Reliable and future-proof railway communications

RAILWAY DEDICATED NETWORKS

- **RDN PORTFOLIO**
  Supporting safe and efficient travel
- **NEXT GENERATION**
  Portfolio prepared towards next generation

INSIDE KONTRON TRANSPORTATION

DIGITALIZATION IS TRANSFORMING RAILWAY TRANSPORTATION, WHERE IT ALLOWS OPERATORS TO INCREASE THE CAPACITY AND RELIABILITY OF TRACK INFRASTRUCTURE. THE PROCESS OF DIGITAL TRANSFORMATION ALSO PREPARES OPERATORS AND AUTHORITIES FOR FUTURE TECHNOLOGIES AND WIRELESS STANDARDS THAT WILL SUPPORT RICH APPLICATIONS AND NEW BUSINESS MODELS, ENABLED BY INDUSTRIAL IOT, COGNITIVE ANALYTICS, MACHINE LEARNING, AI AND MORE.

KEY BENEFITS OF RDN SOLUTION

WHY KONTRON TRANSPORTATION FOR RDN?

TO OPERATE EFFECTIVELY AND PROTECT PASSENGERS AND STAFF, RAIL OPERATORS NEED COMMUNICATIONS INFRASTRUCTURE THAT IS CONSTANTLY AVAILABLE AND ABLE TO SUPPORT A WIDE RANGE OF RAILWAY SPECIFIC FUNCTIONALITY. WITH THESE REQUIREMENTS IN MIND, KONTRON TRANSPORTATION HAS CREATED OUR UNIQUE RAILWAY DEDICATED NETWORK (RDN) PORTFOLIO. ALL OUR SOLUTIONS ARE ERTMS-COMPLIANT AND EU CCS TSI CERTIFIED. WE WORK WITH ERA, UIC, ETSI, UNIFE AND RAILWAY OPERATORS.

KONTRON TRANSPORTATION HAS ALREADY PREPARED ITS PORTFOLIO TOWARDS NEXT-GENERATION ARCHITECTURE. OUR LABS INTEGRATE END-TO-END MISSION CRITICAL PUSH-TO-TALK (MCPTT) BASED SOLUTION, ENABLING THE ENHANCED SUPPORT OF RAILWAY SPECIFIC SERVICES AND INTERCONNECTING WITH UNIFE NETWORKS TO BEST PREPARE FOR TECHNOLOGY CO-EXISTENCE AND SMOOTH TRANSITION.

SAFE AND SECURE

Our railway communications solutions help to maximise passenger safety based on extremely high availability for mission-critical voice and data services and compliance with EIRENE standards for emergency alerts.

INNOVATIVE

We invest in R&D, enabling us to build innovative, world-class railway communications solutions for our customers.

BEST OF BREED

Our entire RDN product portfolio meets and exceeds GSM-R standards, including core, access and transmission infrastructure, management tools, applications and terminals.

RAILWAY DEDICATED

All of our solutions are designed and built to meet the specific operational requirements of railway operators: not adapted from generic carrier solutions. This ensures that RDN solutions provide the mission criticality and specific rail functionality operators need.

END-TO-END

We have the technology portfolio and skillsets needed to deliver entire RDN projects, giving operators a single point of contact and accountability as well as reducing complexity and costs.

RAILWAY LIFECYCLE SUPPORT

Unlike competing offerings, our RDN solutions are supported for the extended railway equipment lifecycle, which means 'inlife' support for 15+ years.

STANDARDS BASED

All our solutions are ERTMS-compliant and EU CCS TSI certified. We work with the ERA, UIC, ETSI, the UNIFE, railway operators and others to drive the next-generation of railway communication innovations.

FUTURE PROOF

We help railway operators migrate to all-IP infrastructure over time, making it easier to adopt new technologies based on upgrades. We are also working with standards bodies to ensure that our infrastructure is compatible with all future wireless standards, whether that's LTE, 4.5G or 5G.

RDN PORTFOLIO

Kontron Transportation is a leader in Railway Dedicated Networks (RDN), supporting safe and efficient travel on more than 83,000 km of railway tracks across Europe, Africa and Asia. We have been designing, building, deploying and supporting RDN solutions based on the UNIFE standard for more than 20 years. Kontron Transportation RDN solutions support operators' mission-critical voice and data communications at speeds of up to 574 km/h.

- RDN.core
- RDN.access
- RDN.transmission
- RDN.terminals
- RDN.applications
- RDN.management
- RDN.services

RDN.CORE

RDN.CORE IS BUILT ON THE 3GPP RELEASE 4 (R4) ARCHITECTURE, WHICH OFFERS THE HIGHEST LEVELS OF RELIABILITY AND SAFETY. BECAUSE IT IS AN ALL-IP SOLUTION, RAILWAY OPERATORS CAN ALSO ADOPT EMERGING NETWORK TECHNOLOGIES SIMPLY AND COST EFFECTIVELY AS THEIR NEEDS CHANGE.

RDN.CORE OFFERS A HIGHLY STABLE, MATURE AND FEATURE-RICH APPLICATION SUITE FOR RAILWAY OPERATORS. THIS INCLUDES ENHANCED MULTI-LEVEL PRECEDENCE AND PRE-EMPTION (EMLPP) FOR PRIORITISING USERS AND CALLS, VOICE BROADCAST SERVICES (VBS) FOR COMMUNICATION AMONGST GROUPS OF SUBSCRIBERS AND MANY MORE.

TRIED AND TRUSTED

Ours was the first R4 core architecture to be successfully deployed in the railway environment, and it is the industry's most proven solution with 19 R4 networks deployed across the world solution.

STANDARDS BASED

The RDN.core solution is compliant with all current and emerging GSM-R standards, including ETSI TS 103 066_ Rel-4 Core Network requirements for GSM-R.

ALWAYS AVAILABLE

RDN.core delivers more than 'five-nines' availability based on hardware availability, fault-tolerant software architecture, network selfhealing and geographical redundancy.

END-TO-END

Our services teams provide a single point of contact and support for operators' core networking projects, ensuring that they can retain control and ease management workloads.

COST-EFFICIENT

The solution helps to reduce network footprint and power consumption by 40 % compared to TDM infrastructure, dramatically lowering operational and support costs.

FUTURE PROOF

The RDN.core solution paves the way to all-IP networking based on open standards and innovative software configurations. This allows operators to evolve and modernise both their voice and packet core networks.

RDN.ACCESS

RDN.ACCESS INCORPORATES THE FULL RANGE OF ACCESS COMPONENTS OPERATORS NEED, INCLUDING OUR LATEST PRODUCT RELEASE: THE RDN.BASE STATION. THIS CAN REPLACE UP TO SIX LAST-GENERATION BASE STATIONS, REDUCING HARDWARE REQUIREMENTS BY UP TO 80%.

WITH NATIVE SUPPORT FOR BOTH TDM AND IP TRAFFIC, RDN.ACCESS HELPS OPERATORS TO PROTECT THEIR EXISTING INFRASTRUCTURE INVESTMENTS AND EMBRACE NEW TECHNOLOGIES SUCH AS PS-LTE AND 5G FRMCS WHEN THE TIME IS RIGHT. AS AN ADDITIONAL BENEFIT, RDN.ACCESS OFFERS FULLY REDUNDANT COMPONENTS AND OPTICAL CONNECTIONS, PROVIDING 99.9995% AVAILABILITY FOR MISSION-CRITICAL COMMUNICATIONS.

ERTMS GRADE
The solution complies with ERTMS availability requirements, offering fully redundant components and optical connections.

EVOLUTIONARY
RDN.access provides a platform for network evolution based on native support for both TDM and IP traffic.

COST EFFECTIVE
The RDN.base station Digital Modules (DMs) can be connected to up to six Remote Radio Head (RRH) units via optical links, reducing equipment requirements by 80%. With one RDN.base station covering up to 60 km of track, operators can reduce their equipment costs, network footprints and maintenance and support costs.

LOW IMPACT
The solution can be deployed quickly and simply, offering a light, compact format and the same interfaces as our legacy base stations.

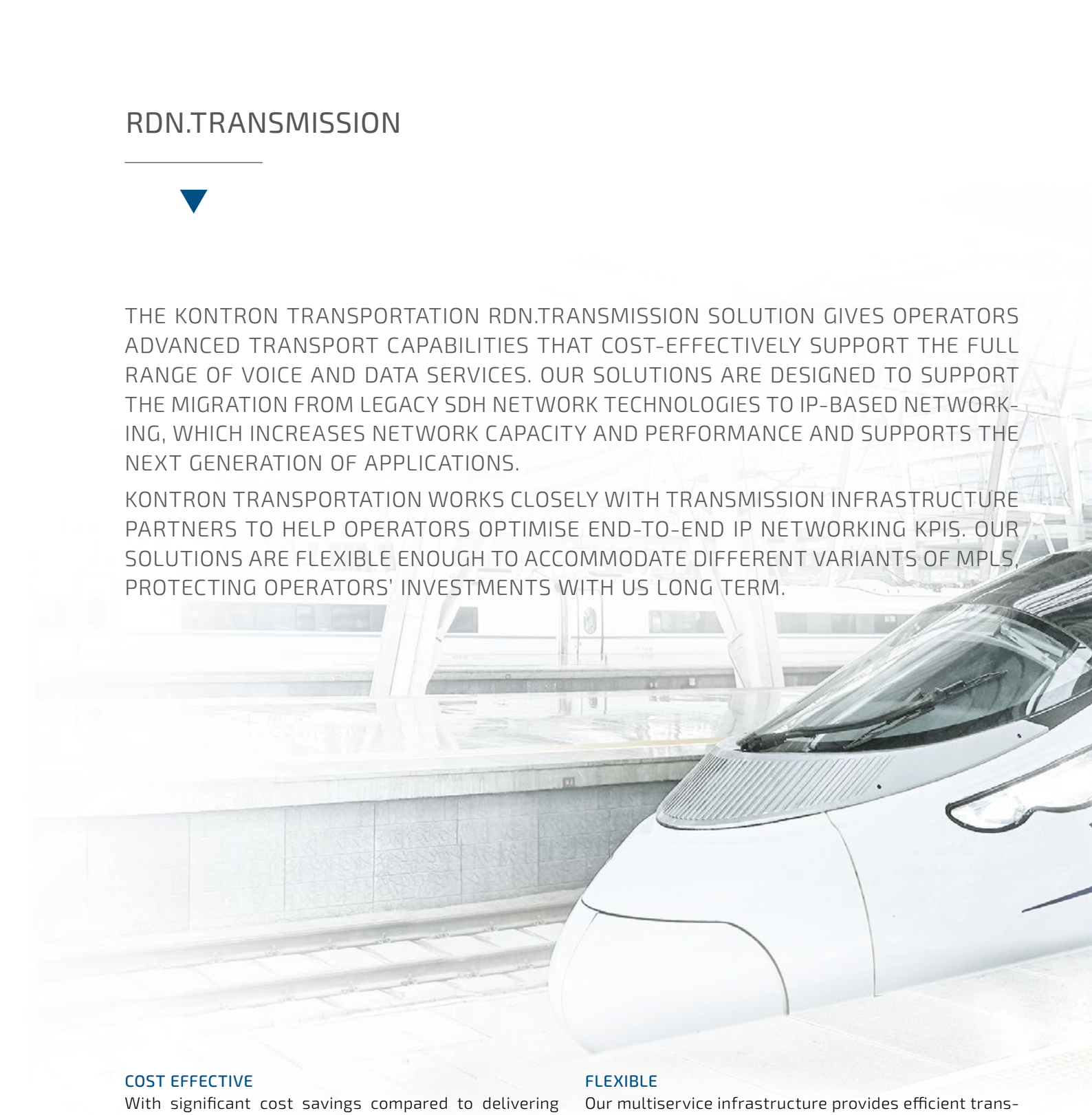
HIGHLY FLEXIBLE
RDN.access can be deployed both indoors and outdoors and in difficult terrain. Digital Modules and Remote Radio Heads can be in the same location or deployed in remote configurations as needed.

FUTURE PROOF
RDN.access is fully IP-ready, enabling operators to deploy emerging technologies quickly and cost effectively, with minimal network impact.

RDN.TRANSMISSION

THE KONTRON TRANSPORTATION RDN.TRANSMISSION SOLUTION GIVES OPERATORS ADVANCED TRANSPORT CAPABILITIES THAT COST-EFFECTIVELY SUPPORT THE FULL RANGE OF VOICE AND DATA SERVICES. OUR SOLUTIONS ARE DESIGNED TO SUPPORT THE MIGRATION FROM LEGACY SDH NETWORK TECHNOLOGIES TO IP-BASED NETWORKING, WHICH INCREASES NETWORK CAPACITY AND PERFORMANCE AND SUPPORTS THE NEXT GENERATION OF APPLICATIONS.

KONTRON TRANSPORTATION WORKS CLOSELY WITH TRANSMISSION INFRASTRUCTURE PARTNERS TO HELP OPERATORS OPTIMISE END-TO-END IP NETWORKING KPIS. OUR SOLUTIONS ARE FLEXIBLE ENOUGH TO ACCOMMODATE DIFFERENT VARIANTS OF MPLS, PROTECTING OPERATORS' INVESTMENTS WITH US LONG TERM.



COST EFFECTIVE
With significant cost savings compared to delivering SDH traffic over the network.

PROVEN
RDN.transmission is delivering extremely high reliability and excellent performance for a large number of railways worldwide.

EVOLUTIONARY
Streamlined migration from SDH networks to IP-based networking.

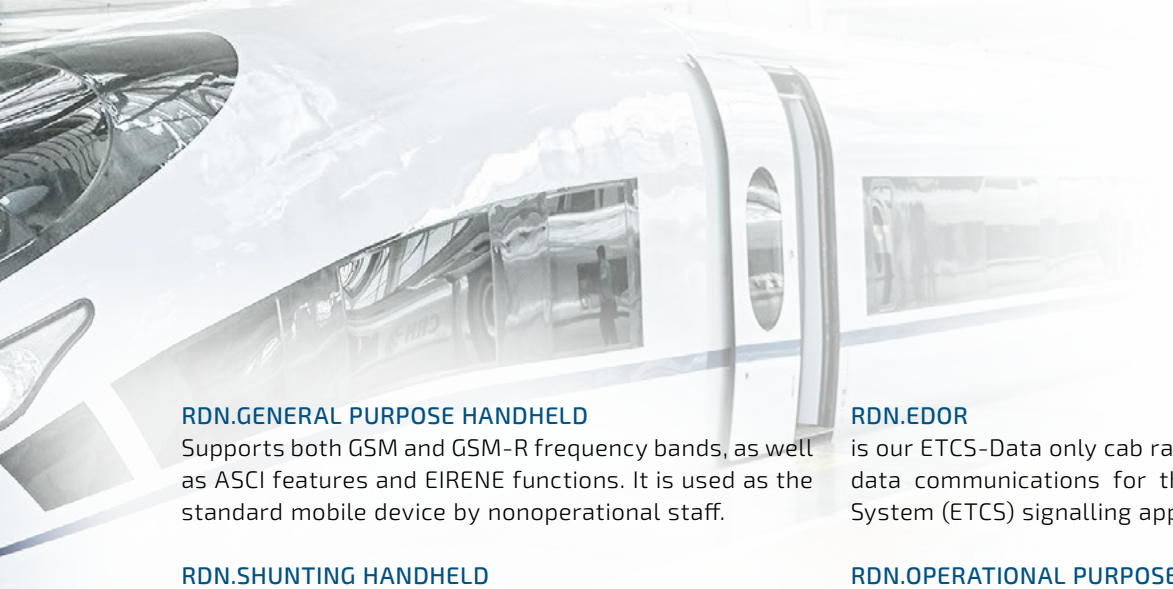
FLEXIBLE
Our multiservice infrastructure provides efficient transport for all traffic types and applications.

FUTURE READY
With the ability to implement KPIs for end-to-end IP networking and delivering substantial increases in network performance.

RDN.TERMINALS

MAXIMISING THE PERFORMANCE AND AVAILABILITY OF RAILWAY COMMUNICATIONS REQUIRES ALL NETWORK COMPONENTS TO BE SEAMLESSLY INTEGRATED: FROM CORE, ACCESS AND TRANSMISSION INFRASTRUCTURE; TO ON-BOARD AND HANDHELD TERMINALS.

OUR PORTFOLIO OF TERMINALS OFFERS NATIVE INTEGRATION WITH OUR GSM-R INFRASTRUCTURE PORTFOLIO, GIVING OPERATORS GUARANTEED INTEROPERABILITY AND A SINGLE POINT OF CONTACT FOR ALL THEIR COMMUNICATIONS NEEDS.



RDN.GENERAL PURPOSE HANDHELD

Supports both GSM and GSM-R frequency bands, as well as ASCI features and EIRENE functions. It is used as the standard mobile device by nonoperational staff.

RDN.SHUNTING HANDHELD

This is specifically designed for the needs of the shunting application. It is equipped with software supporting shunting functionality such as link assurance signal transmission.

RDN.EDGE GATEWAY

RDN.Edge Gateway (TBC) is a railway standard certified controller equipped with GSM-R data connectivity (eGPRS) as well as additional features such as WIFi, LoRa, GPS and multiple I/O interfaces to enable real-time data access and control and provide railway staff with updated information.

RDN.DISPATCHER

Our EIRENEcompliant dispatcher terminals provide a proven, user-friendly interface for handling and placing railway-related calls. Traffic control switches support the dispatcher terminals and control interfaces to the GSM-R network and other railway systems.

RDN.EDOR

is our ETCS-Data only cab radio which supports reliable data communications for the European Train Control System (ETCS) signalling applications.

RDN.OPERATIONAL PURPOSE HANDHELD

Designed for railway staff working in extreme conditions. It is specifically designed to withstand shocks and vibration, as well as various temperature and humidity conditions.

RDN.CAB RADIO

With fully redundant radio modules and unrivalled interference blocking features, our voice and data cab radio offers the mission-critica reliability railway operators need. You can also choose between rack-mounted radios or smaller-format devices to overcome space constraints on-board.

RDN.APPLICATIONS

AS WELL AS SUPPORTING THE TRACK TO TRAIN RADIO COMMUNICATIONS, KONTRON TRANSPORTATION SUPPORTS A RANGE OF HIGH-VALUE RAILWAY APPLICATIONS, FROM SHUNTING AND 'DEPARTURE READY' MESSAGING, TO LONE WORKER APPLICATIONS THAT HELP PROTECT MEMBERS OF STAFF.

OUR PORTFOLIO OF INNOVATIVE RAILWAY APPLICATIONS IS HELPING OPERATORS TO STREAMLINE THEIR PROCESSES AND ENHANCE PASSENGER EXPERIENCE. WE DEDICATE SIGNIFICANT RESOURCES TO DEVELOPING THE NEXT-GENERATION OF RAILWAY-DEDICATED APPLICATIONS THAT WILL DRIVE FURTHER EFFICIENCY.

RDN.SHUNTING

Ensures the efficient use of resources and increasing safety for staff for shunting operations.

RDN.SIGNALLING

Enhances data capabilities to support reliable transfer of operational information.

RDN.SECURITY

Uses hardware and software elements to protect operators' mission-critical networks.

RDN.VOICE

Enhances voice communications between individuals and groups.

RDN.DATA

Enables operators to deliver circuit switched data and packet data over the network.

RDN.SURVEILLANCE

Monitors assets and rolling stock in stations and on tracks across the railway network.

RDN.TRACK&TRACE

Provides a realtime view of the network.

RDN.MANAGEMENT

TO ENSURE THAT OPERATORS' MISSION-CRITICAL NETWORKS ARE ALWAYS AVAILABLE, KONTRON TRANSPORTATION PROVIDES A RANGE OF RAILWAY-SPECIFIC MANAGEMENT AND MONITORING TOOLS THAT SEAMLESSLY INTEGRATE WITH OUR RDN PORTFOLIO.

WITH RDN.MANAGEMENT, OPERATORS ACCESS OUR MONITORING AND MANAGEMENT TOOLS VIA PRIVATE CLOUD INFRASTRUCTURE. INSTEAD OF RUNNING APPLICATION SERVERS, WE DISTRIBUTE WORKLOADS ACROSS MULTIPLE VIRTUAL MACHINES, INCREASING RESILIENCE AND AVAILABILITY.

RAILWAY GRADE AVAILABILITY
App virtualisation increases resilience and opens the possibility of geo-redundancy, reducing the risk of unplanned downtime or service disruptions.

RAILWAY SPECIFIC FUNCTIONALITY
Our solution offers features such as subscriber and configuration management from one central point, eliminating errorprone manual configuration tasks.

CONVERGENCE WITH THIRD-PARTY APPS
Operators' third-party apps can be integrated seamlessly with RDN.management to extend returns on past investments.

FAST & SIMPLE MANAGEMENT
With intuitive tools for monitoring and management, RDN.management helps operators reduce management workloads and costs.

REDUCED SPECIALIST SUPPORT REQUIREMENTS
By bringing management apps into the IT realm, RDN.management simplifies support requirements and hardware and software support costs.

REDUCED INFRASTRUCTURE COSTS
The cloud helps operators to minimise inhouse hardware requirements and reduce CAPEX, OPEX and staffing costs.

RDN.SERVICES

RDN.PLAN
Kontron Transportation provides all the design and engineering support railway operators need to plan network projects on any scale, from greenfield deployments to equipment upgrades.

RDN.MANAGE
To minimise workloads and disruption for clients, we provide turnkey project management for network projects, ensuring that key milestones are delivered on time and on budget.

RDN.MAINTAIN
We ensure networks continue to perform at their best through technical assistance services, emergency recovery services and managed spares and support.

RDN.SUPPORT
We monitor our customers' networks around the clock from our Network Operations Centre (NOC), and there is even the option to outsource end-to-end management and operation of the network to us.

RDN.BUILD
Kontron Transportation service teams can act as the lead contractor for entire network deployments. Our RDN.build services incorporate everything from project management and logistics; to installation, commissioning and migration.

KONTRON TRANSPORTATION OFFERS RAILWAY OPERATORS THE KNOWLEDGE AND SKILLS REQUIRED TO PLAN, BUILD, MAINTAIN AND OPERATE A NEXT-GENERATION RAILWAY COMMUNICATIONS INFRASTRUCTURE THAT EXCEEDS GSM-R STANDARDS. WITH YEARS OF EXPERIENCE DEPLOYING GSM-R NETWORKS FOR MAJOR RAILWAY OPERATORS, OUR SERVICE TEAMS CAN TAKE FULL RESPONSIBILITY FOR END-TO-END PROJECT DELIVERY. OUR SKILLED ENGINEERS DELIVER A WIDE RANGE OF NETWORK SERVICES FROM ANALYSIS, CONSULTING, DESIGN, INTEGRATION, INSTALLATION, AND TRAINING; TO THE MAINTENANCE AND OPERATION OF ENTIRE NETWORKS. WE CAN OFFER AS MUCH, OR AS LITTLE SUPPORT AS OPERATORS NEED TO ACHIEVE THEIR NETWORKING OBJECTIVES.

CUSTOMER REFERENCES

25 COUNTRIES, 36 CUSTOMER SERVED.

KONTRON TRANSPORTATION IS A GLOBAL PROVIDER OF RAILWAY COMMUNICATIONS AND GSM-R INFRASTRUCTURE. CUSTOMERS IN 25 COUNTRIES TRUST OUR SOLUTIONS, WHICH PROVIDE COMMUNICATION ON MORE THAN 83,000 KM OF RAILWAY TRACK WORLDWIDE. WE ALREADY CARRIED OUT 19 ETCS LEVEL 2 PROJECTS AND 12 HIGH-SPEED LINES.

- Kontron Transportation is delivering national RDN infrastructure for Austria, the UK, France, Germany, Luxembourg and Ireland to support mission-critical communications on both conventional and high-speed lines.
- Kontron Transportation has also delivered RDN infrastructure for several Eastern European operators in the Czech Republic, Lithuania, Hungary, and Slovenia as well corridors in Poland and Slovakia. These projects are helping operators to improve the reliability of their communications, while ensuring ERTMS interoperability.
- Kontron Transportation was chosen to deliver infrastructure solutions for China's national rail operator. We provide a state-of-the-art, all-IP access network on 8,000 km of track, helping the operator to future-proof its operations and adopt emerging standards and technologies.
- Kontron Transportation has deployed a next-generation all-IP core network for SNTF in Algeria on 2,000 km of track. The infrastructure is able to withstand tough geographical conditions and increase efficiency and safety based on ETCS Level 2. The new RDN was deployed by Kontron Transportation teams as a turnkey solution.
- Kontron Transportation has delivered RDN infrastructure with 'fourfold' redundancy to support mission-critical communications on the 450 km high-speed line between Mecca and Medina in the Kingdom of Saudi Arabia. Kontron Transportaion technology will play a key role in ensuring train and passenger safety on the line.
- Kontron Transportation has won contracts to provide state-of-the-art cab radio infrastructure to major railway operators in a number of countries, fulfilling our vision for a truly end-to-end RDN portfolio.

INDUSTRY FOCUS

KONTRON TRANSPORTATION AND SHIFT2RAIL

Kontron Transportation is participating in the European rail joint technology initiative Shift2Rail, which aims to drive innovation in the rail sector. Specifically, Kontron Transportation is helping to develop a highly secure emergency call application for the future railway communication system, which will help operators to manage more traffic on their networks, and to raise the competitiveness of European railway solutions and products globally.

FOCUSING ON CYBERSECURITY

With the increasing complexity of railway telecom solutions which become highly distributed and growth of new technologies, companies are naturally exposed to a broad spectrum of cyber threats. Kontron Transportation is facing this challenge by investing in our products' cyber resilience and contributing to international working groups to jointly tackle the security issue for the railway industry. Kontron Transportation is pioneering a "secure thinking" approach that optimizes security provision across all departments and network projects. If you are looking for a trusted and experienced partner, with Kontron Transportation you are on the right track.

STEERING THE FUTURE OF RAILWAY COMMS.

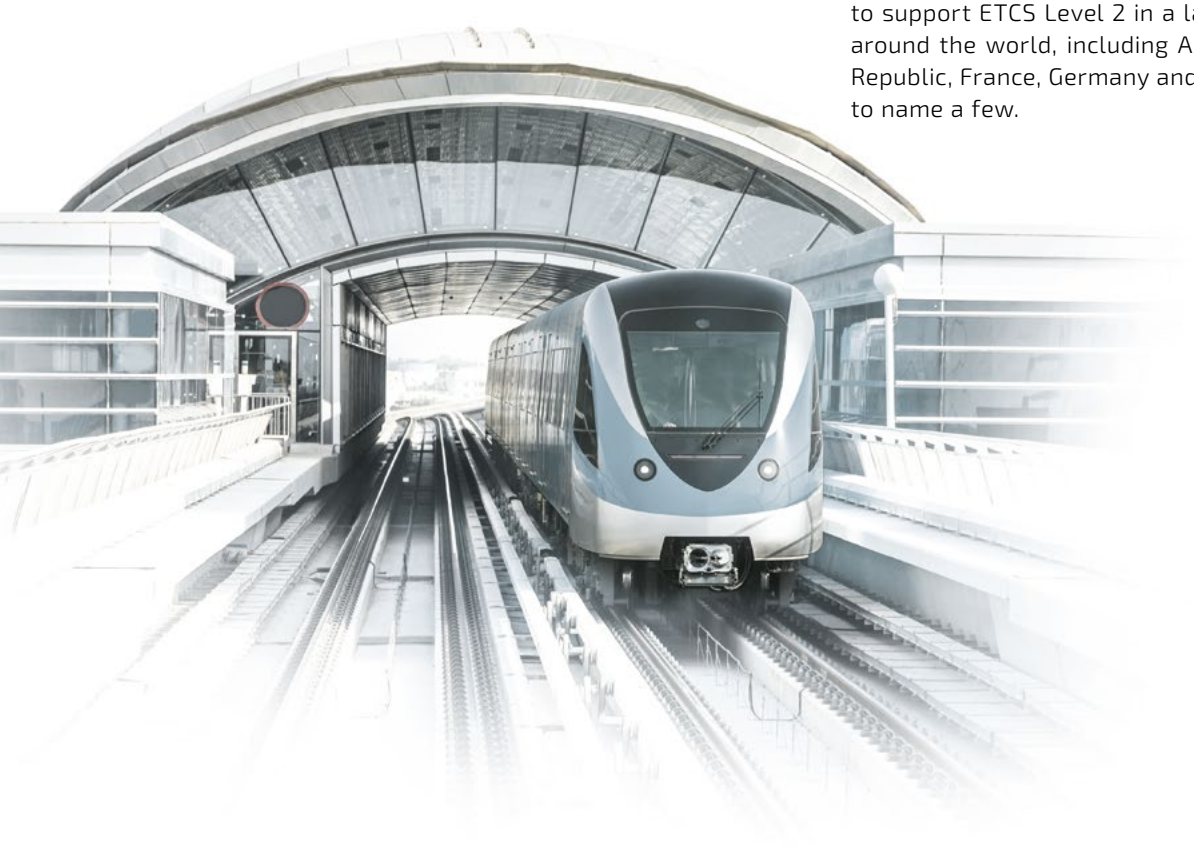
Through their active role in standardization and the European Shift2Rail program, Kontron Transportation has fully engaged their portfolio into the evolution towards next generation communication networks for Railways or FRMCS. Our products have been designed day 1 to ensure a smooth network transition with an evolution enabling: all IP architecture, virtualization for highest flexibility in deployment and resiliency models, and services harmonization across technologies.

DRIVING INNOVATION

To keep pace with operator's changing needs, Kontron Transportation invests 20% of our annual revenues in research and development. We operate R&D centres across Europe and Asia, and all of our new solutions are tested in the lab to guarantee a smooth introduction into our customers' live networks.

SUPPORTING ETCS OVER GPRS.

Kontron Transportation is helping major railway operators to prepare for ETCS Level 2 over GPRS, which will dramatically increase available bandwidth for voice and data services and support more trains concurrently. We have already deployed the GPRS edge equipment needed to support ETCS Level 2 in a large number of countries around the world, including Algeria, Austria, the Czech Republic, France, Germany and the United Kingdom, just to name a few.



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

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

GLOBAL HEADQUARTERS

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