

NOKIA

Evolve your
railway data
center network.

Put data center fabrics
and OT cloud to work
to transform your
railway operations

Why railways are moving operational technology to the OT cloud

Railway operators everywhere are working to expand their high-speed services, boost train capacity, enhance passenger services and improve safety and security. They are also searching for better ways to deal with disruptions caused by powerful weather events and economic shifts.

Many operators are addressing these challenges by migrating their operational technology (OT) applications and data to a segregated, on-premises cloud environment known as the OT cloud. The first wave of migration is underway and includes OT applications such as:

- FRMCS, train-to-ground broadband wireless core and other telecommunication systems

- Group communications, push-to-talk (PTT) and push-to-video (PTV)
- Next-generation computer-aided dispatch (CAD) systems
- Computer-based interlocking (IXL) and digital signaling systems
- SCADA systems.

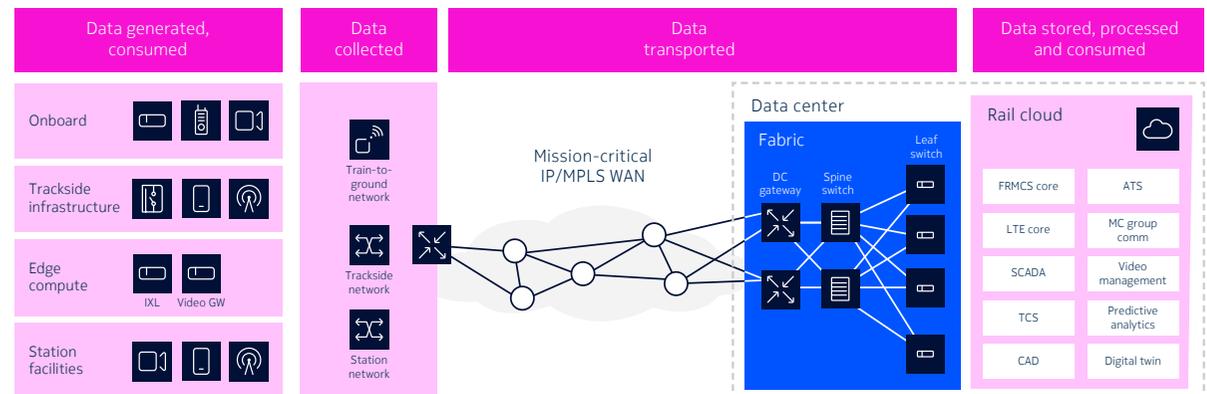
To get maximum benefit from your OT cloud, you need data centers that can provide resilient, scalable and secure connectivity for the servers that host your OT applications and data. This connectivity, interworking with the WAN, will help you use OT to create an adaptive digital rail system that uses data-driven automation to respond to new challenges with smarter decisions, greater efficiency and higher agility.

Extending mission-critical OT communications into the data center

As you migrate applications to the OT cloud, you extend your mission-critical railway network into a data center network domain called the data center fabric. Your data center fabric already plays an essential role in supporting your IT applications. It must now evolve to meet the higher networking demands of your OT equipment and applications.

In this new mission-critical network blueprint, intelligent equipment and sensors generate data at remote locations across your physical railway infrastructure. This data may first be processed by local edge compute systems before being collected and aggregated by trackside, station or train-to-ground networks.

The mission-critical IP/MPLS backbone core network then transports the data to the OT cloud, which has a dedicated compute pool for OT applications. The data center fabric provides all the connections that OT applications in this compute pool need to communicate with each other and intelligent rail assets across the infrastructure.



Benefits of a railway OT cloud

Accelerate your digital transformation

Securely and reliably connect physical rail assets and workers with OT applications in the cloud.

Embrace adaptive digital rail operations

Use data-driven automation to monitor and control physical rail assets in real time.

Meet the demands of critical OT assets

Evolve and scale your data center fabric to keep pace with the growing connectivity and data processing needs of your OT systems.



Is your data center fabric ready for OT?

To support OT applications, your data center fabric needs to meet stringent requirements relating to availability, quality of service (QoS), security and internetworking.

Strong resiliency and high availability

Communication outages can disrupt the flow of data to safety-critical OT applications and cause you to lose real-time visibility and control of your rail infrastructure. To avoid outages, your data center fabric must complement the robustness of your network backbone with high levels of resiliency and availability.

Flexible QoS capabilities

Your data center fabric needs flexible QoS capabilities to meet the demands of diverse OT applications. A fabric that lets you set QoS levels by application or user class can help you control heavy usage, protect your network from microbursts of data and ensure consistent performance for OT applications.

Seamless integration with the backbone network

Your data center fabric and backbone network need to internetwork seamlessly to connect IoT devices and users to applications in the OT cloud. This integration is essential for supporting use cases that combine trackside infrastructure with digital assets such as SCADA and train control system applications.

Robust network security

Your attack surface will grow when the data center fabric becomes part of your mission-critical railway network. Your data center fabric needs a multi-layer zero-trust security framework that can help defend your platforms and network against sophisticated cyber threats.

Agile data center fabric for OT cloud

The Nokia Data Center Fabric solution provides mission-critical networking that connects your OT application software to physical railway assets with OT-class reliability and five-nines availability. It also provides cutting-edge IT agility to fit your existing IT ecosystem.

Our solution lets you bring new levels of openness and automation to data center networking. This helps your OT teams control and accelerate the digitalization and automation of your rail operations. It also enables them to collaborate seamlessly with your data center staff to scale and adapt the fabric to meet changing OT needs while containing costs and improving efficiency.

OT-class reliability



- 5-nines or higher availability
- Common proven OS foundation with IP/MPLS routers
- Full IP/MPLS internetworking
- E2E redundancy protection
- High performance sustainable HW
- Zero-trust network security

Cutting edge IT agility



- K8s-based fabric management
- Intent-based automation
- Seamless integration with CMS and other IT automation ecosystems
- Linux/container-based NOS
- State-of-the-art NDK
- Digital sandbox





A blueprint for smooth fabric-backbone interconnection

Our Data Center Fabric solution supports an interconnection blueprint that addresses the need for seamless internetworking between the fabric and the IP/MPLS backbone core network. This blueprint uses a data center gateway to reliably connect physical assets across the rail system with digital assets in the OT cloud. It ensures that OT application software always delivers high performance.

With our data center gateway, you can take advantage of seamless control, data and service plane interconnection to:

- Fully automate application deployment
- Accelerate disaster recovery and preserve operational continuity
- Seamlessly connect applications with intelligent rail assets and other IoT devices
- Extend a consistent QoS policy across the data center and backbone
- Enable IoT devices to communicate with each other
- Implement comprehensive filtering rules to protect your applications against DDoS attacks.

Nokia Data Center Fabric for adaptive digital rail



Fabric Services System

Quickly operationalize new grid applications and resources through intent-based **automation** at scale



Open, extensible and secure NOS

Take control with a totally **open**, extensible and resilient NOS with proven routing capabilities



7220 IXR and 7250 IXR

Flexibly **scale and sustainable** data plane resources with a full portfolio of platforms for leaf and spine applications

Case study: Public Transport Authority of Western Australia

PTA chooses Nokia private 4.9G/LTE, IP/MPLS and Data Center Fabric to modernize rail communications

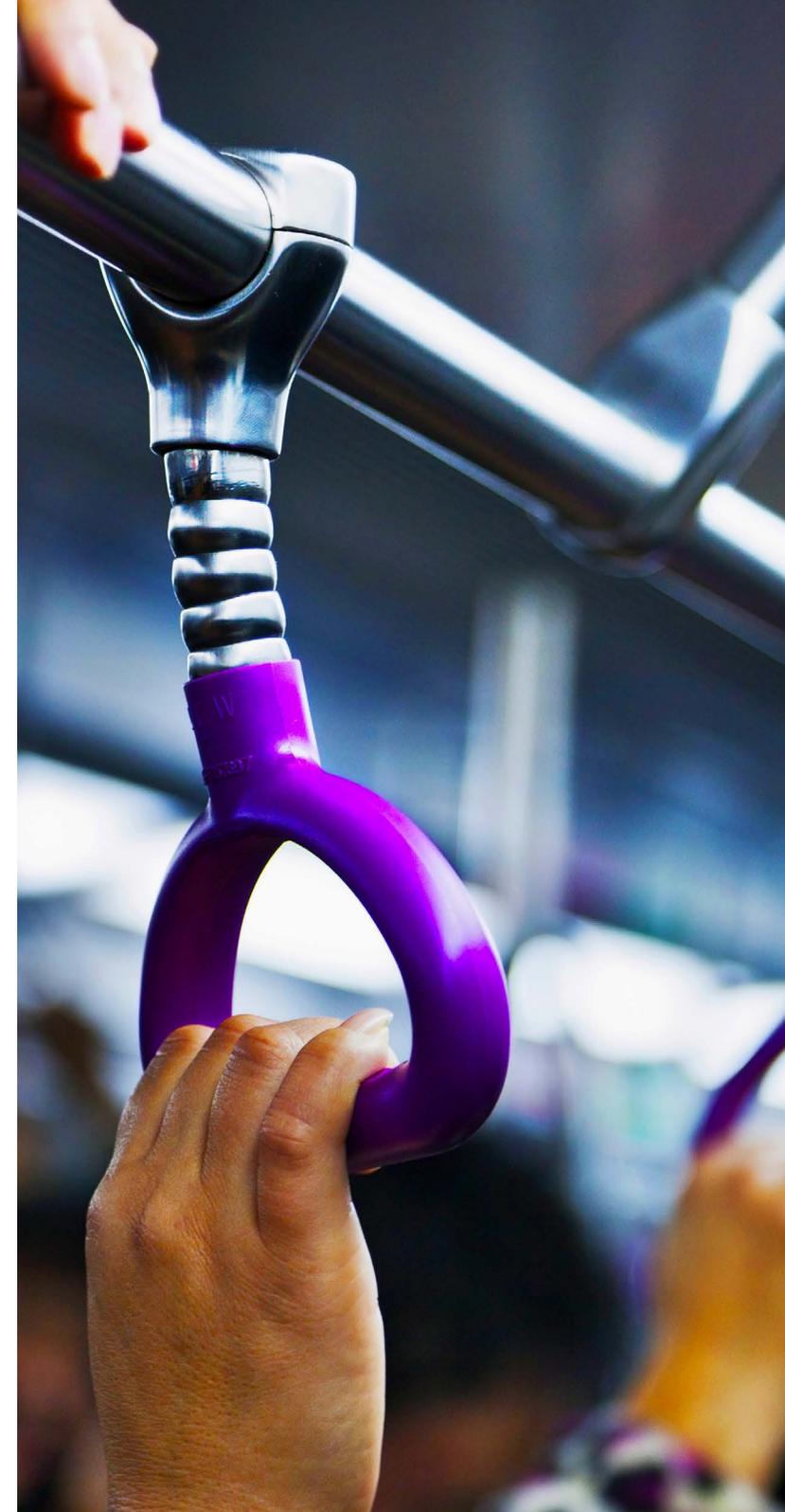
The Public Transport Authority of Western Australia (PTA) has selected Nokia to design, build and maintain a next-generation digital railway communications system in Perth.

Over the next decade, we will use our private 4.9G/LTE, mission-critical IP/MPLS, Data Center Fabric and microwave backhaul solutions to upgrade railway communications for 250 km of track and tunnels.

We will also work with PTA to install new fixed infrastructure and replace all on-board radio devices, mobile staff handhelds and control center consoles with digital-friendly equipment. A full cybersecurity fabric will cover all solution elements.

PTA will use the modernized system to support high-capacity signaling for communications-based train control (CBTC). The new system will provide greater accuracy and efficiency compared to traditional signaling systems. It will also enable extremely reliable mission-critical voice, data and video services.

[Read our press release](#) to find out how the new railway communications system will help PTA improve safety and efficiency, deliver more value to passengers and accelerate its digital transformation.



Let us help you unlock the potential of OT applications

Nokia is ready to help you harness the power of OT cloud to build an adaptive digital railway that's ready for any challenge or change. With our mission-critical communication network blueprint, you can seamlessly interconnect your backbone core network with your data center fabric to meet the demands of any OT application.

[Contact us](#) to learn more about how our Data Center Fabric solution can help you build a cloud-optimized communications platform that will empower your railway to thrive in the digital future.

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NOKIA

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.

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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