

The OSPFv3 protocol can be configured to participate in the checkpointing service, so that these protocols can execute a graceful restart when the management unit fails. In a graceful restart, the hardware continues forwarding IPv6 packets using OSPFv3 routes while a backup switch takes over management unit responsibility.

Graceful restart uses the concept of helpful neighbors. A fully adjacent router enters helper mode when it receives a link state announcement (LSA) from the restarting management unit indicating its intention of performing a graceful restart. In helper mode, a switch continues to advertise to the rest of the network that they have full adjacencies with the restarting router, thereby avoiding announcement of a topology change and the potential for flooding of LSAs and shortest-path-first (SPF) runs (which determine OSPF routes). Helpful neighbors continue to forward packets through the restarting router. The restarting router relearns the network topology from its helpful neighbors.

Graceful restart can be enabled for either planned or unplanned restarts, or both. A planned restart is initiated by the operator through the management command `initiate failover`. The operator may initiate a failover to take the management unit out of service (for example, to address a partial hardware failure), to correct faulty system behavior which cannot be corrected through less severe management actions, or other reasons. An unplanned restart is an unexpected failover caused by a fatal hardware failure of the management unit or the software stops responding or crashes on the management unit.

### 6.4.50 nsf (OSPFv3)

Use this command to enable the OSPF graceful restart functionality on an interface. To disable graceful restart, use the `no` form of the command.

**Default**           disabled  
**Format**           nsf [ietf] [planned-only]  
**Modes**           Router OSPFv3 Config

| Parameter    | Description                                                                                                                                                                                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ietf         | This keyword is accepted but not required.                                                                                                                                                          |
| planned-only | This optional keyword indicates that OSPF should only perform a graceful restart when the restart is planned (that is, when the restart is a result of the <code>initiate failover</code> command). |

#### 6.4.50.1 no nsf (OSPFv3)

Use this command to disable graceful restart for all restarts.

### 6.4.51 nsf restart-interval (OSPFv3)

Use this command to configure the number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. This is referred to as the grace period. The restarting router includes the grace period in its grace LSAs. For planned restarts (using the `initiate failover` command), the grace LSAs are sent prior to restarting the management unit, whereas for unplanned restarts, they are sent after reboot begins.

The grace period must be set long enough to allow the restarting router to reestablish all of its adjacencies and complete a full database exchange with each of those neighbors.

**Default**           120 seconds  
**Format**           nsf [ietf] restart-interval 1-1800  
**Modes**           Router OSPFv3 Config

| Parameter | Description                                                                                                                                  |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------|
| ietf      | This keyword is accepted but not required.                                                                                                   |
| seconds   | The number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. The range is from 1 to 1800 seconds. |

#### 6.4.51.1 no nsf restart-interval (OSPFv3)

Use this command to revert the grace period to its default value.

**Format**           no [ietf] nsf restart-interval  
**Modes**            Router OSPFv3 Config

#### 6.4.52 nsf helper (OSPFv3)

Use this command to enable helpful neighbor functionality for the OSPF protocol. You can enable this functionality for planned or unplanned restarts, or both.

**Default**            OSPF may act as a helpful neighbor for both planned and unplanned restarts.  
**Format**            nsf helper [planned-only]  
**Modes**            Router OSPFv3 Config

| Parameter    | Description                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------|
| planned-only | This optional keyword indicates that OSPF should only help a restarting router performing a planned restart. |

#### 6.4.52.1 no nsf helper (OSPFv3)

Use this command to disable helpful neighbor functionality for OSPF.

**Format**            no nsf helper  
**Modes**            Router OSPFv3 Config

#### 6.4.53 nsf ietf helper disable (OSPFv3)

Use this command to disable helpful neighbor functionality for OSPF.

**NOTE:**    The commands `no nsf helper` and `nsf ietf helper disable` are functionally equivalent. The command `nsf ietf helper disable` is supported solely for compatibility with other network software CLI.

**Format**            nsf ietf helper disable  
**Modes**            Router OSPFv3 Config

#### 6.4.54 nsf helper strict-lsa-checking (OSPFv3)

The restarting router is unable to react to topology changes. In particular, the restarting router will not immediately update its forwarding table; therefore, a topology change may introduce forwarding loops or black holes that persist until the graceful restart completes. By exiting the graceful restart on a topology change, a router tries to eliminate the loops or black holes as quickly as possible by routing around the restarting router. A helpful neighbor considers a link down with the restarting router to be a topology change, regardless of the strict LSA checking configuration.

Use this command to require that an OSPF helpful neighbor exit helper mode whenever a topology change occurs.

**Default**            enabled  
**Format**            nsf [ietf] helper strict-lsa-checking  
**Modes**            Router OSPFv3 Config

| Parameter | Description                                |
|-----------|--------------------------------------------|
| ietf      | This keyword is accepted but not required. |

### 6.4.54.1 no nsf [ietf] helper strict-lsa-checking (OSPFv3)

Use this command to allow OSPF to continue as a helpful neighbor in spite of topology changes.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | enabled                               |
| <b>Format</b>  | nsf [ietf] helper strict-lsa-checking |
| <b>Modes</b>   | Router OSPFv3 Config                  |

## OSPFv3 Stub Router Commands

### 6.4.55 max-metric router-lsa

To configure OSPFv3 to enter stub router mode, use this command in Router OSPFv3 Global Configuration mode. When OSPFv3 is in stub router mode, OSPFv3 sets the metric in the nonstub links in its router LSA to MaxLinkMetric. Other routers therefore compute very long paths through the stub router, and prefer any alternate path. Doing so eliminates all transit traffic through the stub router, when alternate routes are available. Stub router mode is useful when adding or removing a router from a network or to avoid transient routes when a router reloads.

You can administratively force OSPFv3 into stub router mode. OSPFv3 remains in stub router mode until you take OSPFv3 out of stub router mode. Alternatively, you can configure OSPF to start in stub router mode for a configurable period of time after the router boots up.

If you set the summary LSA metric to 16,777,215, other routers will skip the summary LSA when they compute routes.

If you have configured the router to enter stub router mode on startup (`max-metric router-lsa on-startup`), and then enter `max-metric router lsa`, there is no change. If OSPFv3 is administratively in stub router mode (the `max-metric router-lsa` command has been given), and you configure OSPFv3 to enter stub router mode on startup (`max-metric router-lsa on-startup`), OSPFv3 exits stub router mode (assuming the startup period has expired) and the configuration is updated. Without any parameters, stub router mode only sends maximum metric values for router LSAs.

|                |                                                                                                                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | OSPF is not in stub router mode by default.                                                                                                                                                                                                                       |
| <b>Format</b>  | <code>max-metric router-lsa [on-startup seconds] [summary-lsa {metric}]</code><br><code>max-metric router-lsa [external-lsa [max-metric-value]] [inter-area-lsas</code><br><code>[max-metric-value]] [on-startup seconds] [summary-lsa [max-metric-value]]</code> |
| <b>Mode</b>    | OSPFv3 Router Configuration                                                                                                                                                                                                                                       |

| Parameter       | Description                                                                                                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| external-lsa    | (Optional) Sends the maximum metric values for external LSAs. max-metric-value is the maximum metric value to use for LSAs. The range is 1 to 16,777,215 (0xFFFFF). The default value is 16,711,680 (0xFF0000). |
| inter-area-lsas | (Optional) Sends the maximum metric values for Inter-Area-Router LSAs                                                                                                                                           |
| on-startup      | (Optional) Starts OSPF in stub router mode. seconds is the number of seconds that OSPF remains in stub router mode after a reboot. The range is 5 to 86,400 seconds. There is no default value.                 |
| summary-lsa     | (Optional) Sends the maximum metric values for Summary LSAs                                                                                                                                                     |

### 6.4.55.1 no max-metric router-lsa

Use this command in OSPFv3 Router Configuration mode to disable stub router mode. The command clears either type of stub router mode (always or on-startup) and resets all LSA options. If OSPF is configured to enter global configuration mode on startup, and during normal operation you want to immediately place OSPF in stub router mode, issue the command `no max-metric router-lsa on-startup`. The command `no max-metric` with the `external-lsa`, `inter-area-lsas`, or `summary-lsa` option `router-lsa summary-lsa` causes OSPF to send summary LSAs with metrics computed using normal procedures.

**Format**           no max-metric router-lsa [external-lsa] [inter-area-lsas] [on-startup] [summary-lsa]  
**Mode**             OSPFv3 Router Configuration

### 6.4.56 clear ipv6 ospf stub-router

Use this command to force OSPF to exit stub router mode when it has automatically entered stub router mode because of a resource limitation. OSPF only exits stub router mode if it entered stub router mode because of a resource limitation or it is in stub router mode at startup. This command has no effect if OSPF is configured to be in stub router mode permanently.

The command is executed for the default router.

**Format**           clear ipv6 ospf stub-router  
**Mode**             Privileged EXEC

## OSPFv3 Show Commands

### 6.4.57 show ipv6 ospf

This command displays information relevant to the OSPF router. The OSPFv3 configuration for the default router is displayed.

**Format**           show ipv6 ospf  
**Mode**             • Privileged EXEC  
                   • User EXEC

---

Some of the information below displays only if you enable OSPF and configure certain features.

#### **NOTICE**

| Parameter                     | Description                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Router ID                     | A 32-bit integer in dotted decimal format identifying the router, about which information is displayed. This is a configured value.    |
| OSPF Admin Mode               | Shows whether the administrative mode of OSPF in the router is enabled or disabled. This is a configured value.                        |
| External LSDB Limit           | The maximum number of non-default AS-external-LSAs entries that can be stored in the link-state database.                              |
| Exit Overflow Interval        | The number of seconds that, after entering overflow state, a router will attempt to leave overflow state.                              |
| SPF Start Time                | The number of milliseconds the SPF calculation is delayed if no SPF calculation has been scheduled during the current "wait interval". |
| SPF Hold Time                 | The number of milliseconds of the initial "wait interval".                                                                             |
| SPF Maximum Hold Time         | The maximum number of milliseconds of the "wait interval".                                                                             |
| LSA Refresh Group Pacing Time | The size of the LSA refresh group window, in seconds.                                                                                  |
| AutoCost Ref BW               | Shows the value of the auto-cost reference bandwidth configured on the router.                                                         |
| Default Passive Setting       | Shows whether the interfaces are passive by default.                                                                                   |
| Maximum Paths                 | The maximum number of paths that OSPF can report for a given destination.                                                              |
| Default Metric                | Default value for redistributed routes.                                                                                                |
| Default Route Advertise       | Indicates whether the default routes received from other source protocols are advertised or not.                                       |
| Always                        | Shows whether default routes are always advertised.                                                                                    |

| Parameter                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Metric                               | The metric for the advertised default routes. If the metric is not configured, this field is blank.                                                                                                                                                                                                                                                                                                                                 |
| Metric Type                          | Shows whether the routes are External Type 1 or External Type 2.                                                                                                                                                                                                                                                                                                                                                                    |
| Number of Active Areas               | The number of active OSPF areas. An "active" OSPF area is an area with at least one interface up.                                                                                                                                                                                                                                                                                                                                   |
| ABR Status                           | Shows whether the router is an OSPF Area Border Router.                                                                                                                                                                                                                                                                                                                                                                             |
| ASBR Status                          | Shows if the ASBR mode is enabled or disabled. Enable implies that the router is an autonomous system border router. Router automatically becomes an ASBR when it is configured to redistribute routes learned from other protocol. The possible values for the ASBR status is enabled (if the router is configured to re-distribute routes learned by other protocols) or disabled (if the router is not configured for the same). |
| Stub Router Status                   | The status of the stub router: Active or Inactive.                                                                                                                                                                                                                                                                                                                                                                                  |
| Stub Router Reason                   | This is displayed only if the stub router is active.<br>Shows the reason for the stub router: Configured, Startup, or Resource Limitation                                                                                                                                                                                                                                                                                           |
| Stub Router Startup Time Remaining   | This is displayed only if the stub router is in startup stub router mode.<br>The remaining time (in seconds) until OSPF exits stub router mode.                                                                                                                                                                                                                                                                                     |
| Stub Router Duration                 | This row is only listed if the stub router is active and the router entered stub mode because of a resource limitation.<br>The time elapsed since the router last entered the stub router mode. The duration is displayed in DD:HH:MM:SS format.                                                                                                                                                                                    |
| External LSDB Overflow               | When the number of non-default external LSAs exceeds the configured limit, External LSDB Limit, OSPF goes into LSDB overflow state. In this state, OSPF withdraws all of its self-originated non-default external LSAs. After the Exit Overflow Interval, OSPF leaves the overflow state, if the number of external LSAs has been reduced.                                                                                          |
| External LSA Count                   | The number of external (LS type 5) link-state advertisements in the link-state database.                                                                                                                                                                                                                                                                                                                                            |
| External LSA Checksum                | The sum of the LS checksums of external link-state advertisements contained in the link-state database.                                                                                                                                                                                                                                                                                                                             |
| New LSAs Originated                  | The number of new link-state advertisements that have been originated.                                                                                                                                                                                                                                                                                                                                                              |
| LSAs Received                        | The number of link-state advertisements received determined to be new instantiations.                                                                                                                                                                                                                                                                                                                                               |
| LSA Count                            | The total number of link state advertisements currently in the link state database.                                                                                                                                                                                                                                                                                                                                                 |
| Maximum Number of LSAs               | The maximum number of LSAs that OSPF can store.                                                                                                                                                                                                                                                                                                                                                                                     |
| LSA High Water Mark                  | The maximum size of the link state database since the system started.                                                                                                                                                                                                                                                                                                                                                               |
| Retransmit List Entries              | The total number of LSAs waiting to be acknowledged by all neighbors. An LSA may be pending acknowledgment from more than one neighbor.                                                                                                                                                                                                                                                                                             |
| Maximum Number of Retransmit Entries | The maximum number of LSAs that can be waiting for acknowledgment at any given time.                                                                                                                                                                                                                                                                                                                                                |
| Retransmit Entries High Water Mark   | The highest number of LSAs that have been waiting for acknowledgment.                                                                                                                                                                                                                                                                                                                                                               |
| Redistributing                       | This field is a heading and appears only if you configure the system to take routes learned from a non-OSPF source and advertise them to its peers.                                                                                                                                                                                                                                                                                 |
| Source                               | Shows source protocol/routes that are being redistributed. Possible values are static, connected, BGP, or RIP.                                                                                                                                                                                                                                                                                                                      |
| Metric                               | The metric of the routes being redistributed.                                                                                                                                                                                                                                                                                                                                                                                       |
| Metric Type                          | Shows whether the routes are External Type 1 or External Type 2.                                                                                                                                                                                                                                                                                                                                                                    |
| Tag                                  | The decimal value attached to each external route.                                                                                                                                                                                                                                                                                                                                                                                  |
| Subnets                              | For redistributing routes into OSPF, the scope of redistribution for the specified protocol.                                                                                                                                                                                                                                                                                                                                        |
| Distribute-List                      | The access list used to filter redistributed routes.                                                                                                                                                                                                                                                                                                                                                                                |
| Prefix-suppression                   | Displays whether prefix-suppression is enabled or disabled on the given interface.                                                                                                                                                                                                                                                                                                                                                  |
| NSF Support                          | Indicates whether nonstop forwarding (NSF) is enabled for the OSPF protocol for planned restarts, unplanned restarts or both (Always).                                                                                                                                                                                                                                                                                              |
| NSF Restart Interval                 | The user-configurable grace period during which a neighboring router will be in the helper state after receiving notice that the management unit is performing a graceful restart.                                                                                                                                                                                                                                                  |

| Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSF Restart Status           | The current graceful restart status of the router.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| NSF Restart Age              | Number of seconds until the graceful restart grace period expires.                                                                                                                                                                                                                                                                                                                                                                                                   |
| NSF Restart Exit Reason      | Indicates why the router last exited the last restart: <ul style="list-style-type: none"> <li>• None— Graceful restart has not been attempted.</li> <li>• In Progress— Restart is in progress.</li> <li>• Completed— The previous graceful restart completed successfully.</li> <li>• Timed Out— The previous graceful restart timed out.</li> <li>• Topology Changed— The previous graceful restart terminated prematurely because of a topology change.</li> </ul> |
| NSF Help Support             | Indicates whether helpful neighbor functionality has been enabled for OSPF for planned restarts, unplanned restarts, or both (Always).                                                                                                                                                                                                                                                                                                                               |
| NSF help Strict LSA checking | Indicates whether strict LSA checking has been enabled. If enabled, then an OSPF helpful neighbor will exit helper mode whenever a topology change occurs. If disabled, an OSPF neighbor will continue as a helpful neighbor in spite of topology changes.                                                                                                                                                                                                           |

### 6.4.58 show ipv6 ospf abr

This command displays the internal OSPFv3 routes to reach Area Border Routers (ABRs). The entries for the default routers are displayed.

**Format**            `show ipv6 ospf abr`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter     | Description                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type          | The type of the route to the destination. It can be either: <ul style="list-style-type: none"> <li>• intra — Intra-area route</li> <li>• inter — Inter-area route</li> </ul> |
| Router ID     | Router ID of the destination.                                                                                                                                                |
| Cost          | Cost of using this route.                                                                                                                                                    |
| Area ID       | The area ID of the area from which this route is learned.                                                                                                                    |
| Next Hop      | Next hop toward the destination.                                                                                                                                             |
| Next Hop Intf | The outgoing router interface to use when forwarding traffic to the next hop.                                                                                                |

### 6.4.59 show ipv6 ospf area

This command displays information about the area. The *areaid* identifies the OSPF area that is being displayed. Information for the default router is displayed.

**Format**            `show ipv6 ospf area areaid`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter                | Description                                                                                                    |
|--------------------------|----------------------------------------------------------------------------------------------------------------|
| AreaID                   | The area id of the requested OSPF area.                                                                        |
| External Routing         | A number representing the external routing capabilities for this area.                                         |
| Spf Runs                 | The number of times that the intra-area route table has been calculated using this area's link-state database. |
| Area Border Router Count | The total number of area border routers reachable within this area.                                            |

| Parameter              | Description                                                                                                                            |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Area LSA Count         | Total number of link-state advertisements in this area's link-state database, excluding AS External LSAs.                              |
| Area LSA Checksum      | A number representing the Area LSA Checksum for the specified AreaID excluding the external (LS type 5) link-state advertisements.     |
| Stub Mode              | Represents whether the specified Area is a stub area or not. The possible values are enabled and disabled. This is a configured value. |
| Import Summary LSAs    | Shows whether to import summary LSAs (enabled).                                                                                        |
| OSPF Stub Metric Value | The metric value of the stub area. This field displays only if the area is configured as a stub area.                                  |

The following OSPF NSSA specific information displays only if the area is configured as an NSSA.

| Parameter                     | Description                                                                                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Import Summary LSAs           | Shows whether to import summary LSAs into the NSSA.                                                                                                              |
| Redistribute into NSSA        | Shows whether to redistribute information into the NSSA.                                                                                                         |
| Default Information Originate | Shows whether to advertise a default route into the NSSA.                                                                                                        |
| Default Metric                | The metric value for the default route advertised into the NSSA.                                                                                                 |
| Default Metric Type           | The metric type for the default route advertised into the NSSA.                                                                                                  |
| Translator Role               | The NSSA translator role of the ABR, which is always or candidate.                                                                                               |
| Translator Stability Interval | The amount of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router. |
| Translator State              | Shows whether the ABR translator state is disabled, always, or elected.                                                                                          |

#### 6.4.60 show ipv6 ospf asbr

This command displays the internal OSPFv3 routes to reach Autonomous System Boundary Routers (ASBRs). The entries for the default router is displayed.

**Format**            `show ipv6 ospf asbr`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter     | Description                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type          | The type of the route to the destination. It can be either: <ul style="list-style-type: none"> <li>• intra — Intra-area route</li> <li>• inter — Inter-area route</li> </ul> |
| Router ID     | Router ID of the destination.                                                                                                                                                |
| Cost          | Cost of using this route.                                                                                                                                                    |
| Area ID       | The area ID of the area from which this route is learned.                                                                                                                    |
| Next Hop      | Next hop toward the destination.                                                                                                                                             |
| Next Hop Intf | The outgoing router interface to use when forwarding traffic to the next hop.                                                                                                |



## 6.4.61 show ipv6 ospf database

This command displays information about the link state database when OSPFv3 is enabled. If you do not enter any parameters, the command displays the LSA headers for all areas. If you do not enter any parameters, the command displays the LSA headers for all areas. The database for the default router is displayed.

Use the optional *areaid* parameter to display database information about a specific area. Use the other optional parameters to specify the type of link state advertisements to display. Use *external* to display the external LSAs. Use *inter-area* to display the inter-area LSAs. Use *link* to display the link LSAs. Use *network* to display the network LSAs. Use *nssa-external* to display NSSA external LSAs. Use *prefix* to display intra-area Prefix LSAs. Use *router* to display router LSAs. Use *unknown area*, *unknown as*, or *unknown link* to display unknown area, AS or link-scope LSAs, respectively. Use *lsid* to specify the link state ID (LSID). Use *adv-router* to show the LSAs that are restricted by the advertising router. Use *self-originate* to display the LSAs in that are self originated. The information below is only displayed if OSPF is enabled.

**Format**            `show ipv6 ospf [areaid] database [{external | inter-area {prefix | router} | link | network | nssa-external | prefix | router | unknown {area | as | link}}] [lsid] [{adv-router [rtrid] | self-originate}]`

- Modes**
- Privileged EXEC
  - User EXEC

For each link-type and area, the following information is displayed.

| Parameter  | Description                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------------------|
| Link Id    | A number that uniquely identifies an LSA that a router originates from all other self originated LSAs of the same LS type. |
| Adv Router | The Advertising Router. Is a 32-bit dotted decimal number representing the LSDB interface.                                 |
| Age        | A number representing the age of the link state advertisement in seconds.                                                  |
| Sequence   | A number that represents which LSA is more recent.                                                                         |
| Checksum   | The total number LSA checksum.                                                                                             |
| Prefix     | The IPv6 prefix.                                                                                                           |
| Interface  | The interface for the link.                                                                                                |
| Rtr Count  | The number of routers attached to the network.                                                                             |

## 6.4.62 show ipv6 ospf database database-summary

Use this command to display the number of each type of LSA in the database and the total number of LSAs in the database.

**Format**            `show ipv6 ospf database database-summary`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter           | Description                                                                 |
|---------------------|-----------------------------------------------------------------------------|
| Router              | Total number of router LSAs in the OSPFv3 link state database.              |
| Network             | Total number of network LSAs in the OSPFv3 link state database.             |
| Inter-area Prefix   | Total number of inter-area prefix LSAs in the OSPFv3 link state database.   |
| Inter-area Router   | Total number of inter-area router LSAs in the OSPFv3 link state database.   |
| Type-7 Ext          | Total number of NSSA external LSAs in the OSPFv3 link state database.       |
| Link                | Total number of link LSAs in the OSPFv3 link state database.                |
| Intra-area Prefix   | Total number of intra-area prefix LSAs in the OSPFv3 link state database.   |
| <b>Link Unknown</b> | Total number of link-source unknown LSAs in the OSPFv3 link state database. |
| <b>Area Unknown</b> | Total number of area unknown LSAs in the OSPFv3 link state database.        |
| <b>AS Unknown</b>   | Total number of as unknown LSAs in the OSPFv3 link state database.          |

| Parameter                     | Description                                                                         |
|-------------------------------|-------------------------------------------------------------------------------------|
| <b>Type-5 Ext</b>             | Total number of AS external LSAs in the OSPFv3 link state database.                 |
| <b>Self-Originated Type-5</b> | Total number of self originated AS external LSAs in the OSPFv3 link state database. |
| <b>Total</b>                  | Total number of router LSAs in the OSPFv3 link state database.                      |

### 6.4.63 show ipv6 ospf interface

This command displays the information for the IFO object or virtual interface tables. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format.

**Format** `show ipv6 ospf interface {slot/port/vlan 1-4093|loopback loopback-id | tunnel tunnel-id}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------|
| IP Address               | The IPv6 address of the interface.                                                                               |
| ifIndex                  | The interface index number associated with the interface.                                                        |
| OSPF Admin Mode          | Shows whether the admin mode is enabled or disabled.                                                             |
| OSPF Area ID             | The area ID associated with this interface.                                                                      |
| Router Priority          | The router priority. The router priority determines which router is the designated router.                       |
| Retransmit Interval      | The frequency, in seconds, at which the interface sends LSA.                                                     |
| Hello Interval           | The frequency, in seconds, at which the interface sends Hello packets.                                           |
| Dead Interval            | The amount of time, in seconds, the interface waits before assuming a neighbor is down.                          |
| LSA Ack Interval         | The amount of time, in seconds, the interface waits before sending an LSA acknowledgment after receiving an LSA. |
| Interface Transmit Delay | The number of seconds the interface adds to the age of LSA packets before transmission.                          |
| Authentication Type      | The type of authentication the interface performs on LSAs it receives.                                           |
| Metric Cost              | The priority of the path. Low costs have a higher priority than high costs.                                      |
| Prefix-suppression       | Displays whether prefix-suppression is enabled, disabled, or unconfigured on the given interface.                |
| Passive Status           | Shows whether the interface is passive or not.                                                                   |
| OSPF MTU-ignore          | Shows whether to ignore MTU mismatches in database descriptor packets sent from neighboring routers.             |
| Link LSA Suppression     | The configured state of Link LSA Suppression for the interface.                                                  |

The following information only displays if OSPF is initialized on the interface:

| Parameter                | Description                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPF Interface Type      | Broadcast LANs, such as Ethernet and IEEE 802.5, take the value <code>broadcast</code> . The OSPF Interface Type will be <code>broadcast</code> .                                                            |
| State                    | The OSPF Interface States are: <code>down</code> , <code>loopback</code> , <code>waiting</code> , <code>point-to-point</code> , <code>designated router</code> , and <code>backup designated router</code> . |
| Designated Router        | The router ID representing the designated router.                                                                                                                                                            |
| Backup Designated Router | The router ID representing the backup designated router.                                                                                                                                                     |
| Number of Link Events    | The number of link events.                                                                                                                                                                                   |
| Metric Cost              | The cost of the OSPF interface.                                                                                                                                                                              |

## 6.4.64 show ipv6 ospf interface brief

This command displays brief information for the IFO object or virtual interface tables. The OSPFv3 interfaces for the default router are displayed.

**Format**            show ipv6 ospf interface brief

**Modes**

- Privileged EXEC
- User EXEC

| Parameter                 | Description                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------------------|
| Interface                 | slot/port                                                                                                        |
| OSPF Admin Mode           | States whether OSPF is enabled or disabled on a router interface.                                                |
| OSPF Area ID              | The OSPF Area ID for the specified interface.                                                                    |
| Router Priority           | The router priority. The router priority determines which router is the designated router.                       |
| Metric Cost               | The priority of the path. Low costs have a higher priority than high costs.                                      |
| Hello Interval            | The frequency, in seconds, at which the interface sends Hello packets.                                           |
| Dead Interval             | The amount of time, in seconds, the interface waits before assuming a neighbor is down.                          |
| Retransmit Interval       | The frequency, in seconds, at which the interface sends LSA.                                                     |
| Retransmit Delay Interval | The number of seconds the interface adds to the age of LSA packets before transmission.                          |
| LSA Ack Interval          | The amount of time, in seconds, the interface waits before sending an LSA acknowledgment after receiving an LSA. |

## 6.4.65 show ipv6 ospf interface stats

This command displays the statistics for a specific interface. The command displays information only if OSPF is enabled.

**Format**            show ipv6 ospf interface stats {slot/port | vlan id}

**Modes**

- Privileged EXEC
- User EXEC

| Parameter               | Description                                                                                                                                    |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPFv3 Area ID          | The area id of this OSPF interface.                                                                                                            |
| IP Address              | The IP address associated with this OSPF interface.                                                                                            |
| OSPFv3 Interface Events | The number of times the specified OSPF interface has changed its state, or an error has occurred.                                              |
| Virtual Events          | The number of state changes or errors that occurred on this virtual link.                                                                      |
| Neighbor Events         | The number of times this neighbor relationship has changed state, or an error has occurred.                                                    |
| Packets Received        | The number of OSPFv3 packets received on the interface.                                                                                        |
| Packets Transmitted     | The number of OSPFv3 packets sent on the interface.                                                                                            |
| LSAs Sent               | The total number of LSAs flooded on the interface.                                                                                             |
| LSA Acks Received       | The total number of LSA acknowledged from this interface.                                                                                      |
| LSA Acks Sent           | The total number of LSAs acknowledged to this interface.                                                                                       |
| Sent Packets            | The number of OSPF packets transmitted on the interface.                                                                                       |
| Received Packets        | The number of valid OSPF packets received on the interface.                                                                                    |
| Discards                | The number of received OSPF packets discarded because of an error in the packet or an error in processing the packet.                          |
| Bad Version             | The number of received OSPF packets whose version field in the OSPF header does not match the version of the OSPF process handling the packet. |

| Parameter                     | Description                                                                                                                                                                                                                               |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Virtual Link Not Found        | The number of received OSPF packets discarded where the ingress interface is in a non-backbone area and the OSPF header identifies the packet as belonging to the backbone, but OSPF does not have a virtual link to the packet's sender. |
| Area Mismatch                 | The number of OSPF packets discarded because the area ID in the OSPF header is not the area ID configured on the ingress interface.                                                                                                       |
| Invalid Destination Address   | The number of OSPF packets discarded because the packet's destination IP address is not the address of the ingress interface and is not the AllDrRouters or AllSpfRouters multi-cast addresses.                                           |
| No Neighbor at Source Address | The number of OSPF packets dropped because the sender is not an existing neighbor or the sender's IP address does not match the previously recorded IP address for that neighbor. NOTE: Does not apply to Hellos.                         |
| Invalid OSPF Packet Type      | The number of OSPF packets discarded because the packet type field in the OSPF header is not a known type.                                                                                                                                |
| Hellos Ignored                | The number of received Hello packets that were ignored by this router from the new neighbors after the limit has been reached for the number of neighbors on an interface or on the system as a whole.                                    |

lists the number of OSPF packets of each type sent and received on the interface.

### 6.4.66 show ipv6 ospf lsa-group

This command displays the number of self-originated LSAs within each LSA group. The information for the default router is displayed.

**Format**            show ipv6 ospf lsa-group

**Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter                  | Description                                                                                                                                                                                                                              |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total self-originated LSAs | The number of LSAs the router is currently originating.                                                                                                                                                                                  |
| Average LSAs per group     | The number of self-originated LSAs divided by the number of LSA groups. The number of LSA groups is the refresh interval (1800 seconds) divided by the pacing interval (configured with <code>timers pacing lsa-group</code> ) plus two. |
| Pacing group limit         | The maximum number of self-originated LSAs in one LSA group. If the number of LSAs in a group exceeds this limit, OSPF redistributes LSAs throughout the refresh interval to achieve better balance.                                     |
| Groups                     | For each LSA pacing group, the output shows the range of LSA ages in the group and the number of LSAs in the group.                                                                                                                      |

**Example:** The following shows an example of the command.

```
(R1) #show ipv6 ospf lsa-group
```

```
Total self-originated LSAs: 3019
Average LSAs per group: 100
Pacing group limit: 400
Number of self-originated LSAs within each LSA group...
```

```
Group Start Age Group End Age Count
 0 59 96
 60 119 88
 120 179 102
 180 239 95
 240 299 95
 300 359 92
```

|      |      |     |
|------|------|-----|
| 360  | 419  | 48  |
| 420  | 479  | 58  |
| 480  | 539  | 103 |
| 540  | 599  | 99  |
| 600  | 659  | 119 |
| 660  | 719  | 110 |
| 720  | 779  | 106 |
| 780  | 839  | 122 |
| 840  | 899  | 110 |
| 900  | 959  | 99  |
| 960  | 1019 | 135 |
| 1020 | 1079 | 101 |
| 1080 | 1139 | 94  |
| 1140 | 1199 | 115 |
| 1200 | 1259 | 110 |
| 1260 | 1319 | 111 |
| 1320 | 1379 | 111 |
| 1380 | 1439 | 99  |
| 1440 | 1499 | 102 |
| 1500 | 1559 | 96  |
| 1560 | 1619 | 106 |
| 1620 | 1679 | 111 |
| 1680 | 1739 | 106 |
| 1740 | 1799 | 80  |
| 1800 | 1859 | 0   |
| 1860 | 1919 | 0   |

### 6.4.67 show ipv6 ospf max-metric

This command displays the configured maximum metrics for stub-router mode.

**Format** show ipv6 ospf max-metric

**Modes**

- Privileged EXEC
- User EXEC

**Example:** The following shows an example of the command.

```
(config)#show ipv6 ospf max-metric
OSPFv3 Router with ID (3.3.3.3)
Start time: 00:00:00, Time elapsed: 00:01:05
Originating router-LSAs with maximum metric
Condition: on startup for 1000 seconds, State: inactive
Advertise external-LSAs with metric 16711680
```

### 6.4.68 show ipv6 ospf neighbor

This command displays information about OSPF neighbors. The neighbor for the default router is displayed.

If you do not specify a neighbor IP address, the output displays summary information in a table. If you specify an interface or tunnel, only the information for that interface or tunnel displays. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. The `ip-address` is the IP address of the neighbor, and when you specify this, detailed information about the neighbor displays. The information below only displays if OSPF is enabled and the interface has a neighbor.

**Format** show ipv6 ospf neighbor [interface {slot/port/vlan 1-4093|tunnel tunnel\_id}][ip-address]

**Modes**

- Privileged EXEC
- User EXEC

If you do not specify an IP address, a table with the following columns displays for all neighbors or the neighbor associated with the interface that you specify:

| Parameter                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router ID                  | The 4-digit dotted-decimal number of the neighbor router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Priority                   | The OSPF priority for the specified interface. The priority of an interface is a priority integer from 0 to 255. A value of '0' indicates that the router is not eligible to become the designated router on this network.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Intf ID                    | The interface ID of the neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Interface                  | The interface of the local router in <i>slot/port</i> format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| State                      | The state of the neighboring routers. Possible values are: <ul style="list-style-type: none"> <li>• <code>Down</code> – Initial state of the neighbor conversation - no recent information has been received from the neighbor.</li> <li>• <code>Attempt</code> – No recent information has been received from the neighbor but a more concerted effort should be made to contact the neighbor.</li> <li>• <code>Init</code> – An Hello packet has recently been seen from the neighbor, but bidirectional communication has not yet been established.</li> <li>• <code>2 way</code> – Communication between the two routers is bidirectional.</li> <li>• <code>Exchange start</code> – The first step in creating an adjacency between the two neighboring routers, the goal is to decide which router is the master and to decide upon the initial DD sequence number.</li> <li>• <code>Exchange</code> – The router is describing its entire link state database by sending Database Description packets to the neighbor.</li> <li>• <code>Full</code> – The neighboring routers are fully adjacent and they will now appear in router-LSAs and network-LSAs.</li> </ul> |
| Dead Time                  | The amount of time, in seconds, to wait before the router assumes the neighbor is unreachable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Restart Helper Status      | Indicates the status of this router as a helper during a graceful restart of the router specified in the command line: <ul style="list-style-type: none"> <li>• <code>Helping</code> – This router is acting as a helpful neighbor to the specified router.</li> <li>• <code>Not Helping</code> – This router is not a helpful neighbor at this time.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Restart Reason             | When this router is in helpful neighbor mode, this indicates the reason for the restart as provided by the restarting router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Remaining Grace Time       | The number of seconds remaining the in current graceful restart interval. This is displayed only when this router is currently acting as a helpful neighbor for the router specified in the command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Restart Helper Exit Reason | Indicates the reason that the specified router last exited a graceful restart. <ul style="list-style-type: none"> <li>• <code>None</code> – Graceful restart has not been attempted</li> <li>• <code>In Progress</code> – Restart is in progress</li> <li>• <code>Completed</code> – The previous graceful restart completed successfully</li> <li>• <code>Timed Out</code> – The previous graceful restart timed out</li> <li>• <code>Topology Changed</code> – The previous graceful restart terminated prematurely because of a topology change</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

If you specify an IP address for the neighbor router, the following fields display.

| Parameter       | Description                                                                                                                                                                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface       | The interface of the local router in <i>slot/port</i> format.                                                                                                                                                                                                                                                  |
| Area ID         | The area ID associated with the interface.                                                                                                                                                                                                                                                                     |
| Options         | An integer value that indicates the optional OSPF capabilities supported by the neighbor. These are listed in its Hello packets. This enables received Hello Packets to be rejected (that is, neighbor relationships will not even start to form) if there is a mismatch in certain crucial OSPF capabilities. |
| Router Priority | The router priority for the specified interface.                                                                                                                                                                                                                                                               |
| Dead Timer Due  | The amount of time, in seconds, to wait before the router assumes the neighbor is unreachable.                                                                                                                                                                                                                 |

| Parameter                   | Description                                                                                                                            |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| State                       | The state of the neighboring routers.                                                                                                  |
| Events                      | Number of times this neighbor relationship has changed state, or an error has occurred.                                                |
| Retransmission Queue Length | An integer representing the current length of the retransmission queue of the specified neighbor router Id of the specified interface. |

#### 6.4.69 show ipv6 ospf range

This command displays the set of OSPFv3 area ranges configured for a given area. The configured area ranges for the default router is displayed.

**Format**            `show ipv6 ospf range areaid`

**Modes**            Privileged EXEC

| Parameter                 | Description                                       |
|---------------------------|---------------------------------------------------|
| Area ID                   | The area whose prefixes are summarized.           |
| IPv6 Prefix/Prefix Length | The summary prefix and prefix length.             |
| Type                      | s (Summary Link) or E (External Link)             |
| Action                    | Enabled or Disabled                               |
| Cost                      | Metric to be advertised when the range is active. |

#### 6.4.70 show ipv6 ospf statistics

This command displays information about the 15 most recent Shortest Path First (SPF) calculations. SPF is the OSPF routing table calculation. The configured area ranges for the default router is displayed.

**Format**            `show ipv6 ospf statistics`

**Modes**            • Privileged EXEC  
• User EXEC

The command displays the following information with the most recent statistics displayed at the end of the table.

| Parameter  | Description                                                                                                                                                                                                                                                                                                                                                                                            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delta T    | The time since the routing table was computed. The time is in the format hours, minutes, and seconds (hh:mm:ss).                                                                                                                                                                                                                                                                                       |
| Intra      | The time taken to compute intra-area routes, in milliseconds.                                                                                                                                                                                                                                                                                                                                          |
| Summ       | The time taken to compute inter-area routes, in milliseconds.                                                                                                                                                                                                                                                                                                                                          |
| Ext        | The time taken to compute external routes, in milliseconds.                                                                                                                                                                                                                                                                                                                                            |
| SPF Total  | The total time taken to compute routes, in milliseconds. The total may exceed the sum of Intra, Summ, and Ext times.                                                                                                                                                                                                                                                                                   |
| RIB Update | The time from the completion of the routing table calculation until all changes have been made in the common routing table [the Routing Information Base (RIB)], in milliseconds                                                                                                                                                                                                                       |
| Reason     | The event or events that triggered the SPF. The reason codes are as follows: <ul style="list-style-type: none"> <li>• R: New router LSA</li> <li>• N: New network LSA</li> <li>• SN: New network (inter-area prefix) summary LSA</li> <li>• SA: New ASBR (inter-area router) summary LSA</li> <li>• X: New external LSA</li> <li>• IP: New intra-area prefix LSA</li> <li>• L: New Link LSA</li> </ul> |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 ospf statistics
```

```
Area 0.0.0.0: SPF algorithm executed 10 times
```

| Delta T  | Intra | Summ | Ext | SPF Total | RIB Update | Reason   |
|----------|-------|------|-----|-----------|------------|----------|
| 23:32:46 | 0     | 0    | 0   | 0         | 0          | R, IP    |
| 23:32:09 | 0     | 0    | 0   | 0         | 0          | R, N, IP |
| 23:32:04 | 0     | 0    | 0   | 0         | 0          | R        |
| 23:31:44 | 0     | 0    | 0   | 0         | 0          | R, N, IP |
| 23:31:39 | 0     | 0    | 0   | 0         | 1          | R        |
| 23:29:57 | 0     | 3    | 7   | 10        | 131        | R        |
| 23:29:52 | 0     | 14   | 29  | 43        | 568        | SN       |
| 04:07:23 | 0     | 9    | 23  | 33        | 117        | SN       |
| 04:07:23 | 0     | 9    | 23  | 33        | 117        | SN       |
| 04:07:18 | 0     | 0    | 0   | 1         | 485        | SN       |
| 04:07:14 | 0     | 1    | 0   | 1         | 3          | X        |

### 6.4.71 show ipv6 ospf stub table

This command displays the OSPF stub table. The configured stub areas for the default router are displayed. The information below will only be displayed if OSPF is initialized on the switch.

**Format** show ipv6 ospf stub table

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter          | Description                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area ID            | A 32-bit identifier for the created stub area.                                                                                                                                                         |
| Type of Service    | Type of service associated with the stub metric. For this release, Normal TOS is the only supported type.                                                                                              |
| Metric Val         | The metric value is applied based on the TOS. It defaults to the least metric of the type of service among the interfaces to other areas. The OSPF cost for a route is a function of the metric value. |
| Import Summary LSA | Controls the import of summary LSAs into stub areas.                                                                                                                                                   |

### 6.4.72 show ipv6 ospf virtual-link

This command displays the OSPF Virtual Interface information for a specific area and neighbor. The information for the default router is displayed.

The *areaid* parameter identifies the area and the *neighbor* parameter identifies the neighbor's Router ID.

**Format** show ipv6 ospf virtual-link *areaid neighbor*

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                | Description                                                   |
|--------------------------|---------------------------------------------------------------|
| Area ID                  | The area id of the requested OSPF area.                       |
| Neighbor Router ID       | The input neighbor Router ID.                                 |
| Hello Interval           | The configured hello interval for the OSPF virtual interface. |
| Dead Interval            | The configured dead interval for the OSPF virtual interface.  |
| Interface Transmit Delay | The configured transmit delay for the OSPF virtual interface. |



| Parameter           | Description                                                                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Retransmit Interval | The configured retransmit interval for the OSPF virtual interface.                                                                                                |
| Authentication Type | The type of authentication the interface performs on LSAs it receives.                                                                                            |
| State               | The OSPF Interface States are: down, loopback, waiting, point-to-point, designated router, and backup designated router. This is the state of the OSPF interface. |
| Neighbor State      | The neighbor state.                                                                                                                                               |

### 6.4.73 show ipv6 ospf virtual-link brief

This command displays the OSPFV3 Virtual Interface information for all areas in the system.

**Format** show ipv6 ospf virtual-link brief

**Modes**

- Privileged EXEC
- User EXEC

| Parameter           | Description                                                          |
|---------------------|----------------------------------------------------------------------|
| Area ID             | The area id of the requested OSPFV3 area.                            |
| Neighbor            | The neighbor interface of the OSPFV3 virtual interface.              |
| Hello Interval      | The configured hello interval for the OSPFV3 virtual interface.      |
| Dead Interval       | The configured dead interval for the OSPFV3 virtual interface.       |
| Retransmit Interval | The configured retransmit interval for the OSPFV3 virtual interface. |
| Transmit Delay      | The configured transmit delay for the OSPFV3 virtual interface.      |

## DHCPv6 Commands

This section describes the commands you use to configure the DHCPv6 server on the system and to view DHCPv6 information.

### 6.4.74 service dhcpv6

This command enables DHCPv6 configuration on the router.

**Default** enabled

**Format** service dhcpv6

**Mode** Global Config

**Example:** The following example enables DHCPv6 service in the default VRF.

```
(Routing)#configure
(Routing)(Config)# service dhcpv6
```

**Example:** The following example enables DHCPv6 service in the VRF red.

```
(Routing)#configure
(Routing)(Config)# service dhcpv6 vrf red
```

#### 6.4.74.1 no service dhcpv6

This command disables DHCPv6 configuration on router.

**Format** no service dhcpv6

**Mode** Global Config

## 6.4.75 ipv6 dhcp client pd

Use this command to enable the Dynamic Host Configuration Protocol (DHCP) for IPv6 client process (if the process is not currently running) and to enable requests for prefix delegation through a specified interface. When prefix delegation is enabled and a prefix is successfully acquired, the prefix is stored in the IPv6 general prefix pool with an internal name defined by the automatic argument.

**NOTE:** The Prefix Delegation client is supported on only one IP interface.

rapid-commit enables the use of a two-message exchange method for prefix delegation and other configuration. If enabled, the client includes the rapid commit option in a solicit message.

The DHCP for IPv6 client, server, and relay functions are mutually exclusive on an interface. If one of these functions is already enabled and a user tries to configure a different function on the same interface, a message is displayed.

**Default** Prefix delegation is disabled on an interface.

**Format** ipv6 dhcp client pd [rapid-commit]

**Mode** Interface Config

**Example:** The following examples enable prefix delegation on interface 1/0/1.

```
(Switch) #configure
(Switch) (Config)#interface 1/0/1
(Switch) (Interface 1/0/1)# ipv6 dhcp client pd
```

```
(Switch) #configure
(Switch) (Config)#interface 1/0/1
(Switch) (Interface 1/0/1)# ipv6 dhcp client pd rapid-commit
```

### 6.4.75.1 no ipv6 dhcp client pd

This command disables requests for prefix delegation.

**Format** no ipv6 dhcp client pd

**Mode** Interface Config

## 6.4.76 ipv6 dhcp conflict logging

This command enables/disables the logging of the bindings reported to be conflicting by the DHCPv6 Clients using DECLINE messages.

**Default** enabled

**Format** ipv6 dhcp conflict logging

**Mode** Global Config

**Example:** The following shows an example of the command.

```
(switch) #configure
(switch) (Config)# ipv6 dhcp conflict logging
(switch) (Config)# ipv6 dhcp conflict logging red
```

## 6.4.77 ipv6 dhcp server

Use this command to configure DHCPv6 server functionality on an interface or range of interfaces using the pool for prefix delegation and other configuration through that interface. For a particular interface, DHCPv6 server and DHCPv6 relay functions are mutually exclusive.

**Format** ipv6 dhcp server {poolname | automatic interface <interface number>} [rapid-commit] [preference pref-value]

**Mode** Interface Config

| Parameter             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| poolname              | (Optional) The user-defined name for the local prefix pool. The pool name can be a symbolic string (such as Management) or an integer (such as 0).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| automatic             | (Optional) Enables the server to automatically determine which pool to use when allocating addresses for a client. When the user chooses to configure the automatic pool, the user must specify the interface number through which the prefix delegation client learns the IA_PD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| rapid-commit          | (Optional) Allows the two-message exchange method for prefix delegation and other configuration. If a client has included a rapid commit option in the solicit message and the rapid-commit keyword is enabled for the server, the server responds to the solicit message with a reply message.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| preference pref-value | (Optional) Specifies the preference value carried in the preference option in the advertise message sent by the server. The range is 0 to 255. The preference value defaults to 0. If the preference keyword is configured with a value other than 0, the server adds a preference option to carry the preference value for the advertise messages. This action affects the selection of a server by the client. Any advertise message that does not include a preference option is considered to have a preference value of 0. If the client receives an advertise message that includes a preference option with a preference value of 255, the client immediately sends a request message to the server from which the advertise message was received. |

**Example:** The following example enables DHCP for IPv6 for the local prefix pool named server1.

```
(Routing) # configure
(Routing) (Config)# interface 1/0/1
(Routing) (Interface 1/0/1)# ipv6 dhcp server server1
```

### 6.4.77.1 no ipv6 dhcp server

Use the `no` form of the command to disable DHCPv6 server on an interface.

**Format**            `no ipv6 dhcp server`  
**Mode**             Interface Config

### 6.4.78 ipv6 dhcp relay

Use this command to configure an interface for DHCPv6 relay functionality on an interface or range of interfaces. To unconfigure a particular relay address use the `no` command with that particular relay address. To unconfigure all relay addresses on an interface, use the `no` command with the relay address and no arguments.

#### NOTICE

If *relay-address* is an IPv6 global address, then *relay-interface* is not required. If *relay-address* is a link-local or multicast address, then *relay-interface* is required. Finally, if you do not specify a value for *relay-address*, then you must specify a value for *relay-interface* and the DHCPV6-ALL-AGENTS multicast address (that is, `FF02::1:2`) is used to relay DHCPv6 messages to the relay server.

**Format**            `ipv6 dhcp relay {destination [relay-address] interface [relay-interface] | interface [relay-interface]} [remote-id (duid-uuid | user-defined-string)]`  
**Mode**             Interface Config

| Parameter     | Description                                                                           |
|---------------|---------------------------------------------------------------------------------------|
| destination   | Use the <code>destination</code> keyword to set the relay server IPv6 address.        |
| relay-address | The <code>relay-address</code> parameter is an IPv6 address of a DHCPv6 relay server. |
| interface     | Use the <code>interface</code> keyword to set the relay server interface.             |

| Parameter       | Description                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| relay-interface | The relay-interface parameter is an interface (slot/port) to reach a relay server. Multiple relay addresses can be configured on an interface. |

**Example:** The following shows examples of the command.

```
(Routing) #configure
(Routing) (Config)#interface 1/0/1
(Routing) (Interface 1/0/1)# ipv6 dhcp relay destination 2003::2
(Routing) (Interface 1/0/1)# ipv6 dhcp relay destination 3003::2 interface 1/0/3
(Routing) (Interface 1/0/1)# ipv6 dhcp relay interface 1/0/2
(Routing) (Interface 1/0/1)# ipv6 dhcp relay interface 1/0/4
```

## 6.4.79 ipv6 dhcp relay remote-id

This command configures the relay agent information option remote ID sub-option to be added to the DHCPv6 relayed messages. This can either be the special keyword `duid-ifid`, which causes the remote ID to be derived from the DHCPv6 Server DUID and the relay interface number, or it can be specified as a user-defined string.

**Default** None configured  
**Format** `ipv6 dhcp relay remote-id {duid-ifid | user-defined-string}`  
**Mode** Interface Config

### 6.4.79.1 no ipv6 dhcp relay remote-id

This command resets the relay agent information option remote ID sub-option to be added to the DHCPv6 relayed messages to the default value.

**Default** None configured  
**Format** `no ipv6 dhcp relay remote-id {duid-ifid | user-defined-string}`  
**Mode** Interface Config

## 6.4.80 ipv6 dhcp pool

Use this command from Global Config mode to enter IPv6 DHCP Pool Config mode. Use the `exit` command to return to Global Config mode. To return to the User EXEC mode, enter CTRL+Z. The `pool-name` should be less than 31 alphanumeric characters. DHCPv6 pools are used to specify information for DHCPv6 server to distribute to DHCPv6 clients. These pools are shared between multiple interfaces over which DHCPv6 server capabilities are configured.

Once the DHCP for IPv6 configuration information pool has been created, use the `ipv6 dhcp server` command to associate the pool with a server on an interface. If you do not configure an information pool, use the `ipv6 dhcp server` interface configuration command to enable the DHCPv6 server function on an interface.

When you associate a DHCPv6 pool with an interface, only that pool services requests on the associated interface. The pool also services other interfaces. If you do not associate a DHCPv6 pool with an interface, it can service requests on any interface. Not using any IPv6 address prefix means that the pool returns only configured options.

**Format** `ipv6 dhcp pool pool-name`  
**Mode** Global Config

### 6.4.80.1 no ipv6 dhcp pool

This command removes the specified DHCPv6 pool.

**Format** `no ipv6 dhcp pool pool-name`  
**Mode** Global Config

## 6.4.81 address prefix (IPv6)

Use this command to sets an address prefix for address assignment. This address must be in hexadecimal, using 16-bit values between colons.

If `lifetime` values are not configured, the default lifetime values for valid-lifetime and preferred-lifetime are considered to be infinite.

**Format** address prefix *ipv6-prefix* [*lifetime* {*valid-lifetime preferred-lifetime* | *infinite*}]  
**Mode** IPv6 DHCP Pool Config

| Parameter          | Description                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lifetime           | (Optional) Sets a length of time for the hosts to remember router advertisements. If configured, both valid and preferred lifetimes must be configured.                                                              |
| valid-lifetime     | The amount of time, in seconds, the prefix remains valid for the requesting router to use. The range is from 60 through 4,294,967,294. The preferred-lifetime value cannot exceed the valid-lifetime value.          |
| preferred-lifetime | The amount of time, in seconds, that the prefix remains preferred for the requesting router to use. The range is from 60 through 4,294,967,294. The preferred-lifetime value cannot exceed the valid-lifetime value. |
| infinite           | An unlimited lifetime.                                                                                                                                                                                               |

**Example:** The following example shows how to configure an IPv6 address prefix for the IPv6 configuration pool *pool1*.

```
(Switch) #configure
(Switch) (Config)# ipv6 dhcp pool pool1
(Switch) (Config-dhcp6s-pool)# address prefix 2001::/64
(Switch) (Config-dhcp6s-pool)# exit
```

## 6.4.82 domain-name (IPv6)

This command sets the DNS domain name which is provided to DHCPv6 client by DHCPv6 server. DNS domain name is configured for stateless server support. Domain name consist of no more than 31 alpha-numeric characters. DHCPv6 pool can have multiple number of domain names with maximum of 8.

**Format** domain-name *dns-domain-name*  
**Mode** IPv6 DHCP Pool Config

### 6.4.82.1 no domain-name

This command will remove dhcpv6 domain name from dhcpv6 pool.

**Format** no domain-name *dns-domain-name*  
**Mode** IPv6 DHCP Pool Config

## 6.4.83 dns-server (IPv6)

This command sets the ipv6 DNS server address which is provided to dhcpv6 client by dhcpv6 server. DNS server address is configured for stateless server support. DHCPv6 pool can have multiple number of domain names with a maximum of 8.

**Format** dns-server *dns-server-address*  
**Mode** IPv6 DHCP Pool Config

### 6.4.83.1 no dns-server

This command will remove DHCPv6 server address from DHCPv6 server.

**Format** no dns-server *dns-server-address*

**Mode** IPv6 DHCP Pool Config

### 6.4.84 prefix-delegation (IPv6)

Multiple IPv6 prefixes can be defined within a pool for distributing to specific DHCPv6 Prefix delegation clients. Prefix is the delegated IPv6 prefix. DUID is the client's unique DUID value (Example: 00:01:00:09:f8:79:4e:00:04:76:73:43:76'). Name is 31 characters textual client's name which is useful for logging or tracing only. Valid lifetime is the valid lifetime for the delegated prefix in seconds and preferred lifetime is the preferred lifetime for the delegated prefix in seconds.

**Default**

- valid-lifetime: 2592000
- preferred-lifetime: 604800

**Format** prefix-delegation *prefix/prefixLength DUID [name hostname][valid-lifetime 0-4294967295][preferred-lifetime 0-4294967295]*

**Mode** IPv6 DHCP Pool Config

#### 6.4.84.1 no prefix-delegation

This command deletes a specific prefix-delegation client.

**Format** no prefix-delegation *prefix/prefix-delegation DUID*

**Mode** IPv6 DHCP Pool Config

### 6.4.85 show ipv6 dhcp

This command displays the DHCPv6 server name, status, and conflict logging status.

**Format** show ipv6 dhcp

**Mode** Privileged EXEC

| Parameter                    | Description                                                       |
|------------------------------|-------------------------------------------------------------------|
| DHCPv6 is Enabled (Disabled) | The status of the DHCPv6 server.                                  |
| DHCPv6 Conflict Logging Mode | Indicates whether DHCPv6 Conflict Logging is enabled or disabled. |
| Server DUID                  | If configured, shows the DHCPv6 unique identifier.                |

**Example:** The following shows example command output.

```
(switch) #show ipv6 dhcp
```

```
DHCPv6 is enabled
DHCPv6 Conflict Logging Mode is enabled
Server DUID: 00:01:00:06:a5:e6:dc:bb:f8:b1:56:29:fc:2c
```

### 6.4.86 show ipv6 dhcp statistics

This command displays the IPv6 DHCP statistics for all interfaces.

**Format** show ipv6 dhcp statistics

**Mode** Privileged EXEC

| Parameter                                | Description                                  |
|------------------------------------------|----------------------------------------------|
| DHCPv6 Solicit Packets Received          | Number of solicit received statistics.       |
| DHCPv6 Request Packets Received          | Number of request received statistics.       |
| DHCPv6 Confirm Packets Received          | Number of confirm received statistics.       |
| DHCPv6 Renew Packets Received            | Number of renew received statistics.         |
| DHCPv6 Rebind Packets Received           | Number of rebind received statistics.        |
| DHCPv6 Release Packets Received          | Number of release received statistics.       |
| DHCPv6 Decline Packets Received          | Number of decline received statistics.       |
| DHCPv6 Inform Packets Received           | Number of inform received statistics.        |
| DHCPv6 Relay-forward Packets Received    | Number of relay forward received statistics. |
| DHCPv6 Relay-reply Packets Received      | Number of relay-reply received statistics.   |
| DHCPv6 Malformed Packets Received        | Number of malformed packets statistics.      |
| Received DHCPv6 Packets Discarded        | Number of DHCP discarded statistics.         |
| Total DHCPv6 Packets Received            | Total number of DHCPv6 received statistics   |
| DHCPv6 Advertisement Packets Transmitted | Number of advertise sent statistics.         |
| DHCPv6 Reply Packets Transmitted         | Number of reply sent statistics.             |
| DHCPv6 Reconfig Packets Transmitted      | Number of reconfigure sent statistics.       |
| DHCPv6 Relay-reply Packets Transmitted   | Number of relay-reply sent statistics.       |
| DHCPv6 Relay-forward Packets Transmitted | Number of relay-forward sent statistics.     |
| Total DHCPv6 Packets Transmitted         | Total number of DHCPv6 sent statistics.      |

### 6.4.87 show ipv6 dhcp interface

This command displays DHCPv6 information for all relevant interfaces or the specified interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of a slot/port format. If you specify an interface, you can use the optional `statistics` parameter to view statistics for the specified interface.

**Format**            `show ipv6 dhcp interface {slot/port/vlan 1-4093} [statistics]`

**Mode**             Privileged EXEC

| Parameter      | Description                                                 |
|----------------|-------------------------------------------------------------|
| IPv6 Interface | The interface name in <i>slot/port</i> format.              |
| Mode           | Shows whether the interface is a IPv6 DHCP relay or server. |

If the interface mode is server, the following information is displayed.

| Parameter         | Description                                                                            |
|-------------------|----------------------------------------------------------------------------------------|
| Pool Name         | The pool name specifying information for DHCPv6 server distribution to DHCPv6 clients. |
| Server Preference | The preference of the server.                                                          |
| Option Flags      | Shows whether rapid commit is enabled.                                                 |

If the interface mode is relay, the following information is displayed.

| Parameter              | Description                                            |
|------------------------|--------------------------------------------------------|
| Relay Address          | The IPv6 address of the relay server.                  |
| Relay Interface Number | The relay server interface in <i>slot/port</i> format. |
| Relay Remote ID        | If configured, shows the name of the relay remote.     |
| Option Flags           | Shows whether rapid commit is configured.              |

If you use the statistics parameter, the command displays the IPv6 DHCP statistics for the specified interface. See the [show ipv6 dhcp statistics](#) command for information about the output.

**Example:** The following shows example command output.

```
(Routing) # show ipv6 dhcp interface vlan 10
```

```
DHCPv6 Interface 3/1 Statistics
```

```

```

```
DHCPv6 Client Statistics
```

```

```

```
DHCPv6 Advertisement Packets Received..... 2
DHCPv6 Reply Packets Received..... 3
Received DHCPv6 Advertisement Packets Discard.. 0
Received DHCPv6 Reply Packets Discarded..... 0
DHCPv6 Malformed Packets Received..... 0
Total DHCPv6 Packets Received..... 5
DHCPv6 Solicit Packets Transmitted..... 2
DHCPv6 Request Packets Transmitted..... 2
DHCPv6 Renew Packets Transmitted..... 0
DHCPv6 Rebind Packets Transmitted..... 0
DHCPv6 Release Packets Transmitted..... 0
DHCPv6 Decline Packets Transmitted..... 1
DHCPv6 Confirm Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 5
DHCPv6 Server/Relay Statistics
```

```

```

```
DHCPv6 Solicit Packets Received..... 0
DHCPv6 Request Packets Received..... 0
DHCPv6 Confirm Packets Received..... 0
DHCPv6 Renew Packets Received..... 0
DHCPv6 Rebind Packets Received..... 0
DHCPv6 Release Packets Received..... 0
DHCPv6 Decline Packets Received..... 0
DHCPv6 Inform Packets Received..... 0
DHCPv6 Relay-forward Packets Received..... 0
DHCPv6 Relay-reply Packets Received..... 0
DHCPv6 Malformed Packets Received..... 0
Received DHCPv6 Packets Discarded..... 0
Total DHCPv6 Packets Received..... 0
```



```

DHCPv6 Advertisement Packets Transmitted..... 0
DHCPv6 Reply Packets Transmitted..... 0
DHCPv6 Reconfig Packets Transmitted..... 0
DHCPv6 Relay-reply Packets Transmitted..... 0
DHCPv6 Relay-forward Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0

```

### 6.4.88 show ipv6 dhcp binding

This command displays configured DHCP pool.

**Format** show ipv6 dhcp binding [*ipv6-address*]  
**Mode** Privileged EXEC

| Parameter            | Description                                         |
|----------------------|-----------------------------------------------------|
| DHCP Client Address  | Address of DHCP Client.                             |
| DUID                 | String that represents the Client DUID.             |
| IAID                 | Identity Association ID.                            |
| Prefix/Prefix Length | IPv6 address and mask length for delegated prefix.  |
| Prefix Type          | IPv6 Prefix type (IAPD, IANA, or IATA).             |
| Client Address       | Address of DHCP Client.                             |
| Client Interface     | IPv6 Address of DHCP Client.                        |
| Expiration           | Address of DNS server address.                      |
| Valid Lifetime       | Valid lifetime in seconds for delegated prefix.     |
| Preferred Lifetime   | Preferred lifetime in seconds for delegated prefix. |

### 6.4.89 show ipv6 dhcp conflict

This command displays the conflict bindings in the DHCPv6 server that are created when the leased bindings are declined by DHCPv6 clients.

**Format** show ipv6 dhcp conflict [*ipv6-address*]  
**Mode** Privileged EXEC

| Syntax              | Description                                                                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ipv6-address</i> | (Optional) Passing an optional <i>ipv6-address</i> argument displays the details about the specific conflict binding corresponding to that IPv6 address. |

**Example:** The following shows example command output.

```
(switch) #show ipv6 dhcp conflict
```

```

Pool Name..... STATEFUL
Prefix..... 2001::/64
Conflict Bindings..... 2001::2
..... 2001::3

```

### 6.4.90 show ipv6 dhcp pool

This command displays configured DHCP pool.

**Format** show ipv6 dhcp pool *pool-name*  
**Mode** Privileged EXEC

| Parameter            | Description                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| DHCP Pool Name       | Unique pool name configuration.                                                                                                           |
| Client DUID          | Client's DHCP unique identifier. DUID is generated using the combination of the local system burned-in MAC address and a timestamp value. |
| Host                 | Name of the client.                                                                                                                       |
| Prefix/Prefix Length | IPv6 address and mask length for delegated prefix.                                                                                        |
| Preferred Lifetime   | Preferred lifetime in seconds for delegated prefix.                                                                                       |
| Valid Lifetime       | Valid lifetime in seconds for delegated prefix.                                                                                           |
| DNS Server Address   | Address of DNS server address.                                                                                                            |
| Domain Name          | DNS domain name.                                                                                                                          |

### 6.4.91 show network ipv6 dhcp statistics

This command displays the statistics of the DHCPv6 client running on the network management interface.

**Format**            `show network ipv6 dhcp statistics`

**Mode**

- Privileged EXEC
- User EXEC

| Parameter                                       | Description                                                                        |
|-------------------------------------------------|------------------------------------------------------------------------------------|
| DHCPv6 Advertisement Packets Received           | The number of DHCPv6 Advertisement packets received on the network interface.      |
| DHCPv6 Reply Packets Received                   | The number of DHCPv6 Reply packets received on the network interface.              |
| Received DHCPv6 Advertisement Packets Discarded | The number of DHCPv6 Advertisement packets discarded on the network interface.     |
| Received DHCPv6 Reply Packets Discarded         | The number of DHCPv6 Reply packets discarded on the network interface.             |
| DHCPv6 Malformed Packets Received               | The number of DHCPv6 packets that are received malformed on the network interface. |
| Total DHCPv6 Packets Received                   | The total number of DHCPv6 packets received on the network interface.              |
| DHCPv6 Solicit Packets Transmitted              | The number of DHCPv6 Solicit packets transmitted on the network interface.         |
| DHCPv6 Request Packets Transmitted              | The number of DHCPv6 Request packets transmitted on the network interface.         |
| DHCPv6 Renew Packets Transmitted                | The number of DHCPv6 Renew packets transmitted on the network interface.           |
| DHCPv6 Rebind Packets Transmitted               | The number of DHCPv6 Rebind packets transmitted on the network interface.          |
| DHCPv6 Release Packets Transmitted              | The number of DHCPv6 Release packets transmitted on the network interface.         |
| Total DHCPv6 Packets Transmitted                | The total number of DHCPv6 packets transmitted on the network interface.           |

**Example:** The following shows example CLI display output for the command.

```
(admin)#show network ipv6 dhcp statistics
DHCPv6 Client Statistics

```

```

DHCPv6 Advertisement Packets Received..... 0
DHCPv6 Reply Packets Received..... 0
Received DHCPv6 Advertisement Packets Discarded..... 0
Received DHCPv6 Reply Packets Discarded..... 0
DHCPv6 Malformed Packets Received..... 0
Total DHCPv6 Packets Received..... 0

DHCPv6 Solicit Packets Transmitted..... 0
DHCPv6 Request Packets Transmitted..... 0
DHCPv6 Renew Packets Transmitted..... 0
DHCPv6 Rebind Packets Transmitted..... 0
DHCPv6 Release Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0

```

## 6.4.92 show serviceport ipv6 dhcp statistics

This command displays the statistics of the DHCPv6 client running on the serviceport management interface.

**Format**            show serviceport ipv6 dhcp statistics

**Mode**             • Privileged EXEC

                     • User EXEC

| Parameter                                       | Description                                                                             |
|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| DHCPv6 Advertisement Packets Received           | The number of DHCPv6 Advertisement packets received on the service port interface.      |
| DHCPv6 Reply Packets Received                   | The number of DHCPv6 Reply packets received on the service port interface.              |
| Received DHCPv6 Advertisement Packets Discarded | The number of DHCPv6 Advertisement packets discarded on the service port interface.     |
| Received DHCPv6 Reply Packets Discarded         | The number of DHCPv6 Reply packets discarded on the service port interface.             |
| DHCPv6 Malformed Packets Received               | The number of DHCPv6 packets that are received malformed on the service port interface. |
| Total DHCPv6 Packets Received                   | The total number of DHCPv6 packets received on the service port interface.              |
| DHCPv6 Solicit Packets Transmitted              | The number of DHCPv6 Solicit packets transmitted on the service port interface.         |
| DHCPv6 Request Packets Transmitted              | The number of DHCPv6 Request packets transmitted on the service port interface.         |
| DHCPv6 Renew Packets Transmitted                | The number of DHCPv6 Renew packets transmitted on the service port interface.           |
| DHCPv6 Rebind Packets Transmitted               | The number of DHCPv6 Rebind packets transmitted on the service port interface.          |
| DHCPv6 Release Packets Transmitted              | The number of DHCPv6 Release packets transmitted on the service port interface.         |
| Total DHCPv6 Packets Transmitted                | The total number of DHCPv6 packets transmitted on the service port interface.           |

**Example:** The following shows example CLI display output for the command.

```
(admin)#show serviceport ipv6 dhcp statistics
DHCPv6 Client Statistics

DHCPv6 Advertisement Packets Received..... 0
DHCPv6 Reply Packets Received..... 0
Received DHCPv6 Advertisement Packets Discarded..... 0
Received DHCPv6 Reply Packets Discarded..... 0
DHCPv6 Malformed Packets Received..... 0
Total DHCPv6 Packets Received..... 0

DHCPv6 Solicit Packets Transmitted..... 0
DHCPv6 Request Packets Transmitted..... 0
DHCPv6 Renew Packets Transmitted..... 0
DHCPv6 Rebind Packets Transmitted..... 0
DHCPv6 Release Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0
```

### 6.4.93 clear ipv6 dhcp

Use this command to clear DHCPv6 statistics for all interfaces or for a specific interface. Use the *slot/port* parameter to specify an interface and the *vlan* parameter to specify a VLAN.

**Format** clear ipv6 dhcp {statistics | interface {slot/port | vlan id}}

**Mode** Privileged EXEC

### 6.4.94 clear ipv6 dhcp binding

This command deletes an automatic address binding from the DHCP server database. *address* is a valid IPv6 address.

A binding table entry on the DHCP for IPv6 server is automatically:

- Created whenever a prefix is delegated to a client from the configuration pool.
- Updated when the client renews, rebinds, or confirms the prefix delegation.
- Deleted when the client releases all the prefixes in the binding voluntarily, all prefixes' valid lifetimes have expired, or an administrator runs the `clear ipv6 dhcp binding` command.

If the `clear ipv6 dhcp binding` command is used with the optional `ipv6-address` argument specified, only the binding for the specified client is deleted. If the `clear ipv6 dhcp binding` command is used without the `ipv6-address` argument, all automatic client bindings are deleted from the DHCP for IPv6 binding table.

**Format** clear ipv6 dhcp binding [*ipv6-address*]

**Mode** Privileged EXEC

| Parameter    | Description                                       |
|--------------|---------------------------------------------------|
| ipv6-address | (Optional) The address of a DHCP for IPv6 client. |

**Example:** The following examples deletes all automatic client bindings from the DHCP for IPv6 server binding table.

```
(Routing) #clear ipv6 dhcp binding
```

### 6.4.95 clear ipv6 dhcp conflict

This command deletes the DHCPv6 Client conflict bindings that represent the address (es) declined by DHCPv6 Clients.

**Format** clear ipv6 dhcp conflict [ <*ipv6-address*> | \* ]

**Mode** Privileged EXEC

| Syntax       | Description                                                     |
|--------------|-----------------------------------------------------------------|
| ipv6-address | (Optional) The conflicting address declined by a DHCPv6 Client. |
| *            | Indicates all conflicting addresses in the database.            |

## Usage Guidelines

The `clear ipv6 dhcp conflict` command is used as a server function.

A conflict binding entry is created by the DHCPv6 server whenever an advertised lease binding is declined by a DHCPv6 client.

If the `clear ipv6 dhcp conflict` command is used with the optional `ipv6-address` argument specified, only that specific conflict binding is deleted. If the `clear ipv6 dhcp conflict *` command is used without the `ipv6-address` argument, then all conflict client bindings are deleted.

**Example:** The following shows examples of the command.

```
(switch) # clear ipv6 dhcp conflict 2003:1::2
(switch) # clear ipv6 dhcp conflict *
```

### 6.4.96 clear network ipv6 dhcp statistics

Use this command to clear the DHCPv6 statistics on the network management interface.

**Format** clear network ipv6 dhcp statistics

**Mode** Privileged EXEC

### 6.4.97 clear serviceport ipv6 dhcp statistics

Use this command to clear the DHCPv6 client statistics on the service port interface.

**Format** clear serviceport ipv6 dhcp statistics

**Mode** Privileged EXEC

## 6.5 DHCPv6 Snooping Configuration Commands

This section describes commands you use to configure IPv6 DHCP Snooping.

### 6.5.1 ipv6 dhcp snooping

Use this command to globally enable IPv6 DHCP Snooping.

**Default** disabled

**Format** ipv6 dhcp snooping

**Mode** Global Config

#### 6.5.1.1 no ipv6 dhcp snooping

Use this command to globally disable IPv6 DHCP Snooping.

**Format** no ipv6 dhcp snooping

**Mode** Global Config

## 6.5.2 ipv6 dhcp snooping vlan

Use this command to enable DHCP Snooping on a list of comma-separated VLAN ranges.

|                |                                          |
|----------------|------------------------------------------|
| <b>Default</b> | disabled                                 |
| <b>Format</b>  | ipv6 dhcp snooping vlan <i>vlan-list</i> |
| <b>Mode</b>    | Global Config                            |

### 6.5.2.1 no ipv6 dhcp snooping vlan

Use this command to disable DHCP Snooping on VLANs.

|               |                                             |
|---------------|---------------------------------------------|
| <b>Format</b> | no ipv6 dhcp snooping vlan <i>vlan-list</i> |
| <b>Mode</b>   | Global Config                               |

## 6.5.3 ipv6 dhcp snooping verify mac-address

Use this command to enable verification of the source MAC address with the client hardware address in the received DHCP message.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | enabled                               |
| <b>Format</b>  | ipv6 dhcp snooping verify mac-address |
| <b>Mode</b>    | Global Config                         |

### 6.5.3.1 no ipv6 dhcp snooping verify mac-address

Use this command to disable verification of the source MAC address with the client hardware address.

|               |                                          |
|---------------|------------------------------------------|
| <b>Format</b> | no ipv6 dhcp snooping verify mac-address |
| <b>Mode</b>   | Global Config                            |

## 6.5.4 ipv6 dhcp snooping database

Use this command to configure the persistent location of the DHCP Snooping database. This can be local or a remote file on a given IP machine.

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Default</b> | local                                                      |
| <b>Format</b>  | ipv6 dhcp snooping database {local tftp://hostIP/filename} |
| <b>Mode</b>    | Global Config                                              |

## 6.5.5 ip dhcp snooping database write-delay

Use this command to configure the interval in seconds at which the DHCP Snooping database is persisted. The interval value ranges from 15 to 86400 seconds.

|                |                                                         |
|----------------|---------------------------------------------------------|
| <b>Default</b> | 300 seconds                                             |
| <b>Format</b>  | ip dhcp snooping database write-delay <i>in seconds</i> |
| <b>Mode</b>    | Global Config                                           |

### 6.5.5.1 no ip dhcp snooping database write-delay

Use this command to set the write delay value to the default value.

|               |                                          |
|---------------|------------------------------------------|
| <b>Format</b> | no ip dhcp snooping database write-delay |
| <b>Mode</b>   | Global Config                            |

## 6.5.6 ipv6 dhcp snooping binding

Use this command to configure static DHCP Snooping binding.

**Format**            `ipv6 dhcp snooping binding mac-address vlan vlan id ip address interface interface id`  
**Mode**             Global Config

### 6.5.6.1 no ipv6 dhcp snooping binding

Use this command to remove the DHCP static entry from the DHCP Snooping database.

**Format**            `no ipv6 dhcp snooping binding mac-address`  
**Mode**             Global Config

## 6.5.7 ipv6 dhcp snooping trust

Use this command to configure an interface or range of interfaces as trusted.

**Default**            disabled  
**Format**            `ipv6 dhcp snooping trust`  
**Mode**             Interface Config

### 6.5.7.1 no ipv6 dhcp snooping trust

Use this command to configure the port as untrusted.

**Format**            `no ipv6 dhcp snooping trust`  
**Mode**             Interface Config

## 6.5.8 ipv6 dhcp snooping log-invalid

Use this command to control the logging DHCP messages filtration by the DHCP Snooping application. This command can be used to configure a single interface or a range of interfaces.

**Default**            disabled  
**Format**            `ipv6 dhcp snooping log-invalid`  
**Mode**             Interface Config

### 6.5.8.1 no ipv6 dhcp snooping log-invalid

Use this command to disable the logging DHCP messages filtration by the DHCP Snooping application.

**Format**            `no ipv6 dhcp snooping log-invalid`  
**Mode**             Interface Config

## 6.5.9 ipv6 dhcp snooping limit

Use this command to control the rate at which the DHCP Snooping messages come on an interface or range of interfaces. By default, rate limiting is disabled. When enabled, the rate can range from 0 to 300 packets per second. The burst level range is 1 to 15 seconds. Rate limiting is configured on a physical port and may be applied to trusted and untrusted ports.

**Default**            disabled (no limit)  
**Format**            `ipv6 dhcp snooping limit {rate pps [burst interval seconds]}`  
**Mode**             Interface Config

### 6.5.9.1 no ipv6 dhcp snooping limit

Use this command to set the rate at which the DHCP Snooping messages come, and the burst level, to the defaults.

**Format**            no ipv6 dhcp snooping limit  
**Mode**             Interface Config

### 6.5.10 ipv6 verify source

Use this command to configure the IPv6SG source ID attribute to filter the data traffic in the hardware. Source ID is the combination of IP address and MAC address. Normal command allows data traffic filtration based on the IP address. With the `port-security` option, the data traffic is filtered based on the IP and MAC addresses.

This command can be used to configure a single interface or a range of interfaces.

**Default**           The source ID is the IP address.  
**Format**            ipv6 verify source {port-security}  
**Mode**             Interface Config

#### 6.5.10.1 no ipv6 verify source

Use this command to disable the IPv6SG configuration in the hardware. You cannot disable port-security alone if it is configured.

**Format**            no ipv6 verify source  
**Mode**             Interface Config

### 6.5.11 ipv6 verify binding

Use this command to configure static IPv6 source guard (IPv6SG) entries.

**Format**            ipv6 verify binding *mac-address* *vlan* *vlan-id* *ipv6 address* *interface* *interface-id*  
**Mode**             Global Config

#### 6.5.11.1 no ipv6 verify binding

Use this command to remove the IPv6SG static entry from the IPv6SG database.

**Format**            no ipv6 verify binding *mac-address* *vlan* *vlan-id* *ipv6 address* *interface* *interface-id*  
**Mode**             Global Config

### 6.5.12 show ipv6 dhcp snooping

Use this command to display the DHCP Snooping global configurations and per-port configurations.

**Format**            show ipv6 dhcp snooping  
**Mode**             • Privileged EXEC  
                     • User EXEC

| Parameter        | Description                                                                                     |
|------------------|-------------------------------------------------------------------------------------------------|
| Interface        | The interface for which data is displayed.                                                      |
| Trusted          | If it is enabled, DHCP snooping considers the port as trusted. The factory default is disabled. |
| Log Invalid Pkts | If it is enabled, DHCP snooping application logs invalid packets on the specified interface.    |



**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 dhcp snooping
```

```
DHCP snooping is Disabled
DHCP snooping source MAC verification is enabled
DHCP snooping is enabled on the following VLANs:
11 - 30, 40
```

| Interface | Trusted | Log Invalid Pkts |
|-----------|---------|------------------|
| 0/1       | Yes     | No               |
| 0/2       | No      | Yes              |
| 0/3       | No      | Yes              |
| 0/4       | No      | No               |
| 0/6       | No      | No               |

### 6.5.13 show ipv6 dhcp snooping binding

Use this command to display the DHCP Snooping binding entries. To restrict the output, use the following options:

- Dynamic: Restrict the output based on DHCP snooping.
- Interface: Restrict the output based on a specific interface.
- Static: Restrict the output based on static entries.
- VLAN: Restrict the output based on VLAN.

**Format**            `show ipv6 dhcp snooping binding [{static/dynamic}] [interface slot/port] [vlan id]`  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter    | Description                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------|
| MAC Address  | Displays the MAC address for the binding that was added. The MAC address is the key to the binding database. |
| IPv6 Address | Displays the valid IPv6 address for the binding rule.                                                        |
| VLAN         | The VLAN for the binding rule.                                                                               |
| Interface    | The interface to add a binding into the DHCP snooping interface.                                             |
| Type         | Binding type; statically configured from the CLI or dynamically learned.                                     |
| Lease (sec)  | The remaining lease time for the entry.                                                                      |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 dhcp snooping binding
```

```
Total number of bindings: 2
```

| MAC Address       | IPv6 Address | VLAN | Interface | Type | Lease time (Secs) |
|-------------------|--------------|------|-----------|------|-------------------|
| 00:02:B3:06:60:80 | 2000::1/64   | 10   | 0/1       |      | 86400             |
| 00:0F:FE:00:13:04 | 3000::1/64   | 10   | 0/1       |      | 86400             |

### 6.5.14 show ipv6 dhcp snooping database

Use this command to display the DHCP Snooping configuration related to the database persistence.

**Format**            `show ipv6 dhcp snooping database`  
**Mode**             • Privileged EXEC  
                      • User EXEC

| Parameter   | Description                                                        |
|-------------|--------------------------------------------------------------------|
| Agent URL   | Bindings database agent URL.                                       |
| Write Delay | The maximum write time to write the database into local or remote. |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 dhcp snooping database
```

```
agent url: /10.131.13.79:/sai1.txt
```

```
write-delay: 5000
```

### 6.5.15 show ipv6 dhcp snooping interfaces

Use this command to show the DHCP Snooping status of all interfaces or a specified interface.

**Format** show ipv6 dhcp snooping interfaces [interface *slot/port*]

**Mode** Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 dhcp snooping interfaces
```

| Interface | Trust State | Rate Limit<br>(pps) | Burst Interval<br>(seconds) |
|-----------|-------------|---------------------|-----------------------------|
| 1/g1      | No          | 15                  | 1                           |
| 1/g2      | No          | 15                  | 1                           |
| 1/g3      | No          | 15                  | 1                           |

```
(switch) #show ip dhcp snooping interfaces ethernet 1/0/1
```

| Interface | Trust State | Rate Limit<br>(pps) | Burst Interval<br>(seconds) |
|-----------|-------------|---------------------|-----------------------------|
| 1/0/1     | Yes         | 15                  | 1                           |

### 6.5.16 show ipv6 dhcp snooping statistics

Use this command to list statistics for IPv6 DHCP Snooping security violations on untrusted ports.

**Format** show ipv6 dhcp snooping statistics

**Mode**

- Privileged EXEC
- User EXEC

| Parameter              | Description                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface              | The IPv6 address of the interface in <i>slot/port</i> format.                                                                                           |
| MAC Verify Failures    | Represents the number of DHCP messages that were filtered on an untrusted interface because of source MAC address and client hardware address mismatch. |
| Client Ifc Mismatch    | Represents the number of DHCP release and Deny messages received on the different ports than learned previously.                                        |
| DHCP Server Msgs Rec'd | Represents the number of DHCP server messages received on Untrusted ports.                                                                              |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 dhcp snooping statistics
```

| Interface | MAC Verify Failures | Client Ifc Mismatch | DHCP Server Msgs Rec'd |
|-----------|---------------------|---------------------|------------------------|
| 1/0/2     | 0                   | 0                   | 0                      |
| 1/0/3     | 0                   | 0                   | 0                      |
| 1/0/4     | 0                   | 0                   | 0                      |
| 1/0/5     | 0                   | 0                   | 0                      |
| 1/0/6     | 0                   | 0                   | 0                      |
| 1/0/7     | 0                   | 0                   | 0                      |
| 1/0/8     | 0                   | 0                   | 0                      |
| 1/0/9     | 0                   | 0                   | 0                      |
| 1/0/10    | 0                   | 0                   | 0                      |
| 1/0/11    | 0                   | 0                   | 0                      |
| 1/0/12    | 0                   | 0                   | 0                      |
| 1/0/13    | 0                   | 0                   | 0                      |
| 1/0/14    | 0                   | 0                   | 0                      |
| 1/0/15    | 0                   | 0                   | 0                      |
| 1/0/16    | 0                   | 0                   | 0                      |
| 1/0/17    | 0                   | 0                   | 0                      |
| 1/0/18    | 0                   | 0                   | 0                      |
| 1/0/19    | 0                   | 0                   | 0                      |
| 1/0/20    | 0                   | 0                   | 0                      |

### 6.5.17 clear ipv6 dhcp snooping binding

Use this command to clear all DHCPv6 Snooping bindings on all interfaces or on a specific interface.

**Format** clear ipv6 dhcp snooping binding [interface *slot/port*]

- Mode**
- Privileged EXEC
  - User EXEC

### 6.5.18 clear ipv6 dhcp snooping statistics

Use this command to clear all DHCPv6 Snooping statistics.

**Format** clear ipv6 dhcp snooping statistics

- Mode**
- Privileged EXEC
  - User EXEC

### 6.5.19 show ipv6 verify

Use this command to display the IPv6 configuration on a specified slot/port.

**Format** show ipv6 verify *interface*

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter    | Description                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface    | Interface address in slot/port format.                                                                                                                                                                       |
| Filter Type  | Is one of two values: <ul style="list-style-type: none"> <li>ip-v6mac: User has configured MAC address filtering on this interface.</li> <li>ipv6: Only IPv6 address filtering on this interface.</li> </ul> |
| IPv6 Address | IPv6 address of the interface                                                                                                                                                                                |
| MAC Address  | If MAC address filtering is not configured on the interface, the MAC Address field is empty. If port security is disabled on the interface, then the MAC Address field displays "permit-all."                |
| VLAN         | The VLAN for the binding rule.                                                                                                                                                                               |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 verify 0/1
```

| Interface | Filter Type | IP Address | MAC Address       | Vlan |
|-----------|-------------|------------|-------------------|------|
| 0/1       | ipv6-mac    | 2000::1/64 | 00:02:B3:06:60:80 | 10   |
| 0/1       | ipv6-mac    | 3000::1/64 | 00:0F:FE:00:13:04 | 10   |

### 6.5.20 show ipv6 verify source

Use this command to display the IPv6SG configurations on all ports. If the interface option is specified, the output is restricted to the specified slot/port.

**Format**            show ipv6 verify source {interface}

**Mode**

- Privileged EXEC
- User EXEC

| Parameter    | Description                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface    | Interface address in slot/port format.                                                                                                                                                                       |
| Filter Type  | Is one of two values: <ul style="list-style-type: none"> <li>ip-v6mac: User has configured MAC address filtering on this interface.</li> <li>ipv6: Only IPv6 address filtering on this interface.</li> </ul> |
| IPv6 Address | IPv6 address of the interface                                                                                                                                                                                |
| MAC Address  | If MAC address filtering is not configured on the interface, the MAC Address field is empty. If port security is disabled on the interface, then the MAC Address field displays "permit-all."                |
| VLAN         | The VLAN for the binding rule.                                                                                                                                                                               |

**Example:** The following shows example CLI display output for the command.

```
(switch) #show ipv6 verify source
```

| Interface | Filter Type | IP Address | MAC Address       | Vlan |
|-----------|-------------|------------|-------------------|------|
| 0/1       | ipv6-mac    | 2000::1/64 | 00:02:B3:06:60:80 | 10   |
| 0/1       | ipv6-mac    | 3000::1/64 | 00:0F:FE:00:13:04 | 10   |

### 6.5.21 show ipv6 source binding

Use this command to display the IPv6SG bindings.

- Format**            `show ipv6 source binding [{dhcp-snooping|static}] [interface slot/port] [vlan id]`
- Mode**
- Privileged EXEC
  - User EXEC

| Parameter   | Description                                                                           |
|-------------|---------------------------------------------------------------------------------------|
| MAC Address | The MAC address for the entry that is added.                                          |
| IP Address  | The IP address of the entry that is added.                                            |
| Type        | Entry type; statically configured from CLI or dynamically learned from DHCP Snooping. |
| VLAN        | VLAN for the entry.                                                                   |
| Interface   | IP address of the interface in <i>slot/port</i> format.                               |

**Example:** The following shows example CLI display output for the command.

(switch) #show ipv6 source binding

| MAC Address       | IP Address | Type          | Vlan | Interface |
|-------------------|------------|---------------|------|-----------|
| 00:00:00:00:00:08 | 2000::1    | dhcp-snooping | 2    | 1/0/1     |
| 00:00:00:00:00:09 | 3000::1    | dhcp-snooping | 3    | 1/0/1     |
| 00:00:00:00:00:0A | 4000::1    | dhcp-snooping | 4    | 1/0/1     |

## 7/ Quality of Service Commands

This chapter describes the Quality of Service (QoS) commands available in the FASTPATH CLI.

### NOTICE

The commands in this chapter are in one of two functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.

## 7.1 Class of Service Commands

This section describes the commands you use to configure and view Class of Service (CoS) settings for the switch. The commands in this section allow you to control the priority and transmission rate of traffic.

**NOTE:** Commands you issue in the Interface Config mode only affect a single interface. Commands you issue in the Global Config mode affect all interfaces.

### 7.1.1 classofservice dot1p-mapping

This command maps an IEEE 802.1p priority to an internal traffic class. The *userpriority* values can range from 0 to 7. The *trafficclass* values range from 0 to 6, although the actual number of available traffic classes depends on the platform.

**Format** `classofservice dot1p-mapping userpriority trafficclass`

**Modes**

- Global Config
- Interface Config

#### 7.1.1.1 no classofservice dot1p-mapping

This command maps each IEEE 802.1p priority to its default internal traffic class value. The 802.1p priority value ranges from 0 to 7.

**Format** `no classofservice dot1p-mapping [802.1p priority]`

**Modes**

- Global Config
- Interface Config

### 7.1.2 classofservice ip-dscp-mapping

This command maps an IP DSCP value to an internal traffic class. The *ipdscp* value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef.

The *trafficclass* values can range from 0 to 6, although the actual number of available traffic classes depends on the platform.

**Format** `classofservice ip-dscp-mapping ipdscp trafficclass`

**Mode** Global Config

#### 7.1.2.1 no classofservice ip-dscp-mapping

This command maps each IP DSCP value to its default internal traffic class value.

**Format** `no classofservice ip-dscp-mapping`

**Mode** Global Config

### 7.1.3 classofservice ip-precedence-mapping

This command maps an IP Precedence value to an internal traffic class for a specific interface. The `0-7` parameter is optional and is only valid on platforms that support independent per-port class of service mappings.

**Format** `classofservice ip-precedence-mapping 0-7`  
**Mode** Global Config

| Parameter | Description              |
|-----------|--------------------------|
| 0-7       | The IP Precedence value. |

### 7.1.4 classofservice trust

This command sets the class of service trust mode of an interface or range of interfaces. You can set the mode to trust one of the Dot1p (IEEE 802.1p), IP DSCP, or IP Precedence packet markings. You can also set the interface mode to untrusted. If you configure an interface to use Dot1p, the mode does not appear in the output of the `show classofservice` command because Dot1p is the default.

#### NOTICE

The `classofservice trust dot1p` command will not be supported in future releases of the software because Dot1p is the default value. Use the `no classofservice trust` command to set the mode to the default value.

**Default** `dot1p`  
**Format** `classofservice trust {dot1p | ip-dscp | untrusted}`  
**Modes**

- Global Config
- Interface Config

#### 7.1.4.1 no classofservice trust

This command sets the interface mode to the default value.

**Format** `no classofservice trust`  
**Modes**

- Global Config
- Interface Config

### 7.1.5 cos-queue max-bandwidth

This command specifies the maximum transmission bandwidth guarantee for each interface queue on an interface, a range of interfaces, or all interfaces. The total number of queues supported per interface is platform specific. A value from 0 to 100 (percentage of link rate) must be specified for each supported queue, with 0 indicating no maximum bandwidth. The sum of all values entered must not exceed 100.

**Format** `cos-queue max-bandwidth bw-0 bw-1 ... bw-n`  
**Modes**

- Global Config
- Interface Config

#### 7.1.5.1 no cos-queue max-bandwidth

This command restores the default for each queue's minimum bandwidth value.

**Format** `no cos-queue min-bandwidth`  
**Modes**

- Global Config
- Interface Config

## 7.1.6 cos-queue min-bandwidth

This command specifies the minimum transmission bandwidth guarantee for each interface queue on an interface, a range of interfaces, or all interfaces. The total number of queues supported per interface is platform specific. A value from 0 to 100 (percentage of link rate) must be specified for each supported queue, with 0 indicating no guaranteed minimum bandwidth. The sum of all values entered must not exceed 100.

**Format** `cos-queue min-bandwidth bw-0 bw-1 ... bw-n`

**Modes**

- Global Config
- Interface Config

### 7.1.6.1 no cos-queue min-bandwidth

This command restores the default for each queue's minimum bandwidth value.

**Format** `no cos-queue min-bandwidth`

**Modes**

- Global Config
- Interface Config

## 7.1.7 cos-queue random-detect

This command activates weighted random early discard (WRED) for each specified queue on the interface. Specific WRED parameters are configured using the `random-detect queue-params` and the `random-detect exponential-weighting-constant` commands.

**Format** `cos-queue random-detect queue-id-1 [queue-id-2 ... queue-id-n]`

**Modes**

- Global Config
- Interface Config

When specified in Interface Config mode, this command affects a single interface only, whereas in Global Config mode, it applies to all interfaces.

At least one, but no more than *n* `queue-id` values are specified with this command. Duplicate `queue-id` values are ignored. Each `queue-id` value ranges from 0 to (*n*-1), where *n* is the total number of queues supported per interface. The number *n* = 7 and corresponds to the number of supported queues (traffic classes).

### 7.1.7.1 no cos-queue random-detect

Use this command to disable WRED, thereby restoring the default tail drop operation for the specified queues on the interface.

**Format** `no cos-queue random-detect queue-id-1 [queue-id-2 ... queue-id-n]`

**Modes**

- Global Config
- Interface Config

## 7.1.8 cos-queue strict

This command activates the strict priority scheduler mode for each specified queue for an interface queue on an interface, a range of interfaces, or all interfaces.

**Format** `cos-queue strict queue-id-1 [queue-id-2 ... queue-id-n]`

**Modes**

- Global Config
- Interface Config



### 7.1.8.1 no cos-queue strict

This command restores the default weighted scheduler mode for each specified queue.

**Format**           no cos-queue strict *queue-id-1* [*queue-id-2* ... *queue-id-n*]

- Modes**
- Global Config
  - Interface Config

### 7.1.9 random-detect

This command is used to enable WRED for the interface as a whole, and is only available when per-queue WRED activation control is not supported by the device. Specific WRED parameters are configured using the `random-detect queue-parms` and the `random-detect exponential-weighting-constant` commands.

**Format**           random-detect

- Modes**
- Global Config
  - Interface Config

When specified in Interface Config mode, this command affects a single interface only, whereas in Global Config mode, it applies to all interfaces. The Interface Config mode command is only available on platforms that support independent per-port class of service queue configuration.

#### 7.1.9.1 no random-detect

Use this command to disable WRED, thereby restoring the default tail drop operation for all queues on the interface.

**Format**           no random-detect

- Modes**
- Global Config
  - Interface Config

#### 7.1.10 random-detect exponential-weighting-constant

This command is used to configure the WRED decay exponent for a CoS queue interface.

**Format**           random-detect exponential-weighting-constant *0-15*

- Modes**
- Global Config
  - Interface Config

##### 7.1.10.1 no random-detect exponential-weighting-constant

Use this command to set the WRED decay exponent back to the default.

**Format**           no random-detect exponential-weighting-constant

- Modes**
- Global Config
  - Interface Config

### 7.1.11 random-detect queue-parms

This command is used to configure WRED parameters for each drop precedence level supported by a queue. It is used only when per-COS queue configuration is enabled (using the `cos-queue random-detect` command).

**Format**            `random-detect queue-parms queue-id [queue-id] ... [units {KB|percentage}] min-thresh minthresh-green minthresh-yellow minthresh-red minthresh-nontcp max-thresh max-thresh-green max-thresh-yellow max-thresh-red maxthresh-nontcp drop-prob-scale drop-scale-green drop-scale-yellow drop-scale-red drop-scale-nontcp [ ecn ]`  
`no random-detect queue-parms queue-id [queue-id] ...`

- Modes**
- Global Config
  - Interface Config

Each parameter is specified for each possible drop precedence (color of TCP traffic). The last precedence applies to all non-TCP traffic. For example, in a 3-color system, four of each parameter specified: green TCP, yellow TCP, red TCP, and non-TCP, respectively.

| Parameter  | Description                                                                                                                                                                                                                                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| queue-id   | The internal class of service queue. Range 0 to 6.<br>This is the internal CoS queue number, which is not the same as the CoS or DSCP value received in the packet. Use the <code>show classofservice dot1p-mapping</code> command to display the CoS value to CoS queue mapping.                                                                           |
| units      | The minimum and maximum threshold values can be configured in KB or percentage.                                                                                                                                                                                                                                                                             |
| min-thresh | The minimum congestion threshold (in terms of percentage of queue depth) at which to begin dropping or ECN marking packets at 1/8th of the configured drop probability.<br>At or below the minimum threshold, no packets are dropped. The range between the minimum and maximum thresholds is divided equally into 8 increasing levels of drop probability. |
| max-thresh | The maximum congestion threshold to end dropping at the configured maximum drop probability and to begin dropping at 100%.                                                                                                                                                                                                                                  |
| drop-prob  | The maximum drop probability. Range 0 to 100.<br>This is the drop probability for a packet when the maximum threshold is reached. Above the maximum threshold, 100% of matching packets are dropped.                                                                                                                                                        |
| ecn        | Enable ECN marking on the selected CoS queues. When ECN is enabled, packets not marked as ECN capable are dropped when selected for discard by WRED.                                                                                                                                                                                                        |

## Default Configuration

The default WRED thresholds are listed below. By default WRED is not enabled for any CoS queue and ECN is not enabled for any CoS queue. By default, minimum and maximum threshold units are percentage. The thresholds for each color and CoS queue are configured independently and may overlap.

## Usage Guidelines for ECN-Capable Systems

ECN capability is an end-to-end feedback mechanism. Both ends of the TCP connection must participate. When ECN is enabled, packets marked as ECN-capable and exceeding the upper WRED threshold are marked CE and are not dropped. In cases of extreme congestion, ECN-capable packets may be dropped.

Use the `show interfaces traffic` command to see color aware drops, ECN Tx counts, and congestion levels.

ECN capability can be enabled in Windows Server 2008 and later releases using the following command.

```
netsh interface tcp set global ecncapability=enabled
```

**Example:** The following example configures simple meter and a trTCM meter.

```
! Define a class-map so that all traffic will be in the set of traffic cos-any
class-map match-all cos-any ipv4
match any
exit
! Define a class-map such that all traffic with a Cos value of 1
! will be in the set of traffic cos1.
! Use this as a conform color class map. Conform-color class
! maps must be one of cos, secondary cos,
! dscp, or ip precedence.
```

```

class-map match-all cos1 ipv4
match cos 1
exit
! Define a class-map such that all ipv4 traffic with a Cos value of 0
! will be in the set of traffic cos0.
! Use this as a conform color class map. Conform-color class
! maps must be one of cos, secondary cos, dscp, or ip precedence.
class-map match-all cos0 ipv4
match cos 0
exit
! Define a class-map such that all TCP will be in the set of traffic TCP.
! Use this as a base color class for metering traffic.
class-map match-all tcp ipv4
match protocol tcp
exit
!
! Define a policy-map to include packets matching class cos-any (IPv4).
! Ingress IPv4 traffic arriving at a port participating this policy will
! be assigned red or green coloring based on the metering.
!
policy-map simple-policy in
class cos-any
!
! Create a simple policer in color blind mode. Packets below the committed information
! rate (CIR) or committed burst size (CBS) are assigned drop precedence green.
! Packets that exceed the CIR (in Kbps) or CBS (in Kbytes) are colored red.
! Both the conform and violate actions are set to transmit as WRED is
! used to drop packets when congested.
!
police-simple 10000000 64 conform-action transmit violate-action transmit
exit
exit
!
! Define a policy-map in color aware mode matching class cos-any (IPv4).
! Ingress IPv4 traffic arriving at a port participating in this policy will be
! assigned green, yellow or red coloring based on the meter.
!
policy-map two-rate-policy in
class tcp
!
! Create a two-rate policer per RFC 2698. The CIR value is 800 Kbps and
! the CBS is set to 96 Kbytes. The PIR is set to 950 Kbps and the PBS is
! set to 128 Kbytes. Color-aware processing is enabled via the conform-color
! command, that is, any packets not in cos 0 or 1 are pre-colored red. Packets in
! cos 0 are pre-colored yellow. Packets in cos 1 are pre-colored green.
! Pre-coloring gives greater bandwidth to CoS 1 as they are initially
! subject to the CIR/CBS limits. Packets in CoS 0 are subject to the PIR limits.
! Based on the CIR/CBS, the PIR/PBS, and the conform, exceed, and
! violate actions specified below:
!
! TCP packets with rates less than or equal to the CIR/CBS in class cos1
! are conforming to the rate (green).
! These packets will be dropped randomly at an increasing rate between 0-3%
! when the outgoing interface is congested between 80 and 100%.
!
! TCP packets with rates above the CIR/CBS and less than or equal to
! PIR/PBS in either class cos1 or class cos2 are policed as exceeding the
! CIR (yellow). These packets will be dropped randomly at an increasing rate
! between 0-5% when the outgoing interface is congested between 70 and 100%.
!
! TCP packets with rates higher than the PIR/PBS or which belong to neither
! class cos1 or class cos2 are violating the rate (red). These packets will be
! dropped randomly at an increasing rate between 0-10% when the outgoing
! interface is congested between 50 and 100%.

```

```

!
! Non TCP packets in CoS queue 0 or 1 will be dropped randomly at an increasing
! rate between 0-15% when the outgoing interface is congested between 50 and 100%.
!
police-two-rate 800 96 950 128 conform-action transmit exceed-action transmit violate-action
transmit
conform-color cos1 exceed-color cos0
exit
exit
!
!Enable WRED drop on traffic classes 0 and 1
!
cos-queue random-detect 0 1
!
! Set the exponential-weighting-constant. The exponential weighting constant smooths
! the result of the average queue depth calculation by the function:
! average depth = (previous queue depth * (1-1/2^n)) + (current queue depth * 1/2^n).
! Because the instantaneous queue depth fluctuates rapidly, larger values will cause
! the average queue depth value to respond to changes more slowly than smaller values.
! The average depth is used in calculating the amount of congestion on a queue.
!
random-detect exponential-weighting-constant 4
!
! Configure the queue parameters for traffic class 0 and 1. Set the minimum threshold and maximum
! thresholds to 80-100% for green traffic, 70-100% for yellow traffic and 50-100% for red traffic.
! Non-TCP traffic drops in the 50-100% congestion range. Green traffic is dropped
! at a very low rate to slowly close the TCP window. Yellow and red traffic
! are dropped more aggressively.
!
random-detect queue-parms 0 1 min-thresh 80 70 50 50 max-thresh 100 100 100 100 drop-prob-scale 3
5 10 15
!
! Assign the color policies to ports. The metering policies are applied on ingress ports.
!
interface 0/22
service-policy in simple-policy
exit
interface 0/23
service-policy in two-rate-policy
exit

```

**Example:** The following example enables WRED discard for non-color aware traffic. Because a color-aware policer is not enabled, the traffic is treated as if it were colored green. This means that only the green TCP and non-TCP WRED thresholds are active.

```

!
! Configure the thresholds for TCP traffic on COS queue 1. The other thresholds are kept at their
! default values.
! The minimum threshold of 50% and maximum threshold of 100% with
! a drop probability of 2% are a good starting point for tuning the WRED
! parameters for a particular network.
!
random-detect queue-parms 1 min-thresh 50 30 20 100 max-thresh 100 90 80 100 drop-prob-scale 2 10
10 10
!
! Enable WRED on cos-queue 1 (the default cos queue).
!
cos-queue random-detect 1

```

**Example:** This example globally configures the switch to utilize ECN marking of packets queued for egress on CoS queues 0 and 1 using the DCTCP threshold as it appears in *DCTCP: Efficient Packet Transport for the Commoditized Data Center*.

The first threshold parameter configures Congestion Enabled TCP packets in CoS queues 0 and 1 that exceed the WRED threshold given below (13%) to be marked as Congestion Experienced with the first ECN parameter. TCP packets without ECN capability bits are dropped according to the normal WRED processing. Packets on other CoS queues are handled in the standard manner, that is, tail dropped when insufficient buffer is available. Yellow and red packet configuration (second and third threshold parameters) is kept at the defaults as no metering to reclassify packets from green to yellow or red is present. The last threshold parameter configures non-TCP packets in CoS queues 0 and 1 to be processed with the WRED defaults. The `ecn` keyword configures CoS queues 0 and 1 for ECN marking. The weighting constant is set to 0 in the second line of the configuration as described in the DCTCP paper cited above. Finally, CoS queues 0 and 1 are configured for WRED as shown in the last line of the configuration.

```
console(config)#random-detect queue-parms 0 1 min-thresh 13 30 20 100 max-thresh 13 90 80 drop-prob-
scale 100 10 10 10 ecn
console(config)#random-detect exponential-weighting-constant 0
console(config)#cos-queue random-detect 0 1
```

**Example:** Enable WRED and ECN on queues 0 and 1, enable WRED on queues 2 and 3.

```
random-detect queue-parms 0 1 min-thresh 13 30 20 100 max-thresh 13 90 80 drop-prob-scale 100 10 10
10 ecn
random-detect queue-parms 2 3 min-thresh 13 30 20 100 max-thresh 13 90 80 drop-prob-scale 100 10 10 10
cos-queue random-detect 0 1 2 3
```

**Example:** Set the WRED parameters to their default values on queues 0 and 1

```
no random-detect queue-parms 0 1
```

### 7.1.11.1 no random-detect queue-parms

Use this command to set the WRED configuration back to the default.

**Format**            `no random-detect queue-parms queue-id-1 [queue-id-2 ... queue-id-n]`

**Modes**

- Global Config
- Interface Config

## 7.1.12 traffic-shape

This command specifies the maximum transmission bandwidth limit for the interface as a whole. The bandwidth values are from 0-100 in increments of 1. You can also specify this value for a range of interfaces or all interfaces. Also known as rate shaping, traffic shaping has the effect of smoothing temporary traffic bursts over time so that the transmitted traffic rate is bounded.

**Format**            `traffic-shape bw`

**Modes**

- Global Config
- Interface Config

### 7.1.12.1 no traffic-shape

This command restores the interface shaping rate to the default value.

**Format**            `no traffic-shape`

**Modes**

- Global Config
- Interface Config

### 7.1.13 show classofservice dot1p-mapping

This command displays the current Dot1p (IEEE 802.1p) priority mapping to internal traffic classes for a specific interface. The *slot/port* parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the IEEE 802.1p mapping table of the interface is displayed. If omitted, the most recent global configuration settings are displayed. For more information, see .

**Format**            show classofservice dot1p-mapping [*slot/port*]

**Mode**             Privileged EXEC

The following information is repeated for each user priority.

| Parameter     | Description                                                                             |
|---------------|-----------------------------------------------------------------------------------------|
| User Priority | The IEEE 802.1p user priority value.                                                    |
| Traffic Class | The traffic class internal queue identifier to which the user priority value is mapped. |

### 7.1.14 show classofservice ip-dscp-mapping

This command displays the current IP DSCP mapping to internal traffic classes for the global configuration settings.

**Format**            show classofservice ip-dscp-mapping

**Mode**             Privileged EXEC

The following information is repeated for each user priority.

| Parameter     | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| IP DSCP       | The IP DSCP value.                                                                |
| Traffic Class | The traffic class internal queue identifier to which the IP DSCP value is mapped. |

### 7.1.15 show classofservice ip-precedence-mapping

This command displays the current IP Precedence mapping to internal traffic classes for a specific interface. The *slot/port* parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the IP Precedence mapping table of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

**Format**            show classofservice ip-precedence-mapping [*slot/port*]

**Mode**             Privileged EXEC

| Parameter     | Description                                                                             |
|---------------|-----------------------------------------------------------------------------------------|
| IP Precedence | The IP Precedence value.                                                                |
| Traffic Class | The traffic class internal queue identifier to which the IP Precedence value is mapped. |

### 7.1.16 show classofservice trust

This command displays the current trust mode setting for a specific interface. The *slot/port* parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If you specify an interface, the command displays the port trust mode of the interface. If you do not specify an interface, the command displays the most recent global configuration settings.

**Format**            show classofservice trust [*slot/port*]

**Mode**             Privileged EXEC

| Parameter                   | Description                                                             |
|-----------------------------|-------------------------------------------------------------------------|
| Class of Service Trust Mode | The the trust mode, which is either Dot1P, IP DSCP, or Untrusted.       |
| Non-IP Traffic Class        | (IP DSCP mode only) The traffic class used for non-IP traffic.          |
| Untrusted Traffic Class     | (Untrusted mode only) The traffic class used for all untrusted traffic. |

### 7.1.17 show interfaces cos-queue

This command displays the class-of-service queue configuration for the specified interface. The *slot/port* parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the class-of-service queue configuration of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

**Format** show interfaces cos-queue [*slot/port*]

**Mode** Privileged EXEC

| Parameter              | Description                                                                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface Shaping Rate | The global interface shaping rate value.                                                                                                                                                                    |
| WRED Decay Exponent    | The global WRED decay exponent value.                                                                                                                                                                       |
| Queue Id               | An interface supports n queues numbered 0 to (n-1). The specific n value is platform dependent.                                                                                                             |
| Minimum Bandwidth      | The minimum transmission bandwidth guarantee for the queue, expressed as a percentage. A value of 0 means bandwidth is not guaranteed and the queue operates using best-effort. This is a configured value. |
| Maximum Bandwidth      | The maximum transmission bandwidth guarantee for the queue, expressed as a percentage. A value of 0 means bandwidth is not guaranteed and the queue operates using best-effort. This is a configured value. |
| Scheduler Type         | Indicates whether this queue is scheduled for transmission using a strict priority or a weighted scheme. This is a configured value.                                                                        |
| Queue Management Type  | The queue depth management technique used for this queue (tail drop).                                                                                                                                       |

If you specify the interface, the command also displays the following information.

| Parameter              | Description                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface              | The <i>slot/port</i> of the interface. If displaying the global configuration, this output line is replaced with a Global Config indication.                                                |
| Interface Shaping Rate | The maximum transmission bandwidth limit for the interface as a whole. It is independent of any per-queue maximum bandwidth values in effect for the interface. This is a configured value. |
| WRED Decay Exponent    | The configured WRED decay exponent for a CoS queue interface.                                                                                                                               |

### 7.1.18 show interfaces random-detect

This command displays the global WRED settings for each CoS queue. If you specify the *slot/port*, the command displays the WRED settings for each CoS queue on the specified interface. Valid interfaces include physical ports and port channels. ECN capability is also displayed.

The per CoS queue display for an interface displays the threshold, drop probability, and ECN capability per color in the order, green, yellow, red, and non-TCP.

**Format** show interfaces random-detect [*slot/port*]

**Mode** Privileged EXEC

| Parameter              | Description                                                                                                                                                                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Queue ID               | An interface supports n queues numbered 0 to (n-1). The specific n value is platform dependent.                                                                                                                                                                                                   |
| WRED Minimum Threshold | The configured minimum threshold the queue depth (as a percentage) where WRED starts marking and dropping traffic.                                                                                                                                                                                |
| WRED Maximum Threshold | The configured maximum threshold is the queue depth (as a percentage) above which WRED marks or drops all traffic.                                                                                                                                                                                |
| WRED Drop Probability  | The configured percentage probability that WRED will mark/drop a packet, when the queue depth is at the maximum threshold. (The drop probability increases linearly from 0 just before the minimum threshold, to this value at the maximum threshold, then goes to 100% for larger queue depths). |
| ECN                    | Identifies whether ECN is enabled.                                                                                                                                                                                                                                                                |

**Example:** This example shows ECN enabled on CoS queues 0 and 1 with a minimum threshold of 40% for green colored packets, 30% for yellow colored packets, 20% for red colored packets and 100% for non-TCP packets.

```
(switch)#show interfaces random-detect
```

```
Global Configuration
Queue ID..... 0
Threshold Units..... Percentage
WRED Minimum Threshold
 Precedence level 0..... 40
 Precedence level 1..... 30
 Precedence level 2..... 20
 Precedence level 3..... 99
WRED Drop Probability
 Precedence level 0..... 10
 Precedence level 1..... 10
 Precedence level 2..... 10
 Precedence level 3..... 10
ECN Enabled..... No

Queue ID..... 1
Threshold Units..... Percentage
WRED Minimum Threshold
 Precedence level 0..... 40
 Precedence level 1..... 30
 Precedence level 2..... 20
 Precedence level 3..... 99
WRED Drop Probability
 Precedence level 0..... 10
 Precedence level 1..... 10
 Precedence level 2..... 10
 Precedence level 3..... 10
ECN Enabled..... No
```

### 7.1.19 show interfaces tail-drop-threshold

This command displays the tail drop threshold information. If you specify the slot/port, the command displays the tail drop threshold information for the specified interface.

**Format**            show interfaces tail-drop-threshold [*slot/port*]

**Mode**             Privileged EXEC

### 7.1.20 protection-group (configure)

This command adds a protection group and/or a name associated to a group. The addition of a protection group has no effect as long as no members are included (interface). Optional a name can be assigned to a protection group with parameter 'name' when adding the group or for an already active group. The length of the name is restricted to 15 char-



acters.

**Format**            `protection-group <0..3>`  
                       `protection-group <0..3> name name`

**Mode**             Global Config

### 7.1.20.1 no protection-group (configure)

This command deletes a protection group and/or a name associated to a group. If deleting a protection group all members of this group are deleted too. The name can be deleted by using the 'no' command with the parameter 'name' (the protection group remains active then). The length of the name is restricted to 15 characters.

**Format**            `no protection-group <0..3>`  
                       `no protection-group <0..3> name name`

**Mode**             Global Config

### 7.1.21 protection-group (interface)

This command includes/excludes interfaces to/from a protection group or sets an egress-mask for an interface.

If an interface is member in a protection group it may sent packets to interfaces which are not member of any group (unprotected) and to interfaces in the same group, but not to interfaces in another group. An egress-mask is calculated based on the protection-groups containing for each interface (bit 0 for first interface) a bit, indicating that it is allowed (1) or prohibited (0) to forward to this interface. The calculated egress-mask can be displayed by "show protection-group mask" below.

The calculated egress-mask may be overridden by setting directly this mask (use parameter "mask"). This is not supported for stacking mode.

For a LAG the minimal egress mask over all member interfaces (either calculated for protection-groups or directly set) is used (<mask-member-1> & ... & <mask-member-N>).

**Format**            `protection-group {<0..3> | mask <mask>}`

**Mode**             Interface Config

#### 7.1.21.1 no protection-group (interface)

The command deletes an interface to a protection group or deletes an egress port mask. The command deletes an egress mask for an interface if specifying the keyword 'mask'.

**Format**            `no protection-group {<0..3> | mask <mask>}`

**Mode**             Interface Config

### 7.1.22 show protection-group

This command lists the protection groups and port egress masks. All or specified protection groups or port egress masks (for all or a specified interface) can be displayed. The protection groups are listed with the interface members, the egress masks are listed related to the calculation type (user specified, related to the protection group or '--' for default).

**Format**            `show protection-group <0..3>`  
                       `show protection-group all`

**Mode**             Privileged EXEC

## 7.2 Differentiated Services Commands

This section describes the commands you use to configure QoS Differentiated Services (DiffServ).

You configure DiffServ in several stages by specifying three DiffServ components:

1. Class
  - a. Creating and deleting classes.
  - b. Defining match criteria for a class.
2. Policy
  - a. Creating and deleting policies
  - b. Associating classes with a policy
  - c. Defining policy statements for a policy/class combination
3. Service
  - a. Adding and removing a policy to/from an inbound interface

The DiffServ class defines the packet filtering criteria. The attributes of a DiffServ policy define the way the switch processes packets. You can define policy attributes on a per-class instance basis. The switch applies these attributes when a match occurs.

Packet processing begins when the switch tests the match criteria for a packet. The switch applies a policy to a packet when it finds a class match within that policy.

The following rules apply when you create a DiffServ class:

- Each class can contain a maximum of one referenced (nested) class
- Class definitions do not support hierarchical service policies

A given class definition can contain a maximum of one reference to another class. You can combine the reference with other match criteria. The referenced class is truly a reference and not a copy since additions to a referenced class affect all classes that reference it. Changes to any class definition currently referenced by any other class must result in valid class definitions for all derived classes, otherwise the switch rejects the change. You can remove a class reference from a class definition.

The only way to remove an individual match criterion from an existing class definition is to delete the class and re-create it.

---

### **NOTICE**

The mark possibilities for policing include CoS, IP DSCP, and IP Precedence. While the latter two are only meaningful for IP packet types, CoS marking is allowed for both IP and non-IP packets, since it updates the IEEE 802.1p user priority field contained in the VLAN tag of the layer 2 packet header.

---

### 7.2.1 `diffserv`

This command sets the DiffServ operational mode to active. While disabled, the DiffServ configuration is retained and can be changed, but it is not activated. When enabled, DiffServ services are activated.

**Format**            `diffserv`  
**Mode**             Global Config

#### 7.2.1.1 `no diffserv`

This command sets the DiffServ operational mode to inactive. While disabled, the DiffServ configuration is retained and can be changed, but it is not activated. When enabled, DiffServ services are activated.

**Format**            `no diffserv`  
**Mode**             Global Config

## 7.3 DiffServ Class Commands

Use the DiffServ class commands to define traffic classification. To classify traffic, you specify Behavior Aggregate (BA), based on DSCP and Multi-Field (MF) classes of traffic (name, match criteria)

This set of commands consists of class creation/deletion and matching, with the class match commands specifying Layer 3, Layer 2, and general match criteria. The class match criteria are also known as class rules, with a class definition consisting of one or more rules to identify the traffic that belongs to the class.

**NOTE:** Once you create a class match criterion for a class, you cannot change or delete the criterion. To change or delete a class match criterion, you must delete and re-create the entire class.

The CLI command root is `class-map`.

### 7.3.1 class-map

This command defines a DiffServ class of type `match-all`. When used without any match condition, this command enters the `class-map` mode. The `class-map-name` is a case sensitive alphanumeric string from 1 to 31 characters uniquely identifying an existing DiffServ class.

---

The class-map-name 'default' is reserved and must not be used.

#### NOTICE

---

The class type of `match-all` indicates all of the individual match conditions must be true for a packet to be considered a member of the class. This command may be used without specifying a class type to enter the Class-Map Config mode for an existing DiffServ class.

#### NOTICE

- The optional keywords [`ipv4` | `ipv6`] specify the Layer 3 protocol for this class. If not specified, this parameter defaults to `ipv4`. This maintains backward compatibility for configurations defined on systems before IPv6 match items were supported. The optional keyword `appiq` creates a new DiffServ `appiq` class. Regular expressions found in the traffic patterns in layer 7 applications can be matched to the App-IQ class using a `match signature` command.
- The CLI mode is changed to Class-Map Config or Ipv6-Class-Map Config when this command is successfully executed depending on the [`ipv4` | `ipv6`] keyword specified.

**Format** `class-map {match-all|match-any} class-map-name [{appiq | ipv4 | ipv6}]`

**Mode** Global Config

| Parameter                   | Description                                                                                                                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>match-all</code>      | For the <code>match-all</code> argument, a given packet needs to match all the rules configured in <code>class-map</code> to get classified as the configured class-map.            |
| <code>match-any</code>      | For the <code>match-any</code> argument, a given packet can match at least one of the rules configured in the <code>class-map</code> to get classified as the configured class-map. |
| <code>class-map-name</code> | A case sensitive alphanumeric string from 1 to 31 characters uniquely identifying a DiffServ class.                                                                                 |

**Example:** This example shows configuring a new class-map with the class-map name `test-class-map`.

```
(Switching) (Config)#class-map match-all test-class-map
(Switching) (Config-classmap)#
(Switching) (Config-classmap)#exit
```

```
(Switching) (Config)#class-map ?
```

```
<class-map-name> Enter an existing DiffServ class name to enter the
 class-map config mode.
match-all Specify class type as all.
match-any Specify class type as any.
```

rename                      Rename a DiffServ Class.

```
(Switching) (Config)#class-map match-all test-class-map-1
(Switching) (Config-classmap)# match ip dscp 36
(Switching) (Config-classmap)# match protocol ip
(Switching) (Config-classmap)# exit

(Switching) (Config)#class-map match-any test-class-map-2
(Switching) (Config-classmap)# match ip dscp 36
(Switching) (Config-classmap)# match protocol ipv6
(Switching) (Config-classmap)# exit

(Switching) (Config)#class-map match-any test-class-map-3
(Switching) (Config-classmap)# match access-group test-access-list-3
(Switching) (Config-classmap)# exit
```

### 7.3.1.1 no class-map

This command eliminates an existing DiffServ class. The *class-map-name* is the name of an existing DiffServ class. (The class name *default* is reserved and is not allowed here.) This command may be issued at any time; if the class is currently referenced by one or more policies or by any other class, the delete action fails.

**Format**            no class-map *class-map-name*  
**Mode**             Global Config

### 7.3.2 class-map rename

This command changes the name of a DiffServ class. The *class-map-name* is the name of an existing DiffServ class. The *new-class-map-name* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the class.

**Default**           none  
**Format**            class-map rename *class-map-name new-class-map-name*  
**Mode**             Global Config

### 7.3.3 match ethertype

This command adds to the specified class definition a match condition based on the value of the ethertype. The *ethertype* value is specified as one of the following keywords: *appletalk*, *arp*, *ibmsna*, *ipv4*, *ipv6*, *ipx*, *mplsmcast*, *mplsucast*, *netbios*, *novell*, *pppoe*, *rarp* or as a custom EtherType value in the range of 0x0600 to 0xFFFF. Use the *[not]* option to negate the match condition.

NOTE:     This command is not available on the Broadcom BCM5630x platform.

**Format**            match *[not]* ethertype {*keyword* | *custom 0x0600-0xFFFF*}  
**Mode**             Class-Map Config

### 7.3.4 match access-group

This command configures for the specified class a match condition based on the configured IPv4 access-list number. The value for *acl-number* is a valid standard or extended ACL in the range from 1 to 199.

NOTE:     The *no* form does not exist for this command.

**Format**            match access-group *acl-number*  
**Mode**             Class-Map Config

### 7.3.5 match access-group name

This command configures for the specified class a match condition based on the name of the configured access-list. The value for *acl-name* is in the range from 1 to 199.

The following notes apply to this command:

- Class-maps containing access-list as match criteria may only be applied to ingress policies.
- The action (mirror, redirect, time-range, etc) clauses in the access-lists referenced by a policy are ignored for the purpose of policy application. The access-lists are used for matching the traffic only.
- The *no* form does not exist for this command.
- IPv4, IPv6, and MAC ACLs can be configured as match criteria using this command.

**Format** match access-group name *acl-name*

**Mode** Class-Map Config

### 7.3.6 match any

This command adds to the specified class definition a match condition whereby all packets are considered to belong to the class. Use the [not] option to negate the match condition.

**Default** none

**Format** match [not] any

**Mode** Class-Map Config

### 7.3.7 match class-map

This command adds to the specified class definition the set of match conditions defined for another class. The *refclassname* is the name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

**Default** none

**Format** match class-map *refclassname*

**Mode** Class-Map Config

---

#### NOTICE

- The parameters *refclassname* and *class-map-name* can not be the same.
  - Only one other class may be referenced by a class.
  - Any attempts to delete the *refclassname* class while the class is still referenced by any *class-map-name* fails.
  - The combined match criteria of *class-map-name* and *refclassname* must be an allowed combination based on the class type.
  - Any subsequent changes to the *refclassname* class match criteria must maintain this validity, or the change attempt fails.
  - The total number of class rules formed by the complete reference class chain (including both predecessor and successor classes) must not exceed a platform-specific maximum. In some cases, each removal of a refclass rule reduces the maximum number of available rules in the class definition by one.
- 

#### 7.3.7.1 no match class-map

This command removes from the specified class definition the set of match conditions defined for another class. The *refclassname* is the name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

**Format** no match class-map *refclassname*

**Mode** Class-Map Config

### 7.3.8 match cos

This command adds to the specified class definition a match condition for the Class of Service value (the only tag in a single tagged packet or the first or outer IEEE 802.1Q tag of a double VLAN tagged packet). The value may be from 0 to 7. Use the `[not]` option to negate the match condition.

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

---

**Default** none  
**Format** match `[not] cos 0-7`  
**Mode** Class-Map Config

### 7.3.9 match secondary-cos

This command adds to the specified class definition a match condition for the secondary Class of Service value (the inner IEEE 802.1Q tag of a double VLAN tagged packet). The value may be from 0 to 7. Use the `[not]` option to negate the match condition.

---

This command is supported on the following platforms:

#### NOTICE

- BCM56314
- BCM56504
- BCM56214
- BCM56224

---

**Default** none  
**Format** match `[not]secondary-cos 0-7`  
**Mode** Class-Map Config

### 7.3.10 match destination-address mac

This command adds to the specified class definition a match condition based on the destination MAC address of a packet. The `macaddr` parameter is any layer 2 MAC address formatted as six, two-digit hexadecimal numbers separated by colons (for example, 00:11:22:dd:ee:ff). The `macmask` parameter is a layer 2 MAC address bit mask, which need not be contiguous, and is formatted as six, two-digit hexadecimal numbers separated by colons (for example, ff:07:23:ff:fe:dc). Use the `[not]` option to negate the match condition.

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

---

**Default** none  
**Format** match `[not] destination-address mac macaddr macmask`  
**Mode** Class-Map Config

### 7.3.11 match dstip

This command adds to the specified class definition a match condition based on the destination IP address of a packet. The `ipaddr` parameter specifies an IP address. The `ipmask` parameter specifies an IP address bit mask and must consist of a contiguous set of leading 1 bits. Use the `[not]` option to negate the match condition.

**Default** none  
**Format** match [not] dstip *ipaddr ipmask*  
**Mode** Class-Map Config

### 7.3.12 match dstip6

This command adds to the specified class definition a match condition based on the destination IPv6 address of a packet. Use the [not] option to negate the match condition.

**Default** none  
**Format** match [not] dstip6 *destination-ipv6-prefix/prefix-length*  
**Mode** Class-Map Config

### 7.3.13 match dstl4port

This command adds to the specified class definition a match condition based on the destination layer 4 port of a packet using a single keyword or numeric notation. To specify the match condition as a single keyword, the value for *portkey* is one of the supported port name keywords. The currently supported *portkey* values are: domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, www. Each of these translates into its equivalent port number. To specify the match condition using a numeric notation, one layer 4 port number is required. The port number is an integer from 0 to 65535. Use the [not] option to negate the match condition.

**Default** none  
**Format** match [not] dstl4port {*portkey* | 0-65535}  
**Mode** Class-Map Config

### 7.3.14 match exp

This command configures for the specified class a match condition based on the MPLS-TP EXP (Traffic Class field) value. The *exp-value* parameter is the MPLS-TP traffic class field value, which has a possible range of 0 to 7.

**Format** match exp *exp-value*  
**Mode** Class-Map Config

#### 7.3.14.1 no match exp

This command removes the MPLS-TP EXP match statement from the class-map.

**Format** no match exp *exp-value*  
**Mode** Class-Map Config

### 7.3.15 match ip dscp

This command adds to the specified class definition a match condition based on the value of the IP DiffServ Code Point (DSCP) field in a packet, which is defined as the high-order 6 bits of the Service Type octet in the IP header (the low-order 2 bits are not checked).

The *dscpval* value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef. Use the [not] option to negate the match condition.

---

#### **NOTICE**

The ip dscp, ip precedence, and ip tos match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.

---

**Default** none  
**Format** match [not] ip dscp *dscpval*  
**Mode** Class-Map Config

### 7.3.16 match ip precedence

This command adds to the specified class definition a match condition based on the value of the IP Precedence field in a packet, which is defined as the high-order three bits of the Service Type octet in the IP header (the low-order five bits are not checked). The precedence value is an integer from 0 to 7. Use the [not] option to negate the match condition.

NOTE: The IP DSCP, IP Precedence, and IP ToS match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.

**Default** none  
**Format** match [not] ip precedence 0-7  
**Mode** Class-Map Config

### 7.3.17 match ip tos

This command adds to the specified class definition a match condition based on the value of the IP TOS field in a packet, which is defined as all eight bits of the Service Type octet in the IP header. The value of *tosbits* is a two-digit hexadecimal number from 00 to ff. The value of *tosmask* is a two-digit hexadecimal number from 00 to ff. The *tosmask* denotes the bit positions in *tosbits* that are used for comparison against the IP TOS field in a packet. For example, to check for an IP TOS value having bits 7 and 5 set and bit 1 clear, where bit 7 is most significant, use a *tosbits* value of a0 (hex) and a *tosmask* of a2 (hex). Use the [not] option to negate the match condition.

#### NOTICE

- The IP DSCP, IP Precedence, and IP ToS match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.
- This "free form" version of the IP DSCP/Precedence/TOS match specification gives the user complete control when specifying which bits of the IP Service Type field are checked.

**Default** none  
**Format** match [not] ip tos *tosbits tosmask*  
**Mode** Class-Map Config

### 7.3.18 match ip6flowlbl

Use this command to enter an IPv6 flow label value. Use the [not] option to negate the match condition.

**Default** none  
**Format** match [not] ip6flowlbl label 0-1048575  
**Mode** Class-Map Config

### 7.3.19 match protocol

This command converts an IPv4 class-map to either an IPv6 class-map (if the argument is *ipv6*) or non-IP class-map (if the argument is *none*).

**Format** match protocol *none|ipv6*  
**Mode** Class-Map Config



---

The `no` form does not exist for this command.

**NOTICE**

### 7.3.20 match protocol

This command adds to the specified class definition a match condition based on the protocol type using a single keyword notation or a numeric value notation.

To specify the match condition using a single keyword, use one of the following: `icmp`, `igmp`, `ip`, `tcp`, `udp`, `ipv6`, `gre`, and `icmpv6`.

To specify the match condition using a numeric value notation, the protocol number is a standard value assigned by IANA and is interpreted as an integer from 0 to 255. Use the `[not]` option to negate the match condition.

**NOTICE**

This command does not validate the protocol number value against the current list defined by IANA.

|                |                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------|
| <b>Default</b> | none                                                                                                      |
| <b>Format</b>  | match <code>[not]</code> protocol {0-255   { icmp   igmp   ip   tcp   udp   ipv6   gre   icmpv6 }   none} |
| <b>Mode</b>    | Class-Map Config                                                                                          |

**Example:** This example shows the process of configuring the protocol type `tcp` for a give class-map `test-class-map`

```
(switch) (Config)#class-map match-all test-class-map
(switch) (Config-classmap)# match protocol tcp
```

### 7.3.21 match source-address mac

This command adds to the specified class definition a match condition based on the source MAC address of a packet. The `address` parameter is any layer 2 MAC address formatted as six, two-digit hexadecimal numbers separated by colons (for example, 00:11:22:dd:ee:ff). The `macmask` parameter is a layer 2 MAC address bit mask, which may not be contiguous, and is formatted as six, two-digit hexadecimal numbers separated by colons (for example, ff:07:23:ff:fe:dc). Use the `[not]` option to negate the match condition.

---

This command is not available on the Broadcom BCM5630x platform.

**NOTICE**

|                |                                                                          |
|----------------|--------------------------------------------------------------------------|
| <b>Default</b> | none                                                                     |
| <b>Format</b>  | match <code>[not]</code> source-address mac <code>address macmask</code> |
| <b>Mode</b>    | Class-Map Config                                                         |

### 7.3.22 match srcip

This command adds to the specified class definition a match condition based on the source IP address of a packet. The `ipaddr` parameter specifies an IP address. The `ipmask` parameter specifies an IP address bit mask and must consist of a contiguous set of leading 1 bits. Use the `[not]` option to negate the match condition.

|                |                                                           |
|----------------|-----------------------------------------------------------|
| <b>Default</b> | none                                                      |
| <b>Format</b>  | match <code>[not]</code> srcip <code>ipaddr ipmask</code> |
| <b>Mode</b>    | Class-Map Config                                          |

### 7.3.23 match srcip6

This command adds to the specified class definition a match condition based on the source IP address of a packet. Use the [not] option to negate the match condition.

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Default</b> | none                                                       |
| <b>Format</b>  | match [not] srcip6 <i>source-ipv6-prefix/prefix-length</i> |
| <b>Mode</b>    | Ipv6-Class-Map Config                                      |

### 7.3.24 match src14port

This command adds to the specified class definition a match condition based on the source layer 4 port of a packet using a single keyword or numeric notation. To specify the match condition as a single keyword notation, the value for *portkey* is one of the supported port name keywords (listed below). The currently supported *portkey* values are: domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, www. Each of these translates into its equivalent port number, which is used as both the start and end of a port range.

To specify the match condition as a numeric value, one layer 4 port number is required. The port number is an integer from 0 to 65535. Use the [not] option to negate the match condition.

|                |                                                   |
|----------------|---------------------------------------------------|
| <b>Default</b> | none                                              |
| <b>Format</b>  | match [not] src14port { <i>portkey</i>   0-65535} |
| <b>Mode</b>    | Class-Map Config                                  |

### 7.3.25 match src port

This command adds a match condition for a range of layer source 4 ports. If an interface receives traffic that is within the configured range of layer 4 source ports, then only the `appiq` class is in effect. *portvalue* specifies a single source port.

|                |                                                                |
|----------------|----------------------------------------------------------------|
| <b>Default</b> | none                                                           |
| <b>Format</b>  | match src port { <i>portstart-portend</i>   <i>portvalue</i> } |
| <b>Mode</b>    | Class-Map Config                                               |

### 7.3.26 match vlan

This command adds to the specified class definition a match condition based on the value of the layer 2 VLAN Identifier field (the only tag in a single tagged packet or the first or outer tag of a double VLAN tagged packet). The VLAN ID is an integer from 0 to 4093. Use the [not] option to negate the match condition.

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

|                |                         |
|----------------|-------------------------|
| <b>Default</b> | none                    |
| <b>Format</b>  | match [not] vlan 0-4093 |
| <b>Mode</b>    | Class-Map Config        |

### 7.3.27 match secondary-vlan

This command adds to the specified class definition a match condition based on the value of the layer 2 secondary VLAN Identifier field (the inner IEEE 802.1Q tag of a double VLAN tagged packet). The secondary VLAN ID is an integer from 0 to 4093. Use the [not] option to negate the match condition.

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

|                |                                   |
|----------------|-----------------------------------|
| <b>Default</b> | none                              |
| <b>Format</b>  | match [not] secondary-vlan 0-4093 |
| <b>Mode</b>    | Class-Map Config                  |

### 7.3.28 match packet-resolution

This command adds to the specific class definition a match condition based on the packet resolution status of Layer 2 destination lookup. The following values are supported:

- Unknown Packet
- Control Packet: Ethertype=0x8808
- BPDU packet (BPDU bit set)
- L2 broadcast packet
- L2 unicast packet
- L2 destination lookup failure (D2DLF) packet
- Unknown IP multicast packet
- Known IP multicast packet
- Known L2 Multicast Packet
- Unknown L2 multicast packet
- Known L3 unicast packet
- Unknown L3 unicast packet
- Known MPLS packet
- Known L3 MPLS packet
- Known L2 MPLS packet
- Unknown MPLS packet

|               |                                  |
|---------------|----------------------------------|
| <b>Format</b> | match packet-resolution <status> |
| <b>Mode</b>   | Class-Map Config                 |

## 7.4 DiffServ Policy Commands

Use the DiffServ policy commands to specify traffic conditioning actions, such as policing and marking, to apply to traffic classes

Use the policy commands to associate a traffic class that you define by using the class command set with one or more QoS policy attributes. Assign the class/policy association to an interface to form a service. Specify the policy name when you create the policy.

Each traffic class defines a particular treatment for packets that match the class definition. You can associate multiple traffic classes with a single policy. When a packet satisfies the conditions of more than one class, preference is based on the order in which you add the classes to the policy. The first class you add has the highest precedence.

This set of commands consists of policy creation/deletion, class addition/removal, and individual policy attributes.

### **NOTICE**

The only way to remove an individual policy attribute from a class instance within a policy is to remove the class instance and re-add it to the policy. The values associated with an existing policy attribute can be changed without removing the class instance.

The CLI command root is `policy-map`.

### 7.4.1 assign-queue

This command modifies the queue id to which the associated traffic stream is assigned. The *queueid* is an integer from 0 to *n*-1, where *n* is the number of egress queues supported by the device.

|                          |                                          |
|--------------------------|------------------------------------------|
| <b>Format</b>            | <code>assign-queue <i>queueid</i></code> |
| <b>Mode</b>              | Policy-Class-Map Config                  |
| <b>Incompatibilities</b> | Drop                                     |

### 7.4.2 drop

This command specifies that all packets for the associated traffic stream are to be dropped at ingress.

|                          |                                                          |
|--------------------------|----------------------------------------------------------|
| <b>Format</b>            | <code>drop</code>                                        |
| <b>Mode</b>              | Policy-Class-Map Config                                  |
| <b>Incompatibilities</b> | Assign Queue, Mark (all forms), Mirror, Police, Redirect |

### 7.4.3 mirror

This command specifies that all incoming packets for the associated traffic stream are copied to a specific egress interface (physical port or LAG).

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

---

|                          |                                      |
|--------------------------|--------------------------------------|
| <b>Format</b>            | <code>mirror <i>slot/port</i></code> |
| <b>Mode</b>              | Policy-Class-Map Config              |
| <b>Incompatibilities</b> | Drop, Redirect                       |

### 7.4.4 redirect

This command specifies that all incoming packets for the associated traffic stream are redirected to a specific egress interface (physical port or port-channel).

---

This command is not available on the Broadcom BCM5630x platform.

#### NOTICE

---

|                          |                                        |
|--------------------------|----------------------------------------|
| <b>Format</b>            | <code>redirect <i>slot/port</i></code> |
| <b>Mode</b>              | Policy-Class-Map Config                |
| <b>Incompatibilities</b> | Drop, Mirror                           |

### 7.4.5 conform-color

Use this command to enable color-aware traffic policing and define the conform-color class map. Used with the `police` command where the fields for the conform level are specified. The *class-map-name* parameter is the name of an existing DiffServ class map.

---

This command may only be used after specifying a `police` command for the policy-class instance.

#### NOTICE

**Format** conform-color *class-map-name*  
**Mode** Policy-Class-Map Config

## 7.4.6 class

This command creates an instance of a class definition within the specified policy for the purpose of defining treatment of the traffic class through subsequent policy attribute statements. The *classname* is the name of an existing DiffServ class.

### NOTICE

- This command causes the specified policy to create a reference to the class definition.
- The CLI mode is changed to Policy-Class-Map Config when this command is successfully executed.

**Format** class *classname*  
**Mode** Policy-Map Config

### 7.4.6.1 no class

This command deletes the instance of a particular class and its defined treatment from the specified policy. *classname* is the names of an existing DiffServ class.

### NOTICE

This command removes the reference to the class definition for the specified policy.

**Format** no class *classname*  
**Mode** Policy-Map Config

## 7.4.7 mark cos

This command marks all packets for the associated traffic stream with the specified class of service (CoS) value in the priority field of the IEEE 802.1p header (the only tag in a single tagged packet or the first or outer IEEE 802.1Q tag of a double VLAN tagged packet). If the packet does not already contain this header, one is inserted. The CoS value is an integer from 0 to 7.

**Default** 1  
**Format** mark-cos *0-7*  
**Mode** Policy-Class-Map Config  
**Incompatibilities** Drop, Mark IP DSCP, IP Precedence, Police

## 7.4.8 mark secondary-cos

This command marks the outer VLAN tags in the packets for the associated traffic stream as secondary CoS.

**Default** 1  
**Format** mark secondary-cos *0-7*  
**Mode** Policy-Class-Map Config  
**Incompatibilities** Drop, Mark IP DSCP, IP Precedence, Police

### 7.4.9 mark cos-as-sec-cos

This command marks outer VLAN tag priority bits of all packets as the inner VLAN tag priority, marking Cos as Secondary CoS. This essentially means that the inner VLAN tag CoS is copied to the outer VLAN tag CoS.

|                          |                                           |
|--------------------------|-------------------------------------------|
| <b>Format</b>            | <code>mark-cos-as-sec-cos</code>          |
| <b>Mode</b>              | Policy-Class-Map Config                   |
| <b>Incompatibilities</b> | Drop, Mark IP DSCP, IP Precedence, Police |

**Example:** The following shows an example of the command.

```
(switch) (Config-policy-classmap)#mark cos-as-sec-cos
```

### 7.4.10 mark ip-dscp

This command marks all packets for the associated traffic stream with the specified IP DSCP value.

The `dscpval` value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef.

|                          |                                            |
|--------------------------|--------------------------------------------|
| <b>Format</b>            | <code>mark ip-dscp dscpval</code>          |
| <b>Mode</b>              | Policy-Class-Map Config                    |
| <b>Incompatibilities</b> | Drop, Mark CoS, Mark IP Precedence, Police |

### 7.4.11 mark ip-precedence

This command marks all packets for the associated traffic stream with the specified IP Precedence value. The IP Precedence value is an integer from 0 to 7.

---

This command may not be used on IPv6 classes. IPv6 does not have a precedence field.

#### NOTICE

|                          |                                            |
|--------------------------|--------------------------------------------|
| <b>Format</b>            | <code>mark ip-precedence 0-7</code>        |
| <b>Mode</b>              | Policy-Class-Map Config                    |
| <b>Incompatibilities</b> | Drop, Mark CoS, Mark IP Precedence, Police |
| <b>Policy Type</b>       | In                                         |

### 7.4.12 police-simple

This command is used to establish the traffic policing style for the specified class. The command can take in values of the data rate as a percentage with the addition of a new option node to specify the unit (either in Kb/s [`rate-kbps`] or as a percentage of the maximum operating speed [`rate-percent`]). The percentage options makes it easier for the user to configure with respect to the operating speed and assess the conform and violate actions for the data rate threshold given.

The simple form of the `police` command uses a single data rate and burst size, resulting in two outcomes: conform and violate. The conforming data rate is specified in kilobits-per-second (Kb/s) and is an integer from 1 to 4294967295. The conforming burst size is specified in kilobytes (KB) and is an integer from 1 to 128.

For each outcome, the only possible actions are drop, set-cos-as-sec-cos, set-cos-transmit, set-sec-cos-transmit, set-dscp-transmit, set-prec-transmit, or transmit. In this simple form of the `police` command, the conform action defaults to transmit and the violate action defaults to drop. These actions can be set with this command once the style has been configured.

For set-dscp-transmit, a `dscpval` value is required and is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef.

For set-prec-transmit, an IP Precedence value is required and is specified as an integer from 0-7.

For set-cos-transmit an IEEE 802.1p priority value is required and is specified as an integer from 0-7.

|                          |                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b>           | By default, <code>police-simple</code> is not configured for any class-map policies.                                                                                                                                                                                                                                                                                                                |
| <b>Format</b>            | <code>police-simple {rate-kbps 1-4294967295   rate-percent 1-100} 1-128 conform-action {drop   set-cos-as-sec-cos   set-cos-transmit 0-7   set-sec-cos-transmit 0-7   set-prec-transmit 0-7   set-dscp-transmit 0-63   transmit} [violate-action {drop   set-cos-as-sec-cos   set-cos-transmit 0-7   set-sec-cos-transmit 0-7   set-prec-transmit 0-7   set-dscp-transmit 0-63   transmit}]}</code> |
| <b>Mode</b>              | Policy-Class-Map Config                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Incompatibilities</b> | Drop, Mark (all forms)                                                                                                                                                                                                                                                                                                                                                                              |

| Parameter    | Description                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| rate-kbps    | The data rate unit is specified in kilobits per second (Kb/s). The range is from 1-4,294,967,295.                                |
| rate-percent | The data rate unit is specified as a percentage of the maximum operating speed in the data transfer. The range is from 1 to 100. |

**Example:** The following example shows a simple police configuration that transmits all the conformed packets below the data rate 40000 Kb/s and drops all the violated packets that are above the data rate.

```
(Routing)(config-policy-classmap)#police-simple rate-kbps ?
```

```
<1-4294967295> Enter an integer in the range of 1 to 4294967295
 specifying conforming data rate in Kbps.
```

```
(Routing)(config-policy-classmap)# police-simple rate-kbps 40000 128 conform-action transmit
violate-action drop
```

**Example:** The following example transmits all the conformed packets below the data-rate 50 percentage of the operating speed, and drops all the violated packets that are above the data rate speed.

```
(Routing)(config-policy-classmap)#police-simple rate-percent ?
```

```
<1-100> Enter an integer in the range of 1 to 100 specifying
 conforming data rate in percentile (of max operating
 speed).
```

```
(Routing)(config-policy-classmap)#police-simple rate-percent 50 128 conform-action transmit
violate-action drop
```

### 7.4.13 police-single-rate

This command is the single-rate form of the `police` command and is used to establish the traffic policing style for the specified class. For each outcome, the only possible actions are drop, set-cos-as-sec-cost, set-cos-transmit, set-sec-cos-transmit, set-dscp-transmit, set-prec-transmit, or transmit. In this single-rate form of the `police` command, the conform action defaults to send, the exceed action defaults to drop, and the violate action defaults to drop. These actions can be set with this command once the style has been configured.

The command can take in values of the data rate as a percentage with the addition of a new option node to specify the unit (either in Kb/s [`rate-kbps`] or as a percentage of the maximum operating speed [`rate-percent`]). The percentage options makes it easier for the user to configure with respect to the operating speed and assess the conform, exceed, and violate actions for the data rate threshold given.

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | By default, <code>police-single-rate</code> is not configured for any class-map policies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Format</b>  | <code>police-single-rate {rate-kbps 1-4294967295   rate-percent 1-100} 1-128 1-128 conform-action {drop   set-cos-as-sec-cos   set-cos-transmit 0-7   set-sec-cos-transmit 0-7   set-prec-transmit 0-7   set-dscp-transmit 0-63   transmit} exceed-action {drop   set-cos-as-sec-cos   set-cos-transmit 0-7   set-sec-cos-transmit 0-7   set-prec-transmit 0-7   set-dscp-transmit 0-63   transmit} [violate-action {drop   set-cos-as-sec-cos-transmit   set-cos-transmit 0-7   set-sec-cos-transmit 0-7   set-prec-transmit 0-7   set-dscp-transmit 0-63   transmit}]}</code> |
| <b>Mode</b>    | Policy-Class-Map Config                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Parameter    | Description                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| rate-kbps    | The data rate unit is specified in kilobits per second (Kb/s). The range is from 1-4,294,967,295.                                |
| rate-percent | The data rate unit is specified as a percentage of the maximum operating speed in the data transfer. The range is from 1 to 100. |

**Example:** The following configuration example transmits all the conformed packets below the data rate 40000 Kb/s and drops all the violated packets that are above the data rate.

```
(Routing)(config-policy-classmap)#police-single-rate rate-kbps ?
```

```
<1-4294967295> Enter an integer in the range of 1 to 4294967295
 specifying conforming data rate in Kbps.
```

```
(Routing)(config-policy-classmap)# police-single-rate rate-kbps 50000 128 128 conform-action
transmit exceed-action transmit violate-action drop
```

**Example:** The following configuration transmits all the conformed packets below the data rate 50 percent of the operating speed, allows the exceeded traffic, and drops all the violated packets that are above the data rate speed.

```
(Routing)(config-policy-classmap)#police-single-rate rate-percent ?
```

```
<1-100> Enter an integer in the range of 1 to 100 specifying
 conforming data rate in percentile (of max operating
 speed).
```

```
(Routing)(config-policy-classmap)#police-single-rate rate-percent 50 128 128 conform-action
transmit exceed-action transmit violate-action drop
```

#### 7.4.14 police-two-rate

This command is the two-rate form of the `police` command and is used to establish the traffic policing style for the specified class. For each outcome, the only possible actions are drop, set-cos-as-sec-cos, set-cos-transmit, set-sec-cos-transmit, set-dscp-transmit, set-prec-transmit, or transmit. In this two-rate form of the `police` command, the conform action defaults to send, the exceed action defaults to drop, and the violate action defaults to drop. These actions can be set with this command once the style has been configured.

The command can take in values of the data rate as a percentage with the addition of a new option node to specify the unit (either in Kb/s [`rate-kbps`] or as a percentage of the maximum operating speed [`rate-percent`]). The percentage options makes it easier for the user to configure with respect to the operating speed and assess the conform, exceed, and violate actions for the data rate threshold given.

**Default** By default, `police-two-rate` is not configured for any class-map policies.

**Format** `police-two-rate {rate-kbps 1-4294967295 | rate-percent 1-100} 1-128 {1-4294967295 | 1-100}1-128 conform-action {drop | set-cos-as-sec-cos | set-cos-transmit 0-7 | set-sec-cos-transmit 0-7 | set-prec-transmit 0-7 | set-dscp-transmit 0-63 | transmit} exceed-action {drop | set-cos-as-sec-cos | set-cos-transmit 0-7 | set-sec-cos-transmit 0-7 | set-prec-transmit 0-7 | set-dscp-transmit 0-63 | transmit} [violate-action {drop | set-cos-as-sec-cos | set-cos-transmit 0-7 | set-sec-cos-transmit 0-7 | set-prec-transmit 0-7 | set-dscp-transmit 0-63 | transmit}]}`

**Mode** Policy-Class-Map Config

| Parameter    | Description                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| rate-kbps    | The data rate unit is specified in kilobits per second (Kb/s). The range is from 1-4,294,967,295.                                |
| rate-percent | The data rate unit is specified as a percentage of the maximum operating speed in the data transfer. The range is from 1 to 100. |

**Example:** The following configuration example transmits all the conformed packets below the data rate 40000 Kb/s and less than the peak-data rate 8000 and drops all the violated packets that are above the data rate.

```
(Routing)(config-policy-classmap)#police-two-rate rate-kbps ?
```



```
<1-4294967295> Enter an integer in the range of 1 to 4294967295
 specifying conforming data rate in Kbps.
```

```
(Routing)(config-policy-classmap)# police-two-rate rate-kbps 50000 128 80000 128 conform-action
transmit exceed-action transmit violate-action drop
```

**Example:** The following configuration transmits all the conformed packets below the data rate 50 percent of the operating speed and less than the peak data rate 80%, allows the exceeded traffic, and drops all the violated packets that are above the data rate speed.

```
(Routing)(config-policy-classmap)#police-two-rate rate-percent ?
<1-100> Enter an integer in the range of 1 to 100 specifying
 conforming data rate in percentile (of max operating
 speed).
```

```
(Routing)(config-policy-classmap)#police-two-rate rate-percent 50 128 80 128 conform-action
transmit exceed-action transmit violate-action drop
```

## 7.4.15 policy-map

This command establishes a new DiffServ policy. The *policyname* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the policy. The type of policy is specific to the inbound traffic direction as indicated by the *in* parameter, or the outbound traffic direction as indicated by the *out* parameter, respectively.

---

The CLI mode is changed to Policy-Map Config when this command is successfully executed.

### NOTICE

**Format**            `policy-map policyname {in|out}`  
**Mode**             Global Config

### 7.4.15.1 no policy-map

This command eliminates an existing DiffServ policy. The *policyname* parameter is the name of an existing DiffServ policy. This command may be issued at any time. If the policy is currently referenced by one or more interface service attachments, this delete attempt fails.

**Format**            `no policy-map policyname`  
**Mode**             Global Config

## 7.4.16 policy-map rename

This command changes the name of a DiffServ policy. The *policyname* is the name of an existing DiffServ class. The *newpolicyname* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the policy.

**Format**            `policy-map rename policyname newpolicyname`  
**Mode**             Global Config

## 7.4.17 egress-mask

This command specifies that all incoming packets of the associated traffic stream are forwarded or dropped on egress side related to the specified egress-mask. The mask consists of bits for each physical interface (interface 0/1 is bit 0).

If a bit is set in the egress-mask it indicates to drop a packet at this interface, otherwise to forward it.

The <mask1> contains bits for interfaces 0/1-0/32, <mask2> for interfaces 0/33-0/64 and <mask3> for interfaces 0/65-0/96 (if applicable). Not specified masks are initialized to 0.

**Format** `egress-mask {<mask1> [<mask2> [<mask3>]}`  
**Mode** Policy-Class-Map Config

## 7.4.18 replace-port-bitmap

This command specifies that all incoming packets of the associated traffic stream are forwarded or dropped on egress side related to the specified bitmap-mask. The mask consists of bits for each physical interface (interface 0/1 is bit 0).

If a bit is set in the bitmap-mask it indicates to forward a packet at this interface, otherwise to drop it.

The <mask1> contains bits for interfaces 0/1-0/32, <mask2> for interfaces 0/33-0/64 and <mask3> for interfaces 0/65-0/96 (if applicable). Not specified masks are initialized to 0.

**Format** `replace-port-bitmap {<mask1> [<mask2> [<mask3>]}`  
**Mode** Policy-Class-Map Config

## 7.5 DiffServ Service Commands

Use the DiffServ service commands to assign a DiffServ traffic conditioning policy, which you specified by using the policy commands, to an interface in the incoming direction. The service commands attach a defined policy to a directional interface. You can assign only one policy at any one time to an interface in the inbound direction. DiffServ is not used in the outbound direction.

This set of commands consists of service addition/removal.

The CLI command root is `service-policy`.

### 7.5.1 service-policy

This command attaches a policy to an interface in the inbound direction as indicated by the `in` parameter, or the outbound direction as indicated by the `out` parameter, respectively. The `policyname` parameter is the name of an existing DiffServ policy. This command causes a service to create a reference to the policy.

#### NOTICE

- This command effectively enables DiffServ on an interface in the inbound direction. There is no separate interface administrative 'mode' command for DiffServ.
- This command fails if any attributes within the policy definition exceed the capabilities of the interface. Once a policy is successfully attached to an interface, any attempt to change the policy definition, that would result in a violation of the interface capabilities, causes the policy change attempt to fail.
- Each interface can have one policy attached.

**Format** `service-policy {in|out} policymapname`  
**Modes**

- Global Config
- Interface Config

#### 7.5.1.1 no service-policy

This command detaches a policy from an interface in the inbound direction as indicated by the `in` parameter, or the outbound direction as indicated by the `out` parameter, respectively. The `policyname` parameter is the name of an existing DiffServ policy.

#### NOTICE

This command causes a service to remove its reference to the policy. This command effectively disables DiffServ on an interface in the inbound direction or an interface in the outbound direction. There is no separate interface administrative 'mode' command for DiffServ.

**Format** `no service-policy {in|out} policymapname`  
**Modes**

- Global Config
- Interface Config

## 7.6 DiffServ Show Commands

Use the DiffServ show commands to display configuration and status information for classes, policies, and services. You can display DiffServ information in summary or detailed formats. The status information is only shown when the DiffServ administrative mode is enabled.

### 7.6.1 show class-map

This command displays all configuration information for the specified class. The *class-map-name* is the name of an existing DiffServ class.

**Format**            `show class-map class-map-name`

**Mode**             Privileged EXEC

If the class-name is specified the following fields are displayed:

| Parameter        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Class Map Name   | A case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying a DiffServ class.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Class Type       | A class type of all means every match criterion defined for the class is evaluated simultaneously and must all be true to indicate a class match.                                                                                                                                                                                                                                                                                                                                                                                                |
| Match Rule Count | Number of match rules configured for the class-map.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Match Criteria   | The Match Criteria fields are only displayed if they have been configured. Not all platforms support all match criteria values. They are displayed in the order entered by the user. The fields are evaluated in accordance with the class type. The possible Match Criteria fields are: Destination IP Address, Destination Layer 4 Port, Destination MAC Address, Ethertype, Source MAC Address, VLAN, Class of Service, Every, IP DSCP, IP Precedence, IP TOS, Protocol Keyword, Reference Class, Source IP Address, and Source Layer 4 Port. |
| Values           | The values of the Match Criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

If you do not specify the Class Name, this command displays a list of all defined DiffServ classes. The following fields are displayed:

| Parameter                | Description                                                                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Class Name               | The name of this class. (Note that the order in which classes are displayed is not necessarily the same order in which they were created.)        |
| Class Type               | A class type of all means every match criterion defined for the class is evaluated simultaneously and must all be true to indicate a class match. |
| ACL ID or Ref Class Name | The name of an existing DiffServ class whose match conditions are being referenced by the specified class definition or access-group name/ID.     |

### 7.6.2 show diffserv

This command displays the DiffServ General Status Group information, which includes the current administrative mode setting as well as the current and maximum number of rows in each of the main DiffServ private MIB tables. This command takes no options.

**Format**            `show diffserv`

**Mode**             Privileged EXEC

| Parameter                              | Description                                                                      |
|----------------------------------------|----------------------------------------------------------------------------------|
| DiffServ Admin mode                    | The current value of the DiffServ administrative mode.                           |
| Class Table Size Current/Max           | The current and maximum number of entries (rows) in the Class Table.             |
| Class Rule Table Size Current/Max      | The current and maximum number of entries (rows) in the Class Rule Table.        |
| Policy Table Size Current/Max          | The current and maximum number of entries (rows) in the Policy Table.            |
| Policy Instance Table Size Current/Max | The current and maximum number of entries (rows) in the Policy Instance Table.   |
| Policy Instance Table Max Current/Max  | The current and maximum number of entries (rows) for the Policy Instance Table.  |
| Policy Attribute Table Max Current/Max | The current and maximum number of entries (rows) for the Policy Attribute Table. |
| Service Table Size Current/Max         | The current and maximum number of entries (rows) in the Service Table.           |

### 7.6.3 show policy-map

This command displays all configuration information for the specified policy. The *polycyname* is the name of an existing DiffServ policy. The parameters displayed for the `show` command for `committed rate` and `peak data rate` in `police simple`, `police single`, and `police two rate` are available in two units: Kb/s and percentile of maximum operating speed.

**Format**            `show policy-map [polycyname]`

**Mode**             Privileged EXEC

If the Policy Name is specified the following fields are displayed:

| Parameter     | Description                                                                        |
|---------------|------------------------------------------------------------------------------------|
| Policy Name   | The name of this policy.                                                           |
| Policy Type   | The policy type (only inbound policy definitions are supported for this platform.) |
| Class Members | The class that is a member of the policy.                                          |

The following information is repeated for each class associated with this policy (only those policy attributes actually configured are displayed).

| Parameter                   | Description                                                                                                                                                                                                                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assign Queue                | Directs traffic stream to the specified QoS queue. This allows a traffic classifier to specify which one of the supported hardware queues are used for handling packets belonging to the class.                                                                                     |
| Class Name                  | The name of this class.                                                                                                                                                                                                                                                             |
| Committed Burst Size (KB)   | The committed burst size, used in simple policing.                                                                                                                                                                                                                                  |
| Committed Rate (Kb/s)       | The committed rate, used in <code>police simple</code> , <code>police single</code> , and <code>police two rate</code> .                                                                                                                                                            |
| Conform Action              | The current setting for the action taken on a packet considered to conform to the policing parameters. This is not displayed if policing is not in use for the class under this policy.                                                                                             |
| Conform Color Mode          | The current setting for the color mode. Policing uses either color blind or color aware mode. Color blind mode ignores the coloration (marking) of the incoming packet. Color aware mode takes into consideration the current packet marking when determining the policing outcome. |
| Conform COS                 | The CoS mark value if the conform action is <code>set-cos-transmit</code> .                                                                                                                                                                                                         |
| Conform DSCP Value          | The DSCP mark value if the conform action is <code>set-dscp-transmit</code> .                                                                                                                                                                                                       |
| Conform IP Precedence Value | The IP Precedence mark value if the conform action is <code>set-prec-transmit</code> .                                                                                                                                                                                              |

| Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drop                            | Drop a packet upon arrival. This is useful for emulating access control list operation using DiffServ, especially when DiffServ and ACL cannot co-exist on the same interface.                                                                                                                                                                                                                                                                                                                                                 |
| Exceed Action                   | The action taken on traffic that exceeds settings that the network administrator specifies.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Exceed Color Mode               | The current setting for the color of exceeding traffic that the user may optionally specify.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Mark CoS                        | The class of service value that is set in the IEEE 802.1p header of inbound packets. This is not displayed if the mark cos was not specified.                                                                                                                                                                                                                                                                                                                                                                                  |
| Mark CoS as Secondary CoS       | The secondary IEEE 802.1p priority value (second/inner VLAN tag. Same as CoS (IEEE 802.1p) marking, but the dot1p value used for remarking is picked from the dot1p value in the secondary (that is, inner) tag of a double-tagged packet.                                                                                                                                                                                                                                                                                     |
| Mark IP DSCP                    | The mark/re-mark value used as the DSCP for traffic matching this class. This is not displayed if mark ip description is not specified.                                                                                                                                                                                                                                                                                                                                                                                        |
| Mark IP Precedence              | The mark/re-mark value used as the IP Precedence for traffic matching this class. This is not displayed if mark ip precedence is not specified.                                                                                                                                                                                                                                                                                                                                                                                |
| Mirror                          | Copies a classified traffic stream to a specified egress port (physical port or LAG). This can occur in addition to any marking or policing action. It may also be specified along with a QoS queue assignment. This field does not display on Broadcom 5630x platforms.                                                                                                                                                                                                                                                       |
| Non-Conform Action              | The current setting for the action taken on a packet considered to not conform to the policing parameters. This is not displayed if policing not in use for the class under this policy.                                                                                                                                                                                                                                                                                                                                       |
| Non-Conform COS                 | The CoS mark value if the non-conform action is set-cos-transmit.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Non-Conform DSCP Value          | The DSCP mark value if the non-conform action is set-dscp-transmit.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Non-Conform IP Precedence Value | The IP Precedence mark value if the non-conform action is set-prec-transmit.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Peak Rate                       | Guarantees a committed rate for transmission, but also transmits excess traffic bursts up to a user-specified peak rate, with the understanding that a downstream network element (such as the next hop's policer) might drop this excess traffic. Traffic is held in queue until it is transmitted or dropped (per type of queue depth management.) Peak rate shaping can be configured for the outgoing transmission stream for an AF (Assured Forwarding) traffic class (although average rate shaping could also be used.) |
| Peak Burst Size                 | (PBS). The network administrator can set the PBS as a means to limit the damage expedited forwarding traffic could inflict on other traffic (for example, a token bucket rate limiter) Traffic that exceeds this limit is discarded.                                                                                                                                                                                                                                                                                           |
| Policing Style                  | The style of policing, if any, used (simple).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Redirect                        | Forces a classified traffic stream to a specified egress port (physical port or LAG). This can occur in addition to any marking or policing action. It may also be specified along with a QoS queue assignment. This field does not display on Broadcom 5630x platforms.                                                                                                                                                                                                                                                       |

If the Policy Name is not specified this command displays a list of all defined DiffServ policies. The following fields are displayed.

| Parameter     | Description                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Policy Name   | The name of this policy. (The order in which the policies are displayed is not necessarily the same order in which they were created.) |
| Policy Type   | The policy type (Only inbound is supported).                                                                                           |
| Class Members | List of all class names associated with this policy.                                                                                   |

**Example:** The following shows example command output, showing Committed Rate and Peak Rate in Kb/s.

```
(Routing)#show policy-map p3
```

```
Policy Name..... p3
Policy Type..... In

Class Name..... c1
Redirect..... Te2/0/20
```

```

Policing Style..... Police Two Rate
Committed Rate (Kbps)..... 50000
Committed Burst Size..... 128
Peak Rate (Kbps)..... 80000
Peak Burst Size..... 128
Conform Action..... Mark IP DSCP
Conform DSCP Value..... 56(cs7)
Exceed Action..... Drop
Non-Conform Action..... Drop
Conform Color Mode..... Blind
Exceed Color Mode..... Blind

```

**Example:** The following shows a second example of command output, showing Committed Rate and Peak Rate as percentages.

```
(Routing)#show policy-map p6
```

```

Policy Name..... p6
Policy Type..... In

Class Name..... c1
Redirect..... Te2/0/20
Policing Style..... Police Two Rate
Committed Rate (%)..... 50
Committed Burst Size..... 128
Peak Rate (%)..... 80
Peak Burst Size..... 128
Conform Action..... Mark IP DSCP
Conform DSCP Value..... 56(cs7)
Exceed Action..... Drop
Non-Conform Action..... Drop
Conform Color Mode..... Blind
Exceed Color Mode..... Blind

```

**Example:** The following shows example CLI display output including the mark-cos-as-sec-cos option specified in the policy action.

```
(Routing) #show policy-map p1
```

```

Policy Name..... p1
Policy Type..... In
Class Name..... c1
Mark CoS as Secondary CoS..... Yes

```

**Example:** The following shows example CLI display output including the mark-cos-as-sec-cos action used in the policing (simple-police, police-single-rate, police two-rate) command.

```
(Routing) #show policy-map p2
```

```

Policy Name..... p2
Policy Type..... In
Class Name..... c2
Policing Style..... Police Two Rate
Committed Rate..... 1
Committed Burst Size..... 1
Peak Rate..... 1
Peak Burst Size..... 1
Conform Action..... Mark CoS as Secondary CoS
Exceed Action..... Mark CoS as Secondary CoS
Non-Conform Action..... Mark CoS as Secondary CoS
Conform Color Mode..... Blind
Exceed Color Mode..... Blind

```

## 7.6.4 show diffserv service

This command displays policy service information for the specified interface and direction. The *slot/port* parameter specifies a valid *slot/port* number for the system.

**Format**            `show diffserv service slot/port in`

**Mode**             Privileged EXEC

| Parameter           | Description                                                                                                                                                            |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DiffServ Admin Mode | The current setting of the DiffServ administrative mode. An attached policy is only in effect on an interface while DiffServ is in an enabled mode.                    |
| Interface           | slot/port                                                                                                                                                              |
| Direction           | The traffic direction of this interface service.                                                                                                                       |
| Operational Status  | The current operational status of this DiffServ service interface.                                                                                                     |
| Policy Name         | The name of the policy attached to the interface in the indicated direction.                                                                                           |
| Policy Details      | Attached policy details, whose content is identical to that described for the <code>show policy-map policyname</code> command (content not repeated here for brevity). |

## 7.6.5 show diffserv service brief

This command displays all interfaces in the system to which a DiffServ policy has been attached. The inbound direction parameter is optional.

**Format**            `show diffserv service brief [in]`

**Mode**             Privileged EXEC

| Parameter     | Description                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| DiffServ Mode | The current setting of the DiffServ administrative mode. An attached policy is only active on an interface while DiffServ is in an enabled mode. |

The following information is repeated for interface and direction (only those interfaces configured with an attached policy are shown).

| Parameter   | Description                                                                  |
|-------------|------------------------------------------------------------------------------|
| Interface   | slot/port                                                                    |
| Direction   | The traffic direction of this interface service.                             |
| OperStatus  | The current operational status of this DiffServ service interface.           |
| Policy Name | The name of the policy attached to the interface in the indicated direction. |

## 7.6.6 show policy-map interface

This command displays policy-oriented statistics information for the specified interface and direction. The *slot/port* parameter specifies a valid interface for the system. Instead of *slot/port*, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number.

**NOTE:** This command is only allowed while the DiffServ administrative mode is enabled.

**Format**            `show policy-map interface slot/port [in]`

**Mode**             Privileged EXEC

| Parameter          | Description                                                        |
|--------------------|--------------------------------------------------------------------|
| Interface          | slot/port                                                          |
| Direction          | The traffic direction of this interface service.                   |
| Operational Status | The current operational status of this DiffServ service interface. |

| Parameter   | Description                                                                  |
|-------------|------------------------------------------------------------------------------|
| Policy Name | The name of the policy attached to the interface in the indicated direction. |

The following information is repeated for each class instance within this policy.

| Parameter            | Description                                                                                                             |
|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| Class Name           | The name of this class instance.                                                                                        |
| In Discarded Packets | A count of the packets discarded for this class instance for any reason due to DiffServ treatment of the traffic class. |
| In Offered Packets   | A count of the inbound offered packets for the specified policy class instance.                                         |

## 7.6.7 show service-policy

This command displays a summary of policy-oriented statistics information for all interfaces in the specified direction.

**Format** show service-policy in

**Mode** Privileged EXEC

The following information is repeated for each interface and direction (only those interfaces configured with an attached policy are shown).

| Parameter          | Description                                                        |
|--------------------|--------------------------------------------------------------------|
| Interface          | slot/port                                                          |
| Operational Status | The current operational status of this DiffServ service interface. |
| Policy Name        | The name of the policy attached to the interface.                  |

## 7.7 MAC Access Control List Commands

This section describes the commands you use to configure MAC Access Control List (ACL) settings. MAC ACLs ensure that only authorized users have access to specific resources and block any unwarranted attempts to reach network resources.

The following rules apply to MAC ACLs:

- The maximum number of ACLs you can create is hardware dependent. The limit applies to all ACLs, regardless of type.
- The system supports only Ethernet II frame types.
- The maximum number of rules per MAC ACL is hardware dependent.
- For the Broadcom 5630x platform, if you configure an IP ACL on an interface, you cannot configure a MAC ACL on the same interface.

### NOTICE

FASTPATH supports ACL counters for MAC, IPv4, and IPv6 access lists. For information about how to enable the counters, see the [access-list counters enable](#) command.

### 7.7.1 mac access-list extended

This command creates a MAC Access Control List (ACL) identified by *name*, consisting of classification fields defined for the Layer 2 header of an Ethernet frame. The *name* parameter is a case-sensitive alphanumeric string from 1 to 255 characters uniquely identifying the MAC access list. The rate-limit attribute configures the committed rate and the committed burst size.

If a MAC ACL by this name already exists, this command enters Mac-Access-List config mode to allow updating the existing MAC ACL.

### NOTICE

The CLI mode changes to Mac-Access-List Config mode when you successfully execute this command.



**Format**            `mac access-list extended name`  
**Mode**             Global Config

### 7.7.1.1 no mac access-list extended

This command deletes a MAC ACL identified by *name* from the system.

**Format**            `no mac access-list extended name`  
**Mode**             Global Config

### 7.7.2 mac access-list extended rename

This command changes the name of a MAC Access Control List (ACL). The *name* parameter is the name of an existing MAC ACL. The *newname* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the MAC access list.

This command fails if a MAC ACL by the name *newname* already exists.

**Format**            `mac access-list extended rename name newname`  
**Mode**             Global Config

### 7.7.3 mac access-list resequence

Use this command to renumber the sequence numbers of the entries for specified MAC access list with the given increment value starting from a particular sequence number. The command is used to edit the sequence numbers of ACL rules in the ACL and change the order in which entries are applied. This command is not saved in startup configuration and is not displayed in running configuration.

#### NOTICE

If the generated sequence number exceeds the maximum sequence number, the ACL rule creation fails and an informational message is displayed.

**Default**            10  
**Format**            `mac access-list resequence {name| id } starting-sequence-number increment`  
**Mode**             Global Config

| Parameter                | Description                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------|
| starting-sequence-number | The sequence number from which to start. The range is 1 to 2,147,483,647. The default is 10. |
| increment                | The amount to increment. The range is 1 to 2,147,483,647. The default is 10.                 |

### 7.7.4 {deny | permit} (MAC ACL)

This command creates a new rule for the current MAC access list. A rule may either deny or permit traffic according to the specified classification fields. At a minimum, the source and destination MAC value must be specified, each of which may be substituted using the keyword *any* to indicate a match on any value in that field. The remaining command parameters are all optional, but the most frequently used parameters appear in the same relative order as shown in the command format.

**Format**            `[sequence-number] {deny|permit} {srcmac | any} {dstmac | any} [ethertypekey | 0x0600-0xFFFF] [vlan {eq 0-4095}] [cos 0-7] [[log] [time-range time-range-name] [assign-queue queue-id] [{mirror | redirect} slot/port][rate-limit rate burst-size] [sflow-remote-agent]`  
**Mode**             Mac-Access-List Config

**NOTICE**

- An implicit deny all MAC rule always terminates the access list.
- For BCM5630x and BCM5650x based systems, assign-queue, redirect, and mirror attributes are configurable for a deny rule, but they have no operational effect.

The sequence-number specifies the sequence number for the ACL rule. The sequence number is specified by the user or is generated by device.

If a sequence number is not specified for the rule, a sequence number that is 10 greater than the last sequence number in ACL is used and this rule is placed in the end of the list. If this is the first ACL rule in the given ACL, a sequence number of 10 is assigned. If the calculated sequence number exceeds the maximum sequence number value, the ACL rule creation fails. A rule cannot be created that duplicates an already existing one and a rule cannot be configured with a sequence number that is already used for another rule.

For example, if user adds new ACL rule to ACL without specifying a sequence number, it is placed at the bottom of the list. By changing the sequence number, the user can move the ACL rule to a different position in the ACL.

The Ethertype may be specified as either a keyword or a four-digit hexadecimal value from 0x0600 to 0xFFFF. The currently supported *ethertypekey* values are: appletalk, arp, ibmsna, ipv4, ipv6, ipx, mplsmcast, mplsucast, netbios, novell, pppoe, rarp. Each of these translates into its equivalent Ethertype values.

**Table 16: Ethertype Keyword and 4-digit Hexadecimal Value**

| Ethertype Keyword | Corresponding Value |
|-------------------|---------------------|
| appletalk         | 0x809B              |
| arp               | 0x0806              |
| ibmsna            | 0x80D5              |
| ipv4              | 0x0800              |
| ipv6              | 0x86DD              |
| ipx               | 0x8037              |
| mplsmcast         | 0x8848              |
| mplsucast         | 0x8847              |
| netbios           | 0x8191              |
| novell            | 0x8137, 0x8138      |
| pppoe             | 0x8863, 0x8864      |
| rarp              | 0x8035              |

The *vlan* and *cos* parameters refer to the VLAN identifier and IEEE 802.1p user priority fields, respectively, of the VLAN tag. For packets containing a double VLAN tag, this is the first (or outer) tag.

The *time-range* parameter allows imposing time limitation on the MAC ACL rule as defined by the parameter *time-range-name*. If a time range with the specified name does not exist and the MAC ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with specified name exists and the MAC ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive. For information about configuring time ranges, see [Section 7.11: "Time Range Commands for Time-Based ACLs"](#).

The *assign-queue* parameter allows specification of a particular hardware queue for handling traffic that matches this rule. The allowed *queue-id* value is 0 to (n-1), where n is the number of user configurable queues available for the hardware platform. The *assign-queue* parameter is valid only for a *permit* rule.

For the Broadcom 5650x platform, the *mirror* parameter allows the traffic matching this rule to be copied to the specified *slot/port*, while the *redirect* parameter allows the traffic matching this rule to be forwarded to the specified *slot/port*. The *assign-queue* and *redirect* parameters are only valid for a *permit* rule.

**NOTICE**

- The *mirror* and *redirect* parameters are not available on the Broadcom 5630x platform.
- The special command form `{deny|permit} any any` is used to match all Ethernet layer 2 packets, and is the equivalent of the IP access list "match every" rule.

The `permit` command's optional attribute `rate-limit` allows you to permit only the allowed rate of traffic as per the configured rate in Kb/s, and burst-size in kbytes.

The `sflow-remote-agent` parameter configures the sFlow sampling action. This action, if configured, copies the packet matching the rule to the remote sFlow agent.

**Example:** The following shows an example of the command.

```
(Routing) (Config)#mac access-list extended mac1
(Routing) (Config-mac-access-list)#permit 00:00:00:00:aa:bb ff:ff:ff:ff:00:00 any rate-limit 32 16
(Routing) (Config-mac-access-list)#exit
```

### 7.7.4.1 no sequence-number

Use this command to remove the ACL rule with the specified sequence number from the ACL.

**Format**            `no sequence-number`

**Mode**             MAC-Access-List Config

### 7.7.5 mac access-group

This command either attaches a specific MAC Access Control List (ACL) identified by *name* to an interface or range of interfaces, or associates it with a VLAN ID, in a given direction. The *name* parameter must be the name of an existing MAC ACL.

An optional sequence number may be specified to indicate the order of this mac access list relative to other mac access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified mac access list replaces the currently attached mac access list using that sequence number. If the sequence number is not specified for this command, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used.

This command specified in Interface Config mode only affects a single interface, whereas the Global Config mode setting is applied to all interfaces. The VLAN keyword is only valid in the Global Config mode. The Interface Config mode command is only available on platforms that support independent per-port class of service queue configuration.

An optional control-plane is specified to apply the MAC ACL on CPU port. The control packets like BPDU are also dropped because of the implicit deny all rule added to the end of the list. To overcome this, permit rules must be added to allow the control packets.

**NOTICE**

- The keyword `control-plane` is only available in Global Config mode.
- You should be aware that the `out` option may or may not be available, depending on the platform.

**Format**            `mac access-group name {{control-plane/in|out} vlan vlan-id {in|out}}`  
                       `[sequence 1-4294967295]`

**Modes**            • Global Config  
                       • Interface Config

| Parameter | Description                                                                                                                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| name      | The name of the Access Control List.                                                                                                                                                                |
| sequence  | A optional sequence number that indicates the order of this IP access list relative to the other IP access lists already assigned to this interface and direction. The range is 1 to 4,294,967,295. |
| vlan-id   | A VLAN ID associated with a specific IP ACL in a given direction.                                                                                                                                   |

**Example:** The following shows an example of the command.

```
(Routing)(Config)#mac access-group mac1 control-plane
```

### 7.7.5.1 no mac access-group

This command removes a MAC ACL identified by *name* from the interface in a given direction.

**Format** no mac access-group *name* {{*control-plane*|in|out} vlan *vlan-id* {in|out}}

- Modes**
- Global Config
  - Interface Config

**Example:** The following shows an example of the command.

```
(Routing)(Config)#no mac access-group mac1 control-plane
```

### 7.7.6 remark

This command adds a new comment to the ACL rule.

Use the remark keyword to add comments (remarks) to ACL rule entries belonging to an IPv4, IPv6, MAC, or ARP ACL. Up to L7\_ACL\_MAX\_RULES\_PER\_LIST\*10 remarks per ACL and up to 10 remarks per ACL rule can be configured. Also, up to L7\_ACL\_MAX\_RULES\*2 remarks for all QOS ACLs(IPv4/IPv6/MAC) for device can be configured. The total length of the remark cannot exceed 100 characters. A remark can contain characters in the range A to Z, a to z, 0 to 9, and special characters like space, hyphen, underscore. Remarks are associated to the ACL rule that is immediately created after the remarks are created. If the ACL rule is removed, the associated remarks are also deleted. Remarks are shown only in show running-config and are not displayed in show ip access-lists.

Remarks can only be added before creating the rule. If a user creates up to 10 remarks, each of them is linked to the next created rule.

**Default** none

**Format** remark *comment*

- Mode**
- IPv4-Access-List Config
  - IPv6-Access-List-Config
  - MAC-Access-List Config
  - ARP-Access-List Config

**Example:** The following shows an example of the command.

```
(Config)#arp access-list new
(Config-arp-access-list)#remark "test1"
(Config-arp-access-list)#permit ip host 1.1.1.1 mac host 00:01:02:03:04:05
(Config-arp-access-list)#remark "test1"
(Config-arp-access-list)#remark "test2"
(Config-arp-access-list)#remark "test3"
(Config-arp-access-list)#permit ip host 1.1.1.2 mac host 00:03:04:05:06:07
(Config-arp-access-list)#permit ip host 2.1.1.2 mac host 00:03:04:05:06:08
(Config-arp-access-list)#remark "test4"
(Config-arp-access-list)#remark "test5"
(Config-arp-access-list)#permit ip host 2.1.1.3 mac host 00:03:04:05:06:01
```

#### 7.7.6.1 no remark

Use this command to remove a remark from an ACL access-list. When the first occurrence of the remark in ACL is found, the remark is deleted. Repeated execution of this command with the same remark removes the remark from the next ACL rule that has the remark associated with it (if there is any rule configured with the same remark). If there are no more rules with this remark, an error message is displayed. If there is no such remark associated with any rule and such remark is among not associated remarks, it is removed.

|                |                                                                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | none                                                                                                                                                                               |
| <b>Format</b>  | no remark <i>comment</i>                                                                                                                                                           |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• IPv4-Access-List Config</li> <li>• IPv6-Access-List-Config</li> <li>• MAC-Access-List Config</li> <li>• ARP-Access-List Config</li> </ul> |

### 7.7.7 show mac access-lists

This command displays summary information for all Mac Access lists and ACL rule hit count of packets matching the configured ACL rule within an ACL. This counter value rolls-over on reaching the maximum value. There is a dedicated counter for each ACL rule. ACL counters do not interact with PBR counters.

For ACL with multiple rules, once a match occurs at any one specific rule, counters associated with this rule only get incremented (for example, consider an ACL with three rules, after matching rule two, counters for rule three would not be incremented).

For ACL counters, If an ACL rule is configured without RATE-LIMIT, the counter value is count of forwarded/discarded packets. (For example: For a burst of 100 packets, the Counter value is 100.)

If the ACL rule is configured with RATE LIMIT, the counter value is the MATCHED packet count. If the sent traffic rate exceeds the configured limit, the counters still display matched packet count (despite getting dropped beyond the configured limit since match criteria is met) which would equal the sent rate. For example, if rate limit is set to 10 Kb/s and matching traffic is sent at 100 Kb/s, counters reflect a 100 Kb/s value. If the sent traffic rate is less than the configured limit, counters display only the matched packet count. Either way, only the matched packet count is reflected in the counters, irrespective of whether they get dropped or forwarded. ACL counters do not interact with diffserv policies.

Use the access list name to display detailed information of a specific MAC ACL.

---

The command output varies based on the match criteria configured within the rules of an ACL.

#### NOTICE

The command displays downloadable MAC ACLs. When access-list is configured as downloadable ACL, the `show mac access-lists` command displays an additional tag (#d) next to the original ACL name. The downloadable MAC ACLs are shown only in the `show mac access-lists` command, and is not displayed in the `show running-config` command. For example, if the ACL is created with the name `dynacl`, this command displays the ACL name as `dynacl#d`.

The output of the `show mac access-lists` command is enhanced to display up to 255 length character ACL names.

|               |                                           |
|---------------|-------------------------------------------|
| <b>Format</b> | <code>show mac access-lists [name]</code> |
| <b>Mode</b>   | Privileged EXEC                           |

| Parameter               | Description                                                                   |
|-------------------------|-------------------------------------------------------------------------------|
| ACL Name                | The user-configured name of the ACL.                                          |
| ACL Counters            | Identifies whether the ACL counters are enabled or disabled.                  |
| Interfaces              | The inbound or outbound interfaces to which the ACL is applied.               |
| Sequence Number         | The ordered rule number identifier defined within the MAC ACL.                |
| Action                  | The action associated with each rule. The possible values are Permit or Deny. |
| Source MAC Address      | The source MAC address for this rule.                                         |
| Source MAC Mask         | The source MAC mask for this rule.                                            |
| Committed Rate          | The committed rate defined by the rate-limit attribute.                       |
| Committed Burst Size    | The committed burst size defined by the rate-limit attribute.                 |
| Destination MAC Address | The destination MAC address for this rule.                                    |
| Ethertype               | The Ethertype keyword or custom value for this rule.                          |

| Parameter          | Description                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| VLAN ID            | The VLAN identifier value or range for this rule.                                                                                                        |
| COS                | The COS (IEEE 802.1p) value for this rule.                                                                                                               |
| Log                | Displays when you enable logging for the rule.                                                                                                           |
| Assign Queue       | The queue identifier to which packets matching this rule are assigned.                                                                                   |
| Mirror Interface   | On Broadcom 5650x platforms, the unit/slot/port to which packets matching this rule are copied.                                                          |
| Redirect Interface | On Broadcom 5650x platforms, the <i>slot/port</i> to which packets matching this rule are forwarded.                                                     |
| sflow-remote-agent | Indicates whether the sFlow sampling action is configured.<br>This action, if configured, copies the packet matching the rule to the remote sFlow agent. |
| Time Range Name    | Displays the name of the time-range if the MAC ACL rule has referenced a time range.                                                                     |
| Rule Status        | Status (Active/Inactive) of the MAC ACL rule.                                                                                                            |
| ACL hit count      | The ACL rule hit count of packets matching the configured ACL rule within an ACL.                                                                        |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show mac access-lists mac1
```

```
ACL Name: mac1
ACL Counters: Enabled
```

```
Outbound Interfaces: control-plane
```

```
Sequence Number: 10
Action.....permit
Source MAC Address..... 00:00:00:00:AA:BB
Source MAC Mask.....FF:FF:FF:FF:00:00
Committed Rate.....32
Committed Burst Size.....16
ACL hit count0
```

```
Sequence Number: 25
Action.....permit
Source MAC Address..... 00:00:00:00:AA:BB
Source MAC Mask.....FF:FF:FF:FF:00:00
Destination MAC Address..... 01:80:C2:00:00:00
Destination MAC Mask.....00:00:00:FF:FF:FF
Ethertype.....ipv6
VLAN.....36
CoS Value.....7
Assign Queue.....4
Redirect Interface.....0/34
sflow-remote-agent.....TRUE
Committed Rate.....32
Committed Burst Size.....16
ACL hit count0
```

**Example:** The following example shows sample output of 255 length character ACL name.

```
(dhcp-10-52-142-182)#show mac access-lists
```

```
ACL Counters: Enabled
Current number of all ACLs: 20 Maximum number of all ACLs: 100
```

```
MAC ACL Name Rules Direction Interface(s) VLAN(s)

y-12345678912345678912345678912345678912
3456789123456789123456789123456
7891234567891234567891234567891
2345678912345678912345678912345
6789123456789123456789123456789
```

```
1234567891234567891234567891234
5678912345678912345678912345678
9123456789123456789123456789123
4567891 0
```

## 7.8 IP Access Control List Commands

This section describes the commands you use to configure IP Access Control List (ACL) settings. IP ACLs ensure that only authorized users have access to specific resources and block any unwarranted attempts to reach network resources.

The following rules apply to IP ACLs:

- FASTPATH software does not support IP ACL configuration for IP packet fragments.
- The maximum number of ACLs you can create is hardware dependent. The limit applies to all ACLs, regardless of type.
- The maximum number of rules per IP ACL is hardware dependent.
- On Broadcom 5630x platforms, if you configure a MAC ACL on an interface, you cannot configure an IP ACL on the same interface.
- Wildcard masking for ACLs operates differently from a subnet mask. A wildcard mask is in essence the inverse of a subnet mask. With a subnet mask, the mask has ones (1's) in the bit positions that are used for the network address, and has zeros (0's) for the bit positions that are not used. In contrast, a wildcard mask has (0's) in a bit position that must be checked. A 1 in a bit position of the ACL mask indicates the corresponding bit can be ignored.

### 7.8.1 access-list

This command creates an IP Access Control List (ACL) that is identified by the access list number, which is 1-99 for standard ACLs or 100-199 for extended ACLs. Table 17, "ACL Command Parameters," on page 840 describes the parameters for the `access-list` command.

IP Standard ACL:

**Format**      `access-list 1-99 {remark comment} | {[sequence-number]} ] {deny | permit} {every | srcip srcmask | host srcip} [time-range time-range-name] [log] [assign-queue queue-id] [{mirror | redirect} slot/port] [rate-limit rate burst-size]`

**Mode**        Global Config

IP Extended ACL:

**Format**      `access-list 100-199 {remark comment} | {[sequence-number]} [rule 1-1023] {deny | permit} {every | {{eigrp | gre | icmp | igmp | ip | ipinip | ospf | pim | tcp | udp | 0-255} {srcip srcmask|any|host srcip}[range {portkey|startport} {portkey|endport} {eq|neq|lt|gt} {portkey|0-65535}{dstip dstmask|any|host dstip}]{range {portkey|startport} {portkey|endport} | {eq | neq | lt | gt} {portkey | 0-65535} ] [flag [+fin | -fin] [+syn | -syn] [+rst | -rst] [+psh | -psh] [+ack | -ack] [+urg | -urg] [established]] [icmp-type icmp-type [icmp-code icmp-code] | icmp-message icmp-message] [igmp-type igmp-type] [fragments] [precedence precedence | tos tos [tosmask] | dscp dscp]]} [time-range time-range-name] [log] [assign-queue queue-id] [{mirror | redirect} slot/port] [rate-limit rate burst-size] [sflow-remote-agent]`

**Mode**        Global Config

---

IPv4 extended ACLs have the following limitations for egress ACLs:

#### NOTICE

- Match on port ranges is not supported.
  - The rate-limit command is not supported.
-

Table 17: ACL Command Parameters

| Parameter                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| remark comment                                                                       | Use the remark keyword to add a comment (remark) to an IP standard or IP extended ACL. The remarks make the ACL easier to understand and scan. Each remark is limited to 100 characters. A remark can consist of characters in the range A to Z, a to z, 0 to 9, and special characters: space, hyphen, underscore. Remarks are displayed only in show running configuration. One remark per rule can be added for IP standard or IP extended ACL. User can remove only remarks that are not associated with a rule. Remarks associated with a rule are removed when the rule is removed                                                                                                                                                                                                                                                                                                                                                                               |
| sequence-number                                                                      | Specifies a sequence number for the ACL rule. Every rule receives a sequence number. A sequence number is specified by the user or is generated by the device.<br>If a sequence number is not specified for the rule, a sequence number that is 10 greater than the last sequence number in the ACL is used and this rule is located in the end of the list. If this is the first ACL rule in the given ACL, a sequence number of 10 is assigned. If the calculated sequence number exceeds the maximum sequence number value, the ACL rule creation fails.<br>It is not allowed to create a rule that duplicates an already existing one and a rule cannot be configured with a sequence number that is already used for another rule.<br>For example, if user adds new ACL rule to ACL without specifying a sequence number, it is placed at the bottom of the list. By changing the sequence number, user can move the ACL rule to a different position in the ACL. |
| 1-99 or 100-199                                                                      | Range 1 to 99 is the access list number for an IP standard ACL. Range 100 to 199 is the access list number for an IP extended ACL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| [rule 1-1023]                                                                        | Specifies the IP access list rule.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| {deny   permit}                                                                      | Specifies whether the IP ACL rule permits or denies an action.<br><b>Note:</b> For 5630x and 5650x-based systems, assign-queue, redirect, and mirror attributes are configurable for a deny rule, but they have no operational effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| every                                                                                | Match every packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| {eigrp   gre   icmp  <br>igmp   ip   ipinip   ospf<br>  pim   tcp   udp   0-<br>255} | Specifies the protocol to filter for an extended IP ACL rule.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| srcip src-<br>mask any host scrip                                                    | Specifies a source IP address and source netmask for match condition of the IP ACL rule.<br>Specifying any specifies srcip as 0.0.0.0 and srcmask as 255.255.255.255.<br>Specifying host A.B.C.D specifies srcip as A.B.C.D and srcmask as 0.0.0.0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



Table 17: ACL Command Parameters (Continued)

| Parameter                                                                                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>{{range{portkey startport}{portkey endport} {eq neq lt gt} {portkey   0-65535}}]</code>                                            | <p><b>Note:</b> This option is available only if the protocol is TCP or UDP.</p> <p>Specifies the source layer 4 port match condition for the IP ACL rule. You can use the port number, which ranges from 0-65535, or you specify the <i>portkey</i>, which can be one of the following keywords:</p> <ul style="list-style-type: none"> <li>For TCP: <i>domain, echo, ftp, ftp-data, http, smtp, telnet, www, pop2, pop3.</i></li> <li>For UDP: <i>domain, echo, ntp, rip, snmp, tftp, time, and who.</i></li> </ul> <p>For both TCP and UDP, each of these keywords translates into its equivalent port number, which is used as both the start and end of a port range.</p> <p>If range is specified, the IP ACL rule matches only if the layer 4 port number falls within the specified portrange. The startport and endport parameters identify the first and last ports that are part of the port range. They have values from 0 to 65535. The ending port must have a value equal or greater than the starting port. The starting port, ending port, and all ports in between will be part of the layer 4 port range.</p> <p>When eq is specified, the IP ACL rule matches only if the layer 4 port number is equal to the specified port number or portkey.</p> <p>When lt is specified, IP ACL rule matches if the layer 4 port number is less than the specified port number or portkey. It is equivalent to specifying the range as 0 to &lt;specified port number - 1&gt;.</p> <p>When gt is specified, the IP ACL rule matches if the layer 4 port number is greater than the specified port number or portkey. It is equivalent to specifying the range as &lt;specified port number + 1&gt; to 65535.</p> <p>When neq is specified, IP ACL rule matches only if the layer 4 port number is not equal to the specified port number or portkey.</p> <p>Two rules are added in the hardware one with range equal to 0 to &lt;specified port number - 1&gt; and one with range equal to &lt;&lt;specified port number + 1 to 65535&gt;&gt;</p> <p><b>Note:</b> Port number matches only apply to unfragmented or first fragments.</p> |
| <code>dstip<br/>dstmask [any host<br/>dstip</code>                                                                                       | <p>Specifies a destination IP address and netmask for match condition of the IP ACL rule.</p> <p>Specifying any implies specifying dstip as 0.0.0.0 and dstmask as 255.255.255.255.</p> <p>Specifying host A.B.C.D implies dstip as A.B.C.D and dstmask as 0.0.0.0.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>[precedence<br/>precedence   tos<br/>tos [tosmask]  <br/>dscp dscp]</code>                                                         | <p>Specifies the TOS for an IP ACL rule depending on a match of precedence or DSCP values using the parameters <i>dscp, precedence, tos/tosmask.</i></p> <p><b>Note:</b> <i>tosmask</i> is an optional parameter.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <code>flag [+fin   -fin]<br/>[+syn   -syn] [+rst<br/>  -rst] [+psh   -<br/>psh] [+ack   -ack]<br/>[+urg   -urg]<br/>[established]</code> | <p><b>Note:</b> This option is available only if the protocol is tcp.</p> <p>Specifies that the IP ACL rule matches on the TCP flags.</p> <p>When +&lt;tcpflagname&gt; is specified, a match occurs if the specified &lt;tcpflagname&gt; flag is set in the TCP header.</p> <p>When -&lt;tcpflagname&gt; is specified, a match occurs if the specified &lt;tcpflagname&gt; flag is *NOT* set in the TCP header.</p> <p>When established is specified, a match occurs if the specified RST or ACK bits are set in the TCP header. Two rules are installed in the hardware when the established option is specified.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>[icmp-type icmp-<br/>type [icmp-code<br/>icmp-code]   icmp-<br/>message icmp-<br/>message]</code>                                  | <p><b>Note:</b> This option is available only if the protocol is icmp.</p> <p>Specifies a match condition for ICMP packets.</p> <p>When icmp-type is specified, the IP ACL rule matches on the specified ICMP message type, a number from 0 to 255.</p> <p>When icmp-code is specified, the IP ACL rule matches on the specified ICMP message code, a number from 0 to 255.</p> <p>Specifying icmp-message implies that both icmp-type and icmp-code are specified. The following icmp-messages are supported: <i>echo, echo-reply, host-redirect, mobile-redirect, net-redirect, net-unreachable, redirect, packet-too-big, port-unreachable, source-quench, router-solicitation, router-advertisement, time-exceeded, ttl-exceeded</i> and <i>unreachable.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

Table 17: ACL Command Parameters (Continued)

| Parameter                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>igmp-type igmp-type</code>             | This option is available only if the protocol is igmp.<br>When <code>igmp-type</code> is specified, the IP ACL rule matches on the specified IGMP message type, a number from 0 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>fragments</code>                       | Specifies that the IP ACL rule matches on fragmented IP packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <code>[log]</code>                           | Specifies that this rule is to be logged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <code>[time-range time-range-name]</code>    | Allows imposing time limitation on the ACL rule as defined by the parameter <code>time-range-name</code> . If a time range with the specified name does not exist and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with specified name exists and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive. For information about configuring time ranges, see <a href="#">Section 7.11: "Time Range Commands for Time-Based ACLs"</a> . |
| <code>[assign-queue queue-id]</code>         | Specifies the assign-queue, which is the queue identifier to which packets matching this rule are assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>[{mirror   redirect} slot/port]</code> | For Broadcom 5650x platforms, specifies the mirror or redirect interface which is the <code>slot/port</code> to which packets matching this rule are copied or forwarded, respectively. The <code>mirror</code> and <code>redirect</code> parameters are not available on the Broadcom 5630x platform.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>[rate-limit rate burst-size]</code>    | Specifies the allowed rate of traffic as per the configured rate in Kb/s, and burst-size in kbytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>[sflow-remote-agent]</code>            | Configures the sFlow sampling action.<br>This action, if configured, copies the packet matching the rule to the remote sFlow agent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### 7.8.1.1 no access-list

This command deletes an IP ACL that is identified by the parameter `accesslistnumber` from the system. The range for `accesslistnumber` 1 to 99 for standard access lists and 100 to 199 for extended access lists.

**Format** `no access-list accesslistnumber [rule 1-1023]`

**Mode** Global Config

### 7.8.2 access-list counters enable

Use this command to enable ACL counters for IPv4, IPv6, and MAC access lists.

**Default** enabled

**Format** `access-list counters enable`

**Mode** Global Config

#### 7.8.2.1 no access-list counters enable

Use this command to disable ACL counters for IPv4, IPv6, and MAC access lists.

**Format** `no access-list counters enable`

**Mode** Global Config

## 7.8.3 ip access-list

This command creates an extended IP Access Control List (ACL) identified by name, consisting of classification fields defined for the IP header of an IPv4 frame. The name parameter is a case-sensitive alphanumeric string from 1 to 255 characters uniquely identifying the IP access list. The rate-limit attribute configures the committed rate and the committed burst size.

If an IP ACL by this name already exists, this command enters IPv4-Access\_List config mode to allow updating the existing IP ACL.

### NOTICE

The CLI mode changes to IPv4-Access-List config mode when you successfully execute this command.

**Format** ip access-list *name*

**Mode** Global Config

### 7.8.3.1 no ip access-list

This command deletes the IP ACL identified by name from the system.

**Format** no ip access-list *name*

**Mode** Global Config

## 7.8.4 ip access-list rename

This command changes the name of an IP Access Control List (ACL). The name parameter is the names of an existing IP ACL. The newname parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the IP access list.

This command fails if an IP ACL by the name newname already exists.

**Format** ip access-list rename *name newname*

**Mode** Global Config

## 7.8.5 ip access-list resequence

Use this command to renumber the sequence numbers of the entries for specified IP access list with the given increment value starting from a particular sequence number. The command is used to edit the sequence numbers of ACL rules in the ACL and change the order in which entries are applied. This command is not saved in startup configuration and is not displayed in running configuration.

### NOTICE

If the generated sequence number exceeds the maximum sequence number, the ACL rule creation fails and an informational message is displayed.

**Default** 10

**Format** ip access-list resequence {*name* | *id*} *starting-sequence-number increment*

**Mode** Global Config

| Parameter                | Description                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------|
| starting-sequence-number | The sequence number from which to start. The range is 1 to 2,147,483,647. The default is 10. |
| increment                | The amount to increment. The range is 1 to 2,147,483,647. The default is 10.                 |

## 7.8.6 {deny | permit} (IP ACL)

This command creates a new rule for the current IP access list. A rule may either deny or permit traffic according to the specified classification fields. At a minimum, either the every keyword or the protocol, source address, and destination address values must be specified. The source and destination IP address fields may be specified using the keyword `any` to indicate a match on any value in that field. The remaining command parameters are all optional, but the most frequently used parameters appear in the same relative order as shown in the command format.

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>[sequence-number] {deny   permit} {every   {{eigrp   gre   icmp   igmp   ip   ipinip   ospf   pim   tcp   udp   0 -255} {srcip srcmask   any   host srcip} [{range {portkey   startport} {portkey   endport}   {eq   neq   lt   gt} {portkey   0-65535} ] {dstip dstmask   any   host dstip} [{range {portkey   startport} {portkey   endport}   {eq   neq   lt   gt} {portkey   0-65535} ] [flag [+fin   -fin] [+syn   -syn] [+rst   -rst] [+psh   -psh] [+ack   -ack] [+urg   -urg] [established]] [icmp-type icmp-type [icmp-code icmp-code]   icmp-message icmp-message] [igmp-type igmp-type] [fragments] [precedence precedence   tos tos [tosmask]   dscp dscp] [ttl eq 0-255]}} [time-range time-range-name] [log] [assign-queue queue-id] [{mirror   redirect} slot/port] [rate-limit rate burst-size] [slow-remote-agent]</code> |
| <b>Mode</b>   | Ipv4-Access-List Config                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### NOTICE

- An implicit deny all IP rule always terminates the access list.
- For BCM5630x-based systems, the `mirror` and `redirect` parameters are not available.
- For BCM5650x-based systems, the `mirror` parameter allows the traffic matching this rule to be copied to the specified `slot/port`, while the `redirect` parameter allows the traffic matching this rule to be forwarded to the specified `slot/port`. The `assign-queue` and `redirect` parameters are only valid for a `permit` rule.

For IPv4, a match on port ranges is not supported for egress ACLs.

### NOTICE

The `time-range` parameter allows imposing time limitation on the IP ACL rule as defined by the specified time range. If a time range with the specified name does not exist and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with specified name exists and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive. For information about configuring time ranges, see [Section 7.11: "Time Range Commands for Time-Based ACLs"](#).

The `assign-queue` parameter allows specification of a particular hardware queue for handling traffic that matches this rule. The allowed `queue-id` value is 0 to (n-1), where n is the number of user configurable queues available for the hardware platform. The `assign-queue` parameter is valid only for a `permit` rule.

The `permit` command's optional attribute `rate-limit` allows you to permit only the allowed rate of traffic as per the configured rate in Kb/s, and `burst-size` in kbytes.

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sequence-number | The sequence-number specifies the sequence number for the ACL rule. The sequence number is specified by the user or is generated by device.<br><br>If a sequence number is not specified for the rule, a sequence number that is 10 greater than the last sequence number in ACL is used and this rule is placed at the end of the list. If this is the first ACL rule in the given ACL, a sequence number of 10 is assigned. If the calculated sequence number exceeds the maximum sequence number value, the ACL rule creation fails. A rule cannot be created that duplicates an already existing one and a rule cannot be configured with a sequence number that is already used for another rule.<br><br>For example, if user adds new ACL rule to ACL without specifying a sequence number, it is placed at the bottom of the list. By changing the sequence number, the user can move the ACL rule to a different position in the ACL. |
| {deny   permit} | Specifies whether the IP ACL rule permits or denies the matching traffic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Every           | Match every packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Parameter                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| {eigrp   gre   icmp   igmp   ip   ipinip   ospf   pim   tcp   udp   0-255}                             | Specifies the protocol to match for the IP ACL rule.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| srcip srcmask   any   host srcip                                                                       | Specifies a source IP address and source netmask to match for the IP ACL rule.<br>Specifying "any" implies specifying srcip as "0.0.0.0" and srcmask as "255.255.255.255".<br>Specifying "host A.B.C.D" implies srcip as "A.B.C.D" and srcmask as "0.0.0.0".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| [{range {portkey   startport} {portkey   endport}   {eq   neq   lt   gt} {portkey   0-65535} ]         | This option is available only if the protocol is tcp or udp.<br>Specifies the layer 4 port match condition for the IP ACL rule. Port number can be used, which ranges from 0-65535, or the portkey, which can be one of the following keywords:<br>For tcp protocol: domain, echo, ftp, ftp-data, http, smtp, telnet, www, pop2, pop3<br>For udp protocol: domain, echo, ntp, rip, snmp, tftp, time, who<br>Each of these keywords translates into its equivalent port number.<br>When range is specified, the IP ACL rule matches only if the layer 4 port number falls within the specified port range. The startport and endport parameters identify the first and last ports that are part of the port range. They have values from 0 to 65535. The ending port must have a value equal to or greater than the starting port. The starting port, ending port, and all ports in between will be part of the layer 4 port range.<br>When eq is specified, IP ACL rule matches only if the layer 4 port number is equal to the specified port number or portkey.<br>When lt is specified, IP ACL rule matches if the layer 4 port number is less than the specified port number or portkey. It is equivalent to specifying the range as 0 to <specified port number - 1>.<br>When gt is specified, IP ACL rule matches if the layer 4 port number is greater than the specified port number or portkey. It is equivalent to specifying the range as <specified port number + 1> to 65535.<br>When neq is specified, IP ACL rule matches only if the layer 4 port number is not equal to the specified port number or port key. Two rules are added in the hardware one with range equal to 0 to <specified port number - 1> and one with range equal to <<specified port number + 1 to 65535>>.<br>Port number matches only apply to unfragmented or first fragments. |
| dstip dstmask   any   host dstip                                                                       | Specifies a destination IP address and netmask for match condition of the IP ACL rule.<br>Specifying any implies specifying dstip as 0.0.0.0 and dstmask as 255.255.255.255.<br>Specifying host A.B.C.D implies dstip as A.B.C.D and dstmask as 0.0.0.0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| [precedence precedence   tos tos [tos-mask]   dscp dscp]                                               | Specifies the TOS for an IP ACL rule depending on a match of precedence or DSCP values using the parameters dscp, precedence, tos/tosmask.<br>tosmask is an optional parameter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| flag [+fin   -fin] [+syn   -syn] [+rst   -rst] [+psh   -psh] [+ack   -ack] [+urg   -urg] [established] | Specifies that the IP ACL rule matches on the tcp flags.<br>When +<tcpflagname> is specified, a match occurs if specified <tcpflagname> flag is set in the TCP header.<br>When -<tcpflagname> is specified, a match occurs if specified <tcpflagname> flag is NOT set in the TCP header.<br>When established is specified, a match occurs if either the specified RST or ACK bits are set in the TCP header. Two rules are installed in hardware to when the established option is specified.<br>This option is available only if protocol is tcp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Parameter                                                                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [icmp-type icmp-type<br>[icmp-code icmp-<br>code]   icmp-message<br>icmp-message] | <p>This option is available only if the protocol is ICMP.</p> <p>Specifies a match condition for ICMP packets.</p> <p>When icmp-type is specified, IP ACL rule matches on the specified ICMP message type, a number from 0 to 255.</p> <p>When icmp-code is specified, IP ACL rule matches on the specified ICMP message code, a number from 0 to 255.</p> <p>Specifying icmp-message implies both icmp-type and icmp-code are specified. The following icmp-messages are supported: echo, echo-reply, host-redirect, mobile-redirect, net-redirect, net-unreachable, redirect, packet-too-big, port-unreachable, source-quench, router-solicitation, router-advertisement, time-exceeded, ttl-exceeded and unreachable.</p> <p>The ICMP message is decoded into corresponding ICMP type and ICMP code within that ICMP type.</p> |
| igmp-type igmp-type                                                               | <p>This option is visible only if the protocol is IGMP.</p> <p>When igmp-type is specified, the IP ACL rule matches on the specified IGMP message type, a number from 0 to 255.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| fragments                                                                         | Specifies that IP ACL rule matches on fragmented IP packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ttl eq                                                                            | Specifies that the IP ACL rule matches on packets with the specified Time To Live (TTL) value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| log                                                                               | Specifies that this rule is to be logged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| time-range time-<br>range-name                                                    | Allows imposing a time limitation on the ACL rule as defined by the parameter time-range-name. If a time range with the specified name does not exist and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied immediately. If a time range with specified name exists and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive.                                                                                                                                                                                                                                                   |
| assign-queue queue-<br>id                                                         | Specifies the assign-queue, which is the queue identifier to which packets matching this rule are assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| {mirror   redirect} unit/<br>slot/ port                                           | Specifies the mirror or redirect interface which is the unit/slot/port to which packets matching this rule are copied or forwarded, respectively.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| rate-limit rate burst-<br>size                                                    | Specifies the allowed rate of traffic as per the configured rate in Kb/s, and burst-size in kbytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| sflow-remote-agent                                                                | <p>Configures the sFlow sampling action.</p> <p>This action, if configured, copies the packet matching the rule to the remote sFlow agent.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#ip access-list ip1
(Routing) (Config-ipv4-acl)#permit icmp any any rate-limit 32 16
(Routing) (Config-ipv4-acl)#exit
```

### 7.8.6.1 no sequence-number

Use this command to remove the ACL rule with the specified sequence number from the ACL.

**Format**            no *sequence-number*  
**Mode**                Ipv4-Access-List Config

### 7.8.7 ip access-group

This command either attaches a specific IP Access Control List (ACL) identified by *accesslistnumber* or *name* to an interface (including VLAN routing interfaces), range of interfaces, or all interfaces; or associates it with a VLAN ID in a given direction. The parameter *name* is the name of the Access Control List.

An optional sequence number may be specified to indicate the order of this IP access list relative to other IP access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified access list replaces the currently attached IP access list using that sequence number. If the sequence number is not specified for this command, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used.

An optional control-plane is specified to apply the ACL on CPU port. The IPv4 control packets like RADIUS and TACACS+ are also dropped because of the implicit `deny all` rule added at the end of the list. To overcome this, permit rules must be added to allow the IPv4 control packets.

#### NOTICE

- The keyword `control-plane` is only available in Global Config mode.
- The `out` option may or may not be available, depending on the platform.

**Default**            none  
**Format**            ip access-group {*accesslistnumber|name*} {{*control-plane|in|out*}}|vlan *vlan-id* {*in|out*}}  
 [sequence 1-4294967295]  
**Modes**            • Interface Config  
                     • Global Config

| Parameter               | Description                                                                                                                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>accesslistnumber</i> | Identifies a specific IP ACL. The range is 1 to 199.                                                                                                                                                |
| <i>sequence</i>         | A optional sequence number that indicates the order of this IP access list relative to the other IP access lists already assigned to this interface and direction. The range is 1 to 4,294,967,295. |
| <i>vlan-id</i>          | A VLAN ID associated with a specific IP ACL in a given direction.                                                                                                                                   |
| <i>name</i>             | The name of the Access Control List.                                                                                                                                                                |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#ip access-group ip1 control-plane
```

#### 7.8.7.1 no ip access-group

This command removes a specified IP ACL from an interface.

**Default**            none  
**Format**            no ip access-group {*accesslistnumber|name*} {{*control-plane|in|out*}}|vlan *vlan-id* {*in|out*}}  
**Mode**            • Interface Config  
                     • Global Config

**Example:** The following shows an example of the command.

```
(Routing)(Config)#no ip access-group ip1 control-plane
```

## 7.8.8 acl-trapflags

This command enables the ACL trap mode.

**Default** disabled  
**Format** acl-trapflags  
**Mode** Global Config

### 7.8.8.1 no acl-trapflags

This command disables the ACL trap mode.

**Format** no acl-trapflags  
**Mode** Global Config

## 7.8.9 show ip access-lists

Use this command to view summary information about all IP ACLs configured on the switch. To view more detailed information about a specific access list, specify the ACL number or name that is used to identify the IP ACL. It displays committed rate, committed burst size, and ACL rule hit count of packets matching the configured ACL rule within an ACL. This counter value rolls-over on reaching the maximum value. There is a dedicated counter for each ACL rule. ACL counters do not interact with PBR counters.

For ACL with multiple rules, once a match occurs at any one specific rule, counters associated with this rule only get incremented for example, consider an ACL with three rules, after matching rule two, counters for rule three would not be incremented).

For ACL counters, if an ACL rule is configured without RATE-LIMIT, the counter value is count of forwarded/discarded packets (for example: If burst of 100 packets sent from IXIA, the Counter value is 100).

If an ACL rule is configured with RATE LIMIT, the counter value will be the MATCHED packet count. If the sent traffic rate exceeds the configured limit, counters will still display matched packet count (despite getting dropped beyond the configured limit since match criteria is met) that would equal the sent rate. For example, if rate limit is set to 10 Kb/s and matching traffic is sent at 100 Kb/s, counters would reflect 100 Kb/s value. If the sent traffic rate is less than the configured limit, counters would display only matched packet count. Either way, only matched packet count is reflected in the counters, irrespective of whether they get dropped or forwarded. ACL counters do not interact with diffserv policies.

The command displays downloadable ACLs. When access-list is configured as downloadable ACL, the `show ip access-lists` command displays an additional tag (#d) next to the original ACL name. The downloadable IPv4 ACLs are shown only in the `show ip access-lists` command, and is not displayed in the `show running-config` command. For example, if the ACL is created with the name `dynacl`, this command displays the ACL name as `dynacl#d`.

The output of the `show ip access-lists` command is enhanced to display up to 255 length character names.

**Format** show ip access-lists [accesslistnumber | name]  
**Mode** Privileged EXEC

| Parameter              | Description                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ACL Counters           | Shows whether ACL counters are enabled or disabled.                                                                                 |
| Current number of ACLs | The number of ACLs of any type currently configured on the system.                                                                  |
| Maximum number of ACLs | The maximum number of ACLs of any type that can be configured on the system.                                                        |
| ACL ID/Name            | Identifies the configured ACL number or name.                                                                                       |
| Rules                  | Identifies the number of rules configured for the ACL.                                                                              |
| Direction              | Shows whether the ACL is applied to traffic coming into the interface (inbound/ingress) or leaving the interface (outbound/egress). |



| Parameter  | Description                                                          |
|------------|----------------------------------------------------------------------|
| Interfaces | The interfaces to which the ACL is applied (ACL interface bindings). |
| VLANs      | The VLANs to which the ACL is applied (ACL VLAN bindings).           |

If you specify an IP ACL number or name, the following information displays:

**NOTICE**

Only the access list fields that you configure are displayed. Thus, the command output varies based on the match criteria configured within the rules of an ACL

| Parameter                    | Description                                                                                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACL ID                       | The user-configured ACL identifier.                                                                                                                      |
| ACL Counters                 | Identifies whether the ACL counters are enabled or disabled.                                                                                             |
| Interfaces                   | The inbound or outbound interfaces to which the ACL is applied.                                                                                          |
| Sequence Number              | The number identifier for each rule that is defined for the IP ACL.                                                                                      |
| Action                       | The action associated with each rule. The possible values are Permit or Deny.                                                                            |
| Match All                    | Indicates whether this access list applies to every packet. Possible values are True or False.                                                           |
| Protocol                     | The protocol to filter for this rule.                                                                                                                    |
| ICMP Type                    | <b>Note: This is shown only if the protocol is ICMP.</b><br>The ICMP message type for this rule.                                                         |
| Starting Source L4 port      | The starting source layer 4 port.                                                                                                                        |
| Ending Source L4 port        | The ending source layer 4 port.                                                                                                                          |
| Starting Destination L4 port | The starting destination layer 4 port.                                                                                                                   |
| Ending Destination L4 port   | The ending destination layer 4 port.                                                                                                                     |
| ICMP Code                    | <b>Note: This is shown only if the protocol is ICMP.</b><br>The ICMP message code for this rule.                                                         |
| Fragments                    | If the ACL rule matches on fragmented IP packets.                                                                                                        |
| Committed Rate               | The committed rate defined by the rate-limit attribute.                                                                                                  |
| Committed Burst Size         | The committed burst size defined by the rate-limit attribute.                                                                                            |
| Source IP Address            | The source IP address for this rule.                                                                                                                     |
| Source IP Mask               | The source IP mask for this rule.                                                                                                                        |
| Source L4 Port Key-word      | The source port for this rule.                                                                                                                           |
| Destination IP Address       | The destination IP address for this rule.                                                                                                                |
| Destination IP Mask          | The destination IP mask for this rule.                                                                                                                   |
| Destination L4 Port Keyword  | The destination port for this rule.                                                                                                                      |
| IP DSCP                      | The value specified for IP DSCP.                                                                                                                         |
| IP Precedence                | The value specified IP Precedence.                                                                                                                       |
| IP TOS                       | The value specified for IP TOS.                                                                                                                          |
| Fragments                    | Specifies whether the IP ACL rule matches on fragmented IP packets is enabled.                                                                           |
| sFlow Remote Agent           | Indicates whether the sFlow sampling action is configured.<br>This action, if configured, copies the packet matching the rule to the remote sFlow agent. |
| TTL Field Value              | The value specified for the TTL.                                                                                                                         |
| Log                          | Displays when you enable logging for the rule.                                                                                                           |
| Assign Queue                 | The queue identifier to which packets matching this rule are assigned.                                                                                   |
| Mirror Interface             | The unit/slot/port to which packets matching this rule are copied.                                                                                       |



**Example:** The following examples show the static and redirect ACL names reflected with the actual ACL name.

```
(Routing)#show ip access-lists
```

```
ACL Counters: Enabled
Current number of ACLs: 2 Maximum number of ACLs: 100
```

| ACL ID/Name                  | Rules | Direction | Interface(s) | VLAN(s) |
|------------------------------|-------|-----------|--------------|---------|
| ipacl                        | 1     |           |              |         |
| IP-STATIC-IN-ipacl-0000001#d | 1     | inbound   | 0/1          |         |

```
(Routing)#show ip access-lists
```

```
ACL Counters: Enabled
Current number of ACLs: 2 Maximum number of ACLs: 100
```

| ACL ID/Name                     | Rules | Direction | Interface(s) | VLAN(s) |
|---------------------------------|-------|-----------|--------------|---------|
| ipacl                           | 1     |           |              |         |
| IP-REDIRECT-IN-ipacl-0000002d#d | 1     | inbound   | 0/1          |         |

## 7.8.10 show access-lists

This command displays IP ACLs, IPv6 ACLs, and MAC access control lists information for a designated interface and direction. Instead of `slot/port`, `lag lag-intf-num` can be used as an alternate way to specify the LAG interface. `lag lag-intf-num` can also be used to specify the LAG interface where `lag-intf-num` is the LAG port number. Use the `control-plane` keyword to display the ACLs applied on the CPU port.

**Format** `show access-lists interface {slot/port in|out | control-plane}`

**Mode** Privileged EXEC

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACL Type        | Type of access list (IP, IPv6, or MAC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| ACL ID          | Access List name for a MAC or IPv6 access list or the numeric identifier for an IP access list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sequence Number | An optional sequence number may be specified to indicate the order of this access list relative to other access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified access list replaces the currently attached access list using that sequence number. If the sequence number is not specified by the user, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used. Valid range is (1 to 4,294,967,295). |
| in out          | <ul style="list-style-type: none"> <li>in – Display Access List information for a particular interface and the in direction.</li> <li>out – Display Access List information for a particular interface and the out direction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                         |

**Example:** The following shows an example of the command.

```
(Routing) #show access-lists interface control-plane
```

| ACL Type | ACL ID | Sequence Number |
|----------|--------|-----------------|
| IPv6     | ip61   | 1               |

## 7.8.11 show access-lists vlan

This command displays Access List information for a particular VLAN ID. The `vlan-id` parameter is the VLAN ID of the VLAN with the information to view. The `{in | out}` options specifies the direction of the VLAN ACL information to view.

**Format**            `show access-lists vlan vlan-id in|out`

**Mode**             Privileged EXEC

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACL Type        | Type of access list (IP, IPv6, or MAC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| ACL ID          | Access List name for a MAC or IPv6 access list or the numeric identifier for an IP access list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sequence Number | An optional sequence number may be specified to indicate the order of this access list relative to other access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified access list replaces the currently attached access list using that sequence number. If the sequence number is not specified by the user, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used. Valid range is (1 to 4,294,967,295). |

## 7.9 IPv6 Access Control List Commands

This section describes the commands you use to configure IPv6 Access Control List (ACL) settings. IPv6 ACLs ensure that only authorized users have access to specific resources and block any unwarranted attempts to reach network resources.

The following rules apply to IPv6 ACLs:

- The maximum number of ACLs you create is 100, regardless of type.
- The system supports only Ethernet II frame types.
- The maximum number of rules per IPv6 ACL is hardware dependent.

### NOTICE

FASTPATH supports ACL counters for MAC, IPv4, and IPv6 access lists. For information about how to enable the counters, see the [access-list counters enable](#) command.

### 7.9.1 ipv6 access-list

This command creates an IPv6 Access Control List (ACL) identified by `name`, consisting of classification fields defined for the IP header of an IPv6 frame. The `name` parameter is a case-sensitive alphanumeric string from 1 to 255 characters uniquely identifying the IPv6 access list. The rate-limit attribute configures the committed rate and the committed burst size.

If an IPv6 ACL by this name already exists, this command enters IPv6-Access-List config mode to allow updating the existing IPv6 ACL.

### NOTICE

The CLI mode changes to IPv6-Access-List Config mode when you successfully execute this command.

**Format**            `ipv6 access-list name`

**Mode**             Global Config

### 7.9.1.1 no ipv6 access-list

This command deletes the IPv6 ACL identified by *name* from the system.

**Format** no ipv6 access-list *name*  
**Mode** Global Config

### 7.9.2 ipv6 access-list rename

This command changes the name of an IPv6 ACL. The *name* parameter is the name of an existing IPv6 ACL. The *newname* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the IPv6 access list.

This command fails if an IPv6 ACL by the name *newname* already exists.

**Format** ipv6 access-list rename *name newname*  
**Mode** Global Config

### 7.9.3 ipv6 access-list resequence

Use this command to renumber the sequence numbers of the entries for specified IPv6 access list with the given increment value starting from a particular sequence number. The command is used to edit the sequence numbers of ACL rules in the ACL and change the order in which entries are applied. This command is not saved in startup configuration and is not displayed in running configuration.

#### NOTICE

If the generated sequence number exceeds the maximum sequence number, the ACL rule creation fails and an informational message is displayed.

**Default** 10  
**Format** ipv6 access-list resequence {*name* | *id*} *starting-sequence-number increment*  
**Mode** Global Config

| Parameter                | Description                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------|
| starting-sequence-number | The sequence number from which to start. The range is 1 to 2,147,483,647. The default is 10. |
| increment                | The amount to increment. The range is 1 to 2,147,483,647. The default is 10.                 |

### 7.9.4 {deny | permit} (IPv6)

This command creates a new rule for the current IPv6 access list. A rule may either deny or permit traffic according to the specified classification fields. At a minimum, either the *every* keyword or the protocol, source address, and destination address values must be specified. The source and destination IPv6 address fields may be specified using the keyword *any* to indicate a match on any value in that field. The remaining command parameters are all optional, but the most frequently used parameters appear in the same relative order as shown in the command format.

**Format** {deny | permit} {every | {{icmpv6 | ipv6 | tcp | udp | 0-255} {*source-ipv6-prefix/prefix-length* | any | *host source-ipv6-address*} [{range {*portkey* | *startport*} {*portkey* | *endport*} | {eq | neq | lt | gt} {*portkey* | 0-65535}] {*destination-ipv6-prefix/prefix-length* | any | *host destination-ipv6-address*} [{range {*portkey* | *startport*} {*portkey* | *endport*} | {eq | neq | lt | gt} {*portkey* | 0-65535}]} [flag [+fin | -fin] [+syn | -syn] [+rst | -rst] [+psh | -psh] [+ack | -ack] [+urg | -urg] [established]] [flow-label *value*] [icmp-type *icmp-type* [icmp-code *icmp-code*] | icmp-message *icmp-message*] [routing] [fragments] [sequence *sequence-number*] [dscp *dscp*]}] [log] [assign-queue *queue-id*] [{mirror | redirect} slot/port] [rate-limit *rate burst-size*] [sflow-remote-agent]

**Mode** IPv6-Access-List Config

---

An implicit deny all IPv6 rule always terminates the access list

---

## NOTICE

The `time-range` parameter allows imposing time limitation on the IPv6 ACL rule as defined by the parameter `time-range-name`. If a time range with the specified name does not exist and the IPv6 ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with specified name exists and the IPv6 ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive. For information about configuring time ranges, see [Section 7.11: "Time Range Commands for Time-Based ACLs"](#).

The `assign-queue` parameter allows specification of a particular hardware queue for handling traffic that matches this rule. The allowed `queue-id` value is 0 to (n-1), where n is the number of user configurable queues available for the hardware platform. The `assign-queue` parameter is valid only for a permit rule.

For the Broadcom 5650x platform, the `mirror` parameter allows the traffic matching this rule to be copied to the specified `slot/port`, while the `redirect` parameter allows the traffic matching this rule to be forwarded to the specified `slot/port`. The `assign-queue` and `redirect` parameters are only valid for a permit rule.

---

The `mirror` and `redirect` parameters are not available on the Broadcom 5630x platform.

---

## NOTICE

The `permit` command's optional attribute `rate-limit` allows you to permit only the allowed rate of traffic as per the configured rate in Kb/s, and burst-size in kbytes.

IPv6 ACLs have the following limitations:

- Port ranges are not supported for egress IPv6 ACLs.
- For BCM5684X and BCM5685x platforms, The IPv6 ACL routing keyword is not supported when an IPv6 address is specified.
- For BCM5684X, BCM5685x, and BCM5644X platforms, the IPv6 ACL fragment keyword matches only on the first two IPv6 extension headers for the fragment header (next header code 44). If the fragment header appears in the third or subsequent header, it is not matched.
- For platforms other than BCM5684X, BCM5685x, and BCM5644X, the IPv6 ACL fragment keyword matches only on the first IPv6 extension header (next header code 44). If the fragment header appears in the second or subsequent header, it is not matched.
- For platforms other than the BCM5644X, the IPv6 ACL routing keyword matches only on the first IPv6 extension header (next header code 43). If the fragment header appears in the second or subsequent header, it is not matched.
- The `rate-limit` command is not supported for egress IPv6 ACLs.
- The IPv6 access lists cannot be created with names reserved for dynamic ACLs (for example, `IP-DACL-IN-`, `IPv6-DACL-IN-`).

| Parameter                                                                    | Description                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| {deny   permit}                                                              | Specifies whether the IPv6 ACL rule permits or denies the matching traffic.                                                                                                                                                                                                                                                                                                          |
| Every                                                                        | Specifies to match every packet.                                                                                                                                                                                                                                                                                                                                                     |
| {protocolkey   number}                                                       | Specifies the protocol to match for the IPv6 ACL rule. The current list is: icmpv6, ipv6, tcp, and udp.                                                                                                                                                                                                                                                                              |
| source-ipv6-prefix/<br>prefix-length   any  <br>host source-ipv6-<br>address | Specifies a source IPv6 source address and prefix length to match for the IPv6 ACL rule. Specifying any implies specifying "::/0"<br>Specifying host source-ipv6-address implies matching the specified IPv6 address. This source-ipv6-address argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons. |

| Parameter                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [{range {portkey   startport} {portkey   endport}   {eq   neq   lt   gt} {portkey   0-65535} ]         | <p>This option is available only if the protocol is TCP or UDP.</p> <p>Specifies the layer 4 port match condition for the IPv6 ACL rule. A port number can be used, in the range 0 to 65535, or the portkey, which can be one of the following keywords:</p> <p>For TCP: domain, echo, ftp, ftp-data, http, smtp, telnet, www, pop2, pop3</p> <p>For UDP: domain, echo, ntp, rip, snmp, tftp, time, who.</p> <p>Each of these keywords translates into its equivalent port number.</p> <p>When range is specified, IPv6 ACL rule matches only if the layer 4 port number falls within the specified portrange. The startport and endport parameters identify the first and last ports that are part of the port range. They have values from 0 to 65535. The ending port must have a value equal or greater than the starting port. The starting port, ending port, and all ports in between are part of the layer 4 port range.</p> <p>When eq is specified, IPv6 ACL rule matches only if the layer 4 port number is equal to the specified port number or portkey.</p> <p>When lt is specified, IPv6 ACL rule matches if the layer 4 port number is less than the specified port number or portkey. It is equivalent to specifying the range as 0 to &lt;specified port number - 1&gt;.</p> <p>When gt is specified, IPv6 ACL rule matches if the layer 4 port number is greater than the specified port number or portkey. It is equivalent to specifying the range as &lt;specified port number + 1&gt; to 65535.</p> <p>When neq is specified, IPv6 ACL rule matches only if the layer 4 port number is not equal to the specified port number or portkey.</p> <p>Two rules are added in the hardware one with range equal to 0 to &lt;specified port number - 1&gt; and one with range equal to &lt;&lt;specified port number + 1 to 65535&gt;&gt;</p> |
| destination-ipv6-prefix/prefix-length   any   host destination-ipv6-address                            | <p>Specifies a destination IPv6 source address and prefix length to match for the IPv6 ACL rule.</p> <p>Specifying any implies specifying "::/0 "</p> <p>Specifying host destination-ipv6-address implies matching the specified IPv6 address. This destination-ipv6-address argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| sequence sequence-number                                                                               | <p>Specifies a sequence number for the ACL rule. Every rule receives a sequence number. The sequence number is specified by the user or is generated by the device.</p> <p>If a sequence number is not specified for the rule, a sequence number that is 10 greater than the last sequence number in ACL is used and this rule is placed at the end of the list. If this is the first ACL rule in the given ACL, a sequence number of 10 is assigned. If the calculated sequence number exceeds the maximum sequence number value, the ACL rule creation fails. It is not allowed to create a rule that duplicates an already existing one. A rule cannot be configured with a sequence number that is already used for another rule.</p> <p>For example, if a user adds new ACL rule to ACL without specifying a sequence number, it is placed at the bottom of the list. By changing the sequence number, user can move the ACL rule to a different position in the ACL</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| [dscp dscp]                                                                                            | <p>Specifies the dscp value to match for the IPv6 rule.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| flag [+fin   -fin] [+syn   -syn] [+rst   -rst] [+psh   -psh] [+ack   -ack] [+urg   -urg] [established] | <p>Specifies that the IPv6 ACL rule matches on the tcp flags.</p> <p>When +&lt;tcpflagname&gt; is specified, a match occurs if specified &lt;tcpflagname&gt; flag is set in the TCP header.</p> <p>When "-&lt;tcpflagname&gt;" is specified, a match occurs if specified &lt;tcpflagname&gt; flag is *NOT* set in the TCP header.</p> <p>When established is specified, a match occurs if specified either RST or ACK bits are set in the TCP header.</p> <p>Two rules are installed in hardware to when "established" option is specified.</p> <p>This option is visible only if protocol is "tcp".</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Parameter                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [icmp-type icmp-type [icmp-code icmp-code]   icmp-message icmp-message] | This option is available only if the protocol is icmpv6.<br>Specifies a match condition for ICMP packets.<br>When icmp-type is specified, IPv6 ACL rule matches on the specified ICMP message type, a number from 0 to 255.<br>When icmp-code is specified, IPv6 ACL rule matches on the specified ICMP message code, a number from 0 to 255.<br>Specifying icmp-message implies both icmp-type and icmp-code are specified. The following icmp-messages are supported: destination-unreachable, echo-reply, echo-request, header, hop-limit, mld-query, mld-reduction, mld-report, nd-na, nd-ns, next-header, no-admin, no-route, packet-too-big, port-unreachable, router-solicitation, router-advertisement, router-renumbering, time-exceeded, and unreachable.<br>The ICMP message is decoded into the corresponding ICMP type and ICMP code within that ICMP type. |
| Fragments                                                               | Specifies that IPv6 ACL rule matches on fragmented IPv6 packets (Packets that have the next header field is set to 44).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Routing                                                                 | Specifies that IPv6 ACL rule matches on IPv6 packets that have routing extension headers (the next header field is set to 43).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Log                                                                     | Specifies that this rule is to be logged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| time-range time-range-name                                              | Allows imposing a time limitation on the ACL rule as defined by the parameter time-range-name. If a time range with the specified name does not exist and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied immediately. If a time range with the specified name exists and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, the ACL rule is applied when the time-range with the specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive.                                                                                                                                                                                                                                                                                  |
| assign-queue queue-id                                                   | Specifies the assign-queue, which is the queue identifier to which packets matching this rule are assigned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| {mirror   redirect} unit/slot/ port                                     | Specifies the mirror or redirect interface which is the unit/slot/port to which packets matching this rule are copied or forwarded, respectively.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| rate-limit rate burst-size                                              | Specifies the allowed rate of traffic as per the configured rate in Kb/s, and burst-size in kbytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| sflow-remote-agent                                                      | Configures the sFlow sampling action.<br>This action, if configured, copies the packet matching the rule to the remote sFlow agent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#ipv6 access-list ip61
(Routing) (Config-ipv6-acl)#permit udp any any rate-limit 32 16
(Routing) (Config-ipv6-acl)#exit
```

### 7.9.4.1 no sequence-number

Use this command to remove the ACL rule with the specified sequence number from the ACL.

**Format**           no *sequence-number*  
**Mode**             Ipv6-Access-List Config



## 7.9.5 ipv6 traffic-filter

This command either attaches a specific IPv6 ACL identified by *name* to an interface or range of interfaces, or associates it with a VLAN ID in a given direction. The *name* parameter must be the name of an existing IPv6 ACL.

An optional sequence number may be specified to indicate the order of this mac access list relative to other IPv6 access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified IPv6 access list replaces the currently attached IPv6 access list using that sequence number. If the sequence number is not specified for this command, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used.

This command specified in Interface Config mode only affects a single interface, whereas the Global Config mode setting is applied to all interfaces. The *vlan* keyword is only valid in the Global Config mode. The Interface Config mode command is only available on platforms that support independent per-port class of service queue configuration.

An optional control-plane is specified to apply the ACL on CPU port. The IPv6 control packets like IGMPv6 are also dropped because of the implicit deny all rule added at the end of the list. To overcome this, permit rules must be added to allow the IPv6 control packets.

### NOTICE

- The keyword *control-plane* is only available in Global Config mode.
- The *out* option may or may not be available, depending on the platform.

|               |                                                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>ipv6 traffic-filter name {{control-plane   in out} vlan vlan-id {in out}} [sequence 1-4294967295]</code> |
| <b>Modes</b>  | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul>                  |

| Parameter              | Description                                                                                                  |
|------------------------|--------------------------------------------------------------------------------------------------------------|
| <i>name</i>            | The ACL name of the existing IPv6 ACL.                                                                       |
| <i>in out</i>          | The type of direction: inbound or outbound.                                                                  |
| <i>sequence-number</i> | The order of access list relative to the other access list already assigned to this interface and direction. |

**Example:** The following shows an example of the command.

```
(Routing)(Config)#ipv6 traffic-filter ip61 control-plane
```

### 7.9.5.1 no ipv6 traffic-filter

This command removes an IPv6 ACL identified by *name* from the interfaces in a given direction.

|               |                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no ipv6 traffic-filter &lt;name&gt;{{control-plane   in   out}   vlan &lt;vlan-id&gt; {in out}}</code> |
| <b>Modes</b>  | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul>                |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#no ipv6 traffic-filter ip61 control-plane
```

## 7.9.6 show ipv6 access-lists

This command displays summary information of all the IPv6 Access lists. Use the access list name to display detailed information of a specific IPv6 ACL.

This command displays information about the attributes *icmp-type*, *icmp-code*, *fragments*, *routing*, *tcp flags*, and *source and destination L4 port ranges*. It displays committed rate, committed burst size, and ACL rule hit count of packets matching the configured ACL rule within an ACL. This counter value rolls-over on reaching the maximum value. There is a dedicated counter for each ACL rule. ACL counters do not interact with PBR counters.

For ACL with multiple rules, once a match occurs at any one specific rule, counters associated with this rule only get incremented (for example, consider an ACL with three rules, after matching rule two, counters for rule three would not be incremented).

For ACL counters, If an ACL rule is configured without RATE-LIMIT, the counter value is a count of the forwarded/dropped packets. (For example: for a burst of 100 packets, the Counter value is 100).

If an ACL rule is configured with RATE LIMIT, the counter value is that of the MATCHED packet count. If the sent traffic rate exceeds the configured limit, the counters still display matched packet count (despite getting dropped beyond the configured limit since match criteria is met) that equals the sent rate. For example, if the rate limit is set to 10 kilobits per second (Kb/s) and matching traffic is sent at 100 Kb/s, counters would reflect 100 Kb/s value. If the sent traffic rate is less than the configured limit, the counters display only the matched packet count. Either way, only the matched packet count is reflected in the counters, irrespective of whether they get dropped or forwarded. ACL counters do not interact with DiffServ policies.

The command displays downloadable IPv6 ACLs. When access-list is configured as downloadable ACL, the `show ipv6 access-lists` command displays an additional tag (#d) next to the original ACL name. The downloadable IPv6 ACLs are shown only in the `show ipv6 access-lists` command, and is not displayed in the `show running-config` command. For example, if the ACL is created with the name `ipv6acl`, this command displays the ACL name as `ipv6acl#d`.

The output of the `show ipv6 access-lists` command is enhanced to display up to 255 length character ACL names.

**Format**            `show ipv6 access-lists [name]`

**Mode**             Privileged EXEC

| Parameter                  | Description                                                                                                                         |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ACL Counters               | Shows whether ACL counters are enabled or disabled.                                                                                 |
| Current number of all ACLs | The number of ACLs of any type currently configured on the system.                                                                  |
| Maximum number of all ACLs | The number of ACLs of any type that can be configured on the system.                                                                |
| IPv6 ACL Name              | The configured ACL name.                                                                                                            |
| Rules                      | The number of rules configured for the ACL.                                                                                         |
| Direction                  | Shows whether the ACL is applied to traffic coming into the interface (inbound/ingress) or leaving the interface (outbound/egress). |
| Interfaces                 | Identifies the interfaces to which the ACL is applied (ACL interface bindings).                                                     |
| VLANs                      | Identifies the VLANs to which the ACL is applied (ACL VLAN bindings).                                                               |

If you specify an IPv6 ACL name, the following information displays:

### NOTICE

Only the access list fields that you configure are displayed. Thus, the command output varies based on the match criteria configured within the rules of an ACL.

| Parameter            | Description                                                                                    |
|----------------------|------------------------------------------------------------------------------------------------|
| ACL Name             | The user-configured name of the ACL.                                                           |
| ACL Counters         | Identifies whether the ACL counters are enabled or disabled.                                   |
| Interfaces           | The inbound and/or outbound interfaces to which the ACL is applied.                            |
| Sequence Number      | The ordered rule number identifier defined within the IPv6 ACL.                                |
| Action               | The action associated with each rule. The possible values are Permit or Deny.                  |
| Match Every          | Indicates whether this access list applies to every packet. Possible values are True or False. |
| Protocol             | The protocol to filter for this rule.                                                          |
| Committed Rate       | The committed rate defined by the rate-limit attribute.                                        |
| Committed Burst Size | The committed burst size defined by the rate-limit attribute.                                  |
| Source IP Address    | The source IP address for this rule.                                                           |



## 7.10 Management Access Control and Administration List

To ensure the security of the switch management features, the administrator may elect to configure a management access control list. The Management Access Control and Administration List (MACAL) feature is used to ensure that only known and trusted devices are allowed to remotely manage the switch using TCP/IP.

MACALs can be applied only to in-band ports and cannot be applied to the service port.

### 7.10.1 management access-list

Use this command to create a management access list and to enter access-list configuration mode, where you must define the denied or permitted access conditions with the `deny` and `permit` commands. If no match criteria are defined, the default is `deny`. If you reenter to an access-list context, the new rules would be entered at the end of the access-list. Use the `management access-class` command to choose the active access-list. The active management list cannot be updated or removed. The `name` value can be up to 32 characters.

**Format**            `management access-list name`

**Mode**             Global Config

#### 7.10.1.1 no management access-list

This command deletes the MACAL identified by `name` from the system.

**Format**            `no management access-list name`

**Mode**             Global Config

**Example:** The following example shows how to configure two management interfaces: ethernet 0/1 and ethernet 0/9.

```
(Routing) (Config)#management access-list mlist
(Routing) (config-macal)#permit ethernet 0/1 priority 63
(Routing) (config-macal)#permit ethernet 0/9 priority 64
(Routing) (config-macal)#exit
(Routing) (Config)#management access-class mlist
(Routing) (Config)#
```

**Example:** The following example shows how to configure all the interfaces to be management interfaces except for two interfaces: ethernet 0/1 and ethernet 0/9.

```
(Routing) (Config)#management access-list mlist
(Routing) (config-macal)#deny ethernet 0/1 priority 62
(Routing) (config-macal)#deny ethernet 0/9 priority 63
(Routing) (config-macal)#permit priority 64
(Routing) (config-macal)#exit
(Routing)(Config)#management access-class mlist
```

### 7.10.2 {deny | permit} (Management ACAL)

This command creates a new rule for the current management access list. A rule may either deny or permit traffic according to the specified classification fields. Rules with `ethernet`, `vlan` and `port-channel` parameters will be valid only if an IP address is defined on the appropriate interface. Each rule should have a unique priority.

**Format** `{deny | permit} [ethernet interface-number | vlan vlan-id | port-channel number] [service service] [priority priority-value]`

`{deny | permit} ip-source ip-address [mask mask | prefix-length] [ethernet interface-number | vlan vlan-id | port-channel number] [service service] [priority priority-value]`

**Mode** Management-ACAL Config

| Parameter     | Description                                                                                                                                                                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ethernet      | Ethernet port number.                                                                                                                                                                                                                                          |
| ip-source     | Source IP address                                                                                                                                                                                                                                              |
| port-channel  | Port-channel number.                                                                                                                                                                                                                                           |
| priority      | Priority for rule.                                                                                                                                                                                                                                             |
| service       | Service type condition, which can be one of the following key words: <ul style="list-style-type: none"> <li>• java</li> <li>• tftp</li> <li>• telnet</li> <li>• ssh</li> <li>• http</li> <li>• https</li> <li>• snmp</li> <li>• sntp</li> <li>• any</li> </ul> |
| vlan          | VLAN number.                                                                                                                                                                                                                                                   |
| mask          | The network mask of the source IP address (0 to 32)                                                                                                                                                                                                            |
| prefix-length | The number of bits that comprise the source IP address prefix. prefix length must be preceded by a forward slash (/).                                                                                                                                          |

**Example:** The following example shows how to configure two management interfaces.

```

ethernet 0/1 and ethernet 0/9.
(Routing) (Config)#management access-list mlist
(Routing) (config-macal)#permit ethernet 0/1 priority 63
(Routing) (config-macal)#permit ethernet 0/9 priority 64
(Routing) (config-macal)#exit
(Routing) (Config)#management access-class mlist

```

**Example:** The following example shows how to configure all the interfaces to be management interfaces except for two interfaces: ethernet 0/1 and ethernet 0/9.

```

(Routing) (Config)#management access-list mlist
(Routing) (config-macal)#deny ethernet 0/1 priority 62
(Routing) (config-macal)#deny ethernet 0/9 priority 63
(Routing) (config-macal)#permit priority 64
(Routing) (config-macal)#exit

```

### 7.10.3 management access-class

Use this command to restrict management connections. The `console-only` keyword specifies that the device can be managed only from the console.

**Format** `management access-class {console-only | name}`

**Mode** Global Config

### 7.10.3.1 no management access-class

This command disables the management restrictions

**Format**           no management access-class  
**Mode**             Global Config

### 7.10.4 show management access-list

This command displays management access lists.

**Format**           show management access-list [*name*]  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show management access-list
```

```
List Name..... mlist
List Admin Mode..... Disabled
Packets Filtered..... 0
```

Rules:

```
permit ethernet 0/1 priority 63
permit ethernet 0/9 priority 64
```

NOTE: All other access is implicitly denied.

### 7.10.5 show management access-class

This command displays information about the active management access list.

**Format**           show management access-class [*name*]  
**Mode**             Privileged EXEC

**Example:** The following shows example CLI display output for the command.

```
(Routing) # show management access-class
```

```
Management access-class is enabled, using access list mlist
```

## 7.11 Time Range Commands for Time-Based ACLs

Time-based ACLs allow one or more rules within an ACL to be based on time. Each ACL rule within an ACL except for the implicit deny all rule can be configured to be active and operational only during a specific time period. The time range commands allow you to define specific times of the day and week to implement time-based ACLs. The time range is identified by a name and can then be referenced by an ACL rule defined with in an ACL.

### 7.11.1 time-range (Global Config)

Use this command to create a time range identified by name, consisting of one absolute time entry and/or one or more periodic time entries. The name parameter is a case-sensitive, alphanumeric string from 1 to 31 characters that uniquely identifies the time range. An alpha-numeric string is defined as consisting of only alphabetic, numeric, dash, underscore, or space characters.

If a time range by this name already exists, this command enters Time-Range config mode to allow updating the time range entries.

---

When you successfully execute this command, the CLI mode changes to Time-Range Config mode.

---

## NOTICE

**Format**            `time-range name`  
**Mode**             Global Config

### 7.11.1.1 no time-range (Global Config)

This command deletes a time-range identified by name.

**Format**            `no time-range name`  
**Mode**             Global Config

### 7.11.2 absolute

Use this command to add an absolute time entry to a time range. Only one absolute time entry is allowed per time-range. The time parameter is based on the currently configured time zone.

The `[start time date]` parameters indicate the time and date at which the configuration that referenced the time range starts going into effect. The time is expressed in a 24-hour clock, in the form of hours:minutes. For example, 8:00 is 8:00 am and 20:00 is 8:00 pm. The date is expressed in the format day month year. If no start time and date are specified, the configuration statement is in effect immediately.

The `[end time date]` parameters indicate the time and date at which the configuration that referenced the time range is no longer in effect. The end time and date must be after the start time and date. If no end time and date are specified, the configuration statement is in effect indefinitely.

**Format**            `absolute [start time date] [end time date]`  
**Mode**             Time-Range Config

#### 7.11.2.1 no absolute

This command deletes the absolute time entry in the time range.

**Format**            `no absolute`  
**Mode**             Time-Range Config

### 7.11.3 periodic

Use this command to add a periodic time entry to a time range. The time parameter is based off of the currently configured time zone.

The first occurrence of the `days-of-the-week` argument is the starting days from which the configuration that referenced the time range starts going into effect. The second occurrence is the ending day or days from which the configuration that referenced the time range is no longer in effect. If the end days-of-the-week are the same as the start, they can be omitted

This argument can be any single day or combinations of days: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Other possible values are:

- `daily`—Monday through Sunday
- `weekdays`—Monday through Friday
- `weekend`—Saturday and Sunday

If the ending days of the week are the same as the starting days of the week, they can be omitted.

The first occurrence of the `time` argument is the starting hours:minutes which the configuration that referenced the time range starts going into effect. The second occurrence is the ending hours:minutes at which the configuration that referenced the time range is no longer in effect.

The hours:minutes are expressed in a 24-hour clock. For example, 8:00 is 8:00 am and 20:00 is 8:00 pm.

**Format**            *periodic days-of-the-week time to time*  
**Mode**             Time-Range Config

### 7.11.3.1 no periodic

This command deletes a periodic time entry from a time range

**Format**            *no periodic days-of-the-week time to time*  
**Mode**             Time-Range Config

### 7.11.4 show time-range

Use this command to display a time range and all the absolute/periodic time entries that are defined for the time range. Use the *name* parameter to identify a specific time range to display. When *name* is not specified, all the time ranges defined in the system are displayed.

**Format**            `show time-range [name]`  
**Mode**             Privileged EXEC

The information in the following table displays when no time range name is specified.

| Parameter                         | Description                                                                          |
|-----------------------------------|--------------------------------------------------------------------------------------|
| Admin Mode                        | The administrative mode of the time range feature on the switch                      |
| Current number of all Time Ranges | The number of time ranges currently configured in the system.                        |
| Maximum number of all Time Ranges | The maximum number of time ranges that can be configured in the system.              |
| Time Range Name                   | Name of the time range.                                                              |
| Status                            | Status of the time range (active/inactive)                                           |
| Periodic Entry count              | The number of periodic entries configured for the time range.                        |
| Absolute Entry                    | Indicates whether an absolute entry has been configured for the time range (Exists). |

## 7.12 Auto-Voice over IP Commands

This section describes the commands you use to configure Auto-Voice over IP (VoIP) commands. The Auto-VoIP feature explicitly matches VoIP streams in Ethernet switches and provides them with a better class-of-service than ordinary traffic. When you enable the Auto-VoIP feature on an interface, the interface scans incoming traffic for the following call-control protocols:

- Session Initiation Protocol (SIP)
- H.323
- Skinny Client Control Protocol (SCCP)

When a call-control protocol is detected, the switch assigns the traffic in that session to the highest CoS queue, which is generally used for time-sensitive traffic.

### 7.12.1 auto-voip

Use this command to configure auto VoIP mode. The supported modes are protocol-based and oui-based. Protocol-based auto VoIP prioritizes the voice data based on the layer 4 port used for the voice session. OUI based auto VoIP prioritizes the phone traffic based on the known OUI of the phone.

When both modes are enabled, if the connected phone OUI is one of the configured OUI, then the voice data is prioritized using OUI Auto VoIP, otherwise protocol-based Auto VoIP is used to prioritize the voice data.

Active sessions are cleared if protocol-based auto VoIP is disabled on the port.



|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | oui-based                                                                                     |
| <b>Format</b>  | auto-voip [protocol-based   oui-based]                                                        |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

### 7.12.1.1 no auto-voip

Use the `no` form of the command to set the default mode.

### 7.12.2 auto-voip oui

Use this command to configure an OUI for Auto VoIP. The traffic from the configured OUI will get the highest priority over the other traffic. The `oui-prefix` is a unique OUI that identifies the device manufacturer or vendor. The OUI is specified in three octet values (each octets represented as two hexadecimal digits) separated by colons. The `string` is a description of the OUI that identifies the manufacturer or vendor associated with the OUI.

|                |                                      |
|----------------|--------------------------------------|
| <b>Default</b> | A list of known OUIs is present.     |
| <b>Format</b>  | auto-voip oui oui-prefix desc string |
| <b>Mode</b>    | Global Config                        |

**Example:** The following example shows how to add an OUI to the table.

```
(Routing) (Config)#auto-voip oui 00:03:6B desc "Cisco VoIPPhone"
```

### 7.12.2.1 no auto-voip oui

Use the `no` form of the command to remove a configured OUI prefix from the table.

|               |                             |
|---------------|-----------------------------|
| <b>Format</b> | no auto-voip oui oui-prefix |
| <b>Mode</b>   | Global Config               |

### 7.12.3 auto-voip oui-based priority

Use this command to configure the global OUI based auto VoIP priority. If the phone OUI matches one of the configured OUI, then the priority of traffic from the phone is changed to OUI priority configured through this command. The `priority-value` is the IEEE 802.1p priority used for traffic that matches a value in the known OUI list. If the interface detects an OUI match, the switch assigns the traffic in that session to the traffic class mapped to this priority value. Traffic classes with a higher value are generally used for time-sensitive traffic.

|                |                                             |
|----------------|---------------------------------------------|
| <b>Default</b> | Highest available priority.                 |
| <b>Format</b>  | auto-voip oui-based priority priority-value |
| <b>Mode</b>    | Global Config                               |

### 7.12.3.1 no auto-voip oui

Use the `no` form of the command to remove a configured OUI prefix from the table.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | no auto-voip oui oui-prefix                                                                   |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

## 7.12.4 auto-voip protocol-based

Use this command to configure the global protocol-based auto VoIP remarking priority or traffic-class. If remark priority is configured, the voice data of the session is remarked with the priority configured through this command. The `remark-priority` is the IEEE 802.1p priority used for protocol-based VoIP traffic. If the interface detects a call-control protocol, the device marks traffic in that session with the specified IEEE 802.1p priority value to ensure voice traffic always gets the highest priority throughout the network path.

The `tc` value is the traffic class used for protocol-based VoIP traffic. If the interface detects a call-control protocol, the device assigns the traffic in that session to the configured Class of Service (CoS) queue. Traffic classes with a higher value are generally used for time-sensitive traffic. The CoS queue associated with the specified traffic class should be configured with the appropriate bandwidth allocation to allow priority treatment for VoIP traffic.

---

You must enable tagging on auto VoIP enabled ports to remark the voice data upon egress.

---

### NOTICE

|                |                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------|
| <b>Default</b> | Traffic class 7                                                                               |
| <b>Format</b>  | <code>auto-voip protocol-based {remark remark-priority   traffic-class tc}</code>             |
| <b>Mode</b>    | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

### 7.12.4.1 no auto-voip protocol-based

Use this command to reset the global protocol based auto VoIP remarking priority or traffic-class to the default.

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no auto-voip protocol-based {remark remark-priority   traffic-class tc}</code>          |
| <b>Mode</b>   | <ul style="list-style-type: none"> <li>• Global Config</li> <li>• Interface Config</li> </ul> |

## 7.12.5 auto-voip vlan

Use this command to configure the global Auto VoIP VLAN ID. The VLAN behavior is depend on the configured auto VoIP mode. The auto-VoIP VLAN is the VLAN used to separate VoIP traffic from other non-voice traffic. All VoIP traffic that matches a value in the known OUI list gets assigned to this VoIP VLAN.

|                |                                     |
|----------------|-------------------------------------|
| <b>Default</b> | none                                |
| <b>Format</b>  | <code>auto-voip vlan vlan-id</code> |
| <b>Mode</b>    | Global Config                       |

### 7.12.5.1 no auto-voip vlan

Use the `no` form of the command to reset the auto-VoIP VLAN ID to the default value.

|               |                                |
|---------------|--------------------------------|
| <b>Format</b> | <code>no auto-voip vlan</code> |
| <b>Mode</b>   | Global Config                  |

## 7.12.6 show auto-voip

Use this command to display the auto VoIP settings on the interface or interfaces of the switch.

|               |                                                                                  |
|---------------|----------------------------------------------------------------------------------|
| <b>Format</b> | <code>show auto-voip {protocol-based oui-based} interface {slot/port all}</code> |
| <b>Mode</b>   | Privileged EXEC                                                                  |

| Parameter           | Description                                                                                                                                                                                                                                                                                                                                 |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VoIP VLAN ID        | The global VoIP VLAN ID.                                                                                                                                                                                                                                                                                                                    |
| Prioritization Type | The type of prioritization used on voice traffic.                                                                                                                                                                                                                                                                                           |
| Class Value         | <ul style="list-style-type: none"> <li>If the <code>Prioritization Type</code> is configured as <code>traffic-class</code>, then this value is the queue value.</li> <li>If the <code>Prioritization Type</code> is configured as <code>remark</code>, then this value is IEEE 802.1p priority used to remark the voice traffic.</li> </ul> |
| Priority            | The IEEE 802.1p priority. This field is valid for OUI auto VoIP.                                                                                                                                                                                                                                                                            |
| AutoVoIP Mode       | The Auto VoIP mode on the interface.                                                                                                                                                                                                                                                                                                        |

**Example:** The following shows example CLI display output for the command.

```
(Routing)# show auto-voip protocol-based interface all

VoIP VLAN Id..... 2
Prioritization Type..... traffic-class
Class Value..... 7

Interface Auto VoIP Operational Status
 Mode

0/1 Disabled Down
0/2 Disabled Down
0/3 Disabled Down
0/4 Disabled Down
```

**Example:** The following shows example CLI display output for the command.

```
(Routing)# show auto-voip oui-based interface all

VoIP VLAN Id..... 2
Priority..... 7
Interface Auto VoIP Operational Status
 Mode

0/1 Disabled Down
0/2 Disabled Down
0/3 Disabled Down
0/4 Disabled Down
0/5 Disabled Down
```

### 7.12.7 show auto-voip oui-table

Use this command to display the VoIP oui-table information.

**Format** show auto-voip oui-table

**Mode** Privileged EXEC

| Parameter       | Description                    |
|-----------------|--------------------------------|
| OUI             | OUI of the source MAC address. |
| Status          | Default or configured entry.   |
| OUI Description | Description of the OUI.        |

**Example:** The following shows example CLI display output for the command.

```
(Routing)# show auto-voip oui-table
```

| OUI      | Status     | Description |
|----------|------------|-------------|
| 00:01:E3 | Default    | SIEMENS     |
| 00:03:6B | Default    | CISCO1      |
| 00:01:01 | Configured | VoIP phone  |

## 7.13 iSCSI Optimization Commands

This section describes commands you use to monitor iSCSI sessions and prioritize iSCSI packets. iSCSI Optimization provides a means of giving traffic between iSCSI initiator and target systems special Quality of Service (QoS) treatment. This is accomplished by monitoring traffic to detect packets used by iSCSI stations to establish iSCSI sessions and connections. Data from these exchanges is used to create classification rules that assign the traffic between the stations to a configured traffic class. Packets in the flow are queued and scheduled for egress on the destination port based on these rules.

### 7.13.1 iscsi aging time

This command sets the aging time for iSCSI sessions. Behavior when changing aging time:

- When aging time is increased, current sessions will be timed out according to the new value.
- When aging time is decreased, any sessions that have been dormant for a time exceeding the new setting will be immediately deleted from the table. All other sessions will continue to be monitored against the new time out value.

**Default** 10 minutes  
**Format** `iscsi aging time time`  
**Mode** Global Config

| Parameter | Description                                                                                |
|-----------|--------------------------------------------------------------------------------------------|
| time      | The number of minutes a session must be inactive prior to its removal. Range: 1 to 43,200. |

**Example:** The following example sets the aging time for iSCSI sessions to 100 minutes.

```
(switch)(config)#iscsi aging time 100
```

#### 7.13.1.1 no iscsi aging time

Use the `no` form of the command to reset the aging time value to the default value.

**Format** `no iscsi aging time`  
**Mode** Global Config

### 7.13.2 iscsi cos

This command sets the quality of service profile that will be applied to iSCSI flows. iSCSI flows are assigned by default to the highest VPT/DSCP mapped to the highest queue not used for stack management. The user should also take care of configuring the relevant Class of Service parameters for the queue to complete the setting.

Setting the VPT/DSCP sets the QoS profile which determines the egress queue to which the frame is mapped. The switch default setting for egress queues scheduling is Weighted Round Robin (WRR).

You may complete the QoS setting by configuring the relevant ports to work in other scheduling and queue management modes using the Class of Service settings. Depending on the platform, these choices may include strict priority for the queue used for iSCSI traffic. The downside of strict priority is that, in certain circumstances (under heavy high priority traffic), other lower priority traffic may get starved. In WRR the queue to which the flow is assigned to can be set to get the required percentage.

**Format**            `iscsi cos {vpt vpt | dscp dscp} [remark]`  
**Mode**             Global Config

| Parameter | Description                                                                   |
|-----------|-------------------------------------------------------------------------------|
| vpt/dscp  | The VLAN Priority Tag or DSCP to assign iSCSI session packets.                |
| remark    | Mark the iSCSI frames with the configured VPT/DSCP when egressing the switch. |

**Example:** The following example sets the quality of service profile that will be applied to iSCSI flows.

```
(switch)(config)#iscsi cos vpt 5 remark
```

### 7.13.2.1 no iscsi cos

Use the `no` form of the command to return to the default.

**Format**            `no iscsi cos`  
**Mode**             Global Config

### 7.13.3 iscsi enable

This command globally enables iSCSI awareness.

**Default**            disabled  
**Format**            `iscsi enable`  
**Mode**             Global Config

**Example:** The following example enables iSCSI awareness.

```
(switch)(config)#iscsi enable
```

### 7.13.3.1 no iscsi enable

This command disables iSCSI awareness. When you use the `no iscsi enable` command, iSCSI resources will be released.

**Format**            `no iscsi enable`  
**Mode**             Global Config

### 7.13.4 iscsi target port

This command configures an iSCSI target port and, optionally, a target system's IP address and IQN name. When working with private iSCSI ports (not IANA-assigned ports 3260/860), it is recommended to specify the target IP address as well, so that the switch will only snoop frames with which the TCP destination port is one of the configured TCP ports, and the destination IP is the target's IP address. This way the CPU will not be falsely loaded by non-iSCSI flows (if by chance other applications also choose to use these un-reserved ports).

When a port is already defined and not bound to an IP address, and you want to bind it to an IP address, you should first remove it by using the `no` form of the command and then add it again, this time together with the relevant IP address.

Target names are only for display when using the `show iscsi` command. These names are not used to match with the iSCSI session information acquired by snooping.

A maximum of 16 TCP ports can be configured either bound to IP or not.

|                |                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | iSCSI well-known ports 3260 and 860 are configured as default but can be removed as any other configured target. |
| <b>Format</b>  | <code>iscsi target port tcp-port-1 [tcp-port-2...tcp-port-16] [address ip-address] [name targetname]</code>      |
| <b>Mode</b>    | Global Config                                                                                                    |

| Parameter  | Description                                                                                                                                                                                                                                                                                                                        |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tcp-port-n | TCP port number or list of TCP port numbers on which the iSCSI target listens to requests. Up to 16 TCP ports can be defined in the system in one command or by using multiple commands.                                                                                                                                           |
| ip-address | IP address of the iSCSI target. When the <code>no</code> form of this command is used, and the tcp port to be deleted is one bound to a specific IP address, the address field must be present.                                                                                                                                    |
| targetname | iSCSI name of the iSCSI target. The name can be statically configured; however, it can be obtained from iSNS or from <code>sendTargets</code> response. The initiator must present both its iSCSI Initiator Name and the iSCSI Target Name to which it wants to connect in the first login request of a new session or connection. |

**Example:** The following example configures TCP Port 49154 to target IP address 172.16.1.20.

```
(switch)(config)#iscsi target port 49154 address 172.16.1.20
```

#### 7.13.4.1 no iscsi target port

Use the `no` form of the command to delete an iSCSI target port, address, and name.

#### 7.13.5 show iscsi

This command displays the iSCSI settings.

|               |                         |
|---------------|-------------------------|
| <b>Format</b> | <code>show iscsi</code> |
| <b>Mode</b>   | Privileged EXEC         |

**Example:** The following are examples of the commands used for iSCSI.

##### Example 1: Show iSCSI (Default Configuration)

```
(switch)#show iscsi
iSCSI disabled
iSCSI vpt is 5, remark
Session aging time: 10 min
Maximum number of sessions is 192

iSCSI Targets and TCP ports:

TCP Port Target IP Address Name
860 Not Configured Not Configured
3260 Not Configured Not Configured
```

##### Example 2: Enable iSCSI.

```
(switch)#configure
(switch)(config)#iscsi enable
```

**Example 3: Show iSCSI (After Enable)**

The following configuration detects iSCSI sessions and connections established using TCP ports 3260 or 860. Packets sent on detected iSCSI TCP connections are assigned to traffic class 2 (see the CoS configuration shown below). Because remark is enabled, the packets are marked with IEEE 802.1p priority to 5 before transmission.

```
(switch)#show iscsi
iscsi enabled
iSCSI vpt is 5, remark
Session aging time: 10 min
Maximum number of sessions is 192

iSCSI Targets and TCP ports:

TCP Port Target IP Address Name
860 Not Configured Not Configured
3260 Not Configured Not Configured

(switch)#show classofservice dot1p-mapping
User Priority Traffic Class

0 1
1 0
2 0
3 1
4 2
5 2
6 3
6 3
```

**7.13.6 show iscsi sessions**

This command displays the iSCSI sessions.

**Default** If not specified, sessions are displayed in short mode (not detailed).  
**Format** show iscsi sessions [detailed]  
**Mode** Privileged EXEC

**Example:** The following example displays the iSCSI sessions.

```
(switch) # show iscsi sessions
Target: iqn.1993-11.com.disk-vendor:diskarrays.sn.45678

Initiator: iqn.1992-04.com.os-vendor.plan9:cdrom.12
ISID: 11
Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10
ISID: 222

Target: iqn.103-1.com.storage-vendor:sn.43338.
storage.tape:sys1.xyz
Session 3:
Initiator: iqn.1992-04.com.os-vendor.plan9:cdrom.12
Session 4:
Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10

(switch)# show iscsi sessions detailed
Target: iqn.1993-11.com.disk-vendor:diskarrays.sn.45678

Session 1:

Initiator: iqn.1992-04.com.os
```

vendor.plan9:cdrom.12.storage:sys1.xyz

-----  
 Time started: 17-Jul-2008 10:04:50

Time for aging out: 10 min

ISID: 11

| Initiator  | Initiator | Target      | Target  |
|------------|-----------|-------------|---------|
| IP address | TCP port  | IP address  | IP port |
| 172.16.1.3 | 49154     | 172.16.1.20 | 30001   |
| 172.16.1.4 | 49155     | 172.16.1.21 | 30001   |
| 172.16.1.5 | 49156     | 172.16.1.22 | 30001   |

Session 2:

-----  
 Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10

Time started: 17-Aug-2008 21:04:50

Time for aging out: 2 min

ISID: 22

| Initiator   | Initiator | Target      | Target  |
|-------------|-----------|-------------|---------|
| IP address  | TCP port  | IP address  | IP port |
| 172.16.1.30 | 49200     | 172.16.1.20 | 30001   |
| 172.16.1.30 | 49201     | 172.16.1.21 | 30001   |



## 8/ IP Multicast Commands

This chapter describes the IP Multicast commands available in the FASTPATH CLI.

### NOTICE

The commands in this chapter are in one of two functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.

## 8.1 Multicast Commands

This section describes the commands you use to configure IP Multicast and to view IP Multicast settings and statistics.

### 8.1.1 ip mcast boundary

This command adds an administrative scope multicast boundary specified by *groupipaddr* and *mask* for which this multicast administrative boundary is applicable. *groupipaddr* is a group IP address and *mask* is a group IP mask. This command can be used to configure a single interface or a range of interfaces.

**Format**            `ip mcast boundary groupipaddr mask`

**Mode**             Interface Config

#### 8.1.1.1 no ip mcast boundary

This command deletes an administrative scope multicast boundary specified by *groupipaddr* and *mask* for which this multicast administrative boundary is applicable. *groupipaddr* is a group IP address and *mask* is a group IP mask.

**Format**            `no ip mcast boundary groupipaddr mask`

**Mode**             Interface Config

### 8.1.2 ip mroute

This command configures an IPv4 Multicast Static Route for a source.

**Default**           No MRoute is configured on the system.

**Format**           `ip mroute src-ip-addr src-mask rpf-addr preference`

**Mode**             Global Config

| Parameter   | Description                                                                                               |
|-------------|-----------------------------------------------------------------------------------------------------------|
| src-ip-addr | The IP address of the multicast source network.                                                           |
| src-mask    | The IP mask of the multicast data source.                                                                 |
| rpf-ip-addr | The IP address of the RPF next-hop router toward the source.                                              |
| preference  | The administrative distance for this Static MRoute, that is, the preference value. The range is 1 to 255. |

#### 8.1.2.1 no ip mroute

This command removes the configured IPv4 Multicast Static Route.

**Format**           `no ip mroute src-ip-addr`

**Mode**             Global Config

## 8.1.3 ip multicast

This command sets the administrative mode of the IP multicast forwarder in the router to active. This command also enables the administrative mode of IPv6 multicast routing.

**Default** disabled  
**Format** ip multicast  
**Mode** Global Config

### 8.1.3.1 no ip multicast

This command sets the administrative mode of the IP multicast forwarder in the router to inactive.

**Format** no ip multicast  
**Mode** Global Config

## 8.1.4 ip multicast ttl-threshold

This command is specific to IPv4. Use this command to apply the given Time-to-Live threshold value to a routing interface or range of interfaces. The `ttl-threshold` is the TTL threshold which is to be applied to the multicast Data packets that are to be forwarded from the interface. This command sets the Time-to-Live threshold value such that any data packets forwarded over the interface having TTL value above the configured value are dropped. The value for `ttl-threshold` ranges from 0 to 255.

**Default** 1  
**Format** ip multicast ttl-threshold *ttlvalue*  
**Mode** Interface Config

### 8.1.4.1 no ip multicast ttl-threshold

This command applies the default `ttl-threshold` to a routing interface. The `ttl-threshold` is the TTL threshold which is to be applied to the multicast Data packets that are to be forwarded from the interface.

**Format** no ip multicast ttl-threshold  
**Mode** Interface Config

## 8.1.5 show ip mcast

This command displays the system-wide multicast information.

**Format** show ip mcast  
**Modes**

- Privileged EXEC
- User EXEC

| Parameter                              | Description                                                                                      |
|----------------------------------------|--------------------------------------------------------------------------------------------------|
| Admin Mode                             | The administrative status of multicast. Possible values are enabled or disabled.                 |
| Protocol State                         | The current state of the multicast protocol. Possible values are Operational or Non-Operational. |
| Table Max Size                         | The maximum number of entries allowed in the multicast table.                                    |
| Protocol                               | The multicast protocol running on the router. Possible values are PIMDM, PIMSM, or DVMRP.        |
| Multicast Forwarding Cache Entry Count | The number of entries in the multicast forwarding cache.                                         |

## 8.1.6 show ip mcast boundary

This command displays all the configured administrative scoped multicast boundaries. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a `slot/port` format.

**Format**            `show ip mcast boundary {slot/port|vlan 1-4093|all}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter | Description           |
|-----------|-----------------------|
| Interface | slot/port             |
| Group Ip  | The group IP address. |
| Mask      | The group IP mask.    |

## 8.1.7 show ip mcast interface

This command displays the multicast information for the specified interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a `slot/port` format.

**Format**            `show ip mcast interface {slot/port|vlan 1-4093}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter | Description                                |
|-----------|--------------------------------------------|
| Interface | slot/port                                  |
| TTL       | The time-to-live value for this interface. |

## 8.1.8 show ip mroute

This command displays a summary or all the details of the multicast table.

NOTE: This command replaces the `show ip mcast mroute` command.

**Format**            `show ip mroute {detail | summary | group group-address | source source-address}`

- Modes**
- Privileged EXEC
  - User EXEC

If you use the `detail`, `group`, or `source` parameters in PIM Sparse mode, the command displays the following fields.

| Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flags                    | <ul style="list-style-type: none"> <li>• F: Register flag. Indicates that the source connected router is sending registers to RP. This flag can be seen only on Designated Router connected to source.</li> <li>• T: SPT-bit set. Indicates that packets have been received on the shortest path source tree.</li> <li>• R: RP-bit set. Indicates that the (S, G) entry is pointing toward the RP. This flag typically indicates a prune state along the shared tree for a particular source.</li> </ul> |
| Outgoing interface flags | <ul style="list-style-type: none"> <li>• C: Connected. A member of the multicast group is directly connected to the interface.</li> <li>• J: Received PIM (*,G) Join on this interface.</li> </ul>                                                                                                                                                                                                                                                                                                       |
| Timers:Uptime/Expires    | <ul style="list-style-type: none"> <li>• Uptime: Indicates per interface how long (in hours, minutes, and seconds) the entry has been in the IP multicast routing table.</li> <li>• Expires: Indicates per interface how long (in seconds) until the entry will be removed from the IP multicast routing table</li> </ul>                                                                                                                                                                                |

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Counters                | <ul style="list-style-type: none"> <li>Joins: Indicates the number of (*,G) or (S,G) joins received for the given entry.</li> <li>Prunes: Indicates the number of (*,G) or (S,G) prunes received for the given entry.</li> <li>Registers: Indicates the number of register messages received for the given (S,G) entry.</li> <li>Register Stops: Indicates the number of register stop messages received for the given (S,G) entry.</li> </ul> |
| RPF Address             | IP address of the upstream router to the source.                                                                                                                                                                                                                                                                                                                                                                                               |
| Outgoing interface list | List of outgoing Interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Protocol                | The current operating multicast routing protocol.                                                                                                                                                                                                                                                                                                                                                                                              |
| RP                      | Address of the RP router.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Incoming interface      | Expected interface for a multicast packet from the source. If the packet is not received on this interface, it is discarded.                                                                                                                                                                                                                                                                                                                   |

If you use the `detail` parameter in any mode other than PIM sparse mode, the command displays the following fields.

| Parameter      | Description                                                |
|----------------|------------------------------------------------------------|
| Source IP Addr | The IP address of the multicast data source.               |
| Group IP Addr  | The IP address of the destination of the multicast packet. |
| Expiry Time    | The time of expiry of this entry in seconds.               |
| Up Time        | The time elapsed since the entry was created in seconds.   |
| RPF Neighbor   | The IP address of the RPF neighbor.                        |
| Flags          | The flags associated with this entry.                      |

If you use the `summary` parameter in PIM Sparse mode, the command displays the following fields.

| Parameter               | Description                                                                                                                  |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Source IP               | Source address of the multicast route entry.                                                                                 |
| Group IP                | Group address of the multicast route entry.                                                                                  |
| Protocol                | The current operating multicast routing protocol.                                                                            |
| Incoming Interface      | Expected interface for a multicast packet from the source. If the packet is not received on this interface, it is discarded. |
| Outgoing Interface List | List of outgoing Interfaces.                                                                                                 |

If you use the `summary` parameter, the command displays the following fields.

| Parameter               | Description                                                       |
|-------------------------|-------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                      |
| Group IP Addr           | The IP address of the destination of the multicast packet.        |
| Protocol                | The multicast routing protocol by which the entry was created.    |
| Incoming Interface      | The interface on which the packet for the source/group arrives.   |
| Outgoing Interface List | The list of outgoing interfaces on which the packet is forwarded. |

**Example:** This example shows the output for the `summary` parameter in PIM Sparse mode.

```
(Routing) #show ip mroute summary
```

```

 Multicast route table summary
Source IP Group IP Protocol Incoming Outgoing
----- -
192.168.10.1 225.1.1.1 PIMSM V110 V120, V130

```

**Example:** This example shows the output for the `detail` parameter in PIM Sparse mode.

```
IP Multicast Routing Table
Flags: C - Connected, J - Received Pim (*,G) Join,
R - RP-bit set, F - Register flag, T - SPT-bit set
Timers: Uptime/Expires Protocol: PIMSM

(*,225.6.6.6)
00:00:41/000 RP: 1.1.1.1
Joins/Prunes: 0/0
Incoming interface: RPF nbr: 0.0.0.0
Outgoing interface list:
4/1 00:00:41/218 Joins: 0 Flags: C

(*,225.7.7.7)
00:00:36/000 RP: 1.1.1.1
Joins/Prunes: 0/0
Incoming interface: RPF nbr: 0.0.0.0
Outgoing interface list:
4/1 00:00:36/224 Joins: 0 Flags: C

(3.3.3.11,225.6.6.6)
00:00:51/158 Flags: T
Joins/Prunes: 0/0 Reg/Reg-stop: 0/0
Incoming interface: 4/2 RPF nbr: 3.3.3.11
Outgoing interface list:
4/1 00:00:41/000 Joins: 0

(3.3.3.11,225.7.7.7)
00:17:42/201 Flags: T
Joins/Prunes: 0/0 Reg/Reg-stop: 0/0
Incoming interface: 4/2 RPF nbr: 3.3.3.11
Outgoing interface list:
4/1 00:00:36/000 Joins: 0
```

**Example:** This example shows the output for the `detail` parameter in PIM Dense mode when a multicast routing protocol other than PIMSM is enabled.

```
(Routing) (Config)#show ip mroute detail
```

```
IP Multicast Routing Table
Source IP Group IP Expiry Time Up Time
(hh:mm:ss) (hh:mm:ss) RPF Neighbor Flags

192.168.10.1 225.1.1.1 00:02:45 05:37:09 192.168.20.5 SPT
```

**Example:** This example shows IPv6 output for the `detail` parameter in PIM Sparse mode.

```
#show ipv6 mroute detail
```

```
IP Multicast Routing Table
Flags: C - Connected, J - Received Pim (*,G) Join,
R - RP-bit set, F - Register flag, T - SPT-bit set
Timers: Uptime/Expires Protocol: PIMSM

(*,ff43::3)
00:00:41/000 RP: 2001::1
Joins/Prunes: 0/0
Incoming interface: RPF nbr: ::
Outgoing interface list:
4/1 00:00:41/219 Joins: 0 Flags: C

(*,ff24::6)
00:00:22/000 RP: 2001::1
```

```

Joins/Prunes: 0/0
Incoming interface: RPF nbr: ::
Outgoing interface list:
4/1 00:00:41/219 Joins: 0 Flags: C

```

```

(3001::10,ff43::3)
00:00:07/203 Flags: T
Joins/Prunes: 0/0 Reg/Reg-stop: 0/0
Incoming interface: 4/2 RPF nbr: 3001::10
Outgoing interface list:
4/1 00:00:07/000 Joins: 0

```

```

(4001::33,ff22::3)
00:00:55/108 Flags: T
Joins/Prunes: 0/0 Reg/Reg-stop: 0/0
Incoming interface: 4/1 RPF nbr: 3001::10
Outgoing interface list:
4/2 00:00:66/000 Joins: 0

```

```

(3001::10,ff43::3)
00:00:07/203 Flags: T
Joins/Prunes: 0/0 Reg/Reg-stop: 0/0
Incoming interface: 4/1 RPF nbr: 3001::10
Outgoing interface list:
4/2 00:00:77/000 Joins: 0

```

**Example:** This example shows output for the `group` parameter in PIM Sparse mode.

```

(U16)# show ip mroute group 229.10.0.1
IP Multicast Routing Table

```

```

Flags: C - Connected,J - Received PIM (*,G) Join,
 R - RP-bit set, F - Register flag, T - SPT-bit set
Timers: Uptime(HH:MM:SS)/Expiry(SSS)
Protocol: PIMSM

```

```

(*, 229.10.0.1), 00:04:35/179, RP: 192.0.2.20
Joins/Prunes: 20/1
Incoming interface: Null, RPF Address: 0.0.0.0
Outgoing interface list:
 VLAN 6 00:00:30/150 Joins:15 Flags: C
 VLAN 5 00:04:35/150 Joins:10 Flags: C
 VLAN 2 00:01:28/0 Joins:20 Flags: J

```

```

(192.0.2.20, 229.10.0.1), 00:04:35/177, Flags: T
Joins/Prunes:20/1 , Reg/Reg-Stop:100/0
Incoming interface: VLAN 2, RPF Address: 0.0.0.0
Outgoing interface list:
 VLAN 5 00:03:25/0 Joins:20
 VLAN 6 00:00:10/0 Joins:5

```

**Example:** The following example shows output for the `source` parameter in PIM Sparse mode.

```

(U16)# show ip mroute source 192.0.2.20
IP Multicast Routing Table

```

```

Flags: C - Connected,J - Received PIM (*,G) Join,
 R - RP-bit set, F - Register flag, T - SPT-bit set
Timers: Uptime(HH:MM:SS)/Expiry(SSS)
Protocol: PIMSM

```

```

(192.0.2.20, 229.10.0.1), 00:04:35/177, Flags: T
Joins/Prunes:20/1 , Reg/Reg-Stop:100/0
Incoming interface: VLAN 2, RPF Address: 0.0.0.0
Outgoing interface list:
 VLAN 5 00:03:25/0 Joins:20
 VLAN 6 00:00:10/0 Joins:5

```

## 8.1.9 show ip mcast mroute group

This command displays the multicast configuration settings such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the given *groupipaddr*.

**Format**            `show ip mcast mroute group groupipaddr {detail | summary}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter               | Description                                                        |
|-------------------------|--------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                       |
| Group IP Addr           | The IP address of the destination of the multicast packet.         |
| Protocol                | The multicast routing protocol by which this entry was created.    |
| Incoming Interface      | The interface on which the packet for this group arrives.          |
| Outgoing Interface List | The list of outgoing interfaces on which this packet is forwarded. |

## 8.1.10 show ip mcast mroute source

This command displays the multicast configuration settings such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the given source IP address or source IP address and group IP address pair.

**Format**            `show ip mcast mroute source sourceipaddr {summary | groupipaddr}`

- Modes**
- Privileged EXEC
  - User EXEC

If you use the *groupipaddr* parameter, the command displays the following column headings in the output table.

| Parameter      | Description                                                |
|----------------|------------------------------------------------------------|
| Source IP Addr | The IP address of the multicast data source.               |
| Group IP Addr  | The IP address of the destination of the multicast packet. |
| Expiry Time    | The time of expiry of this entry in seconds.               |
| Up Time        | The time elapsed since the entry was created in seconds.   |
| RPF Neighbor   | The IP address of the RPF neighbor.                        |
| Flags          | The flags associated with this entry.                      |

If you use the *summary* parameter, the command displays the following column headings in the output table.

| Parameter               | Description                                                        |
|-------------------------|--------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                       |
| Group IP Addr           | The IP address of the destination of the multicast packet.         |
| Protocol                | The multicast routing protocol by which this entry was created.    |
| Incoming Interface      | The interface on which the packet for this source arrives.         |
| Outgoing Interface List | The list of outgoing interfaces on which this packet is forwarded. |

## 8.1.11 show ip mcast mroute static

Use the `show ip mcast mroute static` command in Privileged EXEC or User EXEC mode to display all the static routes configured in the static mcast table, if it is specified, or display the static route associated with the particular *sourceipaddr*.

- Format**            `show ip mcast mroute static [sourceipaddr]`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter   | Description                                                  |
|-------------|--------------------------------------------------------------|
| Source IP   | IP address of the multicast source network.                  |
| Source Mask | The subnetwork mask pertaining to the sourceIP.              |
| RPF Address | The IP address of the RPF next-hop router toward the source. |
| Preference  | The administrative distance for this Static MRoute.          |

**Example:** The following shows example CLI display output for the command.

```
console#show ip mcast mroute static
```

```

 MULTICAST STATIC ROUTES
Source IP Source Mask RPF Address Preference

1.1.1.1 255.255.255.0 2.2.2.2 23

```

## 8.1.12 clear ip mroute

This command deletes all or the specified IP multicast route entries.

**NOTE:** This command only clears dynamic mroute entries. It does not clear static mroutes.

- Format**            `clear ip mroute {*|group-address[source-address]}`
- Modes**            Privileged EXEC

| Parameter      | Description                                                                          |
|----------------|--------------------------------------------------------------------------------------|
| *              | Deletes all IPv4 entries from the IP multicast routing table.                        |
| group-address  | IP address of the multicast group.                                                   |
| source-address | The IP address of a multicast source that is sending multicast traffic to the group. |

**Example:** The following deletes all entries from the IP multicast routing table:

```
(Routing) # clear ip mroute *
```

**Example:** The following deletes all entries from the IP multicast routing table that match the given multicast group address (224.1.2.1), irrespective of which source is sending for this group:

```
(Routing) # clear ip mroute 224.1.2.1
```

**Example:** The following deletes all entries from the IP multicast routing table that match the given multicast group address (224.1.2.1) and the multicast source address (192.168.10.10):

```
(Routing) # clear ip mroute 224.1.2.1 192.168.10.10
```

## 8.2 DVMRP Commands

This section describes the Distance Vector Multicast Routing Protocol (DVMRP) commands.

### 8.2.1 ip dvmrp

This command sets administrative mode of DVMRP in the router to active.

- Default**            disabled
- Format**            `ip dvmrp`
- Mode**              Global Config



### 8.2.1.1 no ip dvmrp

This command sets administrative mode of DVMRP in the router to inactive.

**Format** no ip dvmrp  
**Mode** Global Config

### 8.2.2 ip dvmrp metric

This command configures the metric for an interface or range of interfaces. This value is used in the DVMRP messages as the cost to reach this network. This field has a range of 1 to 31.

**Default** 1  
**Format** ip dvmrp metric *metric*  
**Mode** Interface Config

#### 8.2.2.1 no ip dvmrp metric

This command resets the metric for an interface to the default value. This value is used in the DVMRP messages as the cost to reach this network.

**Format** no ip dvmrp metric  
**Mode** Interface Config

### 8.2.3 ip dvmrp trapflags

This command enables the DVMRP trap mode.

**Default** disabled  
**Format** ip dvmrp trapflags  
**Mode** Global Config

#### 8.2.3.1 no ip dvmrp trapflags

This command disables the DVMRP trap mode.

**Format** no ip dvmrp trapflags  
**Mode** Global Config

### 8.2.4 ip dvmrp

This command sets the administrative mode of DVMRP on an interface or range of interfaces to active.

**Default** disabled  
**Format** ip dvmrp  
**Mode** Interface Config

#### 8.2.4.1 no ip dvmrp

This command sets the administrative mode of DVMRP on an interface to inactive.

**Format** no ip dvmrp  
**Mode** Interface Config

## 8.2.5 show ip dvmrp

This command displays the system-wide information for DVMRP.

- Format**            `show ip dvmrp`
- Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter        | Description                                                           |
|------------------|-----------------------------------------------------------------------|
| Admin Mode       | Indicates whether DVMRP is enabled or disabled.                       |
| Version String   | The version of DVMRP being used.                                      |
| Number of Routes | The number of routes in the DVMRP routing table.                      |
| Reachable Routes | The number of entries in the routing table with non-infinite metrics. |

The following fields are displayed for each interface.

| Parameter      | Description                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------|
| Interface      | slot/port                                                                                         |
| Interface Mode | The mode of this interface. Possible values are Enabled and Disabled.                             |
| State          | The current state of DVMRP on this interface. Possible values are Operational or Non-Operational. |

## 8.2.6 show ip dvmrp interface

This command displays the interface information for DVMRP on the specified interface. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

- Format**            `show ip dvmrp interface {slot/port/vlan 1-4093}`
- Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter      | Description                                                                |
|----------------|----------------------------------------------------------------------------|
| Interface Mode | Indicates whether DVMRP is enabled or disabled on the specified interface. |
| Metric         | The metric of this interface. This is a configured value.                  |
| Local Address  | The IP address of the interface.                                           |

The following field is displayed only when DVMRP is operational on the interface.

| Parameter     | Description                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Generation ID | The Generation ID value for the interface. This is used by the neighboring routers to detect that the DVMRP table should be resent. |

The following fields are displayed only if DVMRP is enabled on this interface.

| Parameter            | Description                                                 |
|----------------------|-------------------------------------------------------------|
| Received Bad Packets | The number of invalid packets received.                     |
| Received Bad Routes  | The number of invalid routes received.                      |
| Sent Routes          | The number of routes that have been sent on this interface. |

## 8.2.7 show ip dvmrp neighbor

This command displays the neighbor information for DVMRP.

**Format**            `show ip dvmrp neighbor`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter       | Description                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------|
| IfIndex         | The value of the interface used to reach the neighbor.                                             |
| Nbr IP Addr     | The IP address of the DVMRP neighbor for which this entry contains information.                    |
| State           | The state of the neighboring router. The possible value for this field are ACTIVE or DOWN.         |
| Up Time         | The time since this neighboring router was learned.                                                |
| Expiry Time     | The time remaining for the neighbor to age out. This field is not applicable if the State is DOWN. |
| Generation ID   | The Generation ID value for the neighbor.                                                          |
| Major Version   | The major version of DVMRP protocol of neighbor.                                                   |
| Minor Version   | The minor version of DVMRP protocol of neighbor.                                                   |
| Capabilities    | The capabilities of neighbor.                                                                      |
| Received Routes | The number of routes received from the neighbor.                                                   |
| Rcvd Bad Pkts   | The number of invalid packets received from this neighbor.                                         |
| Rcvd Bad Routes | The number of correct packets received with invalid routes.                                        |

## 8.2.8 show ip dvmrp nexthop

This command displays the next hop information on outgoing interfaces for routing multicast datagrams.

**Format**            `show ip dvmrp nexthop`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter          | Description                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------|
| Source IP          | The sources for which this entry specifies a next hop on an outgoing interface.                 |
| Source Mask        | The IP Mask for the sources for which this entry specifies a next hop on an outgoing interface. |
| Next Hop Interface | The interface in <i>slot/port</i> format for the outgoing interface for this next hop.          |
| Type               | The network is a LEAF or a BRANCH.                                                              |

## 8.2.9 show ip dvmrp prune

This command displays the table listing the router's upstream prune information.

**Format**            `show ip dvmrp prune`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter          | Description                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------|
| Group IP           | The multicast Address that is pruned.                                                                          |
| Source IP          | The IP address of the source that has pruned.                                                                  |
| Source Mask        | The network Mask for the prune source. It should be all 1s or both the prune source and prune mask must match. |
| Expiry Time (secs) | The expiry time in seconds. This is the time remaining for this prune to age out.                              |

## 8.2.10 show ip dvmrp route

This command displays the multicast routing information for DVMRP.

**Format**            show ip dvmrp route

**Modes**            • Privileged EXEC  
                       • User EXEC

| Parameter          | Description                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------|
| Source Address     | The multicast address of the source group.                                                                     |
| Source Mask        | The IP Mask for the source group.                                                                              |
| Upstream Neighbor  | The IP address of the neighbor which is the source for the packets for a specified multi-cast address.         |
| Interface          | The interface used to receive the packets sent by the sources.                                                 |
| Metric             | The distance in hops to the source subnet. This field has a different meaning than the Interface Metric field. |
| Expiry Time (secs) | The expiry time in seconds, which is the time left for this route to age out.                                  |
| Up Time (secs)     | The time when a specified route was learned, in seconds.                                                       |

## 8.3 PIM Commands

This section describes the commands you use to configure Protocol Independent Multicast -Dense Mode (PIM-DM) and Protocol Independent Multicast - Sparse Mode (PIM-SM). PIM-DM and PIM-SM are multicast routing protocols that provides scalable inter-domain multicast routing across the Internet, independent of the mechanisms provided by any particular unicast routing protocol. Only one PIM mode can be operational at a time.

### 8.3.1 ip pim dense

This command administratively enables the PIM Dense mode across the router.

**Default**            disabled

**Format**            ip pim dense

**Mode**              Global Config

**Example:** The following shows an example of the command.

```
(Routing)(Config) #ip pim dense
```

#### 8.3.1.1 no ip pim dense

This command administratively disables the PIM Dense mode across the router.

**Format**            no ip pim dense

**Mode**              Global Config

## 8.3.2 ip pim sparse

This command administratively enables the PIM Sparse mode across the router.

|                |               |
|----------------|---------------|
| <b>Default</b> | disabled      |
| <b>Format</b>  | ip pim sparse |
| <b>Mode</b>    | Global Config |

**Example:** The following shows an example of the command.

```
(Routing) (Config) #ip pim sparse
```

### 8.3.2.1 no ip pim sparse

This command administratively disables the PIM Sparse mode across the router.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no ip pim sparse |
| <b>Mode</b>   | Global Config    |

## 8.3.3 ip pim

Use this command to administratively enable PIM on the specified interface.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | ip pim           |
| <b>Mode</b>    | Interface Config |

**Example:** The following shows example CLI display output for the command.

```
(Routing)(Interface 1/0/1) #ip pim
```

### 8.3.3.1 no ip pim

Use this command to disable PIM on the specified interface.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no ip pim        |
| <b>Mode</b>   | Interface Config |

## 8.3.4 ip pim hello-interval

This command configures the transmission frequency of PIM hello messages the specified interface. This field has a range of 0 to 18000 seconds.

|                |                                      |
|----------------|--------------------------------------|
| <b>Default</b> | 30                                   |
| <b>Format</b>  | ip pim hello-interval <i>seconds</i> |
| <b>Mode</b>    | Interface Config                     |

**Example:** The following shows an example of the command.

```
(Routing)(Interface 1/0/1) #ip pim hello-interval 50
```

### 8.3.4.1 no ip pim hello-interval

This command resets the transmission frequency of hello messages between PIM enabled neighbors to the default value.

|               |                          |
|---------------|--------------------------|
| <b>Format</b> | no ip pim hello-interval |
| <b>Mode</b>   | Interface Config         |

### 8.3.5 ip pim bsr-border

Use this command to prevent bootstrap router (BSR) messages from being sent or received on the specified interface.

---

This command takes effect only when Sparse mode is enabled in the Global mode.

---

#### NOTICE

**Default** disabled  
**Format** ip pim bsr-border  
**Mode** Interface Config

**Example:** The following shows an example of the command.

```
(Routing)(Interface 1/0/1) #ip pim bsr-border
```

#### 8.3.5.1 no ip pim bsr-border

Use this command to disable the specified interface from being the BSR border.

**Format** no ip pim bsr-border  
**Mode** Interface Config

### 8.3.6 ip pim bsr-candidate

This command is used to configure the router to announce its candidacy as a bootstrap router (BSR). The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

---

This command takes effect only when PIM-SM is configured as the PIM mode.

---

#### NOTICE

**Default** disabled  
**Format** ip pim bsr-candidate {interface slot/port | vlan 1-4093} hash-mask-length [bsr-priority] [interval interval]  
**Mode** Global Config

| Parameter        | Description                                                                                                                                                                                                                                                                                                                |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| slot/port        | Interface number on this router from which the BSR address is derived, to make it a candidate. This interface must be enabled with PIM.                                                                                                                                                                                    |
| hash-mask-length | Length of a mask (32 bits maximum) that is to be ANDed with the group address before the hash function is called. All groups with the same seed hash correspond to the same RP. For example, if this value is 24, only the first 24 bits of the group addresses matter. This allows you to get one RP for multiple groups. |
| bsr-priority     | Priority of the candidate BSR. The range is an integer from 0 to 255. The BSR with the larger priority is preferred. If the priority values are the same, the router with the larger IP address is the BSR. The default value is 0.                                                                                        |
| interval         | [Optional] Indicates the BSR candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.                                                                                                                                                                                      |

**Example:** The following shows examples of the command.

```
(Routing)(Config) #ip pim bsr-candidate interface 1/0/1 32 5
(Routing)(Config) #ip pim bsr-candidate interface 1/0/1 32 5 interval 100
```

### 8.3.6.1 no ip pim bsr-candidate

Use this command to remove the configured PIM Candidate BSR router.

**Format** no ip pim bsr-candidate {interface slot/port / vlan 1-4093} hash-mask-length [bsr-priority]

**Mode** Global Config

### 8.3.7 ip pim dr-priority

Use this command to set the priority value for which a router is elected as the designated router (DR).

---

This command takes effect only when Sparse mode is enabled in the Global mode.

#### NOTICE

**Default** 1

**Format** ip pim dr-priority 0-2147483647

**Mode** Interface Config

**Example:** The following shows example CLI display output for the command.

```
(Routing)(Interface 1/0/1) #ip pim dr-priority 10
```

#### 8.3.7.1 no ip pim dr-priority

Use this command to return the DR Priority on the specified interface to its default value.

**Format** no ip pim dr-priority

**Mode** Interface Config

### 8.3.8 ip pim join-prune-interval

Use this command to configure the frequency of PIM Join/Prune messages on a specified interface. The join/prune interval is specified in seconds. This parameter can be configured to a value from 0 to 18000.

---

This command takes effect only when configured as the PIM mode.

#### NOTICE

**Default** 60

**Format** ip pim join-prune-interval 0-18000

**Mode** Interface Config

**Example:** The following shows examples of the command.

```
(Routing)(Interface 1/0/1) #ip pim join-prune-interval 90
```

#### 8.3.8.1 no ip pim join-prune-interval

Use this command to set the join/prune interval on the specified interface to the default value.

**Format** no ip pim join-prune-interval

**Mode** Interface Config

### 8.3.9 ip pim rp-address

This command defines the address of a PIM Rendezvous point (RP) for a specific or set of multicast group ranges.

- Use the *group-address* option to associate a given RP to a specific multicast group range.
- Use the *prefix-list* option to associate a given RP to multiple multicast group ranges (specified as rules within an IP Prefix-List).

#### NOTICE

- This command takes effect only when PIM-SM is configured as the PIM mode.
- If the *override* keyword is not specified and there is an RP address conflict, dynamic group-to-RP mappings take precedence over static group-to-RP mappings.
- The *prefix-list* configuration option has the following caveats:
  - An RP address can be associated with only one IP prefix-list.
  - An IP prefix-list can be associated with only one RP address.
  - When an IP prefix-list configured with *ge* or *le* options is attached to an RP address, these options are ignored in the evaluation of this IP prefix-list during RP selection.

|                |                                                                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                                                   |
| <b>Format</b>  | <code>ip pim rp-address <i>rp-address</i> {<i>group-address group-mask</i>   <i>prefix-list prefix-list-name</i>} [<i>override</i>]</code> |
| <b>Mode</b>    | Global Config                                                                                                                              |

| Parameter        | Description                                                                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rp-address       | The IP address of the RP used for the static group-to-RP mapping. This is a unicast IP address in four-part dotted-decimal notation.                                                                     |
| group-address    | The multicast group address advertised in association with the RP address.                                                                                                                               |
| group-mask       | The multicast group prefix that is advertised in association with the RP address.                                                                                                                        |
| prefix-list-name | [Optional] The name of a prefix-list that defines the multicast groups to be statically mapped to the RP.                                                                                                |
| override         | [Optional] Specifies that if dynamic and static group-to-RP mappings are used together and there is an RP address conflict, the RP address configured for a static group-to-RP mapping takes precedence. |

**Example:** The following shows an example of IPv4 RP configuration with group-address and mask.

```
(Routing)(Config) #ip pim rp-address 192.168.10.1
224.1.2.0 255.255.255.0
```

**Example:** The following shows an example of IPv4 RP configuration with IP prefix-list.

```
(Routing)(Config)#ip prefix-list pfx1 permit 224.1.2.1/32
(Routing)(Config)#ip pim rp-address 65.34.55.12 pfx1
```

**Example:** The following shows an example of IPv6 RP configuration with group-address and mask.

```
(Routing)(Config)#ipv6 pim rp-address 1001::1 ff43::/6
```

**Example:** The following shows an example of IPv6 RP configuration with IPv6 Prefix-List.

```
(Routing)(Config)#ipv6 prefix-list a1 seq 5 permit ff43::/64
(Routing)(Config)#ipv6 prefix-list a1 seq 10 deny ff44::/64
(Routing)(Config)#ipv6 pim rp-address 1000::1 prefix-list a1
```



### 8.3.9.1 no ip pim rp-address

Use this command to remove the address of the configured PIM Rendezvous point (RP) for the specified multicast group range.

**Format**            `no ip pim rp-address rp-address {group-address group-mask | prefix-list prefix-list-name}`

**Mode**             Global Config

### 8.3.10 ip pim rp-candidate

Use this command to configure the router to advertise itself as a PIM candidate rendezvous point (RP) to the bootstrap router (BSR) for a specific multicast group range. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a `slot/port` format.

---

This command takes effect only when PIM-SM is configured as the PIM mode.

#### NOTICE

**Default**            disabled

**Format**            `ip pim rp-candidate {interface {slot/port/vlan 1-4093} group-address group-mask [interval interval][priority value]}`

**Mode**             Global Config

| Parameter     | Description                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| slot/port     | The IP address associated with this interface type and number is advertised as a candidate RP address. This interface must be enabled with PIM.                                                                      |
| group-address | The multicast group address that is advertised in association with the RP address.                                                                                                                                   |
| group-mask    | The multicast group prefix that is advertised in association with the RP address.                                                                                                                                    |
| interval      | [Optional] Indicates the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.                                                                                 |
| priority      | [Optional] The priority for the candidate RP advertised in candidate RP advertisements. The range is from 0 to 255. The default priority value is 192. The candidate RP with the lowest priority value is preferred. |

**Example:** The following shows examples of the command.

```
(Routing)(Config) #ip pim rp-candidate interface 1/0/1 224.1.2.0 255.255.255.0
(Routing)(Config) #ip pim rp-candidate interface 1/0/1 224.1.2.0 255.255.255.0 interval 200
(Routing)(Config) #ip pim rp-candidate interface 1/0/1 224.1.2.0 255.255.255.0 priority 50
(Routing)(Config) #ip pim rp-candidate interface 1/0/1 224.1.2.0 255.255.255.0 interval 100 priority 120
```

#### 8.3.10.1 no ip pim rp-candidate

Use this command to remove the configured PIM candidate Rendezvous point (RP) for a specific multicast group range.

**Format**            `no ip pim rp-candidate interface {slot/port/vlan 1-4093} group-address group-mask`

**Mode**             Global Config

### 8.3.11 ip pim ssm

Use this command to define the Source Specific Multicast (SSM) range of IP multicast addresses on the router.

---

This command takes effect only when PIM-SM is configured as the PIM mode.

#### NOTICE

|                |                                                         |
|----------------|---------------------------------------------------------|
| <b>Default</b> | disabled                                                |
| <b>Format</b>  | ip pim ssm {default   <i>group-address group-mask</i> } |
| <b>Mode</b>    | Global Config                                           |

| Parameter     | Description                                 |
|---------------|---------------------------------------------|
| default-range | Defines the SSM range access list to 232/8. |

**Example:** The following shows an example of the command.

```
(Routing)(Config) #ip pim ssm default
(Routing)(Config) #ip pim ssm 232.1.2.0 255.255.255.0
```

#### 8.3.11.1 no ip pim ssm

Use this command to remove the Source Specific Multicast (SSM) range of IP multicast addresses on the router.

|               |                                                            |
|---------------|------------------------------------------------------------|
| <b>Format</b> | no ip pim ssm {default   <i>group-address group-mask</i> } |
| <b>Mode</b>   | Global Config                                              |

### 8.3.12 ip pim-trapflags

This command enables the PIM trap mode for both Sparse Mode (SM) and Dense Mode (DM).

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | ip pim-trapflags |
| <b>Mode</b>    | Global Config    |

#### 8.3.12.1 no ip pim-trapflags

This command sets the PIM trap mode to the default.

|               |                     |
|---------------|---------------------|
| <b>Format</b> | no ip pim-trapflags |
| <b>Mode</b>   | Global Config       |

### 8.3.13 ip pim spt-threshold

Use this command to configure the Data Threshold rate for the last-hop router to switch to the shortest path on the router. The rate is specified in Kilobits per second. The possible values are 0 to 2000.

---

#### NOTICE

Some FASTPATH platforms do not support a nonzero data threshold rate. For these platforms, only a Switch on First Packet policy is supported.

---

#### NOTICE

This command takes effect only when PIM-SM is configured as the PIM mode.

---

**Default**            0  
**Format**            ip pim spt-threshold 0-2000  
**Modes**             Global Config

**Example:** The following shows an example of the command.

```
(FASTPATH) (Config) #ip pim spt-threshold 100
```

### 8.3.13.1 no ip pim spt-threshold

This command is used to set the data threshold rate for the RP router to the default value.

**Format**            no ip pim-spt-threshold  
**Mode**             Global Config

### 8.3.14 clear ip pim statistics

Use this command to clear all the IP PIM statistics.

**Format**            clear ip pim statistics  
**Modes**             Privileged EXEC

**Example:** The following shows an example of the command.

```
(Switching)#clear ip pim statistics
```

### 8.3.15 show ip mfc

This command displays mroute entries in the multicast forwarding (MFC) database.

**Format**            show ip mfc  
**Modes**             • Privileged EXEC  
                     • User EXEC

| Parameter                                    | Description                                                                                      |
|----------------------------------------------|--------------------------------------------------------------------------------------------------|
| MFC IPv4 Mode                                | Enabled when IPv4 Multicast routing is operational.                                              |
| MFC IPv6 Mode                                | Enabled when IPv6 Multicast routing is operational.                                              |
| MFC Entry Count                              | The number of entries present in MFC.                                                            |
| Current multicast IPv4 Protocol              | The current operating IPv4 multicast routing protocol.                                           |
| Current multicast IPv6 Protocol              | The current operating multicast IPv6 routing protocol.                                           |
| Total Software Forwarded packets             | Total Number of multicast packets forwarded in software.                                         |
| Source Address                               | Source address of the multicast route entry.                                                     |
| Group Address                                | Group address of the multicast route entry.                                                      |
| Packets Forwarded in Software for this entry | Number of multicast packets that are forwarded in software for a specific multicast route entry. |
| Protocol                                     | Multicast Routing Protocol that has added a specific entry                                       |
| Expiry Time (seconds)                        | Expiry time for a specific Multicast Route entry in seconds.                                     |
| Up Time (seconds)                            | Up time in seconds for a specific Multicast Routing entry.                                       |
| Incoming interface                           | Incoming interface for a specific Multicast Route entry.                                         |
| Outgoing interface list                      | Outgoing interface list for a specific Multicast Route entry.                                    |

**Example:** The following shows example command output.

```
(Routing) (Config)#show ip mfc

MFC IPv4 Mode..... Enabled
MFC IPv6 Mode..... Disabled
MFC Entry Count 1
Current multicast IPv4 protocol..... PIMSM
Current multicast IPv6 protocol..... No protocol enabled.
Total software forwarded packets 0

Source address: 192.168.10.5
Group address: 225.1.1.1
Packets forwarded in software for this entry: 0 Protocol: PIM-SM
Expiry Time (secs): 206 Up Time (secs): 4
Incoming interface: 1/0/10 Outgoing interface list: None
```

### 8.3.16 show ip pim

This command displays the system-wide information for PIM-DM or PIM-SM.

**Format**            show ip pim

**Modes**            • Privileged EXEC

                    • User EXEC

#### NOTICE

If the PIM mode is PIM-DM (dense), some of the fields in the following table do not display in the command output because they are applicable only to PIM-SM.

| Parameter           | Description                                                                            |
|---------------------|----------------------------------------------------------------------------------------|
| PIM Mode            | Indicates the configured mode of the PIM protocol as dense (PIM-DM) or sparse (PIM-SM) |
| Data Threshold Rate | The rate (in kbps) of SPT Threshold.                                                   |
| Register Rate-limit | The rate (in kbps) of Register Threshold.                                              |
| C-BSR Adv. Interval | The interval (in secs) that a C-BSR advertises its messages.                           |
| C-RP Adv. Interval  | The interval (in secs) that a C-RP advertises its messages.                            |
| Interface           | slot/port                                                                              |
| Interface-Mode      | Indicates whether PIM is enabled or disabled on this interface.                        |
| Operational-Status  | The current state of PIM on this interface: Operational or Non-Operational.            |

**Example:** The following shows example CLI display output for the command in PIM Mode = Dense mode.

```
(Routing)#show ip pim

PIM Mode Dense
Data Threshold Rate (kbps) 0
Register Rate-limit (kbps) 0
C-BSR Adv. Interval (secs) 60
C-RP Adv. Interval (secs) 60

Interface Interface-Mode Operational-Status

1/0/1 Enabled Operational
1/0/3 Disabled Non-Operational
```

**Example:** The following shows example CLI display output for the command in PIM Mode = Sparse mode.

```
(Routing)#show ip pim

PIM Mode Sparse
Data Threshold Rate (kbps) 500
Register Rate-limit (kbps) 100
C-BSR Adv. Interval (secs) 200
C-RP Adv. Interval (secs) 200

Interface Interface-Mode Operational-Status

1/0/1 Enabled Operational
1/0/3 Disabled Non-Operational
```

**Example:** The following shows example CLI display output for the command in PIM Mode = None mode.

```
(Routing)#show ip pim

PIM Mode None
Data Threshold Rate (kbps) 0
Register Rate-limit (kbps) 0
C-BSR Adv. Interval (secs) 60
C-RP Adv. Interval (secs) 60
```

None of the routing interfaces are enabled for PIM.

### 8.3.17 show ip pim ssm

This command displays the configured source specific IP multicast addresses. If no SSM Group range is configured, this command output is `No SSM address range is configured`.

**Format**            `show ip pim ssm`  
**Modes**            • Privileged EXEC  
                      • User EXEC

| Parameter     | Description                                |
|---------------|--------------------------------------------|
| Group Address | The IP multicast address of the SSM group. |
| Prefix Length | The network prefix length.                 |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ip pim ssm

Group Address/Prefix Length

232.0.0.0/8
```

If no SSM Group range is configured, this command displays the following message:

`No SSM address range is configured.`

### 8.3.18 show ip pim interface

This command displays the PIM interface status parameters. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format. If no interface is specified, the command displays the status parameters of all PIM-enabled interfaces.

- Format**            `show ip pim interface [slot/port/vlan 1-4093]`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter           | Description                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface           | slot/port The interface number.                                                                                                                                                                                      |
| Mode                | Indicates the active PIM mode enabled on the interface is dense or sparse.                                                                                                                                           |
| Hello Interval      | The frequency at which PIM hello messages are transmitted on this interface. By default, the value is 30 seconds.                                                                                                    |
| Join Prune Interval | The join/prune interval value for the PIM router. The interval is in seconds.                                                                                                                                        |
| DR Priority         | The priority of the Designated Router configured on the interface. This field is not applicable if the interface mode is Dense.                                                                                      |
| BSR Border          | Identifies whether this interface is configured as a bootstrap router border interface.                                                                                                                              |
| Neighbor Count      | The number of PIM neighbors learned on this interface. This is a dynamic value and is shown only when a PIM interface is operational.                                                                                |
| Designated Router   | The IP address of the elected Designated Router for this interface. This is a dynamic value and will only be shown when a PIM interface is operational. This field is not applicable if the interface mode is Dense. |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ip pim interface
```

```
Interface.....1/0/1
 Mode.....Sparse
 Hello Interval (secs).....30
 Join Prune Interval (secs).....60
 DR Priority.....1
 BSR Border.....Disabled
 Neighbor Count.....1
 Designated Router.....192.168.10.1

Interface.....1/0/2
 Mode.....Sparse
 Hello Interval (secs).....30
 Join Prune Interval (secs).....60
 DR Priority.....1
 BSR Border.....Disabled
 Neighbor Count.....1
 Designated Router.....192.168.10.1
```

If none of the interfaces are enabled for PIM, the following message is displayed:

```
None of the routing interfaces are enabled for PIM.
```

### 8.3.19 show ip pim neighbor

This command displays PIM neighbors discovered by PIMv2 Hello messages. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format. If the interface number is not specified, the command displays the status parameters of all PIM-enabled interfaces.

- Format**            `show ip pim neighbor [{slot/port/vlan 1-4093}]`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter        | Description                                                                                                                                                                                                                                                                                         |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Neighbor Address | The IP address of the PIM neighbor on an interface.                                                                                                                                                                                                                                                 |
| Interface        | slot/port                                                                                                                                                                                                                                                                                           |
| Up Time          | The time since this neighbor has become active on this interface.                                                                                                                                                                                                                                   |
| Expiry Time      | Time remaining for the neighbor to expire.                                                                                                                                                                                                                                                          |
| DR Priority      | The DR Priority configured on this Interface (PIM-SM only).<br><b>Note:</b> DR Priority is applicable only when sparse-mode configured routers are neighbors. Otherwise, NA is displayed in this field.<br><b>Note:</b> DR indicates that the neighbor is the PIM Designated Router in that subnet. |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ip pim neighbor 1/0/1
```

```
Neighbor Addr Interface Uptime Expiry Time DR
 (hh:mm:ss) (hh:mm:ss) Priority

192.168.10.2 1/0/1 00:02:55 00:01:15 10 (DR)
```

```
(Routing)#show ip pim neighbor
```

```
Neighbor Addr Interface Uptime Expiry Time DR
 (hh:mm:ss) (hh:mm:ss) Priority

192.168.10.2 1/0/1 00:02:55 00:01:15 10 (DR)
192.168.20.2 1/0/2 00:03:50 00:02:10 1
```

If no neighbors have been learned on any of the interfaces, the following message is displayed:

```
No neighbors exist on the router.
```

### 8.3.20 show ip pim bsr-router

This command displays the bootstrap router (BSR) information.

**Format**            `show ip pim bsr-router {candidate | elected}`

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                    | Description                                                                                                                                                                                  |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BSR Address                  | IP address of the BSR.                                                                                                                                                                       |
| BSR Priority                 | Priority as configured in the <code>ip pim bsr-candidate</code> command.                                                                                                                     |
| BSR Hash Mask Length         | Length of a mask (maximum 32 bits) that is to be ANDed with the group address before the hash function is called. This value is configured in the <code>ip pim bsr-candidate</code> command. |
| C-BSR Advertisement Interval | Indicates the configured C-BSR Advertisement interval with which the router, acting as a C-BSR, will periodically send the C-BSR advertisement messages.                                     |
| Next Bootstrap Message       | Time (in hours, minutes, and seconds) in which the next bootstrap message is due from this BSR.                                                                                              |

**Example:** The following shows example CLI display output for the command.

Example 1:

```
(Routing)#show ip pim bsr-router elected
```

```
BSR Address..... 192.168.10.1
BSR Priority..... 0
```

```
BSR Hash Mask Length..... 30
Next Bootstrap message (hh:mm:ss)..... 00:00:24
```

Example 2:

```
(Routing)#show ip pim bsr-router candidate
```

```
BSR Address..... 192.168.10.1
BSR Priority..... 0
BSR Hash Mask Length..... 30
C-BSR Advertisement Interval (secs)..... 60
Next Bootstrap message (hh:mm:ss)..... NA
```

If no configured or elected BSRs exist on the router, the following message is displayed:

```
No BSR's exist/learned on this router.
```

### 8.3.21 show ip pim rp-hash

This command displays the rendezvous point (RP) selected for the specified group address.

**Format** show ip pim rp-hash *group-address*

**Modes**

- Privileged EXEC
- User EXEC

| Parameter  | Description                                                           |
|------------|-----------------------------------------------------------------------|
| RP Address | The IP address of the RP for the group specified.                     |
| Type       | Indicates the mechanism (BSR or static) by which the RP was selected. |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ip pim rp-hash 224.1.2.0
```

```
RP Address 192.168.10.1
Type Static
```

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist/learned on this router.
```

### 8.3.22 show ip pim rp mapping

Use this command to display the mapping for the PIM group to the active Rendezvous points (RP) of which the router is aware (either configured or learned from the bootstrap router [BSR]). Use the optional parameters to limit the display to a specific RP address or to view group-to-candidate RP or group-to-Static RP mapping information.

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist on this router.
```

**Format** show ip pim rp mapping [*rp-address*] [*static*] [*candidate*]

**Modes**

- Privileged EXEC
- User EXEC

| Parameter        | Description                                                                               |
|------------------|-------------------------------------------------------------------------------------------|
| RP Address       | The IP address of the RP for the group specified.                                         |
| Group Address    | The IP address of the multicast group.                                                    |
| Group Mask       | The subnet mask associated with the group.                                                |
| Prefix-List Name | The name of the prefix-list.                                                              |
| Origin           | Indicates the origin mechanism (BSR or static) from where this group mapping was learned. |



| Parameter                   | Description                                                                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C-RP Advertisement Interval | Indicates the configured C-RP Advertisement interval with which the router acting as a Candidate RP will periodically (in seconds) send the C-RP advertisement messages to the elected BSR. |
| C-RP Priority               | The priority value of the candidate RP.                                                                                                                                                     |

**Example:** The following show examples of CLI display output for the command.

Example 1:

```
(Routing)#show ip pim rp mapping 192.168.10.1
```

```
RP Address 192.168.10.1
 Group Address 224.1.2.1
 Group Mask 255.255.255.0
 Origin Static
```

Example 2:

```
(Routing)#show ip pim rp mapping
```

```
RP Address 192.168.10.1
 Group Address 224.1.2.1
 Group Mask 255.255.255.0
 Origin Static
```

```
RP Address 192.168.20.1
 Group Address 229.2.0.0
 Group Mask 255.255.0.0
 Origin Static
```

**Example:** The following shows example command output for IPv4 with prefix-list configuration.

```
(Routing) #show ip pim rp mapping static
```

```
RP Address..... 2.2.2.2
 Prefix-List Name..... pfxlst1
 Origin..... Static
 Expiry Time (hh:mm:ss)..... NA
 Next Candidate RP Advertisement (hh:mm:ss).. NA
```

**Example:** The following shows example command output for IPv6 with prefix-list configuration.

```
(Routing) #show ipv6 pim rp mapping static
```

```
RP Address..... 2000::2
 Prefix-List Name..... pfxlst2
 Origin..... Static
 Expiry Time (hh:mm:ss)..... NA
 Next Candidate RP Advertisement (hh:mm:ss).. NA
```

**Example:** The following shows example command output for IPv4 with Candidate RP configuration.

```
(Routing)# show ip pim rp mapping candidate
```

```
RP Address..... 20.20.20.3
 Group Address..... 224.0.0.0
 Group Mask..... 255.0.0.0
 Origin..... BSR
 C-RP Advertisement Interval (secs)..... 60
 C-RP Priority..... 2
```

**Example:** The following shows example command output for IPv6 with Candidate RP configuration.

```
(Routing)# show ipv6 pim rp mapping candidate
```

```
RP Address..... 4002::1
 Group Address..... ff1e::/64
 Origin..... BSR
 C-RP Advertisement Interval (secs)..... 60
 C-RP Priority..... 3
```

### 8.3.23 show ip pim statistics

This command displays statistics for the received PIM control packets per interface. This command displays statistics only if PIM sparse mode is enabled.

- Format**            show ip pim statistics
- Modes**            • Privileged EXEC  
                      • User EXEC

The following information is displayed.

| Parameter | Description                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------|
| Stat      | <ul style="list-style-type: none"> <li>RX: Packets received</li> <li>Tx: Packets transmitted</li> </ul> |
| Interface | The PIM-enabled routing interface                                                                       |
| Hello     | The number of PIM Hello messages                                                                        |
| Register  | The number of PIM Register messages                                                                     |
| Reg-Stop  | The number of PIM Register-stop messages                                                                |
| Join/Pru  | The number of PIM Join/Prune messages                                                                   |
| BSR       | The number of PIM Boot Strap messages                                                                   |
| Assert    | The number of PIM Assert messages                                                                       |
| CRP       | The number of PIM Candidate RP Advertisement messages.                                                  |

**Example:** The following shows example command output.

Example 1:

```
(Routing) #show ip pim statistics
=====
Interface Stat Hello Register Reg-Stop Join/Pru BSR Assert CRP
=====
V110 Rx 0 0 0 0 0 0 0
 Tx 2 0 0 0 0 0 0

 Invalid Packets Received - 0

V120 Rx 0 0 0 5 0 0 0
 Tx 8 7 0 0 0 0 0

 Invalid Packets Received - 0

1/0/5 Rx 0 0 6 5 0 0 0
 Tx 10 9 0 0 0 0 0

 Invalid Packets Received - 0

```

Example 2:

```
(Routing) #show ip pim statistics vlan 10
=====
Interface Stat Hello Register Reg-Stop Join/Pru BSR Assert CRP
=====
V110 Rx 0 0 0 0 0 0 0
 Tx 2 0 0 0 0 0 0

 Invalid Packets Received - 0

```

Example 3:

```
(Routing) #show ip pim statistics 1/0/5
=====
Interface Stat Hello Register Reg-Stop Join/Pru BSR Assert CRP
=====
1/0/5 Rx 0 0 6 5 0 0 0
 Tx 10 9 0 0 0 0 0

Invalid Packets Received - 0
```

---

For ipv6 statistics, use the key word ipv6.

### NOTICE

## 8.4 Internet Group Message Protocol Commands

This section describes the commands you use to view and configure Internet Group Message Protocol (IGMP) settings.

### 8.4.1 ip igmp

This command sets the administrative mode of IGMP in the system to active on an interface, range of interfaces, or on all interfaces.

**Default** disabled

**Format** ip igmp

**Modes**

- Global Config
- Interface Config

#### 8.4.1.1 no ip igmp

This command sets the administrative mode of IGMP in the system to inactive.

**Format** no ip igmp

**Modes**

- Global Config
- Interface Config

### 8.4.2 ip igmp header-validation

Use this command to enable header validation for IGMP messages.

**Default** disabled

**Format** ip igmp header-validation

**Mode** Global Config

#### 8.4.2.1 no ip igmp header-validation

This command disables header validation for IGMP messages.

**Format** no ip igmp header-validation

**Mode** Global Config

### 8.4.3 ip igmp version

This command configures the version of IGMP for an interface or range of interfaces. The value for *version* is either 1, 2, or 3.

|                |                                |
|----------------|--------------------------------|
| <b>Default</b> | 3                              |
| <b>Format</b>  | ip igmp version <i>version</i> |
| <b>Modes</b>   | Interface Config               |

#### 8.4.3.1 no ip igmp version

This command resets the version of IGMP to the default value.

|               |                    |
|---------------|--------------------|
| <b>Format</b> | no ip igmp version |
| <b>Modes</b>  | Interface Config   |

### 8.4.4 ip igmp last-member-query-count

This command sets the number of Group-Specific Queries sent by the interface or range of interfaces before the router assumes that there are no local members on the interface. The range for *count* is 1 to 20.

|               |                                              |
|---------------|----------------------------------------------|
| <b>Format</b> | ip igmp last-member-query-count <i>count</i> |
| <b>Modes</b>  | Interface Config                             |

#### 8.4.4.1 no ip igmp last-member-query-count

This command resets the number of Group-Specific Queries to the default value.

|               |                                    |
|---------------|------------------------------------|
| <b>Format</b> | no ip igmp last-member-query-count |
| <b>Modes</b>  | Interface Config                   |

### 8.4.5 ip igmp last-member-query-interval

This command configures the Maximum Response Time inserted in Group-Specific Queries that are sent in response to Leave Group messages. The range for *seconds* is 0 to 255 tenths of a second. This value can be configured on one interface or a range of interfaces

|                |                                                   |
|----------------|---------------------------------------------------|
| <b>Default</b> | 10 tenths of a second (1 second)                  |
| <b>Format</b>  | ip igmp last-member-query-interval <i>seconds</i> |
| <b>Modes</b>   | Interface Config                                  |

#### 8.4.5.1 no ip igmp last-member-query-interval

This command resets the Maximum Response Time to the default value.

|               |                                       |
|---------------|---------------------------------------|
| <b>Format</b> | no ip igmp last-member-query-interval |
| <b>Modes</b>  | Interface Config                      |

### 8.4.6 ip igmp query-interval

This command configures the query interval for the specified interface or range of interfaces. The query interval determines how fast IGMP Host-Query packets are transmitted on this interface. The range for *query-interval* is 1 to 3600 seconds.

|                |                                       |
|----------------|---------------------------------------|
| <b>Default</b> | 125 seconds                           |
| <b>Format</b>  | ip igmp query-interval <i>seconds</i> |
| <b>Modes</b>   | Interface Config                      |

### 8.4.6.1 no ip igmp query-interval

This command resets the query interval for the specified interface to the default value. This is the frequency at which IGMP Host-Query packets are transmitted on this interface.

**Format** no ip igmp query-interval

**Modes** Interface Config

### 8.4.7 ip igmp query-max-response-time

This command configures the maximum response time interval for the specified interface or range of interfaces, which is the maximum query response time advertised in IGMPv2 queries on this interface. The time interval is specified in tenths of a second. The range for `igmp query-max-response-time` is 0 to 255 tenths of a second.

**Default** 100

**Format** ip igmp query-max-response-time 0-255

**Mode** Interface Config

#### 8.4.7.1 no ip igmp query-max-response-time

This command resets the maximum response time interval for the specified interface, which is the maximum query response time advertised in IGMPv2 queries on this interface to the default value. The maximum response time interval is reset to the default time.

**Format** no ip igmp query-max-response-time

**Mode** Interface Config

### 8.4.8 ip igmp robustness

This command configures the robustness that allows tuning of the interface or range of interfaces. The robustness is the tuning for the expected packet loss on a subnet. If a subnet is expected to have a lot of loss, the Robustness variable may be increased for the interface. The range for `robustness` is 1 to 255.

**Default** 2

**Format** ip igmp robustness 1-255

**Mode** Interface Config

#### 8.4.8.1 no ip igmp robustness

This command sets the robustness value to default.

**Format** no ip igmp robustness

**Mode** Interface Config

### 8.4.9 ip igmp startup-query-count

This command sets the number of Queries sent out on startup, separated by the Startup Query Interval on the interface or range of interfaces. The range for `count` is 1 to 20.

**Default** 2

**Format** ip igmp startup-query-count 1-20

**Mode** Interface Config

#### 8.4.9.1 no ip igmp startup-query-count

This command resets the number of Queries sent out on startup, separated by the Startup Query Interval on the interface to the default value.

**Format** no ip igmp startup-query-count

**Mode** Interface Config

## 8.4.10 ip igmp startup-query-interval

This command sets the interval between General Queries sent on startup on the interface or range of interfaces. The time interval value is in seconds. The range for *interval* is 1 to 300 seconds.

**Default** 31  
**Format** ip igmp startup-query-interval 1-300  
**Mode** Interface Config

### 8.4.10.1 no ip igmp startup-query-interval

This command resets the interval between General Queries sent on startup on the interface to the default value.

**Format** no ip igmp startup-query-interval  
**Mode** Interface Config

## 8.4.11 show ip igmp

This command displays the system-wide IGMP information.

**Format** show ip igmp  
**Modes**

- Privileged EXEC
- User EXEC

| Parameter       | Description                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------|
| IGMP Admin Mode | The administrative status of IGMP. This is a configured value.                                   |
| Interface       | slot/port                                                                                        |
| Interface Mode  | Indicates whether IGMP is enabled or disabled on the interface. This is a configured value.      |
| Protocol State  | The current state of IGMP on this interface. Possible values are Operational or Non-Operational. |

## 8.4.12 show ip igmp groups

This command displays the registered multicast groups on the interface. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format. If *[detail]* is specified, this command displays the registered multicast groups on the interface in detail.

**Format** show ip igmp groups {slot/port/vlan 1-4093 [detail]}  
**Mode** Privileged EXEC

If you do not use the *detail* keyword, the following fields appear:

| Field          | Description                                                            |
|----------------|------------------------------------------------------------------------|
| IP Address     | The IP address of the interface participating in the multicast group.  |
| Subnet Mask    | The subnet mask of the interface participating in the multicast group. |
| Interface Mode | This displays whether IGMP is enabled or disabled on this interface.   |

The following fields are not displayed if the interface is not enabled:

| Field          | Description                                                                       |
|----------------|-----------------------------------------------------------------------------------|
| Querier Status | This displays whether the interface has IGMP in Querier mode or Non-Querier mode. |
| Groups         | The list of multicast groups that are registered on this interface.               |

If you use the `detail` keyword, the following fields appear:

| Field                    | Description                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Multicast IP Address     | The IP address of the registered multicast group on this interface.                                                                                                                                                                          |
| Last Reporter            | The IP address of the source of the last membership report received for the specified multicast group address on this interface.                                                                                                             |
| Up Time                  | The time elapsed since the entry was created for the specified multicast group address on this interface.                                                                                                                                    |
| Expiry Time              | The amount of time remaining to remove this entry before it is aged out.                                                                                                                                                                     |
| Version1 Host Timer      | The time remaining until the local router assumes that there are no longer any IGMP version 1 multicast members on the IP subnet attached to this interface. This could be an integer value or "----" if there is no Version 1 host present. |
| Version2 Host Timer      | The time remaining until the local router assumes that there are no longer any IGMP version 2 multicast members on the IP subnet attached to this interface. This could be an integer value or "----" if there is no Version 2 host present. |
| Group Compatibility Mode | The group compatibility mode (v1, v2 or v3) for this group on the specified interface.                                                                                                                                                       |

### 8.4.13 show ip igmp interface

This command displays the IGMP information for the interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

**Format**            `show ip igmp interface {slot/port/vlan 1-4093}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter                  | Description                                                                                                                                                         |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                  | slot/port                                                                                                                                                           |
| IGMP Admin Mode            | The administrative status of IGMP.                                                                                                                                  |
| Interface Mode             | Indicates whether IGMP is enabled or disabled on the interface.                                                                                                     |
| IGMP Version               | The version of IGMP running on the interface. This value can be configured to create a router capable of running either IGMP version 1 or 2.                        |
| Query Interval             | The frequency at which IGMP Host-Query packets are transmitted on this interface.                                                                                   |
| Query Max Response Time    | The maximum query response time advertised in IGMPv2 queries on this interface.                                                                                     |
| Robustness                 | The tuning for the expected packet loss on a subnet. If a subnet is expected to be have a lot of loss, the Robustness variable may be increased for that interface. |
| Startup Query Interval     | The interval between General Queries sent by a Querier on startup.                                                                                                  |
| Startup Query Count        | The number of Queries sent out on startup, separated by the Startup Query Interval.                                                                                 |
| Last Member Query Interval | The Maximum Response Time inserted into Group-Specific Queries sent in response to Leave Group messages.                                                            |
| Last Member Query Count    | The number of Group-Specific Queries sent before the router assumes that there are no local members.                                                                |

### 8.4.14 show ip igmp interface membership

This command displays the list of interfaces that have registered in the multicast group.

**Format**            `show ip igmp interface membership multiipaddr [detail]`

**Mode**              Privileged EXEC

| Parameter                | Description                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                | Valid unit, slot and port number separated by forward slashes.                                                                                |
| Interface IP             | The IP address of the interface participating in the multicast group.                                                                         |
| State                    | The interface that has IGMP in Querier mode or Non-Querier mode.                                                                              |
| Group Compatibility Mode | The group compatibility mode (v1, v2 or v3) for the specified group on this interface.                                                        |
| Source Filter Mode       | The source filter mode (Include/Exclude) for the specified group on this interface. This is "-----" for IGMPv1 and IGMPv2 Membership Reports. |

If you use the `detail` keyword, the following fields appear.

| Parameter                | Description                                                                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                | Valid unit, slot and port number separated by forward slashes.                                                                                                                                       |
| Group Compatibility Mode | The group compatibility mode (v1, v2 or v3) for the specified group on this interface.                                                                                                               |
| Source Filter Mode       | The source filter mode (Include/Exclude) for the specified group on this interface. This is "-----" for IGMPv1 and IGMPv2 Membership Reports.                                                        |
| Source Hosts             | The list of unicast source IP addresses in the group record of the IGMPv3 Membership Report with the specified multicast group IP address. This is "-----" for IGMPv1 and IGMPv2 Membership Reports. |
| Expiry Time              | The amount of time remaining to remove this entry before it is aged out. This is "-----" for IGMPv1 and IGMPv2 Membership Reports.                                                                   |

#### 8.4.15 show ip igmp interface stats

This command displays the IGMP statistical information for the interface. The statistics are only displayed when the interface is enabled for IGMP. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

**Format**            `show ip igmp interface stats [slot/port/vlan 1-4093]`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter             | Description                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Querier Status        | The status of the IGMP router, whether it is running in Querier mode or Non-Querier mode.                                                          |
| Querier IP Address    | The IP address of the IGMP Querier on the IP subnet to which this interface is attached.                                                           |
| Querier Up Time       | The time since the interface Querier was last changed.                                                                                             |
| Querier Expiry Time   | The amount of time remaining before the Other Querier Present Timer expires. If the local system is the querier, the value of this object is zero. |
| Wrong Version Queries | The number of queries received whose IGMP version does not match the IGMP version of the interface.                                                |
| Number of Joins       | The number of times a group membership has been added on this interface.                                                                           |
| Number of Groups      | The current number of membership entries for this interface.                                                                                       |



## 8.4.16 ip igmp static address

This command sets a static IP IGMP multicast address. Normally the IP IGMP protocol is used to register or unregister an IP multicast address. In case of devices not supporting the IP IGMP protocol, this feature can be used.

The IP address must be set for port-based routing on the physical interface and for VLAN-based routing on the VLAN routing interface. The IP IGMP protocol must be enabled first because the address is added to the IP IGMP group table as a multicast address in an IP IGMP membership message. The registered multicast address can be listed by CLI command "show ip igmp groups <interface>".

**Format** ip igmp stat address <ip-address>

**Modes** Interface Config

### 8.4.16.1 no ip igmp static address

This command resets a static IP IGMP multicast address.

**Format** no ip igmp stat address <ip-address>

**Modes** Interface Config

## 8.5 IGMP Proxy Commands

The IGMP Proxy is used by IGMP Router (IPv4 system) to enable the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP router interfaces. With IGMP Proxy enabled, the system acts as proxy to all the hosts residing on its router interfaces.

### 8.5.1 ip igmp-proxy

This command enables the IGMP Proxy on the an interface or range of interfaces. To enable the IGMP Proxy on an interface, you must enable multicast forwarding. Also, make sure that there are no multicast routing protocols enabled on the router.

**Format** ip igmp-proxy

**Mode** Interface Config

#### 8.5.1.1 no ip igmp-proxy

This command disables the IGMP Proxy on the router.

**Format** no ip igmp-proxy

**Mode** Interface Config

### 8.5.2 ip igmp-proxy unsolicit-rprt-interval

This command sets the unsolicited report interval for the IGMP Proxy interface or range of interfaces. This command is valid only when you enable IGMP Proxy on the interface or range of interfaces. The value of *interval* can be 1 to 260 seconds.

**Default** 1

**Format** ip igmp-proxy unsolicit-rprt-interval 1-260

**Mode** Interface Config

#### 8.5.2.1 no ip igmp-proxy unsolicit-rprt-interval

This command resets the unsolicited report interval of the IGMP Proxy router to the default value.

**Format** no ip igmp-proxy unsolicit-rprt-interval

**Mode** Interface Config

### 8.5.3 ip igmp-proxy reset-status

This command resets the host interface status parameters of the IGMP Proxy interface (or range of interfaces). This command is valid only when you enable IGMP Proxy on the interface.

**Format** ip igmp-proxy reset-status

**Mode** Interface Config

### 8.5.4 show ip igmp-proxy

This command displays a summary of the host interface status parameters. It displays the following parameters only when you enable IGMP Proxy.

**Format** show ip igmp-proxy

**Modes**

- Privileged EXEC
- User EXEC

| Parameter                             | Description                                                                                                      |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Interface index                       | The interface number of the IGMP Proxy.                                                                          |
| Admin Mode                            | States whether the IGMP Proxy is enabled or not. This is a configured value.                                     |
| Operational Mode                      | States whether the IGMP Proxy is operationally enabled or not. This is a status parameter.                       |
| Version                               | The present IGMP host version that is operational on the proxy interface.                                        |
| Number of Multicast Groups            | The number of multicast groups that are associated with the IGMP Proxy interface.                                |
| Unsolicited Report Interval           | The time interval at which the IGMP Proxy interface sends unsolicited group membership report.                   |
| Querier IP Address on Proxy Interface | The IP address of the Querier, if any, in the network attached to the upstream interface (IGMP-Proxy interface). |
| Older Version 1 Querier Timeout       | The interval used to timeout the older version 1 queriers.                                                       |
| Older Version 2 Querier Timeout       | The interval used to timeout the older version 2 queriers.                                                       |
| Proxy Start Frequency                 | The number of times the IGMP Proxy has been stopped and started.                                                 |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip igmp-proxy
```

```
Interface Index..... 1/0/1
Admin Mode..... Enable
Operational Mode..... Enable
Version..... 3
Num of Multicast Groups..... 0
Unsolicited Report Interval..... 1
Querier IP Address on Proxy Interface..... 5.5.5.50
Older Version 1 Querier Timeout..... 0
Older Version 2 Querier Timeout..... 00::00:00
Proxy Start Frequency..... 1
```

## 8.5.5 show ip igmp-proxy interface

This command displays a detailed list of the host interface status parameters. It displays the following parameters only when you enable IGMP Proxy.

**Format**            `show ip igmp-proxy interface`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                             |
|-----------------|-----------------------------------------|
| Interface Index | The <i>slot/port</i> of the IGMP proxy. |

The column headings of the table associated with the interface are as follows.

| Parameter   | Description                                                                  |
|-------------|------------------------------------------------------------------------------|
| Ver         | The IGMP version.                                                            |
| Query Rcvd  | Number of IGMP queries received.                                             |
| Report Rcvd | Number of IGMP reports received.                                             |
| Report Sent | Number of IGMP reports sent.                                                 |
| Leaves Rcvd | Number of IGMP leaves received. Valid for version 2 only.                    |
| Leaves Sent | Number of IGMP leaves sent on the Proxy interface. Valid for version 2 only. |

**Example:** The following shows example CLI display output for the command.

(Routing) #show ip igmp-proxy interface

Interface Index..... 1/0/1

| Ver | Query Rcvd | Report Rcvd | Report Sent | Leave Rcvd | Leave Sent |
|-----|------------|-------------|-------------|------------|------------|
| 1   | 0          | 0           | 0           | ----       | ----       |
| 2   | 0          | 0           | 0           | 0          | 0          |
| 3   | 0          | 0           | 0           | ----       | ----       |

## 8.5.6 show ip igmp-proxy groups

This command displays information about the subscribed multicast groups that IGMP Proxy reported. It displays a table of entries with the following as the fields of each column.

**Format**            `show ip igmp-proxy groups`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter         | Description                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface         | The interface number of the IGMP Proxy.                                                                                                                                                                                                                                                                                                                                                                             |
| Group Address     | The IP address of the multicast group.                                                                                                                                                                                                                                                                                                                                                                              |
| Last Reporter     | The IP address of host that last sent a membership report for the current group on the network attached to the IGMP Proxy interface (upstream interface).                                                                                                                                                                                                                                                           |
| Up Time (in secs) | The time elapsed since last created.                                                                                                                                                                                                                                                                                                                                                                                |
| Member State      | The status of the entry. Possible values are <code>IDLE_MEMBER</code> or <code>DELAY_MEMBER</code> . <ul style="list-style-type: none"> <li>• <code>IDLE_MEMBER</code> - interface has responded to the latest group membership query for this group.</li> <li>• <code>DELAY_MEMBER</code> - interface is going to send a group membership report to respond to a group membership query for this group.</li> </ul> |
| Filter Mode       | Possible values are <code>Include</code> or <code>Exclude</code> .                                                                                                                                                                                                                                                                                                                                                  |

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| Sources   | The number of sources attached to the multicast group. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip igmp-proxy groups
```

```
Interface Index..... 1/0/1
```

| Group Address | Last Reporter | Up Time  | Member State | Filter Mode | Sources |
|---------------|---------------|----------|--------------|-------------|---------|
| 225.4.4.4     | 5.5.5.48      | 00:02:21 | DELAY_MEMBER | Include     | 3       |
| 226.4.4.4     | 5.5.5.48      | 00:02:21 | DELAY_MEMBER | Include     | 3       |
| 227.4.4.4     | 5.5.5.48      | 00:02:21 | DELAY_MEMBER | Exclude     | 0       |
| 228.4.4.4     | 5.5.5.48      | 00:02:21 | DELAY_MEMBER | Include     | 3       |

### 8.5.7 show ip igmp-proxy groups detail

This command displays complete information about multicast groups that IGMP Proxy reported. It displays a table of entries with the following as the fields of each column.

**Format** show ip igmp-proxy groups detail

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter         | Description                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface         | The interface number of the IGMP Proxy.                                                                                                                                                                                                                                                                                                                        |
| Group Address     | The IP address of the multicast group.                                                                                                                                                                                                                                                                                                                         |
| Last Reporter     | The IP address of host that last sent a membership report for the current group, on the network attached to the IGMP-Proxy interface (upstream interface).                                                                                                                                                                                                     |
| Up Time (in secs) | The time elapsed since last created.                                                                                                                                                                                                                                                                                                                           |
| Member State      | The status of the entry. Possible values are IDLE_MEMBER or DELAY_MEMBER. <ul style="list-style-type: none"> <li>• IDLE_MEMBER - interface has responded to the latest group membership query for this group.</li> <li>• DELAY_MEMBER - interface is going to send a group membership report to respond to a group membership query for this group.</li> </ul> |
| Filter Mode       | Possible values are Include or Exclude.                                                                                                                                                                                                                                                                                                                        |
| Sources           | The number of sources attached to the multicast group.                                                                                                                                                                                                                                                                                                         |
| Group Source List | The list of IP addresses of the sources attached to the multicast group.                                                                                                                                                                                                                                                                                       |
| Expiry Time       | Time left before a source is deleted.                                                                                                                                                                                                                                                                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ip igmp-proxy groups
```

```
Interface Index..... 1/0/1
```

| Group Address     | Last Reporter | Up Time  | Member State | Filter Mode | Sources |
|-------------------|---------------|----------|--------------|-------------|---------|
| 225.4.4.4         | 5.5.5.48      | 00:02:21 | DELAY_MEMBER | Include     | 3       |
| Group Source List | Expiry Time   |          |              |             |         |

|                   |          |             |              |         |   |
|-------------------|----------|-------------|--------------|---------|---|
| 5.1.2.3           |          | 00:02:21    |              |         |   |
| 6.1.2.3           |          | 00:02:21    |              |         |   |
| 7.1.2.3           |          | 00:02:21    |              |         |   |
| 226.4.4.4         | 5.5.5.48 | 00:02:21    | DELAY_MEMBER | Include | 3 |
| Group Source List |          | Expiry Time |              |         |   |
| -----             |          | -----       |              |         |   |
| 2.1.2.3           |          | 00:02:21    |              |         |   |
| 6.1.2.3           |          | 00:01:44    |              |         |   |
| 8.1.2.3           |          | 00:01:44    |              |         |   |
| 227.4.4.4         | 5.5.5.48 | 00:02:21    | DELAY_MEMBER | Exclude | 0 |
| 228.4.4.4         | 5.5.5.48 | 00:03:21    | DELAY_MEMBER | Include | 3 |
| Group Source List |          | Expiry Time |              |         |   |
| -----             |          | -----       |              |         |   |
| 9.1.2.3           |          | 00:03:21    |              |         |   |
| 6.1.2.3           |          | 00:03:21    |              |         |   |
| 7.1.2.3           |          | 00:03:21    |              |         |   |

## 9/ IPv6 Multicast Commands

The entire IPv6 Multicast commands section is Enterprise-only. This chapter describes the IPv6 Multicast commands available in the FASTPATH CLI.

### NOTICE

There is no specific IP multicast enable for IPv6. Enabling of multicast at global config is common for both IPv4 and IPv6.

### NOTICE

The commands in this chapter are in one of three functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Clear commands clear some or all of the settings to factory defaults.

## 9.1 IPv6 Multicast Forwarder

### 9.1.1 ipv6 mroute

This command configures an IPv6 Multicast Static Route for a source.

|                |                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | No MRoute is configured on the system.                                                                           |
| <b>Format</b>  | <code>ipv6 mroute <i>src-ip-addr</i> <i>src-mask</i> <i>rpf-addr</i> [<i>interface</i>] <i>preference</i></code> |
| <b>Mode</b>    | Global Config                                                                                                    |

| Parameter                | Description                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------------------|
| <code>src-ip-addr</code> | The IP address of the multicast source network.                                                           |
| <code>src-mask</code>    | The IP mask of the multicast data source.                                                                 |
| <code>rpf-ip-addr</code> | The IP address of the RPF next-hop router toward the source.                                              |
| <code>interface</code>   | Specify the interface if the RPF Address is a link-local address.                                         |
| <code>preference</code>  | The administrative distance for this Static MRoute, that is, the preference value. The range is 1 to 255. |

#### 9.1.1.1 no ipv6 mroute

This command removes the configured IPv6 Multicast Static Route.

|               |                                              |
|---------------|----------------------------------------------|
| <b>Format</b> | <code>no ip mroute <i>src-ip-addr</i></code> |
| <b>Mode</b>   | Global Config                                |

### 9.1.2 show ipv6 mroute

### NOTICE

There is no specific IP multicast enable for IPv6. Enabling of multicast at global config is common for both IPv4 and IPv6.

Use this command to show the mroute entries specific for IPv6. (This command is the IPv6 equivalent of the IPv4 `show ip mroute` command.)

|               |                                                                                                                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b> | <code>show ipv6 mroute {[<i>detail</i>]   [<i>summary</i>]   [<i>group</i> {<i>group-address</i>} [<i>detail</i>   <i>summary</i>]]   [<i>source</i> {<i>source-address</i>} [<i>grpaddr</i>   <i>summary</i> ]]}</code> |
| <b>Modes</b>  | <ul style="list-style-type: none"> <li>• Privileged EXEC</li> <li>• User EXEC</li> </ul>                                                                                                                                 |

If you use the `detail` parameter, the command displays the following Multicast Route Table fields:

| Parameter      | Description                                                |
|----------------|------------------------------------------------------------|
| Source IP Addr | The IP address of the multicast data source.               |
| Group IP Addr  | The IP address of the destination of the multicast packet. |
| Expiry Time    | The time of expiry of this entry in seconds.               |
| Up Time        | The time elapsed since the entry was created in seconds.   |
| RPF Neighbor   | The IP address of the RPF neighbor.                        |
| Flags          | The flags associated with this entry.                      |

If you use the `summary` parameter, the command displays the following fields:

| Parameter               | Description                                                       |
|-------------------------|-------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                      |
| Group IP Addr           | The IP address of the destination of the multicast packet.        |
| Protocol                | The multicast routing protocol by which the entry was created.    |
| Incoming Interface      | The interface on which the packet for the source/group arrives.   |
| Outgoing Interface List | The list of outgoing interfaces on which the packet is forwarded. |

### 9.1.3 show ipv6 mroute group

This command displays the multicast configuration settings specific to IPv6 such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the given group IPv6 address *group-address*.

**Format**            `show ipv6 mroute group group-address {detail | summary}`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter               | Description                                                        |
|-------------------------|--------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                       |
| Group IP Addr           | The IP address of the destination of the multicast packet.         |
| Protocol                | The multicast routing protocol by which this entry was created.    |
| Incoming Interface      | The interface on which the packet for this group arrives.          |
| Outgoing Interface List | The list of outgoing interfaces on which this packet is forwarded. |

### 9.1.4 show ipv6 mroute source

This command displays the multicast configuration settings specific to IPv6 such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the given source IP address or source IP address and group IP address pair.

**Format**            `show ipv6 mroute source source-address {grpaddr | summary}`

- Modes**
- Privileged EXEC
  - User EXEC

If you use the `groupipaddr` parameter, the command displays the following column headings in the output table:

| Parameter      | Description                                                |
|----------------|------------------------------------------------------------|
| Source IP Addr | The IP address of the multicast data source.               |
| Group IP Addr  | The IP address of the destination of the multicast packet. |
| Expiry Time    | The time of expiry of this entry in seconds.               |
| Up Time        | The time elapsed since the entry was created in seconds.   |
| RPF Neighbor   | The IP address of the RPF neighbor.                        |
| Flags          | The flags associated with this entry.                      |

If you use the `summary` parameter, the command displays the following column headings in the output table:

| Parameter               | Description                                                        |
|-------------------------|--------------------------------------------------------------------|
| Source IP Addr          | The IP address of the multicast data source.                       |
| Group IP Addr           | The IP address of the destination of the multicast packet.         |
| Protocol                | The multicast routing protocol by which this entry was created.    |
| Incoming Interface      | The interface on which the packet for this source arrives.         |
| Outgoing Interface List | The list of outgoing interfaces on which this packet is forwarded. |

### 9.1.5 show ipv6 mroute static

Use the `show ipv6 mroute static` command in Privileged EXEC or User EXEC mode to display all the configured IPv6 multicast static routes.

**Format**            `show ipv6 mroute static [source-address]`

**Modes**

- Privileged EXEC
- User EXEC

| Parameter      | Description                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------|
| Source Address | IP address of the multicast source network.                                                                     |
| Source Mask    | The subnetwork mask pertaining to the source IP.                                                                |
| RPF Address    | The IP address of the RPF next-hop router toward the source.                                                    |
| Interface      | The interface that is used to reach the RPF next-hop. This is valid if the RPF address is a link-local address. |
| Preference     | The administrative distance for this Static MRoute.                                                             |

### 9.1.6 clear ipv6 mroute

This command deletes all or the specified IPv6 multicast route entries.

---

This command only clears dynamic mroute entries. It does not clear static mroutes.

#### **NOTICE**

**Format**            `clear ipv6 mroute {*|group-address[source-address]}`

**Modes**            Privileged EXEC



| Parameter      | Description                                                                            |
|----------------|----------------------------------------------------------------------------------------|
| *              | Deletes all IPv6 entries from the IPv6 multicast routing table.                        |
| group-address  | IPv6 address of the multicast group.                                                   |
| source-address | The IPv6 address of a multicast source that is sending multicast traffic to the group. |

**Example:** The following deletes all entries from the IPv6 multicast routing table:

```
(Routing) # clear ipv6 mroute *
```

**Example:** The following deletes all entries from the IPv6 multicast routing table that match the given multicast group address (FF4E::1), irrespective of which source is sending for this group:

```
(Routing) # clear ipv6 mroute FF4E::1
```

**Example:** The following deletes all entries from the IPv6 multicast routing table that match the given multicast group address (FF4E::1) and the multicast source address (2001::2):

```
(Routing) # clear ip mroute FF4E::1 2001::2
```

## 9.2 IPv6 PIM Commands

This section describes the commands you use to configure Protocol Independent Multicast -Dense Mode (PIM-DM) and Protocol Independent Multicast - Sparse Mode (PIM-SM) for IPv6 multicast routing. PIM-DM and PIM-SM are multicast routing protocols that provides scalable inter-domain multicast routing across the Internet, independent of the mechanisms provided by any particular unicast routing protocol. Only one PIM mode can be operational at a time.

### 9.2.1 ipv6 pim dense

This command enables the administrative mode of PIM-DM in the router.

**Default** disabled  
**Format** ipv6 pim dense  
**Mode** Global Config

**Example:** The following shows an example of the command.

```
(Routing)(Config) #ipv6 pim dense
```

#### 9.2.1.1 no ipv6 pim dense

This command disables the administrative mode of PIM-DM in the router.

**Format** no ipv6 pim dense  
**Mode** Global Config

### 9.2.2 ipv6 pim sparse

This command enables the administrative mode of PIM-SM in the router.

**Default** disabled  
**Format** ipv6 pim sparse  
**Mode** Global Config

**Example:** The following shows an example of the command.

```
(Routing)(Config) #ipv6 pim sparse
```

#### 9.2.2.1 no ipv6 pim sparse

This command disables the administrative mode of PIM-SM in the router.

**Format** no ipv6 pim sparse  
**Mode** Global Config

## 9.2.3 ipv6 pim

This command administratively enables PIM on an interface or range of interfaces.

|                |                  |
|----------------|------------------|
| <b>Default</b> | disabled         |
| <b>Format</b>  | ipv6 pim         |
| <b>Mode</b>    | Interface Config |

**Example:** The following shows example CLI display output for the command.

```
(Routing)(Interface 1/0/1) #ipv6 pim
```

### 9.2.3.1 no ipv6 pim

This command sets the administrative mode of PIM on an interface to disabled.

|               |                  |
|---------------|------------------|
| <b>Format</b> | no ipv6 pim      |
| <b>Mode</b>   | Interface Config |

## 9.2.4 ipv6 pim hello-interval

Use this command to configure the PIM hello interval for the specified router interface or range of interfaces. The hello interval is specified in seconds and is in the range 0 to 18000.

|                |                                 |
|----------------|---------------------------------|
| <b>Default</b> | 30                              |
| <b>Format</b>  | ipv6 pim hello-interval 0-18000 |
| <b>Mode</b>    | Interface Config                |

**Example:** The following shows an example of the command.

```
(Routing)(Interface 1/0/1) #ipv6 pim hello-interval 50
```

### 9.2.4.1 no ipv6 pim hello-interval

Use this command to set the PIM hello interval to the default value.

|               |                            |
|---------------|----------------------------|
| <b>Format</b> | no ipv6 pim hello-interval |
| <b>Mode</b>   | Interface Config           |

## 9.2.5 ipv6 pim bsr-border

Use this command to prevent bootstrap router (BSR) messages from being sent or received on the specified interface.

---

This command takes effect only when PIM-SM is enabled in the Global mode.

### NOTICE

|                |                     |
|----------------|---------------------|
| <b>Default</b> | disabled            |
| <b>Format</b>  | ipv6 pim bsr-border |
| <b>Mode</b>    | Interface Config    |

**Example:** The following shows an example of the command.

```
(Routing)(Interface 1/0/1) #ipv6 pim bsr-border
```

### 9.2.5.1 no ipv6 pim bsr-border

Use this command to disable the setting of BSR border on the specified interface.

**Format** no ipv6 pim bsr-border  
**Mode** Interface Config

### 9.2.6 ipv6 pim bsr-candidate

This command is used to configure the router to announce its candidacy as a bootstrap router (BSR). The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

---

This command takes effect only when PIM-SM is configured as the PIM mode.

---

#### NOTICE

**Default** disabled  
**Format** ipv6 pim bsr-candidate interface {slot/port/vlan 1-4093} hash-mask-length [bsr-priority] [interval interval]  
**Mode** Global Config

| Parameters       | Description                                                                                                                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| slot/port        | Interface number on this router from which the BSR address is derived, to make it a candidate. This interface must be enabled with PIM.                                                                                                                                                                                     |
| hash-mask-length | Length of a mask (32 bits maximum) that is to be ANDed with the group address before the hash function is called. All groups with the same seed hash correspond to the same RP. For example, if this value was 24, only the first 24 bits of the group addresses matter. This allows you to get one RP for multiple groups. |
| bsr-priority     | Priority of the candidate BSR. The range is an integer from 0 to 255. The BSR with the larger priority is preferred. If the priority values are the same, the router with the larger IPv6 address is the BSR. The default value is 0.                                                                                       |
| interval         | [Optional] Indicates the BSR candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.                                                                                                                                                                                       |

**Example:** The following shows examples of the command.

```
(Routing) (Config)#ipv6 pim bsr-candidate interface 0/1 32 5
(Routing) (Config)#ipv6 pim bsr-candidate interface 0/1 32 5 interval 100
```

#### 9.2.6.1 no ipv6 pim bsr-candidate

This command is used to remove the configured PIM Candidate BSR router.

**Format** no ipv6 pim bsr-candidate interface {slot/port/vlan 1-4093} hash-mask-length [priority]  
**Mode** Global Config

## 9.2.7 ipv6 pim dr-priority

Use this command to set the priority value for which a router is elected as the designated router (DR).

---

This command takes effect only when PIM-SM is enabled in the Global mode.

### NOTICE

|                |                                   |
|----------------|-----------------------------------|
| <b>Default</b> | 1                                 |
| <b>Format</b>  | ipv6 pim dr-priority 0-2147483647 |
| <b>Mode</b>    | Interface Config                  |

**Example:** The following shows example CLI display output for the command.

```
(Routing)(Interface 1/0/1) #ipv6 pim dr-priority 10
```

### 9.2.7.1 no ipv6 pim dr-priority

Use this command to return the DR Priority on the specified interface to its default value.

|               |                         |
|---------------|-------------------------|
| <b>Format</b> | no ipv6 pim dr-priority |
| <b>Mode</b>   | Interface Config        |

## 9.2.8 ipv6 pim join-prune-interval

This command is used to configure the join/prune interval for the PIM-SM router on an interface or range of interfaces. The join/prune interval is specified in seconds. This parameter can be configured to a value from 0 to 18000.

---

This command takes effect only when PIM-SM is enabled in the Global mode.

### NOTICE

|                |                                      |
|----------------|--------------------------------------|
| <b>Default</b> | 60                                   |
| <b>Format</b>  | ipv6 pim join-prune-interval 0-18000 |
| <b>Mode</b>    | Interface Config                     |

**Example:** The following shows examples of the command.

```
(Routing)(Interface 1/0/1) #ipv6 pim join-prune-interval 90
```

### 9.2.8.1 no ipv6 pim join-prune-interval

Use this command to set the join/prune interval on the specified interface to the default value.

|               |                                 |
|---------------|---------------------------------|
| <b>Format</b> | no ipv6 pim join-prune-interval |
| <b>Mode</b>   | Interface Config                |

## 9.2.9 ipv6 pim rp-address

This command defines the address of a PIM Rendezvous point (RP) for a specific multicast group range.

---

This command takes effect only when PIM-SM is enabled in the Global mode.

### NOTICE

|                |                                                                                      |
|----------------|--------------------------------------------------------------------------------------|
| <b>Default</b> | 0                                                                                    |
| <b>Format</b>  | <code>ipv6 pim rp-address {rp-address   group-address/group-mask } [override]</code> |
| <b>Mode</b>    | Global Config                                                                        |

| Parameter     | Description                                                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------------------|
| rp-address    | The IPv6 address of the RP.                                                                                                |
| group-address | The group address supported by the RP.                                                                                     |
| group-mask    | The group mask for the group address.                                                                                      |
| override      | [Optional] Indicates that if there is a conflict, the RP configured with this command prevails over the RP learned by BSR. |

**Example:** The following shows an example of the command.

```
(Routing) (Config)#ipv6 pim rp-address 2001::1 ff1e::0/64
```

### 9.2.9.1 no ipv6 pim rp-address

This command is used to remove the address of the configured PIM Rendezvous point (RP) for the specified multicast group range.

|               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| <b>Format</b> | <code>no ipv6 pim rp-address {rp-address   group-address/group-mask } [override]</code> |
| <b>Mode</b>   | Global Config                                                                           |

### 9.2.10 ipv6 pim rp-candidate

This command is used to configure the router to advertise itself as a PIM candidate rendezvous point (RP) to the bootstrap router (BSR) for a specific multicast group range. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format.

---

This command takes effect only when PIM-SM is configured as the PIM mode.

#### **NOTICE**

|                |                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | disabled                                                                                                          |
| <b>Format</b>  | <code>ipv6 pim rp-candidate interface {slot/port vlan 1-4093} group-address group-mask [interval interval]</code> |
| <b>Mode</b>    | Global Config                                                                                                     |

| Parameter     | Description                                                                                                                                     |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| slot/port     | The IP address associated with this interface type and number is advertised as a candidate RP address. This interface must be enabled with PIM. |
| group-address | The multicast group address that is advertised in association with the RP address.                                                              |
| group-mask    | The multicast group prefix that is advertised in association with the RP address.                                                               |
| interval      | [Optional] Indicates the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.            |

**Example:** The following shows examples of the command.

```
(Routing) (Config) ipv6 pim rp-candidate interface 0/1 ff1e::0/64
(Routing) (Config) ipv6 pim rp-candidate interface 0/1 ff1e::0/64 interval 200
```

### 9.2.10.1 no ipv6 pim rp-candidate

This command is used to disable the router to advertise itself as a PIM candidate rendezvous point (RP) to the bootstrap router (BSR).

**Format** no ipv6 pim rp-candidate interface {slot/port/vlan 1-4093} group-address group-mask  
**Mode** Global Config

### 9.2.11 ipv6 pim ssm

Use this command to define the Source Specific Multicast (SSM) range of IPv6 multicast addresses on the router.

#### NOTICE

- This command takes effect only when PIM-SM is configured as the PIM mode.
- Some FASTPATH platforms do not support a nonzero data threshold rate. For these platforms, only a Switch on First Packet policy is supported

**Default** disabled  
**Format** ipv6 pim ssm {default | group-address group-mask}  
**Mode** Global Config

| Parameter     | Description                                  |
|---------------|----------------------------------------------|
| default-range | Defines the SSM range access list FF3x::/32. |

**Example:** The following shows an example of the command.

```
(Routing)(Config) #ipv6 pim ssm default
(Routing)(Config) #ipv6 pim ssm ff32::/32
```

#### 9.2.11.1 no ipv6 pim ssm

Use this command to remove the Source Specific Multicast (SSM) range of IP multicast addresses on the router.

**Format** no ipv6 pim ssm {default | group-address group-mask}  
**Mode** Global Config

### 9.2.12 clear ipv6 pim statistics

Use this command to clear all the IPv6 PIM statistics.

**Format** clear ipv6 pim statistics  
**Modes** Privileged EXEC

**Example:** The following shows an example of the command.

```
(Switching)#clear ipv6 pim statistics
```

### 9.2.13 show ipv6 pim

This command displays the system-wide information for PIM-DM or PIM-SM.

**Format** show ipv6 pim  
**Modes**

- Privileged EXEC
- User EXEC

**NOTICE**

If the PIM mode is PIM-DM (dense), some of the fields in the following table do not display in the command output because they are applicable only to PIM-SM.

| Parameter          | Description                                                                 |
|--------------------|-----------------------------------------------------------------------------|
| PIM Mode           | Indicates whether the PIM mode is dense (PIM-DM) or sparse (PIM-SM)         |
| Interface          | slot/port                                                                   |
| Interface Mode     | Indicates whether PIM is enabled or disabled on this interface.             |
| Operational Status | The current state of PIM on this interface: Operational or Non-Operational. |

**Example:** The following shows example CLI display output for the command.

Example 1: PIM Mode - Dense

```
(Routing) #show ipv6 pim
PIM Mode..... Dense
```

```
Interface Interface-Mode Operational-Status
----- -
0/1 Enabled Non-Operational
0/3 Disabled Non-Operational
0/21 Enabled Operational
```

Example 2: PIM Mode - Sparse

```
(Routing) #show ipv6 pim
PIM Mode..... Sparse
```

```
Interface Interface-Mode Operational-Status
----- -
0/1 Enabled Non-Operational
0/3 Disabled Non-Operational
0/21 Enabled Operational
```

Example 3: PIM Mode - None

```
(Routing) #show ipv6 pim

PIM Mode..... None
```

None of the routing interfaces are enabled for PIM.

## 9.2.14 show ipv6 pim ssm

This command displays the configured source specific IPv6 multicast addresses. If no SSM Group range is configured, this command output is `No SSM address range is configured`.

**Format**            `show ipv6 pim ssm`

**Modes**            • Privileged EXEC

                     • User EXEC

| Parameter     | Description                                  |
|---------------|----------------------------------------------|
| Group Address | The IPv6 multicast address of the SSM group. |
| Prefix Length | The network prefix length.                   |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 pim ssm
```

```
Group Address/Prefix Length

ff32::/32
```

If no SSM Group range is configured, this command displays the following message:

```
No SSM address range is configured.
```

## 9.2.15 show ipv6 pim interface

This command displays the interface information for PIM on the specified interface. The argument `slot/port` corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format. If no interface is specified, the command displays the status parameters for all PIM-enabled interfaces.

**Format**            `show ipv6 pim interface [{slot/port/vlan 1-4093}]`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter           | Description                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface           | slot/port                                                                                                                                                                                                           |
| Mode                | Indicates whether the PIM mode enabled on the interface is dense or sparse.                                                                                                                                         |
| Hello Interval      | The frequency at which PIM hello messages are transmitted on this interface. By default, the value is 30 seconds.                                                                                                   |
| Join Prune Interval | The join/prune interval for the PIM router. The interval is in seconds.                                                                                                                                             |
| DR Priority         | The priority of the Designated Router configured on the interface. This field is not applicable if the interface mode is Dense                                                                                      |
| BSR Border          | Identifies whether this interface is configured as a bootstrap router border interface.                                                                                                                             |
| Neighbor Count      | The number of PIM neighbors learned on this interface. This is a dynamic value and is shown only when a PIM interface is operational.                                                                               |
| Designated Router   | The IP address of the elected Designated Router for this interface. This is a dynamic value and will only be shown when a PIM interface is operational. This field is not applicable if the interface mode is Dense |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ipv6 pim interface
```

```
Interface..... 0/1
Mode..... Sparse
Hello Interval (secs)..... 30
Join Prune Interval (secs)..... 60
DR Priority..... 1
BSR Border..... Disabled

Interface..... 0/21
Mode..... Sparse
Hello Interval (secs)..... 30
Join Prune Interval (secs)..... 60
DR Priority..... 1
BSR Border..... Disabled
Neighbor Count 1
Designated Router..... fe80::20a:f7ff:fe81:8ad9
```

If none of the interfaces are enabled for PIM, the following message is displayed:

```
None of the routing interfaces are enabled for PIM.
```



## 9.2.16 show ipv6 pim neighbor

This command displays PIM neighbors discovered by PIMv2 Hello messages. The argument slot/port corresponds to a physical routing interface or VLAN routing interface. The keyword `vlan` is used to specify the VLAN ID of the routing VLAN directly instead of in a slot/port format. If the interface number is not specified, this command displays the neighbors discovered on all the PIM-enabled interfaces.

**Format**            `show ipv6 pim neighbor [{slot/port/vlan 1-4093}]`

- Modes**
- Privileged EXEC
  - User EXEC

| Parameter        | Description                                                                                                                                                                                             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Neighbor Address | The IPv6 address of the PIM neighbor on an interface.                                                                                                                                                   |
| Interface        | slot/port                                                                                                                                                                                               |
| Up Time          | The time since this neighbor has become active on this interface.                                                                                                                                       |
| Expiry Time      | Time remaining for the neighbor to expire.                                                                                                                                                              |
| DR Priority      | The DR Priority configured on this Interface (PIM-SM only).<br><b>Note:</b> DR Priority is applicable only when sparse-mode configured routers are neighbors. Otherwise, NA is displayed in this field. |

**Example:** The following shows example CLI display output for the command.

```
(Routing)#show ipv6 pim neighbor
```

```
Neighbor Addr Interface Up Time Expiry Time DR
 hh:mm:ss hh:mm:ss Priority

fe80::200:52ff:feb7:58ac 0/21 00:00:03 00:01:43 0 (DR)
```

If no neighbors have been learned on any of the interfaces, the following message is displayed:

```
No neighbors are learned on any interface.
```

## 9.2.17 show ipv6 pim bsr-router

This command displays the bootstrap router (BSR) information.

**Format**            `show ipv6 pim bsr-router {candidate | elected}`

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter                    | Description                                                                                                                                                                                    |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BSR Address                  | IPv6 address of the BSR.                                                                                                                                                                       |
| BSR Priority                 | Priority as configured in the <code>ipv6 pim bsr-candidate</code> command.                                                                                                                     |
| BSR Hash Mask Length         | Length of a mask (maximum 32 bits) that is to be ANDed with the group address before the hash function is called. This value is configured in the <code>ipv6 pim bsr-candidate</code> command. |
| C-BSR Advertisement Interval | Indicates the configured C-BSR Advertisement interval with which the router, acting as a C-BSR, will periodically send the C-BSR advertisement messages.                                       |
| Next Bootstrap Message       | Time (in hours, minutes, and seconds) in which the next bootstrap message is due from this BSR.                                                                                                |

**Example:** The following shows example CLI display output for the command.

Example 1:

```
(Routing) #show ipv6 pim bsr-router elected
```

```
BSR Address..... 3001::1
 BSR Priority..... 150
 BSR Hash Mask Length..... 120
 Next Bootstrap message (hh:mm:ss)..... 00:00:15
```

Example 2:

```
(Routing) #show ipv6 pim bsr-router candidate
```

```
BSR Address..... 3001::1
 BSR Priority..... 150
 BSR Hash Mask Length..... 120
 C-BSR Advertisement Interval (secs)..... 60
 Next Bootstrap message (hh:mm:ss)..... NA
```

If no configured or elected BSRs exist on the router, the following message is displayed:

```
No BSR's exist/learned on this router.
```

## 9.2.18 show ipv6 pim rp-hash

This command displays which rendezvous point (RP) is being used for a specified group.

**Format** show ipv6 pim rp-hash *group-address*

**Modes**

- Privileged EXEC
- User EXEC

| Parameter  | Description                                                           |
|------------|-----------------------------------------------------------------------|
| RP Address | The IPv6 address of the RP for the group specified.                   |
| Type       | Indicates the mechanism (BSR or static) by which the RP was selected. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 pim rp-hash ff1e::
```

```
RP Address..... 2001::1
 Type..... Static
```

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist/learned on this router.
```

## 9.2.19 show ipv6 pim rp mapping

Use this command to display the mapping for the PIM group to the active Rendezvous points (RP) of which the router is aware (either configured or learned from the bootstrap router [BSR]). Use the optional parameters to limit the display to a specific RP address or to view group-to-candidate RP or group to Static RP mapping information.

**Format** show ipv6 pim rp mapping [{*rp-address* | candidate | static}]

**Modes**

- Privileged EXEC
- User EXEC

| Parameter     | Description                                                |
|---------------|------------------------------------------------------------|
| RP Address    | The IPv6 address of the RP for the group specified.        |
| Group Address | The IPv6 address and prefix length of the multicast group. |

| Parameter                   | Description                                                                                                                                                                    |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Origin                      | Indicates the mechanism (BSR or static) by which the RP was selected.                                                                                                          |
| C-RP Advertisement Interval | Indicates the configured C-RP Advertisement interval with which the router acting as a Candidate RP will periodically send the C-RP advertisement messages to the elected BSR. |

**Example:** The following show examples of CLI display output for the command.

Example 1:

```
(Routing) #show ipv6 pim rp mapping 2001::1
```

```
RP Address..... 2001::1
 Group Address..... ff1e::/64
 Origin..... Static
 Expiry Time (hh:mm:ss)..... NA
 Next Candidate RP Advertisement (hh:mm:ss).. NA
```

Example 2:

```
(Routing)#show ipv6 pim rp mapping
```

```
RP Address..... 2001::1
 Group Address..... ff1e::/64
 Origin..... Static
 Expiry Time (hh:mm:ss)..... NA
 Next Candidate RP Advertisement (hh:mm:ss).. NA
```

Example 3:

```
(Routing)# show ipv6 pim rp mapping candidate
```

```
RP Address..... 2001::1
 Group Address..... ff1e::/64
 Origin..... BSR
 C-RP Advertisement Interval (secs)..... 200
```

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist on this router.
```

## 9.3 IPv6 MLD Commands

IGMP/MLD Snooping is Layer 2 functionality but IGMP/MLD are Layer 3 multicast protocols. It requires that in a network setup there should be a multicast router (which can act as a querier) to be present to solicit the multicast group registrations. However some network setup does not need a multicast router as multicast traffic is destined to hosts within the same network. In this situation, FASTPATH has an IGMP/MLD Snooping Querier running on one of the switches and Snooping enabled on all the switches. For more information, see [Section 4.33: "IGMP Snooping Configuration Commands"](#) and [Section 4.36: "MLD Snooping Commands"](#).

### 9.3.1 ipv6 mld router

Use this command, in the administrative mode of the router, to enable MLD in the router.

**Default** disabled  
**Format** ipv6 mld router  
**Mode** Global Config

#### 9.3.1.1 no ipv6 mld router

Use this command, in the administrative mode of the router, to disable MLD in the router.

**Default** disabled  
**Format** no ipv6 mld router  
**Mode** Global Config

### 9.3.2 ipv6 mld query-interval

Use this command to set the MLD router's query interval for the interface or range of interfaces. The query-interval is the amount of time between the general queries sent when the router is the querier on that interface. The range for *query-interval* is 1 to 3600 seconds.

**Default** 125  
**Format** ipv6 mld query-interval *query-interval*  
**Mode** Interface Config

#### 9.3.2.1 no ipv6 mld query-interval

Use this command to reset the MLD query interval to the default value for that interface.

**Format** no ipv6 mld query-interval  
**Mode** Interface Config

### 9.3.3 ipv6 mld query-max-response-time

Use this command to set the MLD querier's maximum response time for the interface or range of interfaces and this value is used in assigning the maximum response time in the query messages that are sent on that interface. The range for *query-max-response-time* is 0 to 65535 milliseconds.

**Default** 10000 milliseconds  
**Format** ipv6 mld query-max-response-time *query-max-response-time*  
**Mode** Interface Config

#### 9.3.3.1 no ipv6 mld query-max-response-time

This command resets the MLD query max response time for the interface to the default value.

**Format** no ipv6 mld query-max-response-time  
**Mode** Interface Config

### 9.3.4 ipv6 mld last-member-query-interval

Use this command to set the last member query interval for an MLD interface or range of interfaces, which is the value of the maximum response time parameter in the group specific queries sent out of this interface. The range for *last-member-query-interval* is 0 to 65535 milliseconds.

**Default** 1000 milliseconds  
**Format** ipv6 mld last-member-query-interval *last-member-query-interval*  
**Mode** Interface Config

#### 9.3.4.1 no ipv6 mld last-member-query-interval

Use this command to reset the *last-member-query-interval* parameter of the interface to the default value.

**Format** no ipv6 mld last-member-query-interval  
**Mode** Interface Config

### 9.3.5 ipv6 mld last-member-query-count

Use this command to set the number of listener-specific queries sent before the router assumes that there are no local members on an interface or range of interfaces. The range for *last-member-query-count* is 1 to 20.

**Default** 2  
**Format** `ipv6 mld last-member-query-count last-member-query-count`  
**Mode** Interface Config

#### 9.3.5.1 no ipv6 mld last-member-query-count

Use this command to reset the *last-member-query-count* parameter of the interface to the default value.

**Format** `no ipv6 mld last-member-query-count`  
**Mode** Interface Config

### 9.3.6 ipv6 mld startup-query-count

Use this command to configure the *startup-query-count* parameter. The range for *startup-query-count* is 1 to 20 seconds.

**Default** 2 seconds  
**Format** `ipv6 mld startup-query-count <startup-query-count>`  
**Mode** Interface Config

#### 9.3.6.1 no ipv6 mld startup-query-count

This command resets the *startup-query-count* parameter of the interface to the default value.

**Format** `no ipv6 mld startup-query-count`  
**Mode** Interface Config

### 9.3.7 ipv6 mld startup-query-interval

Use this command to set the *startup-query-interval* parameter of the interface. The range is 1 to 300 seconds.

**Default** 31 seconds  
**Format** `ipv6 mld startup-query-interval <startup-query-interval>`  
**Mode** Interface Config

#### 9.3.7.1 no ipv6 mld startup-query-interval

Use this command to reset the *startup-query-interval* parameter of the interface to the default value.

**Format** `ipv6 mld startup-query-interval <startup-query-interval>`  
**Mode** Interface Config

### 9.3.8 ipv6 mld version

Use this command to configure the MLD version that the interface uses.

**Default** 2  
**Format** `ipv6 mld version { 1 | 2 }`  
**Mode** Interface Config

### 9.3.8.1 no ipv6 mld version

This command resets the MLD version used by the interface to the default value.

**Format**           no ipv6 mld  
**Mode**             Interface Config

### 9.3.9 show ipv6 mld groups

Use this command to display information about multicast groups that MLD reported. The information is displayed only when MLD is enabled on at least one interface. If MLD was not enabled on even one interface, there is no group information to be displayed. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of in a *slot/port* format.

**Format**           show ipv6 mld groups {*slot/port/vlan 1-4093/group-address*}  
**Mode**             • Privileged EXEC  
                     • User EXEC

The following fields are displayed as a table when *slot/port* is specified.

| Parameter     | Description                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------|
| Group Address | The address of the multicast group.                                                                 |
| Interface     | Interface through which the multicast group is reachable.                                           |
| Up Time       | Time elapsed in hours, minutes, and seconds since the multicast group has been known.               |
| Expiry Time   | Time left in hours, minutes, and seconds before the entry is removed from the MLD membership table. |

When *group-address* is specified, the following fields are displayed for each multicast group and each interface.

| Parameter            | Description                                                                                                                 |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Interface            | Interface through which the multicast group is reachable.                                                                   |
| Group Address        | The address of the multicast group.                                                                                         |
| Last Reporter        | The IP Address of the source of the last membership report received for this multicast group address on that interface.     |
| Filter Mode          | The filter mode of the multicast group on this interface. The values it can take are <i>include</i> and <i>exclude</i> .    |
| Version 1 Host Timer | The time remaining until the router assumes there are no longer any MLD version-1 Hosts on the specified interface.         |
| Group Compat Mode    | The compatibility mode of the multicast group on this interface. The values it can take are <i>MLDv1</i> and <i>MLDv2</i> . |

The following table is displayed to indicate all the sources associated with this group.

| Parameter      | Description                                                                  |
|----------------|------------------------------------------------------------------------------|
| Source Address | The IP address of the source.                                                |
| Uptime         | Time elapsed in hours, minutes, and seconds since the source has been known. |
| Expiry Time    | Time left in hours, minutes, and seconds before the entry is removed.        |

**Example:** The following shows examples of CLI display output for the commands.

```
(Routing) #show ipv6 mld groups ?
```

```
group-address Enter Group Address Info.
<unit/slot/port> Enter interface in unit/slot/port format.
```

```
(Routing) #show ipv6 mld groups 1/0/1
```

```
Group Address..... FF43::3
Interface..... 1/0/1
Up Time (hh:mm:ss)..... 00:03:04
Expiry Time (hh:mm:ss)..... -----
```

```
(Routing) #show ipv6 mld groups ff43::3
```

```
Interface..... 1/0/1
Group Address..... FF43::3
Last Reporter..... FE80::200:FF:FE00:3
Up Time (hh:mm:ss)..... 00:02:53
Expiry Time (hh:mm:ss)..... -----
Filter Mode..... Include
Version1 Host Timer..... -----
Group compat mode..... v2
Source Address ExpiryTime

 2003::10 00:04:17
 2003::20 00:04:17
```

### 9.3.10 show ipv6 mld interface

Use this command to display MLD-related information for the interface. The argument *slot/port* corresponds to a physical routing interface or VLAN routing interface. The keyword *vlan* is used to specify the VLAN ID of the routing VLAN directly instead of in a *slot/port* format.

**Format**            `show ipv6 mld interface {slot/port/vlan 1-4093}`

- Mode**
- Privileged EXEC
  - User EXEC

The following information is displayed for each of the interfaces or for only the specified interface.

| Parameter                  | Description                                                                                                                              |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Interface                  | The interface number in <i>slot/port</i> format.                                                                                         |
| MLD Mode                   | Displays the configured administrative status of MLD.                                                                                    |
| Operational Mode           | The operational status of MLD on the interface.                                                                                          |
| MLD Version                | Indicates the version of MLD configured on the interface.                                                                                |
| Query Interval             | Indicates the configured query interval for the interface.                                                                               |
| Query Max Response Time    | Indicates the configured maximum query response time (in seconds) advertised in MLD queries on this interface.                           |
| Robustness                 | Displays the configured value for the tuning for the expected packet loss on a subnet attached to the interface.                         |
| Startup Query interval     | This valued indicates the configured interval between General Queries sent by a Querier on startup.                                      |
| Startup Query Count        | This value indicates the configured number of Queries sent out on startup, separated by the Startup Query Interval.                      |
| Last Member Query Interval | This value indicates the configured Maximum Response Time inserted into Group-Specific Queries sent in response to Leave Group messages. |

| Parameter               | Description                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Last Member Query Count | This value indicates the configured number of Group-Specific Queries sent before the router assumes that there are no local members. |

The following information is displayed if the operational mode of the MLD interface is enabled.

| Parameter             | Description                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------|
| Querier Status        | This value indicates whether the interface is an MLD querier or non-querier on the subnet it is associated with. |
| Querier Address       | The IP address of the MLD querier on the subnet the interface is associated with.                                |
| Querier Up Time       | Time elapsed in seconds since the querier state has been updated.                                                |
| Querier Expiry Time   | Time left in seconds before the Querier loses its title as querier.                                              |
| Wrong Version Queries | Indicates the number of queries received whose MLD version does not match the MLD version of the interface.      |
| Number of Joins       | The number of times a group membership has been added on this interface.                                         |
| Number of Leaves      | The number of times a group membership has been removed on this interface.                                       |
| Number of Groups      | The current number of membership entries for this interface.                                                     |

### 9.3.11 show ipv6 mld traffic

Use this command to display MLD statistical information for the router.

- Format**            `show ipv6 mld traffic`
- Mode**
  - Privileged EXEC
  - User EXEC

| Parameter                  | Description                                                    |
|----------------------------|----------------------------------------------------------------|
| Valid MLD Packets Received | The number of valid MLD packets received by the router.        |
| Valid MLD Packets Sent     | The number of valid MLD packets sent by the router.            |
| Queries Received           | The number of valid MLD queries received by the router.        |
| Queries Sent               | The number of valid MLD queries sent by the router.            |
| Reports Received           | The number of valid MLD reports received by the router.        |
| Reports Sent               | The number of valid MLD reports sent by the router.            |
| Leaves Received            | The number of valid MLD leaves received by the router.         |
| Leaves Sent                | The number of valid MLD leaves sent by the router.             |
| Bad Checksum MLD Packets   | The number of bad checksum MLD packets received by the router. |
| Malformed MLD Packets      | The number of malformed MLD packets received by the router.    |

### 9.3.12 clear ipv6 mld counters

Use this command to reset the MLD counters to zero on the specified interface.

- Format**            `clear ipv6 mld slot/port`
- Mode**             Privileged EXEC



### 9.3.13 clear ipv6 mld traffic

Use this command to clear all entries in the MLD traffic database.

**Format** clear ipv6 mld *slot/port*

**Mode** Privileged EXEC

## 9.4 IPv6 MLD-Proxy Commands

MLD-Proxy is the IPv6 equivalent of IGMP-Proxy. MLD-Proxy commands allow you to configure the network device as well as to view device settings and statistics using either serial interface or telnet session. The operation of MLD-Proxy commands is the same as for IGMP-Proxy: MLD is for IPv6 and IGMP is for IPv4. MGMD is a term used to refer to both IGMP and MLD.

### 9.4.1 ipv6 mld-proxy

Use this command to enable MLD-Proxy on the interface or range of interfaces. To enable MLD-Proxy on the interface, you must enable multicast forwarding. Also, make sure that there are no other multicast routing protocols enabled on the router.

**Format** ipv6 mld-proxy

**Mode** Interface Config

#### 9.4.1.1 no ipv6 mld-proxy

Use this command to disable MLD-Proxy on the router.

**Format** no ipv6 mld-proxy

**Mode** Interface Config

### 9.4.2 ipv6 mld-proxy unsolicit-rprt-interval

Use this command to set the unsolicited report interval for the MLD-Proxy interface or range of interfaces. This command is only valid when you enable MLD-Proxy on the interface. The value of interval is 1 to 260 seconds.

**Default** 1

**Format** ipv6 mld-proxy unsolicit-rprt-interval *interval*

**Mode** Interface Config

#### 9.4.2.1 no ipv6 mld-proxy unsolicited-report-interval

Use this command to reset the MLD-Proxy router's unsolicited report interval to the default value.

**Format** no ipv6 mld-proxy unsolicit-rprt-interval

**Mode** Interface Config

### 9.4.3 ipv6 mld-proxy reset-status

Use this command to reset the host interface status parameters of the MLD-Proxy interface or range of interfaces. This command is only valid when you enable MLD-Proxy on the interface.

**Format** ipv6 mld-proxy reset-status

**Mode** Interface Config

## 9.4.4 show ipv6 mld-proxy

Use this command to display a summary of the host interface status parameters.

- Format**            `show ipv6 mld-proxy`
- Mode**
- Privileged EXEC
  - User EXEC

The command displays the following parameters only when you enable MLD-Proxy.

| Parameter                             | Description                                                                                                     |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Interface Index                       | The interface number of the MLD-Proxy.                                                                          |
| Admin Mode                            | Indicates whether MLD-Proxy is enabled or disabled. This is a configured value.                                 |
| Operational Mode                      | Indicates whether MLD-Proxy is operationally enabled or disabled. This is a status parameter.                   |
| Version                               | The present MLD host version that is operational on the proxy interface.                                        |
| Number of Multicast Groups            | The number of multicast groups that are associated with the MLD-Proxy interface.                                |
| Unsolicited Report Interval           | The time interval at which the MLD-Proxy interface sends unsolicited group membership report.                   |
| Querier IP Address on Proxy Interface | The IP address of the Querier, if any, in the network attached to the upstream interface (MLD-Proxy interface). |
| Older Version 1 Querier Timeout       | The interval used to timeout the older version 1 queriers.                                                      |
| Proxy Start Frequency                 | The number of times the MLD-Proxy has been stopped and started.                                                 |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 mld-proxy
Interface Index..... 1/0/3
Admin Mode..... Enable
Operational Mode..... Enable
Version..... 3
Num of Multicast Groups..... 0
Unsolicited Report Interval..... 1
Querier IP Address on Proxy Interface..... fe80::1:2:5
Older Version 1 Querier Timeout..... 00:00:00
Proxy Start Frequency.....
```

## 9.4.5 show ipv6 mld-proxy interface

This command displays a detailed list of the host interface status parameters. It displays the following parameters only when you enable MLD-Proxy.

- Format**            `show ipv6 mld-proxy interface`
- Modes**
- Privileged EXEC
  - User EXEC

| Parameter       | Description                            |
|-----------------|----------------------------------------|
| Interface Index | The <i>slot/port</i> of the MLD-proxy. |

The column headings of the table associated with the interface are as follows:

| Parameter   | Description                                                                 |
|-------------|-----------------------------------------------------------------------------|
| Ver         | The MLD version.                                                            |
| Query Rcvd  | Number of MLD queries received.                                             |
| Report Rcvd | Number of MLD reports received.                                             |
| Report Sent | Number of MLD reports sent.                                                 |
| Leaves Rcvd | Number of MLD leaves received. Valid for version 2 only.                    |
| Leaves Sent | Number of MLD leaves sent on the Proxy interface. Valid for version 2 only. |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 mld-proxy interface
```

```
Interface Index..... 1/0/1
```

```
Ver Query Rcvd Report Rcvd Report Sent Leave Rcvd Leave Sent

1 2 0 0 0 2
2 3 0 4 ----- -----
```

### 9.4.6 show ipv6 mld-proxy groups

Use this command to display information about multicast groups that the MLD-Proxy reported.

**Format**            show ipv6 mld-proxy groups

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter         | Description                                                                                                                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface         | The interface number of the MLD-Proxy.                                                                                                                                                                                                                                                                          |
| Group Address     | The IP address of the multicast group.                                                                                                                                                                                                                                                                          |
| Last Reporter     | The IP address of the host that last sent a membership report for the current group, on the network attached to the MLD-Proxy interface (upstream interface).                                                                                                                                                   |
| Up Time (in secs) | The time elapsed in seconds since last created.                                                                                                                                                                                                                                                                 |
| Member State      | Possible values are: <ul style="list-style-type: none"> <li>• Idle_Member. The interface has responded to the latest group membership query for this group.</li> <li>• Delay_Member. The interface is going to send a group membership report to respond to a group membership query for this group.</li> </ul> |
| Filter Mode       | Possible values are Include or Exclude.                                                                                                                                                                                                                                                                         |
| Sources           | The number of sources attached to the multicast group.                                                                                                                                                                                                                                                          |

**Example:** The following shows example CLI display output for the command.

```
(Routing) #show ipv6 mld-proxy groups
```

```
Interface Index..... 1/0/3
```

```
Group Address Last Reporter Up Time Member State Filter Mode Sources

FF1E::1 FE80::100:2.3 00:01:40 DELAY_MEMBER Exclude 2
FF1E::2 FE80::100:2.3 00:02:40 DELAY_MEMBER Include 1
FF1E::3 FE80::100:2.3 00:01:40 DELAY_MEMBER Exclude 0
```

FF1E::4                    FE80::100:2.3      00:02:44   DELAY\_MEMBER            Include                    4

## 9.4.7 show ipv6 mld-proxy groups detail

Use this command to display information about multicast groups that MLD-Proxy reported.

**Format**                show ipv6 mld-proxy groups detail

- Mode**
- Privileged EXEC
  - User EXEC

| Parameter         | Description                                                                                                                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface         | The interface number of the MLD-Proxy.                                                                                                                                                                                                                                                                          |
| Group Address     | The IP address of the multicast group.                                                                                                                                                                                                                                                                          |
| Last Reporter     | The IP address of the host that last sent a membership report for the current group, on the network attached to the MLD-Proxy interface (upstream interface).                                                                                                                                                   |
| Up Time (in secs) | The time elapsed in seconds since last created.                                                                                                                                                                                                                                                                 |
| Member State      | Possible values are: <ul style="list-style-type: none"> <li>• Idle_Member. The interface has responded to the latest group membership query for this group.</li> <li>• Delay_Member. The interface is going to send a group membership report to respond to a group membership query for this group.</li> </ul> |
| Filter Mode       | Possible values are Include or Exclude.                                                                                                                                                                                                                                                                         |
| Sources           | The number of sources attached to the multicast group.                                                                                                                                                                                                                                                          |
| Group Source List | The list of IP addresses of the sources attached to the multicast group.                                                                                                                                                                                                                                        |
| Expiry Time       | The time left for a source to get deleted.                                                                                                                                                                                                                                                                      |

**Example:** The following shows example CLI display output for the command.

(Routing) #show ipv6 igmp-proxy groups

Interface Index..... 1/0/3

```

Group Address Last Reporter Up Time Member State Filter Mode Sources

FF1E::1 FE80::100:2.3 244 DELAY_MEMBER Exclude 2

Group Source List Expiry Time

2001::1 00:02:40
2001::2 -----

FF1E::2 FE80::100:2.3 243 DELAY_MEMBER Include 1

Group Source List Expiry Time

3001::1 00:03:32
3002::2 00:03:32

FF1E::3 FE80::100:2.3 328 DELAY_MEMBER Exclude 0

FF1E::4 FE80::100:2.3 255 DELAY_MEMBER Include 4

Group Source List Expiry Time

4001::1 00:03:40
5002::2 00:03:40

```

4001::2  
5002::2

00:03:40  
00:03:40

## 10/ FASTPATH Log Messages

This chapter lists common log messages that are provided by FASTPATH, along with information regarding the cause of each message. There is no specific action that can be taken per message. When there is a problem being diagnosed, a set of these messages in the event log, along with an understanding of the system configuration and details of the problem will assist Broadcom in determining the root cause of such a problem. The most recent log messages are displayed first.

This chapter is not a complete list of all syslog messages.

### NOTICE

## 10.1 Core

Table 18: BSP Log Messages

| Component | Message           | Cause                                                       |
|-----------|-------------------|-------------------------------------------------------------|
| BSP       | Event(0xaaaaaaaa) | Switch has restarted.                                       |
| BSP       | Starting code...  | BSP initialization complete, starting FASTPATH application. |

Table 19: NIM Log Messages

| Component | Message                                                            | Cause                                                                                          |
|-----------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| NIM       | NIM: L7_ATTACH out of order for interface unit x slot x port x     | Interface creation out of order.                                                               |
| NIM       | NIM: Failed to find interface at unit x slot x port x for event(x) | There is no mapping between the USP and Interface number.                                      |
| NIM       | NIM: L7_DETACH out of order for interface unit x slot x port x     | Interface creation out of order.                                                               |
| NIM       | NIM: L7_DELETE out of order for interface unit x slot x port x     | Interface creation out of order.                                                               |
| NIM       | NIM: event(x),intf(x),component(x), in wrong phase                 | An event was issued to NIM during the wrong configuration phase (probably Phase 1, 2, or WMU). |
| NIM       | NIM: Failed to notify users of interface change                    | Event was not propagated to the system.                                                        |
| NIM       | NIM: failed to send message to NIM message Queue.                  | NIM message queue full or non-existent.                                                        |
| NIM       | NIM: Failed to notify the components of L7_CREATE event            | Interface not created.                                                                         |
| NIM       | NIM: Attempted event (x), on USP x.x.x before phase 3              | A component issued an interface event during the wrong initialization phase.                   |
| NIM       | NIM: incorrect phase for operation                                 | An API call was made during the wrong initialization phase.                                    |
| NIM       | NIM: Component(x) failed on event(x) for interface                 | A component responded with a fail indication for an interface event.                           |
| NIM       | NIM: Timeout event(x), interface remaining-Mask = xxxx             | A component did not respond before the NIM timeout occurred.                                   |

Table 20: SIM Log Message

| Component | Message                                                                                                                    | Cause                                                                                                      |
|-----------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| SIM       | IP address conflict on service port/network port for IP address x.x.x.x. Conflicting host MAC address is xx:xx:xx:xx:xx:xx | This message appears when an address conflict is detected in the LAN for the service port/network port IP. |

Table 21: System Log Messages

| Component | Message                                                                                               | Cause                                                                                                                                                                                                                                                                                                             |
|-----------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYSTEM    | Configuration file fastpath.cfg size is 0 (zero) bytes                                                | The configuration file could not be read. This message may occur on a system for which no configuration has ever been saved or for which configuration has been erased.                                                                                                                                           |
| SYSTEM    | could not separate SYSAPI_CONFIG_FILE-NAME                                                            | The configuration file could not be read. This message may occur on a system for which no configuration has ever been saved or for which configuration has been erased.                                                                                                                                           |
| SYSTEM    | Building defaults for file file name version version num                                              | Configuration did not exist or could not be read for the specified feature or file. Default configuration values will be used. The file name and version are indicated.                                                                                                                                           |
| SYSTEM    | File filename: same version (version num) but the sizes (version size – expected version size) differ | The configuration file which was loaded was of a different size than expected for the version number. This message indicates the configuration file needed to be migrated to the version number appropriate for the code image. This message may appear after upgrading the code image to a more current release. |
| SYSTEM    | Migrating config file filename from version version num to version num                                | The configuration file identified was migrated from a previous version number. Both the old and new version number are specified. This message may appear after upgrading the code image to a more current release.                                                                                               |
| SYSTEM    | Building Defaults                                                                                     | Configuration did not exist or could not be read for the specified feature. Default configuration values will be used.                                                                                                                                                                                            |
| SYSTEM    | sysapiCfgFileGet failed size = expected size of file version = expected version                       | Configuration did not exist or could not be read for the specified feature. This message is usually followed by a message indicating that default configuration values will be used.                                                                                                                              |

## 10.2 Utilities

Table 22: Trap Mgr Log Message

| Component | Message                      | Cause                            |
|-----------|------------------------------|----------------------------------|
| Trap Mgr  | Link Up/Down: unit/slot/port | An interface changed link state. |

Table 23: DHCP Filtering Log Messages

| Component      | Message                                      | Cause                                                                       |
|----------------|----------------------------------------------|-----------------------------------------------------------------------------|
| DHCP Filtering | Unable to create r/w lock for DHCP Filtering | Unable to create semaphore used for DHCP filtering configuration structure. |
| DHCP Filtering | Failed to register with nv Store.            | Unable to register save and restore functions for configuration save.       |
| DHCP Filtering | Failed to register with NIM                  | Unable to register with NIM for interface callback functions.               |
| DHCP Filtering | Error on call to sysapiCfgFileWrite file     | Error on trying to save configuration.                                      |

Table 24: NVStore Log Messages

| Component | Message                                                 | Cause                                                                                                                                       |
|-----------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| NVStore   | Building defaults for file XXX                          | A component's configuration file does not exist or the file's checksum is incorrect so the component's default configuration file is built. |
| NVStore   | Error on call to osapiFsWrite routine on file XXX       | Either the file cannot be opened or the OS's file I/O returned an error trying to write to the file.                                        |
| NVStore   | File XXX corrupted from file system. Checksum mismatch. | The calculated checksum of a component's configuration file in the file system did not match the checksum of the file in memory.            |
| NVStore   | Migrating config file XXX from version Y to Z           | A configuration file version mismatch was detected so a configuration file migration has started.                                           |



Table 25: RADIUS Log Messages

| Component | Message                                                     | Cause                                                                    |
|-----------|-------------------------------------------------------------|--------------------------------------------------------------------------|
| RADIUS    | RADIUS: Invalid data length - xxx                           | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Failed to send the request                          | A problem communicating with the RADIUS server.                          |
| RADIUS    | RADIUS: Failed to send all of the request                   | A problem communicating with the RADIUS server during transmit.          |
| RADIUS    | RADIUS: Could not get the Task Sync semaphore!              | Resource issue with RADIUS Client service.                               |
| RADIUS    | RADIUS: Buffer is too small for response processing         | RADIUS Client attempted to build a response larger than resources allow. |
| RADIUS    | RADIUS: Could not allocate accounting requestInfo           | Resource issue with RADIUS Client service.                               |
| RADIUS    | RADIUS: Could not allocate requestInfo                      | Resource issue with RADIUS Client service.                               |
| RADIUS    | RADIUS: osapiSocketRecvFrom returned error                  | Error while attempting to read data from the RADIUS server.              |
| RADIUS    | RADIUS: Accounting-Response failed to validate, id = xxx    | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: User (xxx) needs to respond for challenge           | An unexpected challenge was received for a configured user.              |
| RADIUS    | RADIUS: Could not allocate a buffer for the packet          | Resource issue with RADIUS Client service.                               |
| RADIUS    | RADIUS: Access-Challenge failed to validate, id = xxx       | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Failed to validate Message-Authenticator, id = xxx  | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Access-Accept failed to validate, id = xxx          | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Invalid packet length - xxx                         | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Response is missing Message-Authenticator, id = xxx | The RADIUS Client received an invalid message from the server.           |
| RADIUS    | RADIUS: Server address does not match configured server     | RADIUS Client received a server response from an unconfigured server.    |

Table 26: TACACS+ Log Messages

| Component | Message                                             | Cause                                                                |
|-----------|-----------------------------------------------------|----------------------------------------------------------------------|
| TACACS+   | TACACS+: authentication error, no server to contact | TACACS+ request needed, but no servers are configured.               |
| TACACS+   | TACACS+: connection failed to server x.x.x.x        | TACACS+ request sent to server x.x.x.x but no response was received. |

Table 26: TACACS+ Log Messages (Continued)

| Component | Message                                                         | Cause                                       |
|-----------|-----------------------------------------------------------------|---------------------------------------------|
| TACACS+   | TACACS+: no key configured to encrypt packet for server x.x.x.x | No key configured for the specified server. |
| TACACS+   | TACACS+: received invalid packet type from server.              | Received packet type that is not supported. |
| TACACS+   | TACACS+: invalid major version in received packet.              | Major version mismatch.                     |
| TACACS+   | TACACS+: invalid minor version in received packet.              | Minor version mismatch.                     |

Table 27: LLDP Log Message

| Component | Message                                           | Cause                             |
|-----------|---------------------------------------------------|-----------------------------------|
| LLDP      | lldpTask(): invalid message type:xx.<br>xxxxxx:xx | Unsupported LLDP packet received. |

Table 28: DHCPv6 Client Log Messages

| Component    | Message                                      | Cause                                                                                                                |
|--------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| DHCP6 Client | ip6Map DHCP add failed.                      | This message appears when the update of a DHCP leased IP address to IP6Map fails.                                    |
| DHCP6 Client | osapiNetAddrV6Add failed on interface xxx.   | This message appears when the update of a DHCP leased IP address to the kernel IP Stack fails.                       |
| DHCP6 Client | Failed to add DNS Server xxx to DNS Client.  | This message appears when the update of a DNS6 Server address given by the DHCPv6 Server to the DNS6 Client fails.   |
| DHCP6 Client | Failed to add Domain name xxx to DNS Client. | This message appears when the update of a DNS6 Domain name info given by the DHCPv6 Server to the DNS6 Client fails. |

Table 29: DHCPv4 Client Log Messages

| Component    | Message                                                                    | Cause                                                                                                                   |
|--------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| DHCP4 Client | Unsupported subOption (xxx) in Vendor Specific Option in received DHCP pkt | This message appears when a message is received from the DHCP Server that contains an unsupported Vendor Option.        |
| DHCP4 Client | Failed to acquire an IP address on xxx; DHCP Server did not respond.       | This message appears when the DHCP Client fails to lease an IP address from the DHCP Server.                            |
| DHCP4 Client | DNS name server entry add failed.                                          | This message appears when the update of a DNS Domain name server info given by the DHCP Server to the DNS Client fails. |
| DHCP4 Client | DNS domain name list entry addition failed.                                | This message appears when the update of a DNS Domain name list info given by the DHCP Server to the DNS Client fails.   |
| DHCP4 Client | Interface xxx Link State is Down. Connect the port and try again.          | This message appears when the Network protocol is configured with DHCP without any active links in the Management VLAN. |

## 10.3 Management

Table 30: SNMP Log Message

| Component | Message                     | Cause                            |
|-----------|-----------------------------|----------------------------------|
| SNMP      | EDB Callback: Unit Join: x. | A new unit has joined the stack. |

Table 31: EmWeb Log Messages

| Component | Message                                                             | Cause                                                                                                    |
|-----------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| EmWeb     | EMWEB (Telnet): Max number of Telnet login sessions exceeded        | A user attempted to connect using telnet when the maximum number of telnet sessions were already active. |
| EmWeb     | EMWEB (SSH): Max number of SSH login sessions exceeded              | A user attempted to connect using SSH when the maximum number of SSH sessions were already active.       |
| EmWeb     | Handle table overflow                                               | All the available EmWeb connection handles are being used and the connection could not be made.          |
| EmWeb     | ConnectionType EmWeb socket accept() failed: errno                  | Socket accept failure for the specified connection type.                                                 |
| EmWeb     | ewsNetHTTPReceive failure in NetReceiveLoop() - closing connection. | Socket receive failure.                                                                                  |
| EmWeb     | EmWeb: connection allocation failed                                 | Memory allocation failure for the new connection.                                                        |

Table 31: EmWeb Log Messages (Continued)

| Component | Message                                                    | Cause                                                                         |
|-----------|------------------------------------------------------------|-------------------------------------------------------------------------------|
| EmWeb     | EMWEB TransmitPending: EWOULDBLOCK error sending data      | Socket error on send.                                                         |
| EmWeb     | ewaNetHTTPEnd: internal error - handle not in Handle table | EmWeb handle index not valid.                                                 |
| EmWeb     | ewsNetHTTPReceive:recvBufCnt exceeds MAX_QUEUED_RECV_BUFS! | The receive buffer limit has been reached. Bad request or DoS attack.         |
| EmWeb     | EmWeb accept: XXXX                                         | Accept function for new SSH connection failed. XXXX indicates the error info. |

Table 32: CLI\_UTIL Log Messages

| Component | Message                         | Cause                                                                 |
|-----------|---------------------------------|-----------------------------------------------------------------------|
| CLI_UTIL  | Telnet Send Failed errno = 0x%x | Failed to send text string to the telnet client.                      |
| CLI_UTIL  | osapiFsDir failed               | Failed to obtain the directory information from a volume's directory. |

Table 33: WEB Log Messages

| Component | Message                                                                          | Cause                                                                                                                                                                              |
|-----------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WEB       | Max clients exceeded                                                             | This message is shown when the maximum allowed Java client connections to the switch is exceeded.                                                                                  |
| WEB       | Error on send to sockfd XXXX, closing connection                                 | Failed to send data to the Java clients through the socket.                                                                                                                        |
| WEB       | # (XXXX) Form Submission Failed. No Action Taken.                                | The form submission failed and no action is taken. XXXX indicates the file under consideration.                                                                                    |
| WEB       | ewaFormServe_file_download() - WEB Unknown return code from TFTP download result | Unknown error returned while downloading file using TFTP from web interface.                                                                                                       |
| WEB       | ewaFormServe_file_upload() - Unknown return code from TFTP upload result         | Unknown error returned while uploading file using TFTP from web interface.                                                                                                         |
| WEB       | Web UI Screen with unspecified access attempted to be brought up                 | Failed to get application-specific authorization handle provided to EmWeb/Server by the application in ewsAuthRegister(). The specified web page will be served in read-only mode. |

Table 34: CLI\_WEB\_MGR Log Messages

| Component   | Message                                          | Cause                                                     |
|-------------|--------------------------------------------------|-----------------------------------------------------------|
| CLI_WEB_MGR | File size is greater than 2K                     | The banner file size is greater than 2K bytes.            |
| CLI_WEB_MGR | No. of rows greater than allowed maximum of XXXX | When the number of rows exceeds the maximum allowed rows. |

Table 35: SSHD Log Messages

| Component | Message                                            | Cause                                                                                                                                 |
|-----------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| SSHD      | SSHD: Unable to create the global (data) semaphore | Failed to create semaphore for global data protection.                                                                                |
| SSHD      | SSHD: Msg Queue is full, event = XXXX              | Failed to send the message to the SSHD message queue as message queue is full. XXXX indicates the event to be sent.                   |
| SSHD      | SSHD: Unknown UI event in message, event = XXXX    | Failed to dispatch the UI event to the appropriate SSHD function as it's an invalid event. XXXX indicates the event to be dispatched. |
| SSHD      | sshdApiCnfgrCommand: Failed calling ssh-dIssueCmd. | Failed to send the message to the SSHD message queue.                                                                                 |

Table 36: SSLT Log Messages

| Component | Message                                                                      | Cause                                                                                                                                                                   |
|-----------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SSLT      | SSLT: Exceeded maximum, ssltConnection-Task                                  | Exceeded maximum allowed SSLT connections.                                                                                                                              |
| SSLT      | SSLT: Error creating Secure server socket6                                   | Failed to create secure server socket for IPV6.                                                                                                                         |
| SSLT      | SSLT: Cannot connect to unsecure server at XXXX, result = YYYY, errno = ZZZZ | Failed to open connection to unsecure server. XXXX is the unsecure server socket address. YYYY is the result returned from connect function and ZZZZ is the error code. |
| SSLT      | SSLT: Msg Queue is full, event = XXXX                                        | Failed to send the received message to the SSLT message queue as message queue is full. XXXX indicates the event to be sent.                                            |
| SSLT      | SSLT: Unknown UI event in message, event = XXXX                              | Failed to dispatch the received UI event to the appropriate SSLT function as it's an invalid event. XXXX indicates the event to be dispatched.                          |
| SSLT      | ssltApiCnfgrCommand: Failed calling ssltIssueCmd.                            | Failed to send the message to the SSLT message queue.                                                                                                                   |

Table 36: SSLT Log Messages (Continued)

| Component | Message                                            | Cause                                                                                                                          |
|-----------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| SSLT      | SSLT: Error loading certificate from file XXXX     | Failed while loading the SSLcertificate from specified file. XXXX indicates the file from where the certificate is being read. |
| SSLT      | SSLT: Error loading private key from file          | Failed while loading private key for SSL connection.                                                                           |
| SSLT      | SSLT: Error setting cipher list (no valid ciphers) | Failed while setting cipher list.                                                                                              |
| SSLT      | SSLT: Could not delete the SSL semaphores          | Failed to delete SSL semaphores during cleanup.of all resources associated with the OpenSSL Locking semaphores.                |

Table 37: User\_Manager Log Messages

| Component    | Message                                                                       | Cause                                                                                                                               |
|--------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| User_Manager | User Login Failed for XXXX                                                    | Failed to authenticate user login. XXXX indicates the username to be authenticated.                                                 |
| User_Manager | Access level for user XXXX could not be determined. Setting to Level 1.       | Invalid access level specified for the user. The access level is set to Level 1. XXXX indicates the username.                       |
| User_Manager | Could not migrate config file XXXX from version YYYY to ZZZZ. Using defaults. | Failed to migrate the config file. XXXX is the config file name. YYYY is the old version number and ZZZZ is the new version number. |

## 10.4 Switching

Table 38: Protected Ports Log Messages

| Component       | Message                                                                          | Cause                                                                                                  |
|-----------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Protected Ports | Protected Port: failed to save configuration                                     | This appears when the protected port configuration cannot be saved.                                    |
| Protected Ports | protectedPortCnfrInitPhase1Process: Unable to create r/w lock for protected Port | This appears when protectedPortCfgRW-Lock Fails.                                                       |
| Protected Ports | protectedPortCnfrInitPhase2Process: Unable to register for VLAN change callback  | This appears when nimRegisterIntf-Change with VLAN fails.                                              |
| Protected Ports | Cannot add interface xxx to group yyy                                            | This appears when an interface could not be added to a particular group.                               |
| Protected Ports | unable to set protected port group                                               | This appears when a dtl call fails to add interface mask at the driver level.                          |
| Protected Ports | Cannot delete interface xxx from group yyy                                       | This appears when a dtl call to delete an interface from a group fails.                                |
| Protected Ports | Cannot update group YYY after deleting interface XXX                             | This message appears when an update group for a interface deletion fails.                              |
| Protected Ports | Received an interface change callback while not ready to receive it              | This appears when an interface change call back has come before the protected port component is ready. |

Table 39: IP Subnet VLANs Log Messages

| Component       | Message                                                                        | Cause                                                                              |
|-----------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| IP subnet VLANs | ERROR vlanIpSubnetSubnetValid:Invalid subnet                                   | This occurs when an invalid pair of subnet and netmask has come from the CLI.      |
| IP subnet VLANs | IP Subnet VLANs: failed to save configuration                                  | This message appears when save configuration of subnet VLANs failed.               |
| IP subnet VLANs | vlanIpSubnetCnfrInitPhase1Process: Unable to create r/w lock for vlanIpSubnet  | This appears when a read/write lock creations fails.                               |
| IP subnet VLANs | vlanIpSubnetCnfrInitPhase2Process: Unable to register for VLAN change callback | This appears when this component unable to register for VLAN change notifications. |
| IP subnet VLANs | vlanIpSubnetCnfrFiniPhase1Process: could not delete avl semaphore              | This appears when a semaphore deletion of this component fails.                    |
| IP subnet VLANs | vlanIpSubnetDtlVlanCreate: Failed                                              | This appears when a dtl call fails to add an entry into the table.                 |
| IP subnet VLANs | vlanIpSubnetSubnetDeleteApply: Failed                                          | This appears when a dtl fails to delete an entry from the table.                   |
| IP subnet VLANs | vlanIpSubnetVlanChangeCallback: Failed to add an Entry                         | This appears when a dtl fails to add an entry for a VLAN add notify event.         |
| IP subnet VLANs | vlanIpSubnetVlanChangeCallback: Failed to delete an Entry                      | This appears when a dtl fails to delete an entry for a VLAN delete notify event.   |

Table 40: Mac-based VLANs Log Messages

| Component       | Message                                                             | Cause                                                                              |
|-----------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------|
| MAC-based VLANs | MAC VLANs: Failed to save configuration                             | This message appears when save configuration of Mac VLANs failed.                  |
| MAC-based VLANs | vlanMacCnfrInitPhase1Process: Unable to create r/w lock for vlanMac | This appears when a read/write lock creations fails.                               |
| MAC-based VLANs | Unable to register for VLAN change callback                         | This appears when this component unable to register for VLAN change notifications. |
| MAC-based VLANs | vlanMacCnfrFiniPhase1Process: could not delete avl semaphore        | This appears when a semaphore deletion of this component fails.                    |
| MAC-based VLANs | vlanMacAddApply: Failed to add an entry                             | This appears when a dtl call fails to add an entry into the table.                 |
| MAC-based VLANs | vlanMacDeleteApply: Unable to delete an Entry                       | This appears when a dtl fails to delete an entry from the table.                   |
| MAC-based VLANs | vlanMacVlanChangeCallback: Failed to add an entry                   | This appears when a dtl fails to add an entry for a VLAN add notify event.         |
| MAC-based VLANs | vlanMacVlanChangeCallback: Failed to delete an entry                | This appears when a dtl fails to delete an entry for a VLAN delete notify event.   |

Table 41: 802.1X Log Messages

| Component | Message                                                                      | Cause                                                                   |
|-----------|------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 802.1X    | function: Failed calling dot1xIssueCmd                                       | 802.1X message queue is full.                                           |
| 802.1X    | function: EAP message not received from server                               | RADIUS server did not send required EAP message.                        |
| 802.1X    | function: Out of System buffers                                              | 802.1X cannot process/transmit message due to lack of internal buffers. |
| 802.1X    | function: could not set state to authorized/unauthorized, intf xxx           | DTL call failed setting authorization state of the port.                |
| 802.1X    | dot1xApplyConfigData: Unable to enable/disable dot1x in driver               | DTL call failed enabling/disabling 802.1X.                              |
| 802.1X    | dot1xSendRespToServer: dot1xRadiusAccessRequestSend failed                   | Failed sending message to RADIUS server.                                |
| 802.1X    | dot1xRadiusAcceptProcess: error calling radiusAccountingStart, ifIndex = xxx | Failed sending accounting start to RADIUS server.                       |
| 802.1X    | function: failed sending terminate cause, intf xxx                           | Failed sending accounting stop to RADIUS server.                        |

Table 42: IGMP Snooping Log Messages

| Component     | Message                                                         | Cause                                                                                        |
|---------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| IGMP Snooping | function: osapiMessageSend failed                               | IGMP Snooping message queue is full.                                                         |
| IGMP Snooping | Failed to set global igmp snooping mode to xxx                  | Failed to set global IGMP Snooping mode due to message queue being full.                     |
| IGMP Snooping | Failed to set igmp snooping mode xxx for interface yyy          | Failed to set interface IGMP Snooping mode due to message queue being full.                  |
| IGMP Snooping | Failed to set igmp mrouter mode xxx for interface yyy           | Failed to set interface multicast router mode due to IGMP Snooping message queue being full. |
| IGMP Snooping | Failed to set igmp snooping mode xxx for vlan yyy               | Failed to set VLAN IGM Snooping mode due to message queue being full.                        |
| IGMP Snooping | Failed to set igmp mrouter mode%d for interface xxx on VLAN yyy | Failed to set VLAN multicast router mode due to IGMP Snooping message queue being full.      |
| IGMP Snooping | snoopCnfrlInitPhase1Process: Error allocating small buffers     | Could not allocate buffers for small IGMP packets.                                           |
| IGMP Snooping | snoopCnfrlInitPhase1Process: Error allocating large buffers     | Could not allocate buffers for large IGMP packets.                                           |



Table 43: GARP/GVRP/GMRP Log Messages

| Component          | Message                                                                                                                                                       | Cause                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| GARP/GVRP/<br>GMRP | garpSpanState, garpIfStateChange, GarplsueCmd, garpDot1sChangeCallBack, garpApiCnfrCommand, garpLeaveAllTimerCallback, garpTimerCallback: QUEUE SEND FAILURE: | The garpQueue is full, logs specifics of the message content like internal interface number, type of message, etc.                        |
| GARP/GVRP/<br>GMRP | GarpSendPDU: QUEUE SEND FAILURE                                                                                                                               | The garpPduQueue is full, logs specific of the GPDU, internal interface number, VLAN ID, buffer handle, etc.                              |
| GARP/GVRP/<br>GMRP | garpMapIntflsConfigurable, gmrpMapIntflsConfigurable: Error accessing GARP/GMRP config data for interface %d in garpMapIntflsConfigurable.                    | A default configuration does not exist for this interface. Typically a case when a new interface is created and has no pre-configuration. |
| GARP/GVRP/<br>GMRP | garpTraceMsgQueueUsage: garpQueue usage has exceeded fifty/eighty/ninety percent                                                                              | Traces the build up of message queue. Helpful in determining the load on GARP.                                                            |
| GARP/GVRP/<br>GMRP | gid_destroy_port: Error Removing port %d registration for vlan-mac %d - %02X:%02X:%02X:%02X:%02X:%02X                                                         | Mismatch between the gmd (gmrp database) and MFDB.                                                                                        |
| GARP/GVRP/<br>GMRP | gmd_create_entry: GMRP failure adding MFDB entry: vlan %d and address %s                                                                                      | MFDB table is full.                                                                                                                       |

Table 44: IEEE 802.3ad Log Messages

| Component | Message                                                                                                                                   | Cause                                                                |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 802.3ad   | dot3adReceiveMachine: received default event %x                                                                                           | Received a LAG PDU and the RX state machine is ignoring this LAGPDU. |
| 802.3ad   | dot3adNimEventCompletionCallback, dot3adNimEventCreateCompletionCallback: DOT3AD: notification failed for event(%d), intf(%d), reason(%d) | The event sent to NIM was not completed successfully.                |

Table 45: FDB Log Message

| Component | Message                                                                       | Cause                                       |
|-----------|-------------------------------------------------------------------------------|---------------------------------------------|
| FDB       | fdbSetAddressAgingTimeOut: Failure setting fid %d address aging timeout to %d | Unable to set the age time in the hardware. |

Table 46: Double VLAN Tag Log Message

| Component       | Message                                                                           | Cause                                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Double VLAN Tag | dvlantagIntflsConfigurable: Error accessing dvlantag config data for interface %d | A default configuration does not exist for this interface. Typically a case when a new interface is created and has no pre-configuration. |

Table 47: IPv6 Provisioning Log Message

| Component         | Message                                                                                    | Cause                                                                                                                                     |
|-------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| IPv6 Provisioning | ipv6ProvIntflsConfigurable: Error accessing IPv6 Provisioning config data for interface %d | A default configuration does not exist for this interface. Typically a case when a new interface is created and has no pre-configuration. |

Table 48: MFDB Log Message

| Component | Message                                   | Cause                                  |
|-----------|-------------------------------------------|----------------------------------------|
| MFDB      | mfdbTreeEntryUpdate: entry does not exist | Trying to update a non existing entry. |

Table 49: 802.1Q Log Messages

| Component | Message                                                                                                                          | Cause                                                                                                                                     |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 802.1Q    | dot1qIssueCmd: Unable to send message %d to dot1qMsgQueue for VLAN %d - %d msgs in queue                                         | dot1qMsgQueue is full.                                                                                                                    |
| 802.1Q    | dot1qVlanCreateProcess: Attempt to create a VLAN with an invalid VLAN ID %d ; VLAN %d not in range,                              | Accommodates for reserved VLAN IDs. that is, 4094 - x.                                                                                    |
| 802.1Q    | dot1qMapIntflsConfigurable: Error accessing DOT1Q config data for interface %d in dot1qMapIntflsConfigurable.                    | A default configuration does not exist for this interface. Typically a case when a new interface is created and has no pre-configuration. |
| 802.1Q    | dot1qVlanDeleteProcess: Deleting the default VLAN                                                                                | Typically encountered during clear VLAN and clear config.                                                                                 |
| 802.1Q    | dot1qVlanMemberSetModify, dot1qVlan-TaggedMemberSetModify: Dynamic entry %d can only be modified after it is converted to static | If this VLAN is a learned using GVRP then its member set cannot be modified using management.                                             |
| 802.1Q    | dttl failure when adding ports to VLAN ID %d - portMask = %s                                                                     | Failed to add the ports to VLAN entry in hardware.                                                                                        |
| 802.1Q    | dttl failure when deleting ports from VLAN ID %d - portMask = %s                                                                 | Failed to delete the ports for a VLAN entry from the hardware.                                                                            |

Table 49: 802.1Q Log Messages (Continued)

| Component | Message                                                                                | Cause                                                                                     |
|-----------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| 802.1Q    | dtl failure when adding ports to tagged list for VLAN ID %d - portMask = %s            | Failed to add the port to the tagged list in hardware.                                    |
| 802.1Q    | dtl failure when deleting ports from tagged list for VLAN ID %d - portMask = %s"       | Failed to delete the port to the tagged list from the hardware.                           |
| 802.1Q    | dot1qTask: unsuccessful return code on receive from dot1qMsgQueue: %08x"               | Failed to receive the dot1q message from dot1q message queue.                             |
| 802.1Q    | Unable to apply VLAN creation request for VLAN ID %d, Database reached MAX VLAN count! | Failed to create VLAN ID, VLAN database reached maximum values.                           |
| 802.1Q    | Attempt to create a VLAN (%d) that already exists                                      | Creation of the existing Dynamic VLAN ID from the CLI.                                    |
| 802.1Q    | DTL call to create VLAN %d failed with rc %d"                                          | Failed to create VLAN ID in hardware.                                                     |
| 802.1Q    | Problem unrolling data for VLAN %d                                                     | Failed to delete VLAN from the VLAN database after failure of VLAN hardware creation.     |
| 802.1Q    | VLAN %d does not exist                                                                 | Failed to delete VLAN entry.                                                              |
| 802.1Q    | VLAN %d requestor type %d does not exist                                               | Failed to delete dynamic VLAN ID if the given requestor is not valid.                     |
| 802.1Q    | Can not delete the VLAN, Some unknown component has taken the ownership!               | Failed to delete, as some unknown component has taken the ownership.                      |
| 802.1Q    | Not valid permission to delete the VLAN %d requestor %d                                | Failed to delete the VLAN ID as the given requestor and VLAN entry status are not same.   |
| 802.1Q    | VLAN Delete Call failed in driver for VLAN %d                                          | Failed to delete VLAN ID from the hardware.                                               |
| 802.1Q    | Problem deleting data for VLAN %d                                                      | Failed to delete VLAN ID from the VLAN database.                                          |
| 802.1Q    | Dynamic entry %d can only be modified after it is converted to static                  | Failed to modify the VLAN group filter                                                    |
| 802.1Q    | Cannot find VLAN %d to convert it to static                                            | Failed to convert Dynamic VLAN to static VLAN. VLAN ID not exists.                        |
| 802.1Q    | Only Dynamically created VLANs can be converted                                        | Error while trying to convert the static created VLAN ID to static.                       |
| 802.1Q    | Cannot modify tagging of interface %s to non existence VLAN %d"                        | Error for a given interface sets the tagging property for all the VLANs in the VLAN mask. |
| 802.1Q    | Error in updating data for VLAN %d in VLAN database                                    | Failed to add VLAN entry into VLAN database.                                              |
| 802.1Q    | DTL call to create VLAN %d failed with rc %d                                           | Failed to add VLAN entry in hardware.                                                     |
| 802.1Q    | Not valid permission to delete the VLAN %d                                             | Failed to delete static VLAN ID. Invalid requestor.                                       |
| 802.1Q    | Attempt to set access VLAN with an invalid VLAN ID %d                                  | Invalid VLAN ID.                                                                          |
| 802.1Q    | Attempt to set access VLAN with (%d) that does not exist                               | VLAN ID not exists.                                                                       |
| 802.1Q    | VLAN create currently underway for VLAN ID %d                                          | Creating a VLAN which is already under process of creation.                               |
| 802.1Q    | VLAN ID %d is already exists as static VLAN                                            | Trying to create already existing static VLAN ID.                                         |
| 802.1Q    | Cannot put a message on dot1q msg Queue, Returns:%d                                    | Failed to send Dot1q message on Dot1q message Queue.                                      |

Table 49: 802.1Q Log Messages (Continued)

| Component | Message                                                              | Cause                                                                            |
|-----------|----------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 802.1Q    | Invalid dot1q Interface: %s                                          | Failed to add VLAN to a member of port.                                          |
| 802.1Q    | Cannot set membership for user interface %s on management VLAN %d    | Failed to add VLAN to a member of port.                                          |
| 802.1Q    | Incorrect tagmode for VLAN tagging. tag-mode: %d Interface: %s       | Incorrect tagmode for VLAN tagging.                                              |
| 802.1Q    | Cannot set tagging for interface %d on non-existent VLAN %d"         | The VLAN ID does not exist.                                                      |
| 802.1Q    | Cannot set tagging for interface %d which is not a member of VLAN %d | Failure in Setting the tagging configuration for a interface on a range of VLAN. |
| 802.1Q    | VLAN create currently underway for VLAN ID %d"                       | Trying to create the VLAN ID which is already under process of creation.         |
| 802.1Q    | VLAN ID %d already exists                                            | Trying to create the VLAN ID which is already exists.                            |
| 802.1Q    | Failed to delete, Default VLAN %d cannot be deleted                  | Trying to delete Default VLAN ID.                                                |
| 802.1Q    | Failed to delete, VLAN ID %d is not a static VLAN                    | Trying to delete Dynamic VLAN ID from CLI.                                       |
| 802.1Q    | Requestor %d attempted to release internal VLAN %d: owned by %d      | -                                                                                |

Table 50: 802.1S Log Messages

| Component | Message                                                                                 | Cause                                                                                                                                                                        |
|-----------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 802.1S    | dot1sIssueCmd: Dot1s Msg Queue is full!!!!Event: %u, on interface: %u, for instance: %u | The message Queue is full.                                                                                                                                                   |
| 802.1S    | dot1sStateMachineRxBpdu(): Rcvd BPDU Discarded                                          | The current conditions, like port is not enabled or the system is currently not finished processing another BPDU on the same interface, does not allow processing this BPDU. |
| 802.1S    | dot1sBpduTransmit(): could not get a buffer                                             | Out of system buffers.                                                                                                                                                       |

Table 51: Port Mac Locking Log Message

| Component        | Message                                                                                                 | Cause                                                                                                                                     |
|------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Port Mac Locking | pmlMapIntflsConfigurable: Error accessing PML config data for interface %d in pmlMapIntflsConfigurable. | A default configuration does not exist for this interface. Typically a case when a new interface is created and has no pre-configuration. |

Table 52: Protocol-based VLANs Log Messages

| Component            | Message                                                                       | Cause                                                                                             |
|----------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Protocol-based VLANs | pbVlanCnfgrInitPhase2Process: Unable to register NIM callback                 | Appears when nimRegisterIntfChange fails to register pbVlan for link state changes.               |
| Protocol-based VLANs | pbVlanCnfgrInitPhase2Process: Unable to register pbVlan callback with VLANs   | Appears when VLANRegisterForChange fails to register pbVlan for VLAN changes.                     |
| Protocol-based VLANs | pbVlanCnfgrInitPhase2Process: Unable to register pbVlan callback with nvStore | Appears when nvStoreRegister fails to register save and restore functions for configuration save. |

## 10.5 QoS

Table 53: ACL Log Messages

| Component | Message                                                                       | Cause                                                                                                                                                                                                                                         |
|-----------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACL       | Total number of ACL rules (x) exceeds max (y) on intf i.                      | The combination of all ACLs applied to an interface has resulted in requiring more rules than the platform supports.                                                                                                                          |
| ACL       | ACL name, rule x: This rule is not being logged                               | The ACL configuration has resulted in a requirement for more logging rules than the platform supports. The specified rule is functioning normally except for the logging action.                                                              |
| ACL       | aclLogTask: error logging ACL rule trap for correlator number                 | The system was unable to send an SNMP trap for this ACL rule which contains a logging attribute.                                                                                                                                              |
| ACL       | IP ACL number: Forced truncation of one or more rules during config migration | While processing the saved configuration, the system encountered an ACL with more rules than is supported by the current version. This may happen when code is updated to a version supporting fewer rules per ACL than the previous version. |

Table 54: CoS Log Message

| Component | Message                                                                           | Cause                                                                                                              |
|-----------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| COS       | cosCnfgrInitPhase3Process: Unable to apply saved config -- using factory defaults | The COS component was unable to apply the saved configuration and has initialized to the factory default settings. |

Table 55: DiffServ Log Messages

| Component | Message                                                                              | Cause                                                                                                                                                                                         |
|-----------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DiffServ  | diffserv.c 165: diffServRestore Failed to reset DiffServ. Recommend resetting device | While attempting to clear the running configuration an error was encountered in removing the current settings. This may lead to an inconsistent state in the system and resetting is advised. |
| DiffServ  | Policy invalid for service intf: policy name, interface x, direction y               | The DiffServ policy definition is not compatible with the capabilities of the interface specified. Check the platform release notes for information on configuration limitations.             |

## 10.6 Routing/IPv6 Routing

Table 56: DHCP Relay Log Messages

| Component  | Message                                            | Cause                                                                                                                                                                                    |
|------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DHCP relay | REQUEST hops field more than config value          | The DHCP relay agent has processed a DHCP request whose HOPS field is larger than the maximum value allowed. The relay agent will not forward a message with a hop count greater than 4. |
| DHCP relay | Request's seconds field less than the config value | The DHCP relay agent has processed a DHCP request whose SECS field is larger than the configured minimum wait time allowed.                                                              |
| DHCP relay | processDhcpPacket: invalid DHCP packet type: %u\n  | The DHCP relay agent has processed an invalid DHCP packet. Such packets are discarded by the relay agent.                                                                                |

Table 57: OSPFv2 Log Messages

| Component | Message                                                                              | Cause                                                                                                                                                                                                                                                |
|-----------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPFv2    | Best route client deregistration failed for OSPF Redist                              | OSPFv2 registers with the IPv4 routing table manager ("RTO") to be notified of best route changes. There are cases where OSPFv2 deregisters more than once, causing the second deregistration to fail. The failure is harmless.                      |
| OSPFv2    | XX_Call() failure in _checkTimers for thread 0x869bcc0                               | An OSPFv2 timer has fired but the message queue that holds the event has filled up. This is normally a fatal error.                                                                                                                                  |
| OSPFv2    | Warning: OSPF LSDB is 90% full (22648 LSAs).                                         | OSPFv2 limits the number of Link State Advertisements (LSAs) that can be stored in the link state database (LSDB). When the database becomes 90 or 95 percent full, OSPFv2 logs this warning. The warning includes the current size of the database. |
| OSPFv2    | The number of LSAs, 25165, in the OSPF LSDB has exceeded the LSDB memory allocation. | When the OSPFv2 LSDB becomes full, OSPFv2 logs this message. OSPFv2 reoriginates its router LSAs with the metric of all non-stub links set to the maximum value to encourage other routers to not compute routes through the overloaded router.      |
| OSPFv2    | Dropping the DD packet because of MTU mismatch                                       | OSPFv2 ignored a Database Description packet whose MTU is greater than the IP MTU on the interface where the DD was received.                                                                                                                        |
| OSPFv2    | LSA Checksum error in LsUpdate, dropping LSID 1.2.3.4 checksum 0x1234.               | OSPFv2 ignored a received link state advertisement (LSA) whose checksum was incorrect.                                                                                                                                                               |

Table 58: OSPFv3 Log Messages

| Component | Message                                                                                         | Cause                                                                                                                                                                                                                                                |
|-----------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSPFv3    | Best route client deregistration failed for OSPFv3 Redist                                       | OSPFv3 registers with the IPv6 routing table manager ("RTO6") to be notified of best route changes. There are cases where OSPFv3 deregisters more than once, causing the second deregistration to fail. The failure is harmless.                     |
| OSPFv3    | Warning: OSPF LSDB is 90% full (15292 LSAs).                                                    | OSPFv3 limits the number of Link State Advertisements (LSAs) that can be stored in the link state database (LSDB). When the database becomes 90 or 95 percent full, OSPFv3 logs this warning. The warning includes the current size of the database. |
| OSPFv3    | The number of LSAs, 16992, in the OSPF LSDB has exceeded the LSDB memory allocation.            | When the OSPFv3 LSDB becomes full, OSPFv3 logs this message. OSPFv3 reoriginates its router LSAs with the R-bit clear indicating that OSPFv3 is overloaded.                                                                                          |
| OSPFv3    | LSA Checksum error detected for LSID 1.2.3.4 checksum 0x34f5. OSPFv3 Database may be corrupted. | OSPFv3 periodically verifies the checksum of each LSA in memory. OSPFv3 logs this.                                                                                                                                                                   |

Table 59: Routing Table Manager Log Messages

| Component | Message                                                                                                                                                                                                                                                      | Cause                                                                                                                                                                                                                                                                |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RTO       | RTO is no longer full. Routing table contains xxx best routes, xxx total routes, xxx reserved local routes.                                                                                                                                                  | When the number of best routes drops below full capacity, RTO logs this notice. The number of bad adds may give an indication of the number of route adds that failed while RTO was full, but a full routing table is only one reason why this count is incremented. |
| RTO       | RTO is full. Routing table contains xxx best routes, xxx total routes, xxx reserved local routes. The routing table manager stores a limited number of best routes. The count of total routes includes alternate routes, that are not installed in hardware. | The routing table manager, also called "RTO," stores a limited number of best routes, based on hardware capacity. When the routing table becomes full, RTO logs this alert. The count of total routes includes alternate routes, that are not installed in hardware. |



Table 60: VRRP Log Messages

| Component | Message                                                                                                                  | Cause                                                                                                                                                                                                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VRRP      | VRRP packet of size xxx dropped. Min VRRP packet size is xxx;<br>Max VRRP packet size is xxx.                            | This message appears when there is flood of VRRP messages in the network.                                                                                                                                                                                        |
| VRRP      | VR xxx on interface xxx started as xxx.                                                                                  | This message appears when the Virtual router is started in the role of a Master or a Backup.                                                                                                                                                                     |
| VRRP      | This router is the IP address owner for virtual router xxx on interface xxx. Setting the virtual router priority to xxx. | This message appears when the address ownership status for a specific VR is updated. If this router is the address owner for the VR, set the VR's priority to MAX priority (as per RFC 3768). If the router is no longer the address owner, revert the priority. |

Table 61: ARP Log Message

| Component | Message                                                                                       | Cause                                                                                                                           |
|-----------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ARP       | IP address conflict on interface xxx for IP address yyy. Conflicting host MAC address is zzz. | When an address conflict is detected for any IP address on the switch upon reception of ARP packet from another host or router. |

Table 62: RIP Log Message

| Component | Message                                                   | Cause                                                                                             |
|-----------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| RIP       | RIP: discard response from xxx using unexpected interface | When RIP response is received with a source address not matching the incoming interface's subnet. |

## 10.7 Multicast

Table 63: IGMP/MLD Log Messages

| Component | Message                                                                                    | Cause                                                                                                                                                                                                                                 |
|-----------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IGMP/MLD  | MGMD Protocol Heap Memory Init Failed; Family – xxx.                                       | MGMD Heap memory initialization Failed for the specified address family. This message appears when trying to enable MGMD Protocol.                                                                                                    |
| IGMP/MLD  | MGMD Protocol Heap Memory De-Init Failed; Family – xxx.                                    | MGMD Heap memory de-initialization Failed for the specified address family. This message appears when trying to disable MGMD (IGMP/MLD) Protocol. As a result of this, the subsequent attempts to enable/disable MGMD will also fail. |
| IGMP/MLD  | MGMD Protocol Initialization Failed; Family – xxx.                                         | MGMD protocol initialization sequence Failed. This could be due to the non-availability of some resources. This message appears when trying to enable MGMD Protocol.                                                                  |
| IGMP/MLD  | MGMD All Routers Address – xxx Set to the DTL Mcast List Failed; Mode – xxx, intf – xxx.   | This message appears when trying to enable/disable MGMD Protocol.                                                                                                                                                                     |
| IGMP/MLD  | MGMD All Routers Address – xxx Add to the DTL Mcast List Failed.                           | MGMD All Routers Address addition to the local multicast list Failed. As a result of this, MGMD Multicast packets with this address will not be received at the application.                                                          |
| IGMP/MLD  | MGMD All Routers Address – xxx Delete from the DTL Mcast List Failed.                      | MGMD All Routers Address deletion from the local multicast list Failed. As a result of this, MGMD Multicast packets are still received at the application though MGMD is disabled.                                                    |
| IGMP/MLD  | MLDv2 GroupAddr-[FF02::16] Enable with Interpeak Stack Failed; rtrIfNum – xxx, intf – xxx. | Registration of this Group address with the Interpeak stack failed. As a result of this, MLDv2 packets will not be received at the application.                                                                                       |
| IGMP/MLD  | MGMD Group Entry Creation Failed; grpAddr – xxx, rtrIfNum – xxx.                           | The specified Group Address registration on the specified router interface failed.                                                                                                                                                    |
| IGMP/MLD  | MGMD Socket Creation/Initialization Failed for addrFamily – xxx.                           | MGMD Socket Creation/options Set Failed. As a result of this, the MGMD Control packets cannot be sent out on an interface.                                                                                                            |

Table 64: IGMP-Proxy Log Messages

| Component            | Message                                                                               | Cause                                                                                                                                                                                                                                           |
|----------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IGMP-Proxy/MLD-Proxy | MGMD-Proxy Protocol Initialization Failed; Family – xxx.                              | MGMD-Proxy protocol initialization sequence Failed. This could be due to the non-availability of some resources. This message appears when trying to enable MGMD-Proxy Protocol.                                                                |
| IGMP-Proxy/MLD-Proxy | MGMD-Proxy Protocol Heap Memory De-Init Failed; Family – xxx.                         | MGMD-Proxy Heap memory de-initialization is Failed for the specified address family. This message appears when trying to disable MGMD-Proxy Protocol. As a result of this, the subsequent attempts to enable/disable MGMD-Proxy will also fail. |
| IGMP-Proxy/MLD-Proxy | MGMD Proxy Route Entry Creation Failed; grpAddr – xxx, srcAddr – xxx, rtrIfNum – xxx. | Registration of the Multicast Forwarding entry for the specified Source and Group Address Failed when MGMD-Proxy is used.                                                                                                                       |

Table 65: PIM-SM Log Messages

| Component | Message                                                                             | Cause                                                                                                                                                                                                                         |
|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PIMSM     | Nonzero SPT/Data Threshold Rate – xxx is currently Not Supported on this platform.  | This message appears when the user tries to configure the PIMSM SPT threshold value.                                                                                                                                          |
| PIMSM     | PIMSM Protocol Heap Memory Init Failed; Family – xxx.                               | PIMSM Heap memory initialization Failed for the specified address family. This message appears when trying to enable PIMSM Protocol.                                                                                          |
| PIMSM     | PIMSM Protocol Heap Memory De-Init Failed; Family –xxx.                             | PIMSM Heap memory de-initialization Failed for the specified address family. This message appears when trying to disable PIMSM Protocol. As a result of this, the subsequent attempts to enable/disable PIMSM will also fail. |
| PIMSM     | PIMSM Protocol Initialization Failed; Family –xxx.                                  | PIMSM protocol initialization sequence Failed. This could be due to the non-availability of some resources. This message appears when trying to enable PIMSM Protocol.                                                        |
| PIMSM     | PIMSM Protocol De-Initialization Failed; Family – xxx.                              | PIMSM protocol de-initialization sequence Failed. This message appears when trying to disable PIMSM Protocol.                                                                                                                 |
| PIMSM     | PIMSM SSM Range Table is Full.                                                      | PIMSM SSM Range Table is Full. This message appears when the protocol cannot accommodate new SSM registrations.                                                                                                               |
| PIMSM     | PIM All Routers Address – xxx Delete from the DTL Mcast List Failed for intf – xxx. | PIM All Routers Address deletion from the local multicast list Failed. As a result of this, PIM Multicast packets are still received at the application though PIM is disabled.                                               |

Table 65: PIM-SM Log Messages (Continued)

| Component | Message                                                                               | Cause                                                                                                                                                                                                   |
|-----------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PIMSM     | PIM All Routers Address - xxx Add to the DTL Mcast List Failed for intf - xxx.        | PIM All Routers Address addition to the local multicast list Failed. As a result of this, PIM Multicast packets with this address will not be received at the application.                              |
| PIMSM     | Mcast Forwarding Mode Disable Failed for intf - xxx.                                  | Multicast Forwarding Mode Disable Failed. As a result of this, Multicast packets are still received at the application though no protocol is enabled.                                                   |
| PIMSM     | Mcast Forwarding Mode Enable Failed for intf - xxx.                                   | Multicast Forwarding Mode Enable Failed. As a result of this, Multicast packets will not be received at the application though a protocol is enabled.                                                   |
| PIMSM     | PIMSMv6 Socket Memb'ship Enable Failed for rtrIfNum - xxx.                            | PIMSMv6 Socket Creation/options Set with Kernel IP Stack Failed. As a result of this, the PIM Control packets cannot be received on the interface.                                                      |
| PIMSM     | PIMSMv6 Socket Memb'ship Disable Failed for rtrIfNum - xxx.                           | PIMSMv6 Socket Creation/options Disable with Kernel IP Stack Failed. As a result of this, the PIM Control packets are still received on the interface at the application though no protocol is enabled. |
| PIMSM     | PIMSM (S,G,RPt) Table Max Limit - xxx Reached; Cannot accommodate any further routes. | PIMSM Multicast Route table (S,G,RPt) has reached maximum capacity and cannot accommodate new registrations anymore.                                                                                    |
| PIMSM     | PIMSM (S,G) Table Max Limit - xxx Reached; Cannot accommodate any further routes.     | PIMSM Multicast Route table (S,G) has reached maximum capacity and cannot accommodate new registrations anymore.                                                                                        |
| PIMSM     | PIMSM (*,G) Table Max Limit - xxx Reached; Cannot accommodate any further routes.     | PIMSM Multicast Route table (*,G) has reached maximum capacity and cannot accommodate new registrations anymore.                                                                                        |

Table 66: PIM-DM Log Messages

| Component | Message                                                                             | Cause                                                                                                                                                                                                                                                  |
|-----------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PIMDM     | PIMDM Protocol Heap Memory Init Failed; Family – xxx.                               | PIMDM Heap memory initialization Failed for the specified address family. This message appears when trying to enable PIMDM Protocol.                                                                                                                   |
| PIMDM     | PIMDM Protocol Heap Memory De-Init Failed; Family –xxx.                             | PIMDM Heap memory de-initialization Failed for the specified address family. This message appears when trying to disable PIMDM Protocol. As a result of this, the subsequent attempts to enable/disable PIMDM will also fail.                          |
| PIMDM     | PIMDM Protocol Initialization Failed; Family –xxx.                                  | PIMDM protocol initialization sequence Failed. This could be due to the non-availability of some resources. This message appears when trying to enable PIMDM Protocol.                                                                                 |
| PIMDM     | PIMDM Protocol De-Initialization Failed; Family – xxx.                              | PIMDM protocol de-initialization sequence Failed. This message appears when trying to disable PIMDM Protocol.                                                                                                                                          |
| PIMDM     | PIM All Routers Address – xxx Delete from the DTL Mcast List Failed for intf – xxx. | PIM All Routers Address deletion from the local multicast list Failed. As a result of this, PIM Multicast packets are still received at the application though PIM is disabled.                                                                        |
| PIMDM     | PIM All Routers Address - xxx Add to the DTL Mcast List Failed for intf – xxx.      | PIM All Routers Address addition to the local multicast list Failed. As a result of this, PIM Multicast packets with this address will not be received at the application.                                                                             |
| PIMDM     | Mcast Forwarding Mode Disable Failed for intf – xxx.                                | Multicast Forwarding Mode Disable Failed. As a result of this, Multicast packets are still received at the application though no protocol is enabled.                                                                                                  |
| PIMDM     | Mcast Forwarding Mode Enable Failed for intf – xxx.                                 | Multicast Forwarding Mode Enable Failed. As a result of this, Multicast packets will not be received at the application though a protocol is enabled.                                                                                                  |
| PIMDM     | PIMDMv6 Socket Memb'ship Enable Failed for rtrIfNum – xxx.                          | PIMDMv6 Socket Creation/options Set with Kernel IP Stack Failed. As a result of this, the PIM Control packets cannot be received on the interface.                                                                                                     |
| PIMDM     | PIMDMv6 Socket Memb'ship Disable Failed for rtrIfNum – xxx.                         | PIMDMv6 Socket Creation/options Disable with Kernel IP Stack Failed. As a result of this, the PIM Control packets are still received on the interface at the application though no protocol is enabled.                                                |
| PIMDM     | PIMDM FSM Action Invoke Failed; rtrIfNum – xxx Out of Bounds for Event – xxx.       | The PIMDM FSM Action invocation Failed due to invalid Routing interface number. In such cases, the FSM Action routine can never be invoked which may result in abnormal behavior. The failed FSM-name can be identified from the specified Event name. |

Table 66: PIM-DM Log Messages (Continued)

| Component | Message                                                                         | Cause                                                                                                                                                                                                     |
|-----------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PIMDM     | PIMDM Socket Initialization Failed for addrFamily - xxx.                        | PIMDM Socket Creation/options Set Failed. As a result of this, the PIM Control packets cannot be sent out on an interface.                                                                                |
| PIMDM     | PIMDMv6 Socket Memb'ship Enable Failed for rtrIfNum - xxx.                      | Socket options Set to enable the reception of PIMv6 packets Failed. As a result of this, the PIMv6 packets will not be received by the application.                                                       |
| PIMDM     | PIMDMv6 Socket Memb'ship Disable Failed for rtrIfNum - xxx.                     | PIMDMv6 Socket Creation/options Disable with Kernel IP Stack Failed. As a result of this, the PIMv6 Control packets are still received on the interface at the application though no protocol is enabled. |
| PIMDM     | PIMDM MRT Table Max Limit - xxx Reached; Cannot accommodate any further routes. | PIMDM Multicast Route table (S,G) has reached maximum capacity and cannot accommodate new registrations any more.                                                                                         |

Table 67: DVMRP Log Messages

| Component | Message                                                                               | Cause                                                                                                                                                                                 |
|-----------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DVMRP     | DVMRP Heap memory initialization is Failed for the specified address family.          | This message appears when trying to enable DVMRP Protocol                                                                                                                             |
| DVMRP     | DVMRP Heap memory de-initialization is Failed for the specified address family.       | This message appears when trying to disable DVMRP Protocol. As a result of this, the subsequent attempts to enable/disable DVMRP will also fail.                                      |
| DVMRP     | DVMRP protocol initialization sequence Failed.                                        | This could be due to the non-availability of some resources. This message appears when trying to enable DVMRP Protocol.                                                               |
| DVMRP     | DVMRP All Routers Address - xxx Delete from the DTL Mcast List Failed for intf - xxx. | DMVRP All Routers Address deletion from the local multicast list Failed. As a result of this, DVMRP Multicast packets are still received at the application though DVMRP is disabled. |
| DVMRP     | Mcast Forwarding Mode Disable Failed for intf - xxx.                                  | The Multicast Forwarding mode Disable Failed for this routing interface.                                                                                                              |
| DVMRP     | DVMRP All Routers Address - xxx Add to the DTL Mcast List Failed for intf - xxx.      | DMVRP All Routers Address addition to the local multicast list Failed. As a result of this, DVMRP Multicast packets with this address will not be received at the application.        |

Table 67: DVMRP Log Messages (Continued)

| Component | Message                                                    | Cause                                                                                                                                                                                                                                                        |
|-----------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DVMRP     | Mcast Forwarding Mode Enable Failed for intf - xxx.        | The Multicast Forwarding mode Enable Failed for this routing interface. As a result of this, the ability to forward Multicast packets does not function on this interface.                                                                                   |
| DVMRP     | DVMRP Probe Control message Send Failed on rtrIfNum - xxx. | DVMRP Probe control message send failed. This could mostly be because of a Failure return status of the socket call sendto(). As a result of this, the DVMRP neighbor could be lost in the neighboring DVMRP routers.                                        |
| DVMRP     | DVMRP Prune Control message Send Failed; rtrIfNum - xxx.   | Neighbor - %s, SrcAddr - %s, GrpAddr - %s DVMRP Prune control message send failed. This could mostly be because of a Failure return status of the socket call sendto(). As a result of this, the unwanted multicast traffic is still received and forwarded. |
| DVMRP     | DVMRP Probe Control message Send Failed on rtrIfNum -xxx.  | DVMRP Probe control message send failed. This could mostly be because of a Failure return status of the socket call sendto(). As a result of this, the DVMRP neighbor could be lost in the neighboring DVMRP routers.                                        |

## 10.8 Stacking

Table 68: EDB Log Message

| Component | Message                       | Cause                          |
|-----------|-------------------------------|--------------------------------|
| EDB       | EDB Callback: Unit Join: num. | Unit num has joined the stack. |

## 10.9 Technologies

Table 69: Broadcom Error Messages

| Component | Message                                                                                     | Cause                                                                                                                                                                                                                       |
|-----------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Broadcom  | Invalid USP unit = x, slot = x, port = x                                                    | A port was not able to be translated correctly during the receive.                                                                                                                                                          |
| Broadcom  | In hapiBroadSystemMacAddress call to 'bcm_l2_addr_add' - FAILED : x                         | Failed to add an L2 address to the MAC table. This should only happen when a hash collision occurs or the table is full.                                                                                                    |
| Broadcom  | Failed installing mirror action - rest of the policy applied successfully                   | A previously configured probe port is not being used in the policy. The release notes state that only a single probe port can be configured.                                                                                |
| Broadcom  | Policy x does not contain rule x                                                            | The rule was not added to the policy due to a discrepancy in the rule count for this specific policy. Additionally, the message can be displayed when an old rule is being modified, but the old rule is not in the policy. |
| Broadcom  | ERROR: policy x, tmpPolicy x, size x, data x x x x x x                                      | An issue installing the policy due to a possible duplicate hash.                                                                                                                                                            |
| Broadcom  | ACL x not found in internal table                                                           | Attempting to delete a non-existent ACL.                                                                                                                                                                                    |
| Broadcom  | ACL internal table overflow                                                                 | Attempting to add an ACL to a full table.                                                                                                                                                                                   |
| Broadcom  | In hapiBroadQosCosQueueConfig, Failed to configure minimum bandwidth. Available bandwidth x | Attempting to configure the bandwidth beyond it's capabilities.                                                                                                                                                             |
| Broadcom  | USL: failed to put sync response on queue                                                   | A response to a sync request was not enqueued. This could indicate that a previous sync request was received after it was timed out.                                                                                        |
| Broadcom  | USL: failed to sync ipmc table on unit = x                                                  | Either the transport failed or the message was dropped.                                                                                                                                                                     |
| Broadcom  | usl_task_ipmc_msg_send(): failed to send with x                                             | Either the transport failed or the message was dropped.                                                                                                                                                                     |
| Broadcom  | USL: No available entries in the STG table                                                  | The Spanning Tree Group table is full in USL.                                                                                                                                                                               |
| Broadcom  | USL: failed to sync stg table on unit = x                                                   | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued.                                                                                                |
| Broadcom  | USL: A Trunk does not exist in USL                                                          | Attempting to modify a Trunk that does not exist.                                                                                                                                                                           |
| Broadcom  | USL: A Trunk being created by bcmx already existed in USL                                   | Possible synchronization issue between the application, hardware, and sync layer.                                                                                                                                           |
| Broadcom  | USL: A Trunk being destroyed does not exist in USL                                          | Possible synchronization issue between the application, hardware, and sync layer.                                                                                                                                           |
| Broadcom  | USL: A Trunk being set does not exist in USL                                                | Possible synchronization issue between the application, hardware, and sync layer.                                                                                                                                           |
| Broadcom  | USL: failed to sync trunk table on unit = x                                                 | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued.                                                                                                |
| Broadcom  | USL: Mcast entry not found on a join                                                        | Possible synchronization issue between the application, hardware, and sync layer.                                                                                                                                           |



Table 69: Broadcom Error Messages (Continued)

| Component | Message                                                             | Cause                                                                                                                        |
|-----------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Broadcom  | USL: Mcast entry not found on a leave                               | Possible synchronization issue between the application, hardware, and sync layer.                                            |
| Broadcom  | USL: failed to sync dVLAN data on unit = x                          | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync policy table on unit = x                        | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync VLAN table on unit = x                          | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | Invalid LAG ID x                                                    | Possible synchronization issue between the BCM driver and HAPI.                                                              |
| Broadcom  | Invalid uport calculated from the BCM uport bcmx_l2_addr->lport = x | Uport not valid from BCM driver.                                                                                             |
| Broadcom  | Invalid USP calculated from the BCM uport\nbcmx_l2_addr->lport = x  | USP not able to be calculated from the learn event for BCM driver.                                                           |
| Broadcom  | Unable to insert route R/P                                          | Route R with prefix P could not be inserted in the hardware route table. A retry will be issued.                             |
| Broadcom  | Unable to Insert host H                                             | Host H could not be inserted in hardware host table. A retry will be issued.                                                 |
| Broadcom  | USL: failed to sync L3 Intf table on unit = x                       | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync L3 Host table on unit = x                       | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync L3 Route table on unit = x                      | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync initiator table on unit = x                     | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync terminator table on unit = x                    | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |
| Broadcom  | USL: failed to sync ip-multicast table on unit = x                  | Could not synchronize unit x due to a transport failure or API issue on remote unit. A synchronization retry will be issued. |

## 10.10 O/S Support

Table 70: Linux BSP Log Message

| Component | Message | Cause                                                                         |
|-----------|---------|-------------------------------------------------------------------------------|
| Linux BSP | rc = 10 | Second message logged at bootup, right after Starting code.... Always logged. |

Table 71: OSAPI Linux Log Messages

| Component   | Message                                                                                                                                                         | Cause                                                                                                                                                                                                                                                                                        |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSAPI Linux | osapiNetLinkNeighDump: could not open socket! - or -<br>ipstkNdpFlush: could not open socket! - or -<br>osapiNetlinkDumpOpen: unable to bind socket! errno = XX | Could not open a NetLink <sup>®</sup> socket. Make sure "ARP Daemon support" (CONFIG_ARPD) is enabled in the Linux kernel, if the reference kernel binary is not being used.                                                                                                                 |
| OSAPI Linux | ipstkNdpFlush: sending delete failed                                                                                                                            | Failed when telling the kernel to delete a neighbor table entry (the message is incorrect).                                                                                                                                                                                                  |
| OSAPI Linux | unable to open /proc/net/ipv6/conf/default/hop_limit                                                                                                            | IPv6 MIB objects read, but /proc file system is not mounted, or running kernel does not have IPV6 support.                                                                                                                                                                                   |
| OSAPI Linux | osapimRouteEntryAdd, errno XX adding 0xYY to ZZ - or -<br>osapimRouteEntryDelete, errno XX deleting 0xYY from ZZ                                                | Error adding or deleting an IPv4 route (listed in hex as YY), on the interface with Linux name ZZ Error code can be looked up in errno.h.                                                                                                                                                    |
| OSAPI Linux | l3intfAddRoute: Failed to Add Route - or -<br>l3intfDeleteRoute: Failed to Delete Route                                                                         | Error adding or deleting a default gateway in the kernel's routing table (the function is really osapiRawMRouteAdd()/Delete()).                                                                                                                                                              |
| OSAPI Linux | osapiNetIfConfig: ioctl on XX failed: addr: 0xYY, err: ZZ - or -<br>osapiNetIPSet: ioctl on XX failed: addr: 0x%YY                                              | Failed trying to set the IP address (in hex as YY) of the interface with Linux name XX, and the interface does not exist. Sometimes this is a harmless race condition (for example, try to set address 0 when DHCPing on the network port (dtl0) at bootup, before it is created using TAP). |
| OSAPI Linux | ping: sendto error                                                                                                                                              | Trouble sending an ICMP echo request packet for the UI ping command. Maybe there was no route to that network.                                                                                                                                                                               |
| OSAPI Linux | Failed to Create Interface                                                                                                                                      | Out of memory at system initialization time.                                                                                                                                                                                                                                                 |
| OSAPI Linux | TAP Unable to open XX                                                                                                                                           | The /dev/tap file is missing, or, if not using the reference kernel binary, the kernel is missing "Universal TUN/TAP device driver support" (CONFIG_TUN).                                                                                                                                    |
| OSAPI Linux | Tap monitor task is spinning on select failures - then -<br>Tap monitor select failed: XX                                                                       | Trouble reading the /dev/tap device, check the error message XX for details.                                                                                                                                                                                                                 |

Table 71: OSAPI Linux Log Messages (Continued)

| Component   | Message                                                                                                                                                      | Cause                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| OSAPI Linux | Log_Init: log file error - creating new log file                                                                                                             | This pertains to the "event log" persistent file in flash. Either it did not exist, or had a bad checksum. |
| OSAPI Linux | Log_Init: Flash (event) log full; erasing                                                                                                                    | Event log file has been cleared; happens at boot time.                                                     |
| OSAPI Linux | Log_Init: Corrupt event log; erasing                                                                                                                         | Event log file had a non-blank entry after a blank entry; therefore, something was messed up.              |
| OSAPI Linux | Failed to Set Interface IP Address – or – IP Netmask – or – Broadcast Address – or – Flags – or – Hardware Address – or – Failed to Retrieve Interface Flags | Trouble adding VRRP IP or MAC address(es) to a Linux network interface.                                    |

## APPENDIX A: List of Commands

|                                                      |     |
|------------------------------------------------------|-----|
| {deny   permit} (IP ACL) .....                       | 844 |
| {deny   permit} (IPv6) .....                         | 853 |
| {deny   permit} (MAC ACL) .....                      | 833 |
| {deny   permit} (Management ACAL) .....              | 860 |
| 1583compatibility .....                              | 650 |
| aaa accounting .....                                 | 83  |
| aaa accounting update .....                          | 85  |
| aaa authentication dot1x default .....               | 385 |
| aaa authentication enable .....                      | 61  |
| aaa authentication login .....                       | 60  |
| aaa authorization .....                              | 63  |
| aaa ias-user username .....                          | 83  |
| aaa server radius dynamic-author .....               | 103 |
| aaa session-id .....                                 | 83  |
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| accept-mode .....                                    | 631 |
| access-list .....                                    | 839 |
| access-list counters enable .....                    | 842 |
| accounting .....                                     | 86  |
| acl-trapflags .....                                  | 848 |
| addport .....                                        | 442 |
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| address range .....                                  | 236 |
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| area default-cost (OSPFv3) .....                     | 746 |
| area nssa (OSPF) .....                               | 650 |
| area nssa (OSPFv3) .....                             | 746 |
| area nssa default-info-originate (OSPF) .....        | 650 |
| area nssa default-info-originate (OSPFv3) .....      | 746 |
| area nssa no-redistribute (OSPF) .....               | 651 |
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| area nssa no-summary (OSPF) .....                    | 651 |
| area nssa no-summary (OSPFv3) .....                  | 747 |
| area nssa translator-role (OSPF) .....               | 651 |
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| area nssa translator-stab-intv (OSPFv3) .....        | 748 |
| area range (OSPF) .....                              | 652 |
| area range (OSPFv3) .....                            | 748 |
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| area stub (OSPFv3) .....                             | 749 |
| area stub no-summary (OSPF) .....                    | 653 |
| area stub no-summary (OSPFv3) .....                  | 749 |
| area virtual-link (OSPF) .....                       | 653 |
| area virtual-link (OSPFv3) .....                     | 749 |
| area virtual-link authentication .....               | 654 |
| area virtual-link dead-interval (OSPF) .....         | 654 |
| area virtual-link dead-interval (OSPFv3) .....       | 749 |
| area virtual-link hello-interval (OSPF) .....        | 654 |
| area virtual-link hello-interval (OSPFv3) .....      | 750 |
| area virtual-link retransmit-interval (OSPF) .....   | 655 |
| area virtual-link retransmit-interval (OSPFv3) ..... | 750 |
| area virtual-link transmit-delay (OSPF) .....        | 655 |
| area virtual-link transmit-delay (OSPFv3) .....      | 750 |

|                                                               |     |
|---------------------------------------------------------------|-----|
| arp .....                                                     | 575 |
| arp access-list .....                                         | 491 |
| arp cachesize .....                                           | 576 |
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| arp-guard rate-limit .....                                    | 568 |
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| assert (filter) .....                                         | 103 |
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| authentication command bounce-port ignore .....               | 104 |
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| authorization exec default .....                              | 65  |
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| auto-summary .....                                            | 689 |
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| auto-voip oui .....                                           | 865 |
| auto-voip oui-based priority .....                            | 865 |
| auto-voip protocol-based .....                                | 866 |
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|                                                   |     |
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| bandwidth .....                                   | 664 |
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| bfd echo .....                                    | 697 |
| bfd interval .....                                | 697 |
| bfd slow-timer .....                              | 698 |
| block .....                                       | 319 |
| bonjour run .....                                 | 146 |
| boot autoinstall .....                            | 142 |
| boot autoinstall dhcp startup-config .....        | 145 |
| boot autoinstall file .....                       | 144 |
| boot autoinstall file disable .....               | 145 |
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## About Kontron

Kontron is a global leader in Embedded Computing Technology (ECT). As a part of technology group S&T, Kontron offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information, please visit: <http://www.kontron.com/>



HEADQUARTERS

**Kontron AG**

Gutenbergstrasse 2  
857373 Ismaning  
Germany  
Tel.: + 49 (0) 89 370058-0  
[info@kontron.com](mailto:info@kontron.com)