

Case Study

Stadler Rail / Moscow's Aeroexpress

COMLAB connects 158 millions passengers on Moscow's Airport lines to the mobile network

The project

COMLAB supplied InTrain repeaters for 25 double-decker trains that Russian railway operator Aeroexpress ordered in February 2013 from Stadler Rail. The new fleet comprises 9 six-coach and 16 four-coach trainsets offering 396 and 700 seats respectively. They transport 158 million passengers yearly from the center of Moscow to the three major airports. The new KISS trains from Stadler Rail, the largest Swiss builder of railway rolling stock, and the InTrain coverage from COMLAB have set new standards for public transport in Russia and offer passengers both outstanding comfort and seamless mobile connectivity.

The challenge

Airport rail lines generally present significant challenges for mobile connectivity. The trains carry high passenger loads throughout the day and often run through several tunnels. They also run at high speeds and are well-insulated for climate control.

Good Insulation

The new Aeroexpress vehicles are very well insulated with special heat insulation glasses with vapor deposited layer. This construction not only keeps the climate in the passenger cabin always pleasant but also blocks signals from outside to inside and vice versa.



Image:

Four-coach and six-coach trainsets of Stadler Rail's Aeroexpress.

High speed

In addition to the trains' good insulation the trains' high speed makes mobile reception even more challenging. Aeroexpress trains reach a top speed of 160 km/h. At this speed, a new communication cell takes over the mobile network customers every few seconds. This presents a great challenge for mobile signal systems and the products they use.

High transport capacity

The three lines from the center of Moscow to the Sheremetyevo, Domodedovo and Vnukovo airports run every 30 minutes in each direction. They transport some 158 million passengers yearly. This corresponds to about 2000 people per train ride who may all want to make phone calls or be online and who must share the capacity of the mobile network. In order to make this capacity available to each passenger, COMLAB employed high-performance and innovative repeaters.

The solution

For the Moscow Aeroexpress COMLAB developed an InTrain radio coverage in the form of a highly modular and expandable on-board digital repeater system. Each of the two roof antennas on each trainset receives signals from various landside base stations and forwards them via a coaxial cable to an InTrain repeater inside the train. Each trainset is equipped with two 3-band repeaters. The repeaters first use a band-blocking digital filter to eliminate unwanted signals. In order to use the full capacity of the desired GSM, UMTS and LTE signals in downlink, the repeater amplifies those signals individually for each operator, then forwards the signals via coaxial cable to the InTrain antennas. Each double-decker coach contains four antennas, two above and two below. An optimized inter-car connection allows to provide an optimal reception within three double-decker coaches.

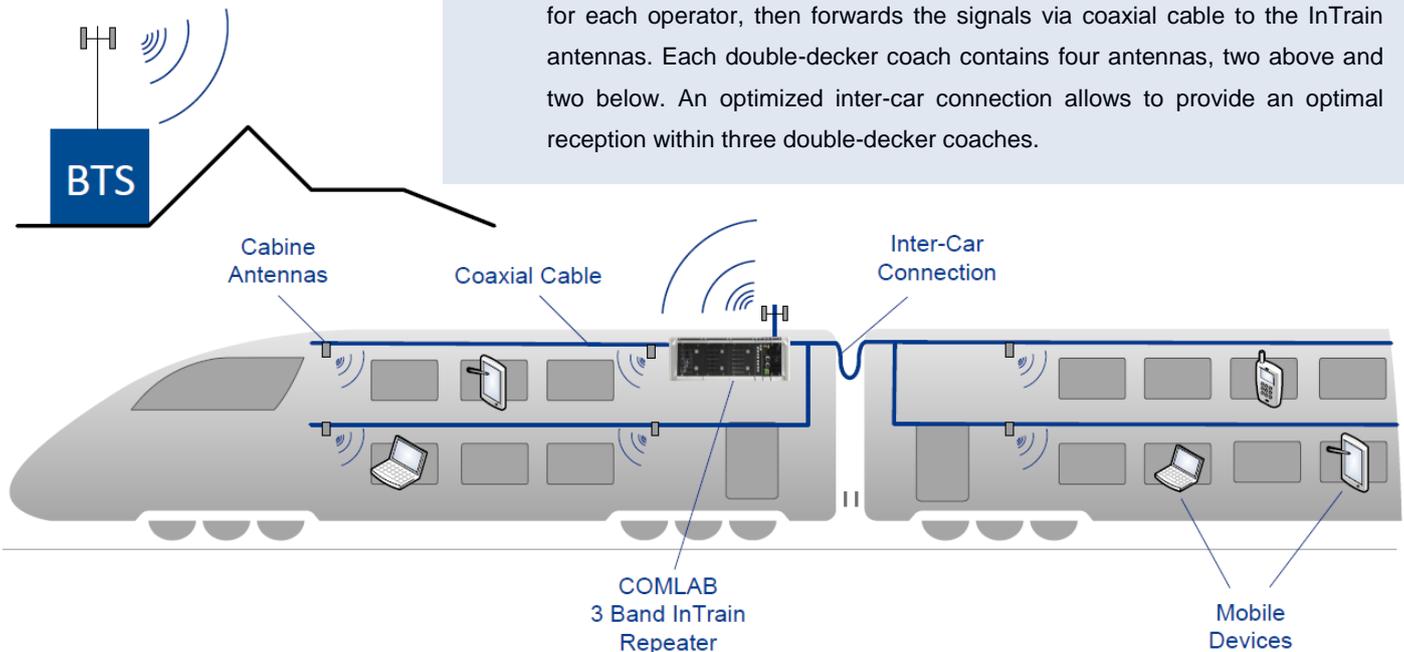


Image:

COMLAB InTrain repeater solution for Stadler Rail's Aeroexpress in Moscow

In addition to the radio-frequency (RF) antenna, a second antenna on the train's roof receives GPS signals. The GPS receiver is integrated within the InTrain repeater and allows the system to log alarms geographically and perform geographically dependent system switching, such as frequency re-allocation when the train crosses the border into another country or depot-switching.

The benefits

Safety

Safety is one of the first priorities of the COMLAB InTrain repeater system. The intelligent digital filtering technology enables selective amplification of desired GSM, UMTS and LTE signals. This protects the GSM-R signals, which are essential for train safety, from interferences. All COMLAB repeaters comply with the high requirements of telecommunications equipment for railway application.

High adaptability

The COMLAB InTrain repeater was designed with an extraordinary ability to adapt to its environment. It provides with an operator specific automatic gain trailing (gain trailing range 40dB) a solution for the near-far problem. In addition with dynamic amplification the repeater compensates the high signal loss in a well-insulated train running at high speed. The digital filtering technology automatically adjusts to provide a steady signal strength and therefore guarantees a steady level of mobile reception in the passenger cabin. The many customers of the Russian Aeroexpress now benefit from distortion-free and qualitatively outstanding mobile reception, high availability of data services and no dropped calls.

Flexible solution

The highly modular and scalable architecture of the COMLAB InTrain repeater makes it easy to modify, upgrade or expand.

Intelligent and cost efficient installation

The COMLAB repeaters are the smallest on the market. Together with the internal antennas they fit perfectly in the technology cabinets and cause therefore no losses on the bright, open and passenger-friendly interior space of the trainsets and leave its aesthetic appeal intact. Even the inter-car connections are adapted to the vehicle architecture and have no negative impact on the signal strength. In addition, just one single digital repeater can distribute mobile communication signals to three double-decker coaches. This makes the COMLAB InTrain solution extremely cost efficient.



COMLAB InTrain Repeater

- Operator specific automatic gain trailing
- 40dB gain trailing range
- Digital subband-filtering
- Highly modular and expandable
- Integrated GPS for geo-switching and localization
- Compact design
- Cost efficient
- Complies with all the requirements of telecommunications equipment for railway application
- EN50155

“With the high-performance InTrain repeater system from COMLAB, we have secured high quality and reliability in mobile communication for our KISS double-decker trainsets. Over all process steps, from development and production all the way to system installation, COMLAB has impressed us with their know-how, flexibility and individual customer care. We are glad to know that COMLAB will continue to stand beside us as a committed partner in other interesting projects.” (Dietmar Schwarz, Project-manager Aeroexpress at Stadler Rail)

COMLAB – your customer’s safety and comfort is our mission



www.comlab.ch

For more information visit our website or contact us directly

COMLAB AG

Ey 13

CH-3063 Ittigen

Phone: +41 31 924 24 24

Fax: +41 31 924 24 20

info@comlab.ch