

Swiss Federal Railways (SBB)

Enhancing operations and efficiency with
advanced communications network

NOKIA





SBB is renewing its entire data network to support an advanced, future-proof platform for mission-critical operations, passenger services and business traffic.

Swiss Federal Railways, Schweizerische Bundesbahnen (SBB), with headquarters in Bern, is Switzerland's largest transportation operator, moving both passengers and freight throughout the country. Owned by the Swiss Confederation, SBB has 32,000 employees, more than 790 stations and 3,100 kilometers of track. It annually transports more than 430 million passengers and 53 million tons of freight, reporting 2014 operating income of CHF 8.5 billion. SBB is upgrading its 8,100 km communications network of transmission cables and more than 8,500 components to an advanced, converged communications network, Datacom NG, by 2020.

This new nationwide networking infrastructure uses WDM and IP/MPLS technologies and will support all mission-critical operations, previously handled by the legacy SDH network. It also will carry passenger services and business communications. SBB will benefit from enhanced efficiency, superior services for operations and lower total cost of ownership.



Challenges

- Address a continuous increase in passenger and freight traffic
- Get more flexibility in the deployment of new operational and passenger services
- Replace a legacy mission-critical SDH communications network approaching end of life
- Build a future-proof networking infrastructure ready for new-generation applications
- Rationalize technologies for all networks for higher efficiency and lower TCO

Solutions

- Fully redundant WDM L1 network based on 1830 PSS, supporting 2 IP/MPLS networks
- One IP/MPLS network for passenger, rail and business applications, and a second redundant IP/MPLS network for mission-critical services based on:
 - 7750 Service Routers
 - 7705 Service Aggregation Routers
 - Managed by 5620 Service Aware Manager

Benefits

- Future-proof, flexible ultra-broadband networking solution for operations, business and passenger services
- Smooth, controlled-pace transition of applications from older networks to new network
- Ultra-high reliability and redundancy

“Nokia best met our selection criteria with its motivated team and best-in-class technology to implement our important project.”

Yves Zischek, Head of SBB Telecom

The challenges

Facing unprecedented growth, Switzerland's nationwide railway organization, SBB, has been looking to shift its mission-critical applications, along with passenger and business operations, to a networking infrastructure based on advanced communication technologies such as optical Wavelength Division Multiplexing (WDM) and Internet Protocol/Multiprotocol Label Switching (IP/MPLS). Its Synchronous Digital Hierarchy (SDH) operational communications network has supported all mission-critical applications, including closed-circuit television (CCTV), train control, signaling and GSM-R. A separate business IT LAN has handled non-vital services. SBB seeks to realize efficiencies by upgrading and rationalizing the technologies used for both networks. It also is looking to gain flexibility in the deployment of new services such as passenger connectivity, as well as advanced applications for projecting and reacting to ongoing increases in ridership and freight traffic.

In 2014, SBB began to define “Datacom NG,” its next-generation realization of this vision. As one of the most reliable and safest public transport operators in the world, SBB was not willing to accept any compromise on performance, security or safety with the new solution.

Why Nokia?

SBB's choice was based on an extensive evaluation process. Nokia's superior technology, experience and successful track record working with the organization on past initiatives best met the selection criteria.

Throughout the qualification phase of the project, Nokia provided comprehensive and professional documentation to SBB. Working across country and organizational borders as one team with a common winning spirit, Nokia leveraged its worldwide rail expertise in designing mission-critical networks — including many for other Swiss customers and industries — and clearly demonstrated a leading technical position — with the best technology and service offerings for WDM and IP/MPLS core products.



Figure 1. Nationwide SBB railways network

“This new nationwide next-generation network will increase our data capacity significantly and at the same time provide an enhanced availability. We’re laying the foundation for an increasingly interconnected and digitized future.”

Yves Zischek, Head of SBB Telecom

The solutions

Targeted to be fully operational in 2020, SBB’s new nationwide data network will consist of more than 10,000 active elements at over 1,300 sites near the railway tracks, and at approximately 500 offices. Figure 1 shows SBB’s entire railway network.

SBB’s existing SDH infrastructure and separate IP platform will be migrated to an integrated IP/MPLS and optical network.

An innovative architecture, shown in Figure 2, will address all SBB needs and support a future-proof networking solution. This encompasses a fully redundant WDM transport layer that will carry data from different sources on optical fiber, utilizing the 1830 Photonic Service Switch (PSS) portfolio. Two different IP/MPLS networks will run on top of that: one full redundant network for all mission-critical applications, including train control and signaling, GSM-R, interlocking and other applications; and another for services and applications such as passenger information, ultra-broadband passenger connectivity, ticketing and a LAN/WLAN for SBB employees. These will use 7750 Service Routers and 7705 Service Aggregation Routers, with end-to-end network management provided by the 5620 Service Aware Manager.

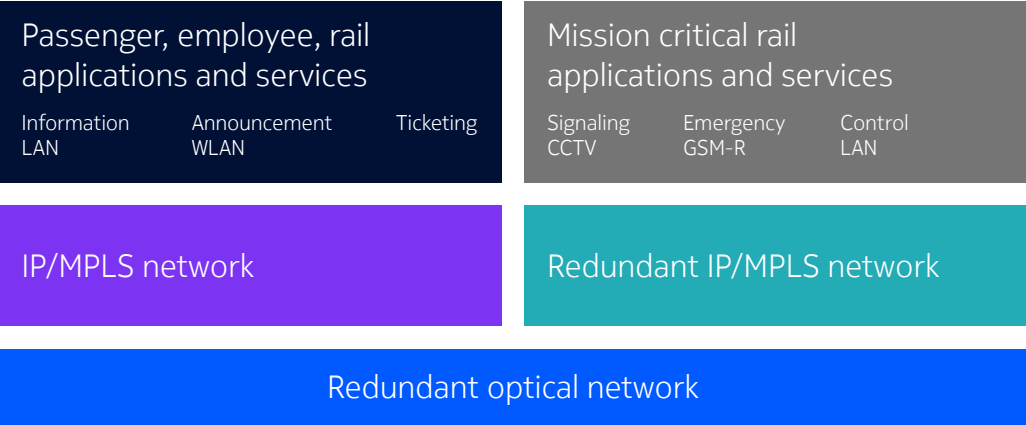


Figure 2. High-level architecture for SBB’s converged Datacom NG operational and business communications network.

The benefits

SBB's Datacom NG solution will support all of its information and communications needs. It matches the reliability of the existing mission-critical SDH network, and also enables the enhanced functionality of IP technologies, supporting business and passenger services.

Maintaining separate mission-critical and "less vital" IP/MPLS networks running on a fully redundant L1 optical network creates important advantages for SBB:

- The network is fully flexible and future proof. SBB will be able to introduce new applications and services for passengers and employees without having to halt train operations or re-process the safety certifications for the other part of the network.
- This design provides the best-possible reliability.

The power and flexibility of these attributes will allow SBB to support increases in traffic while maintaining its worldwide reputation for operational reliability and on-time arrivals. SBB also will reduce its total cost of ownership (TCO), thanks to the use of a single transport layer and management platform, and will be ready to implement next-generation technologies as they become available.

"The new network using the latest networking technologies will allow SBB to maintain its strong reputation of reliability and punctuality, while increasing the capacity of the public transport network and deploying new services," says Yves Zischek, Head of SBB Telecom.

Next steps

Deployment of SBB's Datacom NG solution will take place over a four-year period, starting in 2016. Nokia also will provide its leading professional services expertise, including engineering, installation and commissioning, network operations services and support, for fully deploying the new network. Following the network's launch, Nokia will provide maintenance services for at least eight years, with the option to extend support after this period.

Summary

Many transportation industries with mission-critical requirements want to migrate their existing legacy networks to meet growing demands in the future. SBB's Datacom NG solution will be as reliable as its legacy SDH network with the advantage of the enhanced functionality of IP and optic technologies, making the solution scalable and future-proof. Once operational, this new ultra-broadband network will streamline operations, manage traffic demands more efficiently, and introduce new services, further improving customer satisfaction. The bottom-line result will ensure that SBB further strengthens its reputation as one of the best railways in the world.

Nokia OYJ
Karakaari 7
02610 Espoo
Finland

Tel. +358 (0) 10 44 88 000

CID:193110

nokia.com

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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.

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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