



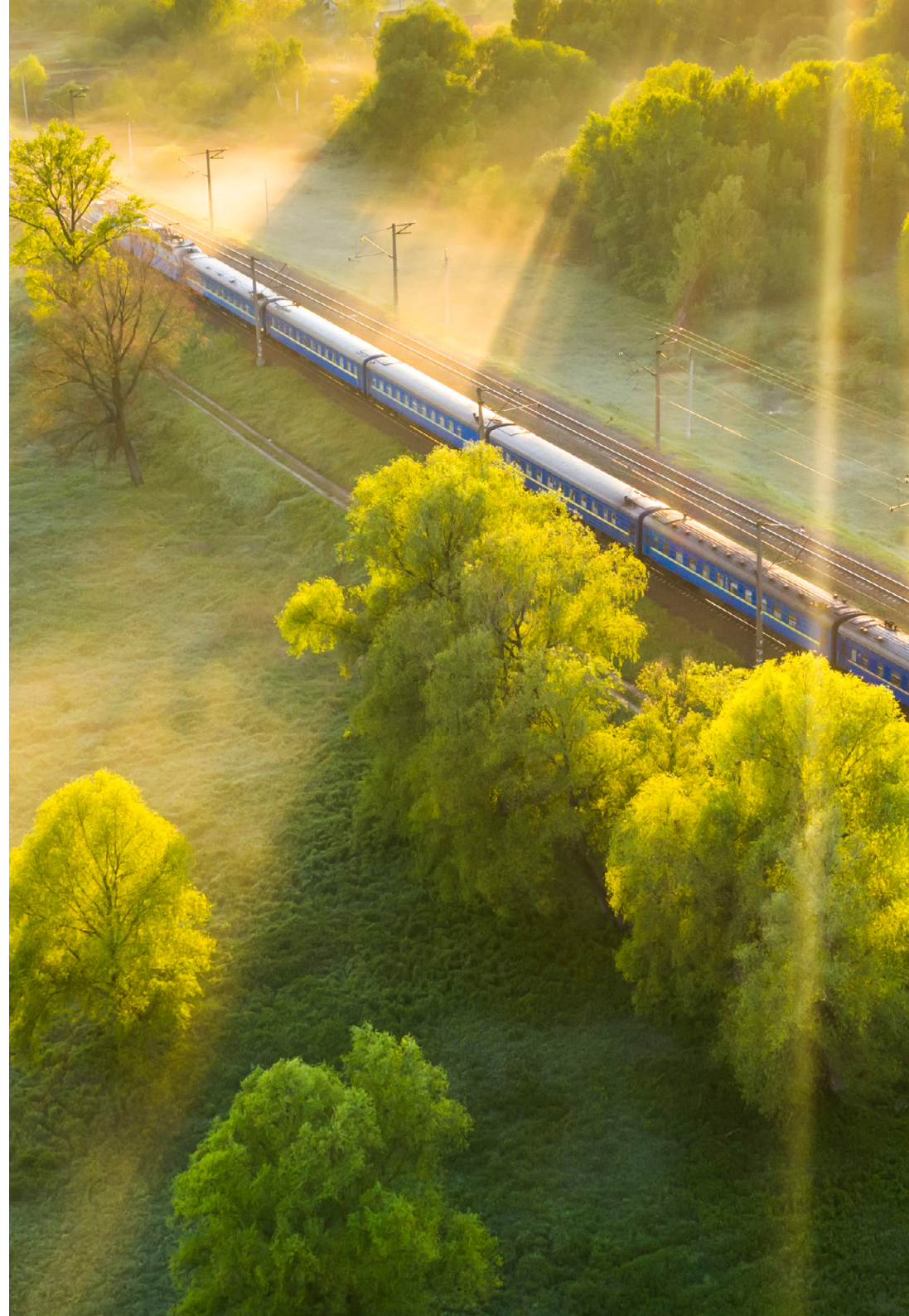
Core Enterprise Solution for Railways

NOKIA

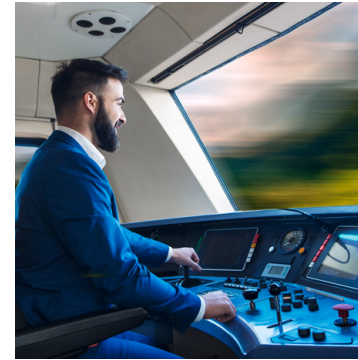
Why change is needed

Railways are under growing pressure to modernize. Climate targets demand cleaner transport, urban populations and shifting trade patterns are driving up volumes, and passengers expect faster, more reliable journeys. Yet the current communications backbone, GSM-R, is nearing the end of its life. Built on ageing 2G technology now being retired worldwide, it cannot

deliver the bandwidth, latency, or flexibility required for automation, real-time monitoring, or advanced services. At the same time, rail is critical infrastructure, so continuity and safety cannot be compromised. To meet rising expectations and secure future operations, rail must evolve toward data-driven automation and next-generation connectivity.



Challenges the modern rail faces



Infrastructure resilience

Rail networks rely on wayside and trackside systems such as signalling, sensors, CCTV, and points control. These assets must withstand harsh environments and long service lives, requiring careful lifecycle management and proactive maintenance.

Network and connectivity

Rail operations depend on continuous connectivity across tracks and stations. Low-latency links are essential for signalling and train control, while resilient coverage is critical in tunnels, remote areas, and cross-border operations for uninterrupted communications.

Operations and control modernization

Legacy control systems must interoperate with modern digital platforms. Railways increasingly need real-time train location, optimized scheduling, and automated safety processes to improve efficiency, reduce delays, and accelerate incident response.

Data, IoT and cybersecurity

Railways are generating vast volumes of data from IoT devices, ranging from train telemetry to environmental sensors. Turning this data into insight requires analytics for performance and forecasting, while robust cybersecurity safeguards critical infrastructure and sensitive information.

Passenger services and experience

Passengers expect seamless ticketing and payment, together with real-time journey information on apps and station displays. While operational needs come first, future-ready networks also create opportunities for improved onboard connectivity, infotainment, and accessibility.



Connecting the rails of the future

Modern railways need mobile networks built for both daily operations and long-term digitalization. 4G/LTE has already proven reliable in early rail deployments, while 5G adds ultra-low latency for train control, higher capacity

for connected sensors and onboard systems, and bandwidth for real-time video in monitoring and diagnostics. Cloud-native design makes these networks flexible and scalable, adapting to new needs without costly overhauls.

At the heart of this evolution is FRMCS, the 5G-based rail standard that will replace GSM-R. During the transition, both systems will coexist to ensure safety and service continuity. FRMCS secures mission-critical railway

operations while creating a path to future passenger services and automation enabling a smarter, more resilient digital railway.

Core Enterprise Solution for Railways

The Future Railway Mobile Communication System (FRMCS) sets the new global standard for how railways will use communications, covering train control, safety systems, asset monitoring, and eventually passenger services. More than just a network, it defines the full capability set required to run a modern digital railway. 4G and 5G private wireless are uniquely suited to deliver this, with the low latency, high capacity, and broad device support operators need.

Nokia's Core Enterprise Solution for Railways is a pre-integrated, field-validated package. Built for mission-critical operations, it provides ultra-reliable voice for drivers and dispatchers, secure prioritized data for control systems, and high-quality video for safety and monitoring. Trusted by hundreds of service providers worldwide, it reduces deployment time and migration risk, giving operators a stable, scalable foundation for FRMCS.

Designed for railways





Purpose-built connectivity for railways

Nokia's Core Enterprise Solution delivers carrier-grade connectivity designed specifically for the safety, reliability, and evolving needs of modern railways

Flexibility and scalability

Guaranteed by our advanced cloud-native platform, enabling rapid adaptation to changing operational needs.

Standards compliance

Built to the latest communications standards, ensuring smooth alignment with FRMCS and railway regulations.

Broad application support

Covering broadband, video, IoT, and train communications for operational systems.

Ultra-high reliability

Delivering mission-critical performance to ensure safety and uninterrupted railway operations.

Tailored for rail

Customized to the specific requirements of railway networks, from control systems to passenger services.

Future ready

Providing a stable foundation for today's operations while evolving seamlessly with future railway demands.

The full power of Nokia Core

Core Enterprise Solution for Railways brings mission-critical, carrier-grade reliability and advanced functionality directly to railway operations. As the core of a modern FRMCS-based network, it uses the same proven software deployed in hundreds of LTE and 5G carrier networks worldwide, adapted to the strict safety and performance requirements of rail.

This combination delivers trusted reliability and performance together with the capabilities needed for digital railway modernization. Nokia's solution gives rail operators a secure, resilient, and future-ready platform to handle today's challenges and support tomorrow's innovations.

“Nokia's pre-integrated, sector- optimized mission-critical core network solutions can reduce risk and help speed challenging wide-area private network deployments.”

KEN REHBEHN, PRINCIPLE ANALYST AT CRITCOMM INSIGHTS



Use case:

Real-time railway operations with FRMCS

The need for real-time, mission-critical communication

Railway safety depends on instant, assured communication between drivers, dispatchers, and trackside teams. GSM-R, built on 2G, cannot support the integrated voice, video, and data exchange that modern operations demand. A new framework is needed to guarantee reliable, prioritized links in critical situations.

The solution

Nokia's Core Enterprise Solution for Railways provides the FRMCS-ready core that supports mission-critical services (MCX) over 4G and 5G. It enables secure, real-time voice, video, and data across drivers, control centers, and field staff through one resilient platform.

Benefits for rail operators

By consolidating critical services onto a single, reliable core, operators strengthen safety with assured availability and prioritization. They gain faster incident response with integrated real-time communications, while reducing complexity by replacing multiple legacy systems with one modern network.





Use case: FRMCS migration — transitioning from 2G to 5G

The need for a safe transition to next-generation networks

GSM-R has supported railway communications for more than two decades, but its 2G technology is reaching end-of-life. A direct switch-off is impossible, since safety and service continuity must be preserved. Railways need a migration path that keeps GSM-R running while FRMCS is introduced.

The solution

Nokia Core Enterprise Solution for Railways enables GSM-R and FRMCS to run in parallel, keeping existing services active while new 4G/5G capabilities are introduced. Delivered as a pre-integrated, field-validated package, it reduces migration risk through proven interoperability. A converged management framework provides unified oversight of both environments, simplifying operations and upholding rail's strict safety standards.

Benefits for rail operators

This approach preserves safety-critical services while operators modernize at their own pace. It reduces risk and avoids disruption during the transition, while ensuring networks remain aligned with global standards. Operators gain a smooth migration path, greater confidence, and simpler long-term operations.

Secure the future of your railway network

Begin modernizing today with proven, railway-ready 5G solutions that protect current operations and prepare for FRMCS.

More than 800 enterprise customers worldwide already rely on Nokia private wireless to deliver mission-critical connectivity. Our Core Enterprise Solution for Railways builds on this leadership with carrier-grade resilience, optimized performance, and built-in security tailored to rail operations.

Delivered as fully cloud-native software in a compact, flexible format, the solution lowers total cost of ownership while simplifying operations. Built on technology proven in hundreds of live

LTE and 5G networks, it meets the demanding requirements of FRMCS—from mission-critical voice and train control to real-time video and IoT telemetry.

Nokia's professional services team ensures smooth deployment and tailored integration, enabling operators to modernize with confidence and manage the GSM-R to FRMCS transition at their own pace.

With three decades of railway communications expertise and unmatched experience in next-generation mobile networks, Nokia provides a secure, reliable foundation for the future of rail.



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About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs, which is celebrating 100 years of innovation.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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