Metro-urban railway solutions

Innovative solutions for the digital transformation of railways

NOKIA

Rail at the speed of life

Our subways, commuter railways and light rail systems are at the center of connecting communities with work and life experiences every day. Whether we are on our way to work, catching a game or out on the town, we rely on today's metro-urban railway systems to get us there.

Yet the world's metro-urban operators want to do even better. They want to connect passengers to the people, things and places they love more securely and efficiently, and with better experiences. As governments look to reduce urban congestion, lower carbon emissions and increase the numbers of passengers served, today's metro-urban railway operators are in the spotlight.

As the transportation backbone of modern, vibrant cities, metro-urban rail needs to provide passengers with a dependable and safe transport service, one that can keep them connected at all times. Nokia is offering innovative solutions for the digital transformation of railways — supporting new, smart railway applications without compromising current ones. Deliver more for your passengers and communities, keep up with the latest technologies and advance your business — ensure that your passengers travel at the speed of life with Nokia.

Nokia railway solutions

With more than 30 years' experience in the rail industry, Nokia has extensive expertise in working with rail operators to develop comprehensive solutions. We are working closely with the transportation industry to standardize advanced communications systems, and our railway solutions reflect an insider's eye on your future needs.

Train-to-ground

The Nokia Train-to-Ground solution supports multi-path wireless concurrent access backhaul. It can be flexibly deployed over wireless networks such as private LTE, existing Wi-Fi networks or a hybrid network setup. Powered by a unique multi-path switching algorithm developed by Nokia Bell Labs, the solution addresses the need for 100 percent network availability to reliably support highly automated rail operations. Along with end-to-end security, urban/metro rail customers benefit from seamless network coverage, assured bandwidth through capacity aggregation and guaranteed QoS using LTE prioritization mechanisms.

IP/MPLS backbone

The Nokia Mission-Critical IP/MPLS Network for Railways solution provides strong resiliency, assured QoS and robust security. As a converged backbone network, it can support all railway applications regardless of their criticality over a common network infrastructure, with no compromise in performance and security. The network's flexible IP/MPLS VPN service capability supports IP, Ethernet and TDM communications with proper network QoS policy. The Nokia IP/MPLS network can provide ultra-high network availability, which is imperative for railway operators to monitor track and rolling stock conditions even under extremely inclement weather. A Nokia IP/MPLS network is an integral part of an in-depth defense framework to protect railway infrastructure from both cyber threats and physical threats.

Nokia railway solutions

Railway crossing safety solution
Nokia Scene Analytics is a computer vision and machine learning solution that can detect anomalies at rail crossings in real-time and alert systems or operators. With out-of-box object detection, it can detect pedestrians, animals, vehicles, and other objects, utilizing virtual polygon fences in the intersection zone. It can combine Nokia algorithms with best-in-class public algorithms for even better results. It integrates with existing operational processes, augmenting the knowledge and decisions made by security and safety personnel without replacing them. It works with most existing cameras, even lower-resolution older cameras, so it doesn't require an expensive upgrade to modern high-definition CCTV cameras.

In-depth cybersecurity for railways
Railway operators face increasingly stringent legal, regulatory and compliance requirements, making them directly accountable for ensuring effective information security. We build cyber-defenses aligned with a network's operational objectives to achieve layered security across network, application, data, identity and access management, establishing a series of defenses that close off any attempts to exploit security gaps. Nokia security solutions encompass business processes, regulations and security policies to keep pace with the rapid rise in attacks. Effective cyber-security enables the safe adoption of new IP-based applications for train control, signal control, maintenance monitoring, video protection and passenger information systems.

Grand Paris Express Lines 15, 16 and 17

Grand Paris Express is the new automated metro of France's Capital Region, with 68 new stations and 200 kilometers of additional tracks. Its four new lines circle the capital and provide connections with Paris' three airports, business districts and research clusters. It will service 165,000 companies and daily transport 2 million commuters.

The Nokia LTE private wireless solution will provide indoor/outdoor connectivity across all Grand Paris Express stations, lines and depots. These include voice, data (file transfer and multimedia support) and video services (transmission, on-board video surveillance) over a high availability private LTE network. Nokia will also supply mobile devices and on-board equipment. The solution will provide critical, high-speed wireless connectivity to meet all future Grand Paris Express operational and maintenance requirements, as well as emergency response and security services.

RATP

The state-owned public transportation provider, Régie Autonome des Transports Parisiens (RATP), operates most of the public transport in Paris and its surrounding Île-de-France region, including 16 lines of the Paris metro, tram and bus services. RATP serves about three billion passengers per year. In early 2014, RATP announced that it would renew its network. Its existing SDH and ATM infrastructure had become costly to manage and maintain. Additionally, the old infrastructure was ill-suited for supporting new IP-based and bandwidth-hungry services, such as high-definition video security and multimedia communications among its hundreds of stations. Automated rail services, next-generation passenger applications and other systems were to be supported by the new network to help ensure the safety and security of operations.

The project migrated the telecommunications services for 360 of its stations (and a large number of other sites) to a converged all-IP ultra-broadband network that supports new-generation services, including an advanced video protection system for 15,000 cameras, with unlimited scalability for the foreseeable future.

Based on an IP/MPLS architecture and a fully passive WDM infrastructure, RATP's new network will provide an efficient infrastructure that is robust, scalable and ready for new-generation services. The new infrastructure will support very high speeds and high availability for RATP's voice transmissions, data and images, along with better supervision of the entire network. By converging their five separate legacy networks – CCTV, telephony, IT, TETRA and passenger information – onto one single IP/MPLS network, RATP will reduce maintenance costs and improve operations — critical in today's economic climate.

Milan Metro

The expansion of Milan's metro and changing passenger habits was placing significant demand on the network infrastructure of its metro operator Azienda Trasporti Milanesi (ATM). They needed to extend the rail communication services so as to eliminate disruptions and provide high-bandwidth capacity to support critical security and safety services, all the while meeting passenger demand for access to new information services such as public Wi-Fi.

The Nokia solutions helped ATM enhance its passenger experience, improve operational efficiency and reduce costs by deploying a single, converged IP/MPLS network. It enabled ATM to revamp its teleoperation systems, including remote control of the signalling system and electrification plants using SCADA. It also helped them to realize a new radio system for train-to-wayside communications based on TETRA, and they extended the video surveillance and video recording systems using over 2,500 cameras transmitting IP video flows to a Unified Control Room.

Why Nokia railway solutions?

Nokia has been providing best-in-class railway solutions for 30+ years. We are the world leader in GSM-Railway, with extensive experience in providing GSM-R systems to rail operators in 22 countries. Overall, Nokia has provided networking, cybersecurity, IoT and analytics solutions to over 120 mainline and metro rail operators.

Our long history in communications innovation is reflected in the nine Nobel prizes won by our Bell Labs researchers. We have extensive experience in designing, deploying and operating mission-critical networks in a variety of industries, including railways, and we bring that expertise to the rail industry, playing an important role in the standardization and development of future communications standards such as FRMCS and 5G.

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About Nokia

We create technology that helps the world act together.

As a trusted partner for critical networks, we are committed to innovation and technology leadership across mobile, fixed and cloud networks. We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Adhering to the highest standards of integrity and security, we help build the capabilities needed for a more productive, sustainable and inclusive world.