Nokia Optical LAN for Railways

Enlighten your LAN and power digital operations for greener, smarter stations

NOKIA

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Powering the digital railway

Railways are pursuing advances in technology driven by their commitment to provide an efficient, enjoyable, and safe travel experience for passengers. Today, they are embracing digital technologies such as industrial IoT, artificial intelligence, and machine learning to expand their operational awareness, automate processes, and improve their end-to-end efficiency.

As the digital sophistication of railway stations increases, the railway station local area network (LAN) must expand to provide secure, high-bandwidth, and reliable connectivity for surveillance cameras, platform operations, multimedia kiosks, public address systems, access control, and communication systems.

The network must also provide connectivity to stakeholders offering services from restaurants and shops to transportation support. It should deliver robust support for wireless systems, including Wi-Fi.

Light on infrastructure, light on energy consumption, and light on total cost of ownership, Nokia Optical LAN solution provides a cost-effective, scalable, and flexible LAN that can support all of your station sub-systems and grow with you as you adopt new digital applications and services.

Application of optical LAN to railways

Operational efficiency: Streamline operations with real-time data transmission, enabling better coordination and decision-making for operation, maintenance and emergency responses.

Passenger experience: Enhance passenger services with seamless ticketing systems and real-time travel information.

Safety and surveillance: Support robust CCTV and surveillance systems for improved security and incident management.

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Evolving the railway LAN

The rapid growth in bandwidth requirements over the years has likely led you to make multiple upgrades to your railway station LAN. This may take the form of running new copper cabling or adding new generations of switches and routers. Whether contemplating new builds or upgrades, you need a more scalable and sustainable approach to the station LAN.

Passive optical LANs (POL) leverage the tremendous bandwidth capacity of optical fiber, as well as its ability to cover large distances without the need for intermediate electronics — up to 20 km between the central switch and the end device. The reduced need for intermediate electronics enables you to gain space that can be used for other services.

Fiber's ability to support terabits of bandwidth also provides investment protection for the station. Copper-based CATx cabling has bandwidth limits that will make it unable to meet the ever-growing bandwidth demands of passengers and digital operational processes in the future. The costs associated with upgrading a passive CATx cable infrastructure are significant. With its much larger capacities, a POL solution avoids these costs and provides you with the wireline LAN foundation to fully support your digitalization journey.

The Nokia Optical LAN is rooted in the telecommunication industry, meaning it is designed to support service availability up to 99.999% of the time (five 9s). Railway stations have many sub-systems with a range of service availability requirements. Nokia's Optical LAN solution fully supports this mix of service requirements for all of your station sub-systems and is able to scale as your needs expand. Nokia's Optical LAN solution is very flexible, supporting from tens to tens of thousands of ports.

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Railway station optical LAN

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The Nokia Optical LAN solution

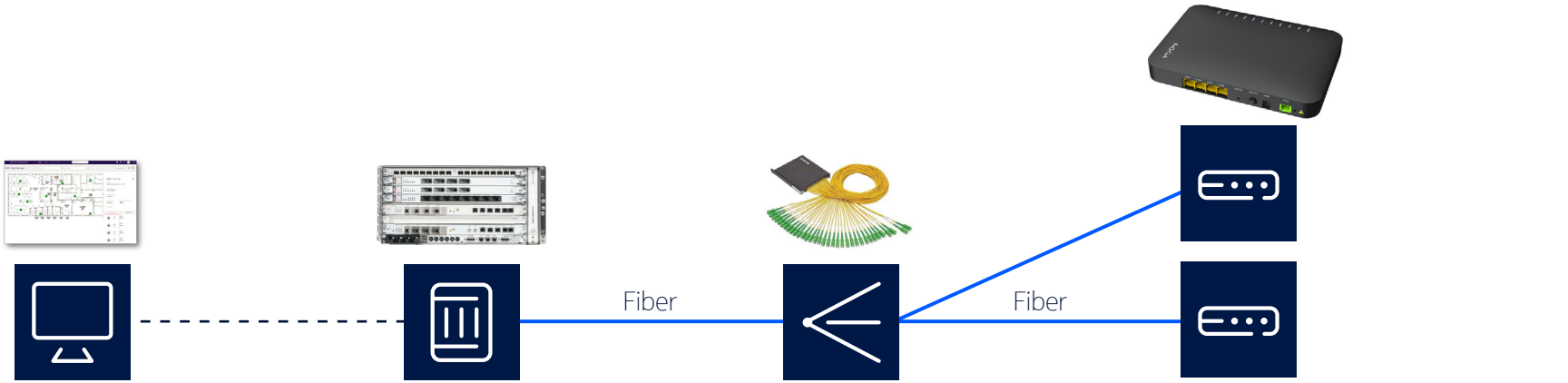
Nokia's Optical LAN solution for railway leverages fiber optics to provide high-speed, reliable, and scalable communication networks, enhancing operational efficiency, passenger experience and security with advanced data transfer capabilities and robust durability.

It uses a fiber-based LAN technology to address the shortcomings of today's copper-based LANs and meets the requirements of high-bandwidth applications. This lightweight and space-saving LAN solution avoids the power and cooling costs associated with traditional CATx LAN infrastructure.

Nokia's POL solution has a simple, flat architecture. The central switch, or Optical Line Terminal (OLT), is typically installed in the main IT room of the station or operations center. Optical Network Termination units (ONT) terminate the fiber and provide Ethernet connections to the station sub-systems or end devices, with the option to support Power over Ethernet (PoE).

The connection between the OLT and ONTs is based on single-mode fiber. A passive optical splitter between the OLT and the ONT allows the OLT to support tens of ONTs per OLT port. Various optical splitter variants are available, such as a 1 to 32 split (1:32), which provides 32 fiber connections from a single OLT port. The OLT also provides the connection to the railway operations core network.

The complete Nokia Optical LAN network is managed by the POL Command Center (PCC).



1. Management
PCC = POL Command Center

2. Central Switch
OLT = Optical Line Terminal

3. Optical Splitter
passive equipment, no power

4. GPON Terminal Equipment
ONT = Optical Network Termination

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Put your operations on the digital track

The Nokia Optical LAN network is managed by the POL Command Center (PCC). The PCC is an advanced management solution optimized for performance and usability in enterprise environments such as railway stations, administrative offices and operations centers. As part of the Nokia Optical LAN solution, Nokia's PCC provides a highly intuitive, simplified environment for configuration, automatic service activation, fault reporting, troubleshooting, and maintenance.

Despite the growing scale and number of connections within your station LAN, Nokia's PCC removes the complexity from railway operations, helping you better serve your passengers' and partners' connectivity needs.

A few highlights of Nokia's PCC management system are:

Service offering

The PCC simplifies management of the network, with quick and easy rollout of new services. Activation of new services is facilitated with predefined service definitions tailored for specific uses. In addition, the PCC verifies your service level agreements (SLAs) using graphed metrics.

Maintenance

The PCC provides easy navigation to network elements and their physical locations in the station using a realistic network view based on your specific floor plan.

Automation

The PCC supports many automated capabilities, such as the use of predefined services. It also simplifies network growth with automated ONT discovery and activation.

Security

The PCC supports role- and resource-based access control, ensuring that staff can only access parts of the network allowed by predefined roles such as admin, designer, observer, etc. The Nokia Optical LAN solution also comes with built-in data encryption.

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Optical is green, expandable and easy to deploy

The Nokia Optical LAN solution introduces several benefits to your railway. The three main ones are described below.

CO_2 reduction

Nokia Optical LAN is a proven “green” solution, and the power consumption of Nokia Optical LAN is much lower compared to CATx solutions. CATx networks require numerous intermediate switches, resulting in significant power consumption. In contrast, Optical LANs can achieve substantial power savings, with reductions of up to 40% depending on the network configuration and size.

Grow your network

The Nokia Optical LAN solution is very scalable. To upgrade your network, you do not need to replace the fiber, but simply upgrade the transmitting and receiving equipment. This maximizes your investment in the fiber plant enabling you to efficiently upgrade to next-generation PON technologies as you grow your operations and deploy more digital use cases.

Easy to roll out

The Nokia Optical LAN employs a very simple architecture with far fewer active components than copper-based LANs. It is easy to maintain using configurations that can be done at the Central Switch and pushed out to the ONTs. The management of the system can be done from your operations center for efficient management.

For the overall hardware and software solution, Nokia Optical LAN demonstrates up to 50 percent total cost of ownership (TCO) reduction over a similarly scaled CATx solution.

At the speed of light

LAN networking with unparalleled performance

Light on energy

A sustainable, long-term fiber LAN that is energy-efficient

Light on infrastructure

Deploy a LAN with minimal infrastructure, equipment and cabling

Light on TCO

Get more value and savings of up to 50%

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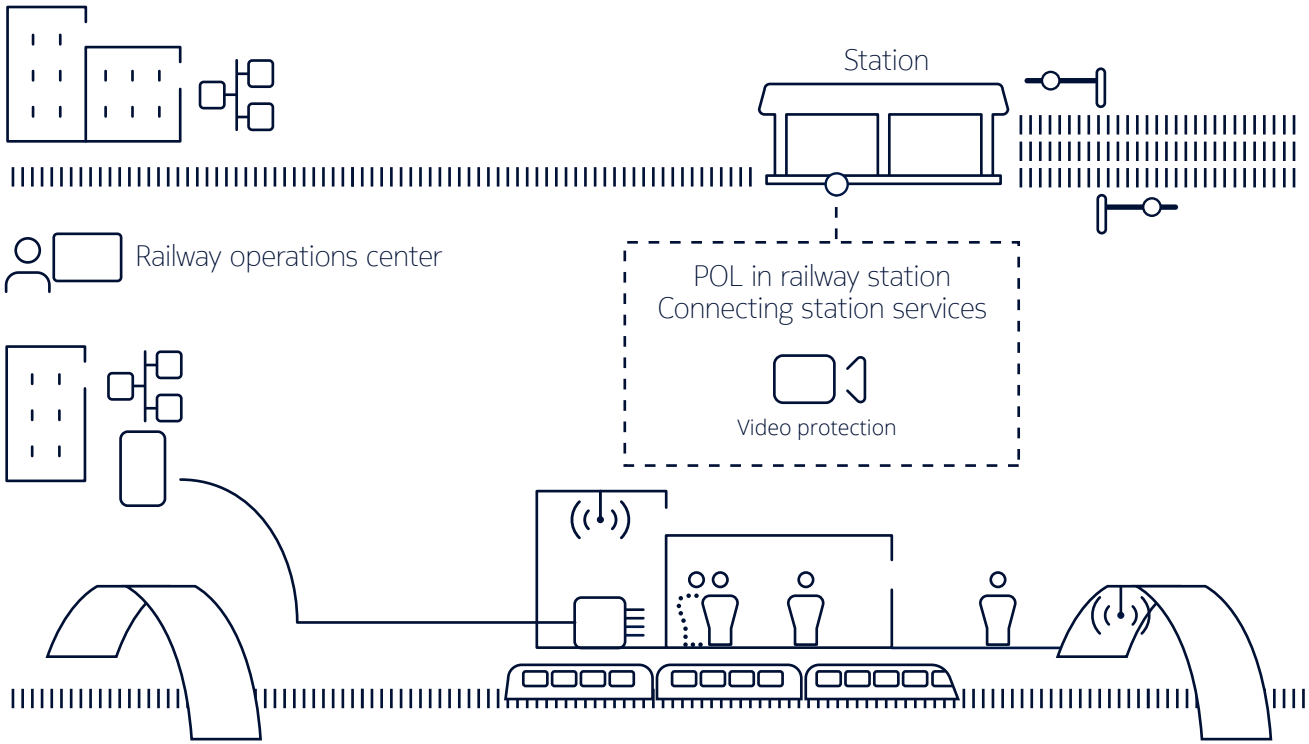
Southeast Asian metro refreshes and expands its network capacity

The metro operator needed to expand its LAN to support more CCTV cameras. Space, energy and a greener network were all important requirements for the LAN, which would support various offices and stations.

The Nokia Optical LAN was the right solution. By investing in fiber-optic infrastructure, they are now able to seamlessly integrate new digital technologies and use cases as they emerge, ensuring their systems remain efficient, safe, and competitive in the future.



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Nokia and railways

Railways worldwide rely on Nokia mission-critical networks, making Nokia a global leader in railway communications.

- Decades of railway experience with end-to-end portfolio and railway-specific services
- #1 supplier of GSM-R with global deployments
- Best-in-class broadband, wireline and wireless networking solutions
- Deeply involved in the standardization of railway communications networking technologies to seamlessly transition to FRMCS
- Nokia is the world leader in fixed access technologies: we have more than twenty years of experience providing enterprises including hotels, hospitals, university campuses, airports and railways around the globe with our optical LAN solutions

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Nokia OYJ
Karakaari 7
02610 Espoo
Finland

Tel. +358 (0) 10 44 88 000

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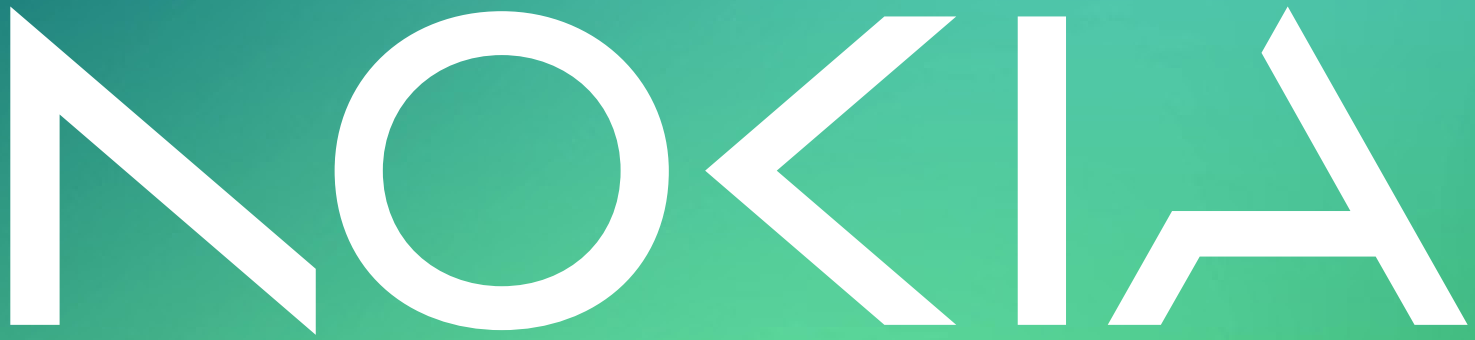

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.