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CASE STUDY / Swiss Federal Railways

Think Green

Establishing and maintaining reliable wireless coverage on high-speed, long-distance trains is a formidable challenge. Implementing that objective using innovative, cost-effective and environmentally friendly technology is something else entirely.

Swiss Federal Railways faces obsolete technology

Balancing commercial and environmental high-speed railway coverage and capacity challenges

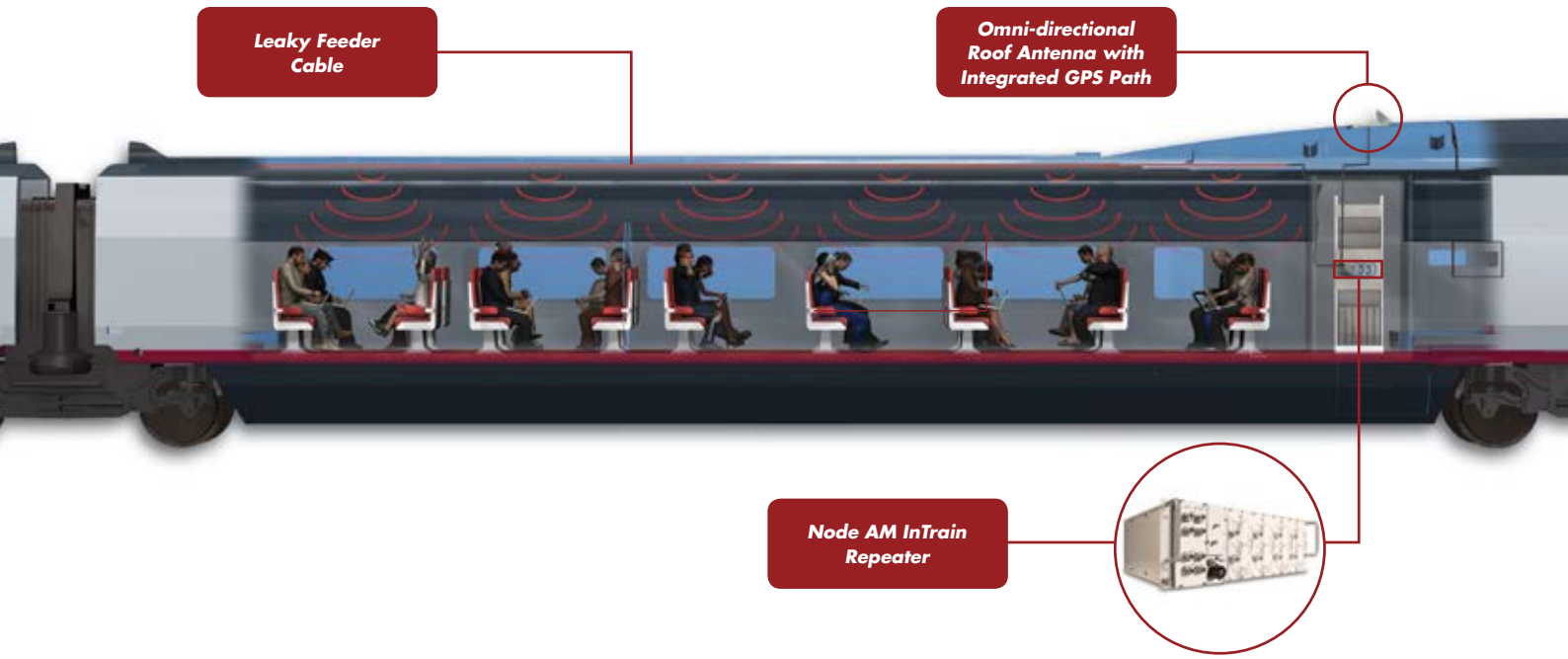
By the end of the 1990s, it became clear that wireless communications technology for Switzerland's long distance railway fleet was insufficient to the point of obsolescence. Realizing that the system required a significant upgrade to meet current and near-future wireless coverage and capacity demands, Swiss Federal Railways (SBB) turned to major European railway operators Orange Switzerland, Swisscom and Sunrise for a solution.

The consortium turns to CommScope

To prepare for such a massive project, the Swiss train operators established the consortium known as InTrainCom, then turned to CommScope to develop and deploy an advanced high-speed in-train wireless solution — with one caveat: the design approach must be on the bleeding-edge of environmental sustainability — as Green as possible.

The project specified the achievement of two primary objectives:

1. Address passengers' increasing demand for wireless services on high-speed trains
2. Integrate environmentally friendly best practices that reduce operating and energy costs while preserving the nation's natural resources.



CommScope develops a flexible, agile solution

Agile mobile communication is essential, especially when travelling. Until recently, mobile voice was the focus. Now services are expanding to include data applications based on newer UMTS and LTE technologies.

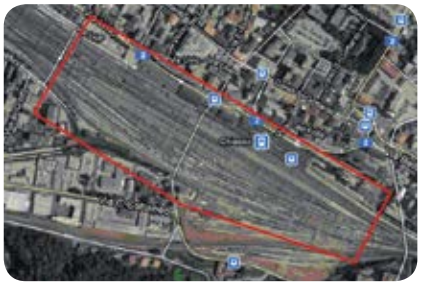
CommScope utilized Node AM digital in-train repeaters and Andrew Integrated Management and Operating System software (A.I.M.O.S.) to ensure rapid signal handoff at high speeds and precise, reliable coverage.

Depending on geographical position and environmental conditions at any one moment, Node AM in-train repeaters use a digital filtering trigger system that automatically adjusts to provide maximum signal strength. The repeaters' software-based design boosts the reception quality of GSM 900 MHz, GSM 1800 MHz and UMTS 2100 MHz, ensuring sufficient in-train signal strength during cell site hand-offs. The modular, scalable architecture and compact dimensions of Node AM also makes it easy to modify, upgrade or expand. Operators just add RF cards and software features, simplifying and accelerating installation and maintenance procedures. A.I.M.O.S. simplifies everything from system supervision and performance oversight to detailed, real-time fault tracking. It allows operators to remotely monitor and operate the wireless system.

Alerts indicating the nature and geographical location of any errors within the system are instantly delivered to train staff.

CommScope's Service Level Agreement (SLA) also provides prompt replacement of the equipment or systems repair in the event of any malfunction.

Polygon examples of the Swiss railway system



Polygon service area in Chiasso, Switzerland

Polygon service area in Chur, Switzerland

A model of efficiency and environmental respect

Utilizing these two technologies, CommScope met the first project requirement. However, they also needed to contend with specific requirements regarding energy efficiency.

The approach had to account for sharply rising electricity prices. Since they consume minimal power and adjust for signal amplification, Node AM repeaters are the ideal solution.

Rail travel involves routine, frequent train stopping and parking within particular zones (like yards and sheds) where almost no signal regeneration or amplification is necessary.

Operators can experience potential energy savings in these areas, since CommScope developed an intelligent stand-by mode where the integrated GPS location system automatically directs each repeater to hibernate.

Node AM designed to hibernate on command

CommScope worked together with InTrainCom to define each zone, dubbed a"polygon". When a train remains idle within a polygon, the GPS coordination software within each Node AM repeater detects the time lapse and automatically triggers a switch that transfers the system into the energy-saving stand-by mode. The repeater automatically restore full power mode within a few seconds of the train's departure. A typical repeater may remain in a polygon for 5-6 hours per day, saving approximately 1 kW. Multiply that figure by a total of 1,200 train amplifiers calculated over an entire year, and SBB can potentially save approximately 420 MWh annually — roughly the same amount of energy required to power 90 residential homes for 12 months.

CommScope implements a successful high-speed wireless solution

The collaboration between CommScope and InTrainCom produced a reliable system of repeaters, monitoring and control software and services that enable state-of-the-art voice and data wireless communications that will support the long-term growth of SBB trains.

CommScope experts installed 3G antennas on car roofs to enable advanced mobile service for 300 passengers at once, rather than the current maximum of 120 passengers. This teamwork paved the way for a cooperative effort that allowed SBB to successfully deploy Node AM signal repeaters on 1,200 railway cars.

The incorporation of high-quality, innovative Green technologies throughout the project proves that a cost-effective strategy which also respects the environment is a realistic, achievable, profitable approach that ultimately benefits train operators and their customers.

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