

GSM-R NOMINAL RRH USED AS AN OPTICAL REPEATER



- ▶ SOLUTION CONCEPT
- ▶ IMPROVEMENTS COMPARED TO OPTICAL REPEATERS
- ▶ POSSIBILITY FOR RRH REDUNDANCY
- ▶ FULLY INTEGRATED IN BTS-R SOLUTION

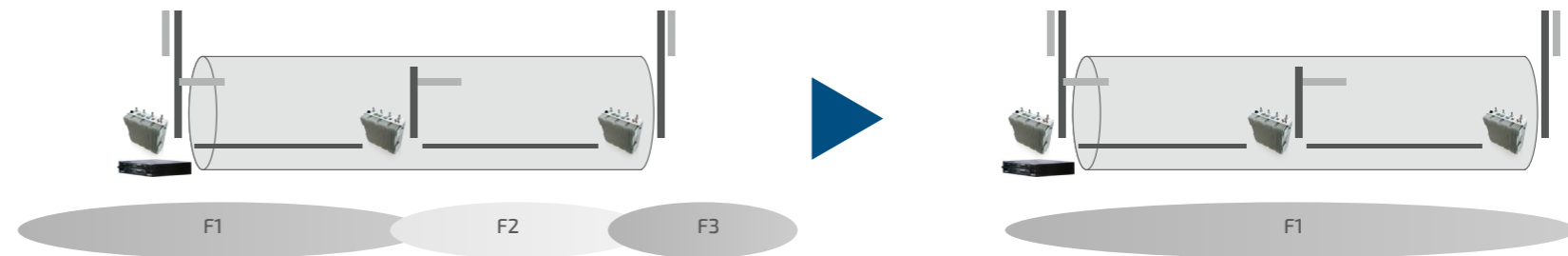
▶ Repeaters are often used in GSM-R systems as they can extend radio coverage in certain zones like tunnels, rough terrain or inside large buildings. These devices are appreciated because this solution for coverage can be easily and cost-effectively deployed.

Kontron Transportation offers an integrated solution within the GSM-R BTS-R by putting the RRH into repeater mode, offering a wide range of possibilities compared to a common third-party optical repeater.

This solution combines the advantages of using a repeater in the railway network environment with the numerous functions of the Kontron BTS-R.

GSM-R BTS-R USE WITH CONNECTED RRH AS A REPEATER

A BTS-R in repeater mode consists in one cell (one BCCH), managed by one common DM



▶ RRH Hardware equipment is identical to classical BTS-R

▶ Operations management is available on the OMC-R

▶ Enhanced features compared to Optical Repeaters

▶ The connection on transport interfaces follows the same rules

✔ Spare management, maintenance

✔ One single management system for all BTS and repeater nodes

✔ Extended range of covering solutions

✔ Easy introduction within legacy networks

GSM-R BTS-R SOLUTION CONCEPT

▶ Remote Radio Head (RRH)

Outdoor - IP 65



▶ CPRI interface

Up to 130 km

Dark Optical fibers

▶ Digital Module (DM)

GSM-R / GPRS / EDGE features



Abis interface over TDM transmission network or Packet transport network

1 RRH = 2 TRX
Up to 6 RRH for 1 BTS-R

Connection through star, redundant star, chain and ring topologies

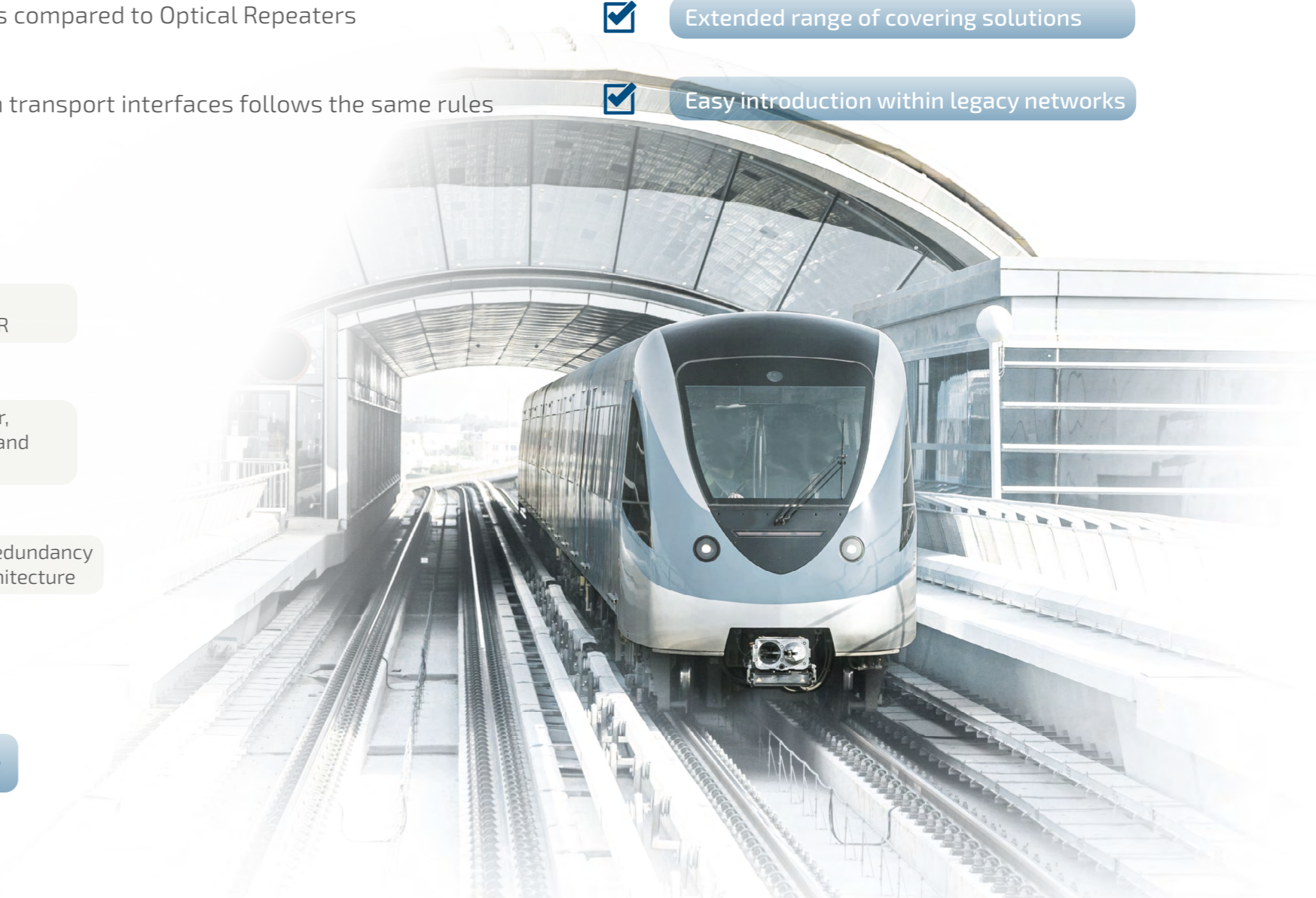
Within internal local redundancy or Geo-redundant architecture

Compact

Flexible

Resilient

Single Hardware



MAJOR IMPROVEMENTS COMPARED TO OPTICAL REPEATERS



▶ ALL GSM-R KONTRON BTS-R RADIO FEATURES & PARAMETERS ARE AVAILABLE

RRH is fully integrated into the Kontron BTS-R solution as a repeater and thus benefits from all radio features in the portfolio, such as high-speed enhancements, QoS management, GPRS and EDGE codecs.

▶ NO DEDICATED OAM IS REQUIRED

RRH as a repeater is operated by a legacy OMC-R supervision system, like a normal BTS-R.

▶ EXTENDED POWER RANGE AND BETTER SENSITIVITY

RRH as a repeater benefits from the extensive radio performance of the RRH hardware, which means more power in the downlink (adapted to each RRH) and incredible sensitivity in the uplink. It enables extensive solutions with DAS systems when using multiple coupling layers.

▶ DIVERSITY IS SUPPORTED IF NEEDED

Diversity is set by parameter on the OMC-R at each RRH, allowing the use of a leaky cable, which is connected directly to the RRH, but without coupling in tunnels. Also the use of a cross-pole panel antenna for outdoor areas, with the rules of the nominal coverage technique, is enabled.

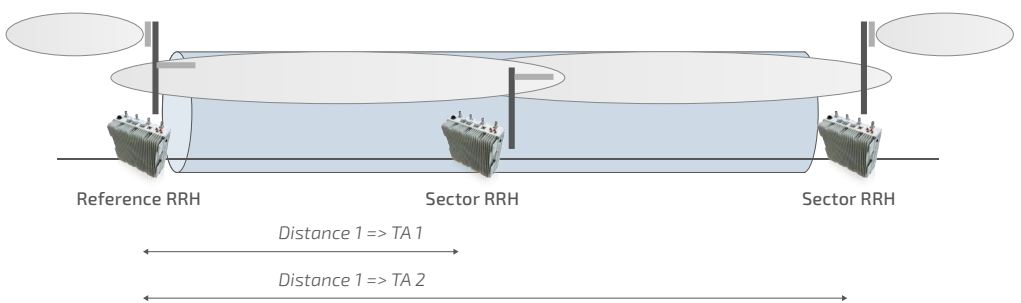
▶ BCCH TDMA IS PROTECTED (INTERNAL RRH DEFENSE)

In O1+1 and O2 configurations, RRH has resilient intelligent functions to protect BCCH TDMA in case of any single TRX or single PA failure.

▶ POSSIBILITY FOR RRH REDUNDANCY FOR REFERENCE RRH (OUTDOOR RADIO COVERAGE AVAILABILITY IMPROVEMENT)

▶ TIMING ALIGNMENT MANAGEMENT

The use of repeaters can create quality issues on radio coverage due to unexpected resurgences.



- ▶ When designing a radio solution with RRH as a repeater, a reference RRH has to be selected
- ▶ The timing alignment function consists in setting a theoretical timing advance of the reference RRH
- ▶ Each RRH as a repeater is configured with suitable timing alignment value

PROTECTION AGAINST TIMING ADVANCE SKIP -
NO DROPPED CALLS DUE TO NEIGHBORED SIGNAL RESURGENCE

About Kontron – Member of the S&T Group

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As part of the S&T technology group, Kontron offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

For more information, please visit: www.kontron.com

About Kontron Transportation – Member of the S&T Group

Kontron Transportation is a leading global supplier of end-to-end communications solutions for mission-critical and carrier networks. Its portfolio includes GSM-Railways, FRMCS (future railway mobile communication system), TETRA, DMR, LTE solutions for mission critical networks as well as mobility solutions for the public transport sector and is enabled with the entire service value chain, from planning, developing and producing to deploying, integrating, maintaining and operating. A further mission is to provide a critical E2E IIoT solution dedicated for railway operators to support data collection, transport, monitoring and analysis.

Kontron Transportation invests in research and development and is driving the evolution into the next generation of broadband solutions for mission-critical networks, for instance as an associated member of the European research initiative Shift2Rail.

Kontron Transportation is part of S&T group and headquartered in Vienna (Kontron Transportation GmbH) with main subsidiaries in Belgium, France, Germany, Portugal, Spain, the Czech Republic and United Kingdom.

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