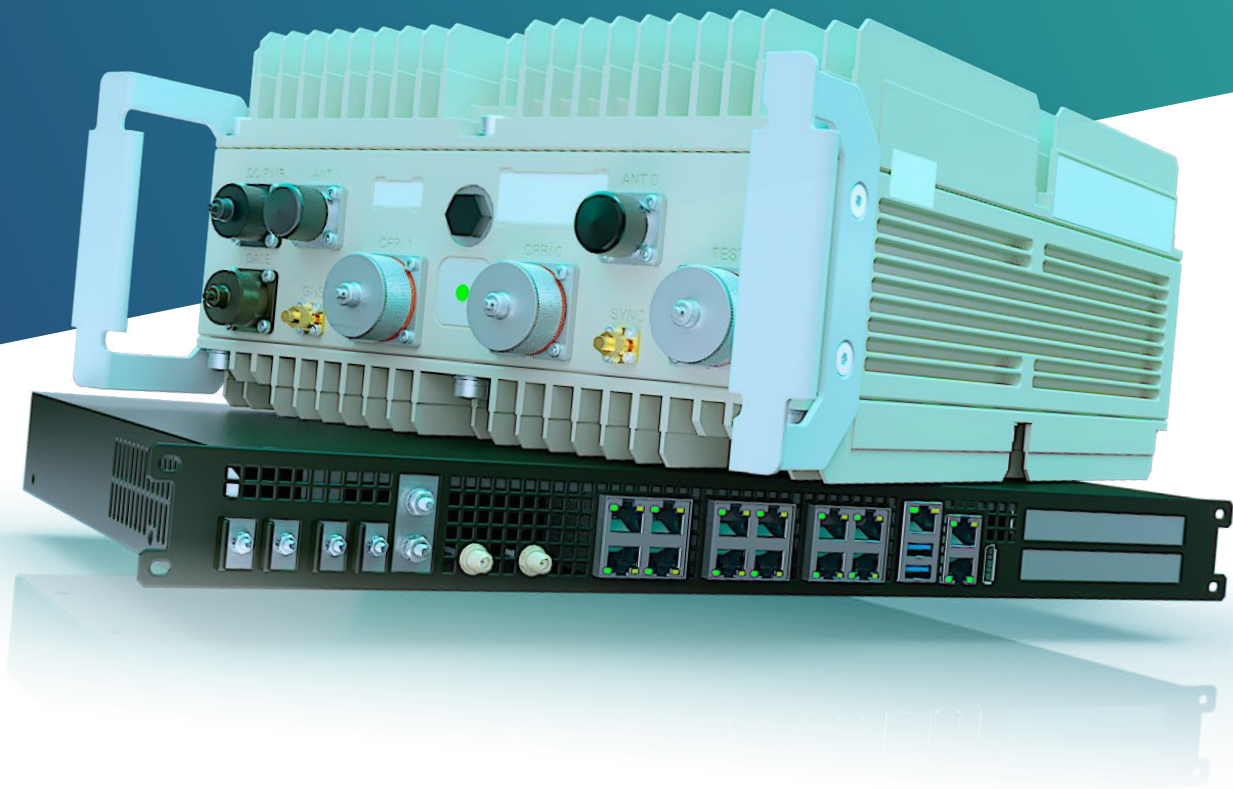


Kontron Transportation

RAN Product Portfolio

New Radio (NR) Designed for Mission-Critical Solutions



**Designed for
4G/5G Private
Networks &
5G/FRMCS –
3GPP R18+ Based**

**Complementary
to 4G/5G Core
& MCx Kontron
Transportation
Portfolio**

**Extended
Product Life
Cycle**

**Reliability and
System
Availability as
Key Attributes**

RAN Product Portfolio

RAN Solution Highlights

Ready to support the next generation of wireless technologies

Kontron Transportation is a global leading supplier of dedicated end-to-end communications solutions for mission-critical networks.

Our RAN solution is the continuity of product leadership that Kontron Transportation has demonstrated for decades in mission-critical networks, starting with telecom applications for railroads, such as GSM-R, MCx, 4G/5G private networks as an alternative to Tetra obsolescence, and in the future with FRMCS.

Our new radio product portfolio adopts an architecture where the baseband and the radios are separated, in order to address versatile installation options – indoor and/or outdoor.

RAN is a sub-system of our complete new portfolio, aiming to support the next generation of wireless technologies, such as 4G/5G private networks and railways FRMCS (5G) and is complemented by all software core and application solutions.

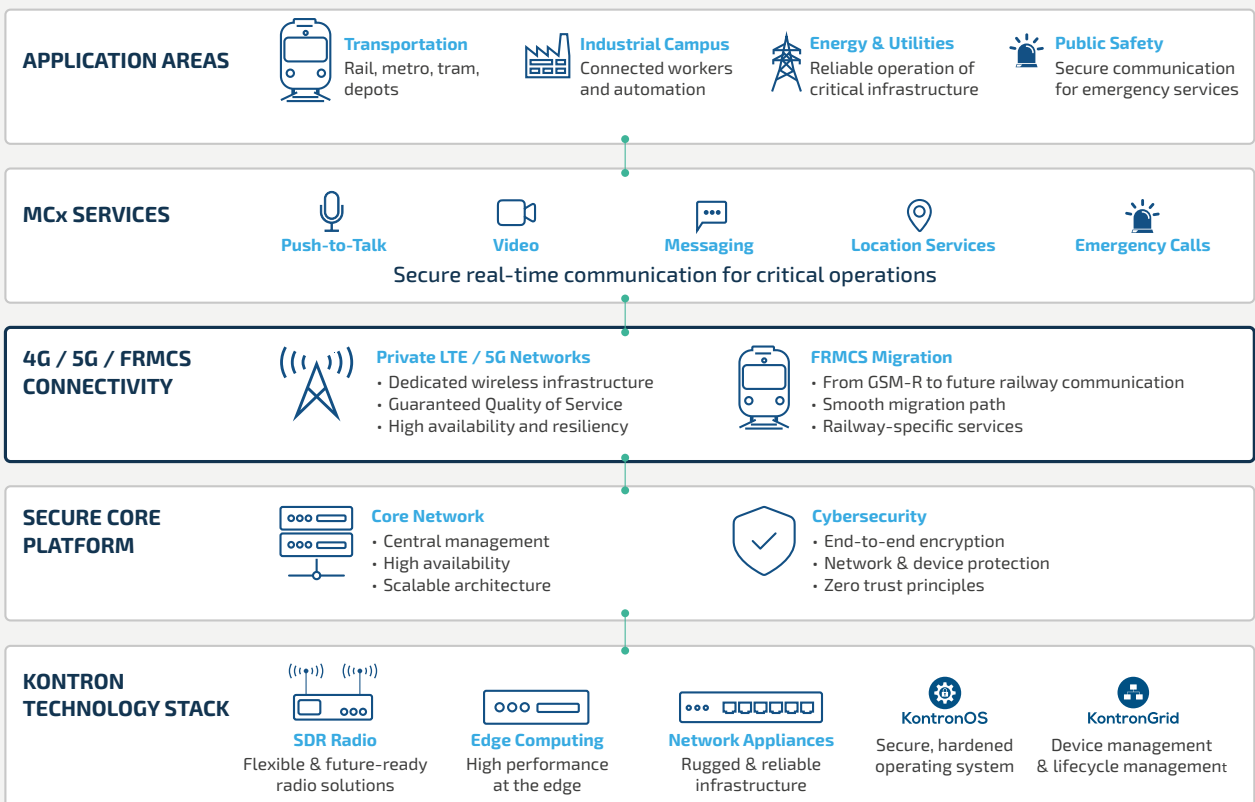
In continuity of our telecom solutions for railways, our RAN product line delivers specific functionalities such as whitespace for technology coexistence and smooth migration from GSM-R and FRMCS features set within MCx standards.



RAN Solution Use Cases Overview

Designed for versatility:

- › Our new Radio Access Network can be deployed in a multitude of scenarios/required applications, with their own specifications
- › Frequencies managed via dedicated radio units (RRH)



RAN Product Portfolio



Technical Information

Baseband Unit (BBU & CU/DU)	
HW Platform	Built for RAN application and MEC computing – x86 Kontron Hardware platform 12x10G integrated switch Intel® Xeon®-D 3rd Gen 20 cores/2.0 GHz, DDR4 up to 512 GBytes, M.2 NVME up to 960GBytes 7x Dry contact alarm inputs (RJ-45) for Mission critical and Railway usages.
Software & Protocols	BBU based on 100% software technology (including PHY) for smooth lifecycle Compliant with 3GPP Release 18 (and beyond, thanks to the 100% software technology) 3GPP 5G NR Compliance: TS 38.101-1, TS 38.401, TS 38.331, and more (available on demand) Supports TDD, FDD, mix TDD/FDD, mix n100 (900MHz FRMCS)/n101 (1900MHz FRMCS), RAN sharing, ... Supports QPSK to QAM 256 UL, QPSK to QAM 256 DL, MIMO 2x2, MIMO 4x4 OAM management via RAN-EM, with possibility to includes in E2E cNMS solution or 3rd party NMS IPSec NG-U and NG-C with Private Key Infrastructure interworking based on CMP2.0
Fronthaul & Synchronisation	Up to 2PCI-E fronthaul boards: 4x CPRI ORI links (split 8.0), max 8 ports with various fronthaul topologies ORAN (5G NR split 7-2 or 8) under investigation versus market requirements Supports IEEE1588-2008 + SyncE as per G.8275.1 telecom profile and/or GNSS synchronization (embedded multi-GNSS receiver with troubleshooting capabilities), OCXO oscillator for holdover management
Enhanced Content for Railways	All TDD modes required for FRMCS, including strong UL oriented ones (equivalent 4G TDD Mode 0) Software option White Space (coexistence n100/GSM-R) for smooth FRMCS introduction. RRH redundancy (Dual MIMO2x2 in MIMO 4x4) with no service continuity impact 4x4 to 2x2 fallback Support also private RRH for railway hybridization (n38, n77, ...) on demand.
Security	Secure Remote Management Capabilities (Encrypted firmware, boot, storage, Secure Boot, Failsafe Boot) – TPM V 2.0 In-service Firmware Upgrade capability HW I/O secured
Environmental & Dimensions	Compliant to railways and all applicable requirements for CE marking. Operating temperature: -40 °C to 65 °C Size: 1U x 13.5 in. (355 mm) deep and designed to be mounted in a 19" standard rack. Indoor version. Weight: approx. 7 kgs Operating Input Voltage options: -48 V DC (-40 VDC to -57 VDC), Dual feed DC PSU Power consumption: 200W typical, max 660W Outdoor version option, on demand.



Railways

Technical Information

Remote Radio Head (RRH & RU)	
Platform	Built in for FRMCS and Railways in two versions: 5G NR FRMCS n100 and n101. Same form factor Built in for Professional networks in various form factors, powers and frequency bands: n38, n77, other frequencies available on demand such as n40, n78, ... Railways: 2x 2 MIMO (stackable by 2 for 4x4 MIMO with RRH redundancy) – Other up to 4x4 MiMo Railways: up to 30 W max per Port for FRMCS deployment – Others up 5W per port and higher power available on demand Built in dual CPRI ORI up to rate 8 in split 8, HW ready for rate 10 Built in external alarms HW ready for eCPRI ORAN pending field requirements Embedded GPS receiver/IEEE 1588 v2 (for eCPRI if needed)
Power Supply	Railways: Built in dual (DC) PSU – isolated DC -36 to -58 Railways: Power consumption: typical 200W, max 350W in n100, 170W/260W in n101
Environmental & Dimensions	Outdoor product IP65 Operating temperature range -40 °C to +55 °C Railways: Same form factors and dimensions n100 and n101 RRHs. Railways: Size: Including ancillaries: 421.2*353.4*160mm, Railways - Weight: 19,6 kgs in n100, 16 kgs in n101
Regulatory	Others: CE marked CE Marking – ROHS – WEEE – REACH Railways: Certified for Railways and all applicable requirements for CE marking

About Kontron Transportation

Kontron Transportation is a leading global supplier of end-to-end communication solutions for mission-critical networks. With a longstanding focus on the railway sector, the company specializes in systems that produce, transport, and process voice, data, and video — reliably, securely, sustainably, and efficiently.

Its portfolio includes GSM-R, FRMCS (Future Railway Mobile Communication System), MCx (mission-critical services, including MCx OTT) with IWF (interworking functions), as well as enhanced radio solutions, private 4G/5G mobile networks, transmission networks, and cybersecurity solutions. Kontron Transportation also serves other mission-critical industries with tailored

communication solutions and offers mobility products such as validators and fare collection systems for public transport operators.

For more than 30 years, the company has helped shape railway communications and continues to drive the evolution of broadband communication solutions for mission-critical networks, for instance as an associated member of Europe's Rail Joint Undertaking (EU-Rail), making it the perfect partner for FRMCS.

The company has more than 700 employees, operates 11 sites across Europe, and is headquartered in Vienna.

Kontron Transportation is part of the Kontron Group.



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The Power of IoT