

Broadband Rail Track Coverage for Südostbahn – Swiss railway

Multi-operator idDAS system for GSM-R and cellular railway coverage

Overview

Cobham Wireless worked with Südostbahn (SOB), a Swiss railway company, to deliver multi-operator cellular coverage and Global System for Mobile Communications – Railway (GSM-R) connectivity to a 6.84km section of SOB's rail network. A solution was required to provide connectivity trackside and in railway tunnels. Cobham's idDAS (intelligent digital distributed antenna system) is now providing reliable, high-quality connectivity services for passengers, and reduced OPEX for SOB and the mobile operators.

Challenge

Providing reliable, multi-operator outdoor coverage alongside rail tracks often requires multiple base stations, which can be expensive to deploy and maintain. SOB needed to cover 6.84km of its network, so therefore needed a solution that would be cost efficient.

The Tech

- 1 idDAS master unit
- 11 remote stations with idRU-40 installed
- Each idRU equipped with 4-Bands incl. GSM-R in one single outdoor box
- One BTS-Hotel for all coverage bands
- 4 operators supported
- AEM (Repeater OMC) installed at SOB and monitored by Cobham



The Challenge

Schweizer Südostbahn (SOB) is a Swiss rail operator which serves more than 13 million passengers each year. Some of SOB's trains run on winding and mountainous terrain, passing 19 tunnels as well as 192 bridges and viaducts. The challenge was to provide a fully digital multi-technology Broadband Corridor Solution for Public Safety (GSM-R) and Cellular (3G, 4G), in a free field area, along a 6.84km section of rail track which encompasses four tunnels.

The Solution

Cobham Wireless deployed the world's first fully end-to-end digital rail-track coverage project with GSM-R connectivity, and the first in Europe to combine multiband cellular coverage with GSM-R in the same single box.

The system architecture is based on a leaky feeder corridor approach. It consists of one idDAS master unit located at the Brunnadern-Neckertal train station, where the idDAS head-end equipment is located, and 11 remote stations where idRU-40 units are installed. All the main headend components such as Active-Point of Interface (APOI), Multi-Technology-Digital-Interface (MTDI) and Multi-Sector-Digital-Hub (MSDH) as well as the feeding base stations of four operators are located in an acclimatised technical room.

All 11 remote units transmit the same transmitter signal per technology and sector. GSM-R 900, LTE 1800, UMTS 2100 and LTE 2600 are the available services designed for this system. The system can also be expanded to additional cellular bands or MIMO channels at any time.

All base stations are hosted in one single BTS hotel. The BTS signals are routed through appropriate attenuators to the respective point of interfaces (POIs) of the idDAS system.

For the cellular signals, Cobham's APOI is used, which is equipped with the specific band modules needed for each service. This means a single box can be installed every kilometre, instead of the typical approach of building out multiple sites for four operators.

The completed system which supports Swisscom, Sunrise and Salt as well as SBB's GSM-R service, is carefully monitored by the Cobham Wireless team in the UK, whilst the Cobham AEM (Active Element Manager) monitoring software is installed at SOB's IT centre.

The Benefit

"Usually for a multi-operators project such as this, whether it be rail, along country roads or motorways, each operator would have to build its own site to ensure both cellular and Public Safety communication. This requires numerous radio stations which need regular maintenance" commented Clemens Becker, CEE Sales Manager and Business Development, Cobham Wireless. "The Broadband-Corridor-Coverage-Solution we have installed enables all operators to use one common infrastructure for all services, even if there is a technology change. This means both the number of base stations as well as the total power consumption can be reduced considerably."

The project architecture means that there is a need for fewer cellular and GSM-R boxes along the track, saving on site building costs. Equally, by hosting the base stations of Swisscom, Sunrise and Salt in one singular BTS hotel, the project significantly saves on operational and maintenance costs.

The system has been designed to easily facilitate system upgrades and network configuration changes. This means the solution can be adapted to support additional operators, as well as facilitating 5G connectivity in future.

"We've developed idDAS to meet the challenges faced by rail operators, venue owners and those overseeing public projects. Modern connectivity solutions need to support multiple operators and frequencies to deliver coverage to large volumes of commuters and their connected devices. Our solutions are used in most of the world's metro systems, as well as a number of over ground rail routes, stadiums and large public venues, reducing both the CAPEX and OPEX for those involved in the project, and guaranteeing a future-proof solution to connectivity challenges" added Becker.

Markus Allenspach, Technology Manager of Telecoms Systems at SOB added: "For us as a train operator, GSM-R train communication is pretty important! Nowadays, of course, proper cell phone coverage is also a key factor for our customers, and every rail operator faces the challenge of providing a broadband rail corridor coverage system. This becomes more complex if it is a winding section of track with many tunnels and it is particularly complex to install an adequate multi-operator & multi-technology system by using only base stations and antennas. For this reason, we decided on a digital DAS radio solution and instead of antennas we used a radiating cable due to the difficult to illuminate topography. This enables us to guarantee continuous radio coverage along the entire section, including the four tunnels."

Thanks to Cobham Wireless' technology, users of the SOB rail line now benefit from reliable cellular coverage from three of Switzerland's major mobile operators.