

Wireless communication in trains

Radio frequency product portfolio



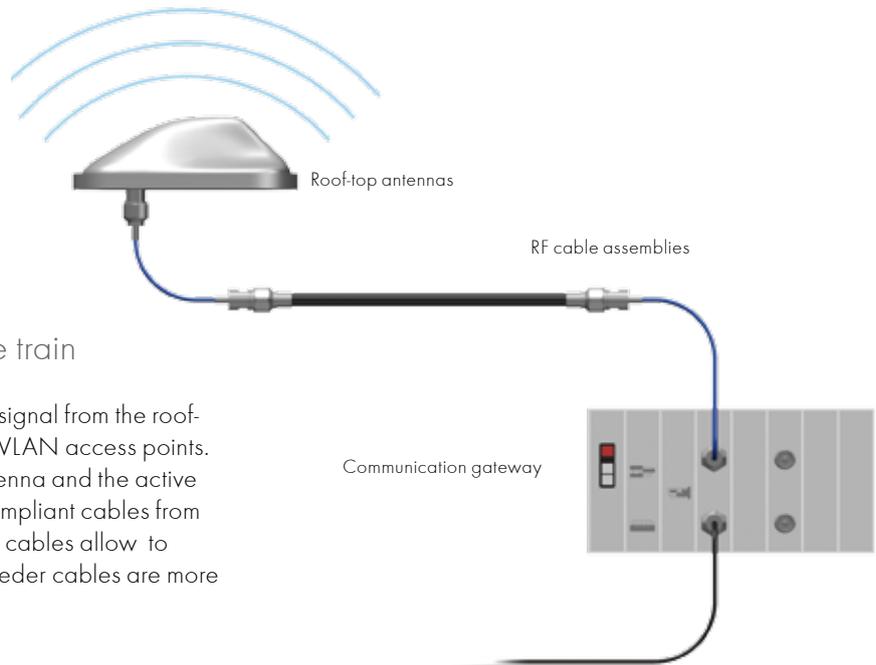
Increased security requirements and better communication facilities using telephones or the Internet are becoming increasingly important in the area of public transport. The demands from customers in terms of constant availability and faster data transmission, e.g. for Internet on board, can be satisfied differently.

With its range of perfectly coordinated radio frequency products, from robust antennas to flexible jumper cables and low-loss feeder cables, HUBER+SUHNER offers integrated signal transmission inside the train. All products conform to the environmental requirements for the rail industry as set out in EN 50155 and comply with the appropriate fire protection requirements, e.g. DIN 5510-2 / BS 6853 / NF F16 101/102 / prEN 45545-2.

Reliable connectivity solutions for wireless communication

The use of mobile communication networks to transmit data or access the Internet poses some problems in trains. The reason for this is that coated windows attenuate radio waves significantly. Today the buildup of WLANs enables the quick and reliable signal transmission within a train. This is especially important in areas where large numbers of users are present. The IEEE 802.11 standard defines the requirements placed on these wireless networks.

HUBER+SUHNER supplies a wide range of radio frequency products which are the ideal choice when installing a standalone WiFi network on a train.



From the roof to the inside of the train

A communication gateway converts the RF signal from the roof-top antenna and transmits it to the various WLAN access points. The optimised connection between the antenna and the active component involves halogen-free, RoHs-compliant cables from HUBER+SUHNER. The thin, flexible jumper cables allow to handle very tight radii, while the low-loss feeder cables are more than capable of covering larger distances.

For more information about HUBER+SUHNER cables and antennas, see our «Train-to-Shore Communication - Railway Antennas» brochure.



In-carriage coverage

Wireless coverage inside the carriage is provided by up to three antennas per access point. Limited positioning options or a desire to provide coverage in just certain parts of the train are important factors to consider when deciding what type of antenna to use. HUBER+SUHNER offers a wide range of omni-directional and directional antennas conforming to the various IEEE 802.11 standards for every application and installation scenario. The antennas are offered in very compact housings with a choice of connectors and installation options.

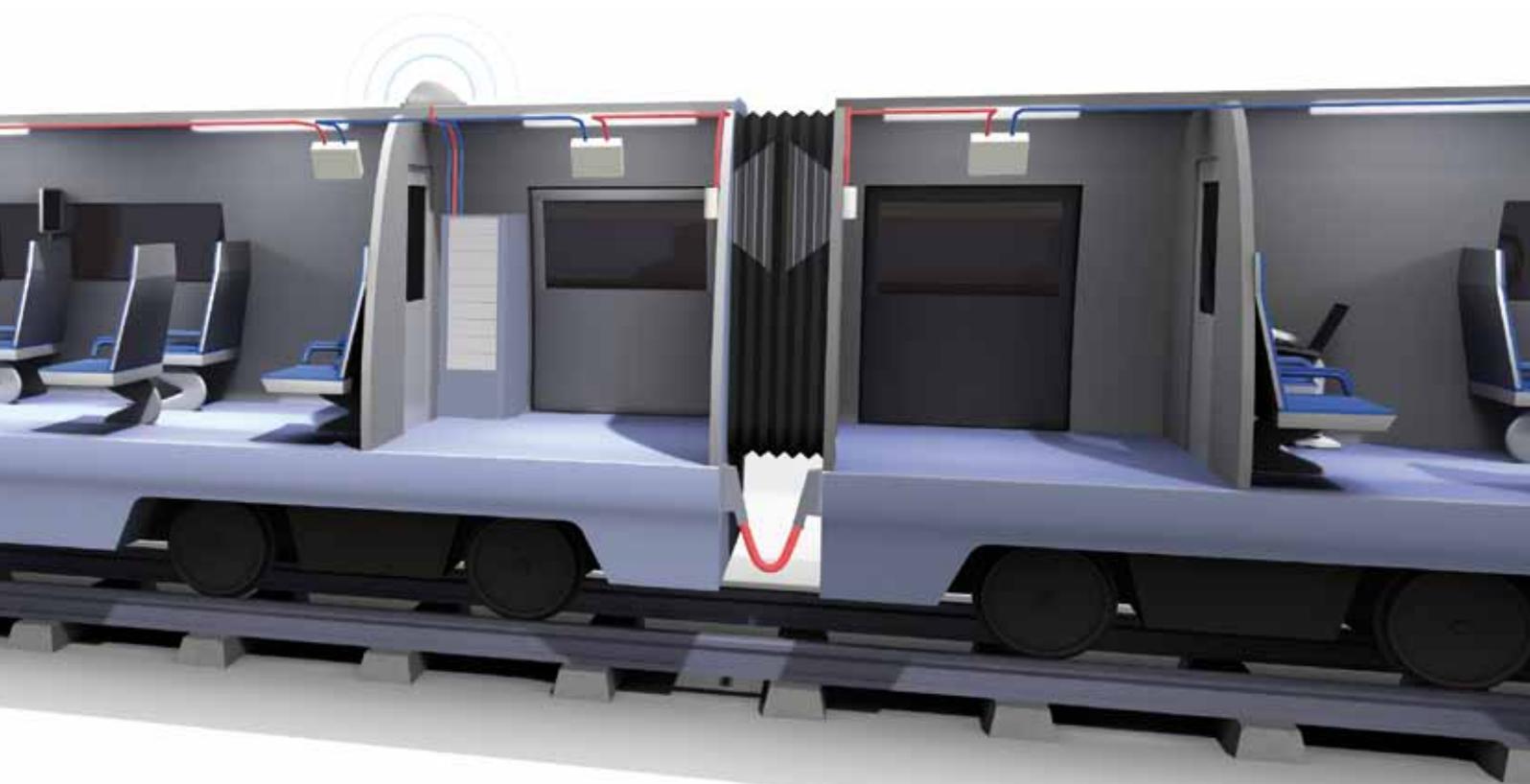
2.4 GHz antennas are normally used to create the WLAN within the carriage. Depending on the positioning standard directional or omni-directional antennas are installed. These HUBER+SUHNER antennas support the standard 802.11b/g. Next to this, the 802.11n standard has seen an increase in its use of late. Employing Multiple-Input-Multiple-Output technology MIMO antennas give wireless systems better coverage and reliability and support higher data rates.

Carriage bridging

The inter-vehicle signal transmission can also be carried out using antennas rather than cables. This results in lower installation and maintenance costs. Coupling and uncoupling of the carriages is also much more straightforward.

From carriage to carriage the signal is usually transmitted using the WiFi standard 802.11 a/n. To prevent interferences between the differing communication standards employed within a train, the inter-vehicle antenna system is usually implemented in the 5 GHz band. Here too, the use of MIMO antennas allows a higher data rate to be transmitted.

For these applications, HUBER+SUHNER offers space-saving, directional antennas that can be installed inside the carriage in a variety of ways. As the products are dust- and waterproof according to IP 67, they can also be mounted on the outside of the vehicle.



Choice of suitable products

	Antenna family	Type designation	Features	Frequency range (MHz)	Gain (dBi)	Polarisation
Antennas for in-carriage coverage						
	SPOT-S	1324.35.0006	directional QMA-W connector	2400-2500	8.5	vertical
	SPOT-S	1399.17.0210	directional N connector	2400-2500 5150-5935	9 9	vertical
	OMNI-S	1324.17.0071	Omni-directional N connector	2400-2500	4	vertical
	OMNI-S	1399.17.0106	Omni-directional N connector	2400-2700 4900-5935	6 8	vertical
	OMNI-S MIMO	1399.35.0002	Omni-directional 3 x QMA-W connector	2400-2690 5150-5935	4 6	vertical
Antennas for carriage bridging						
	SPOT-S	1356.17.0077	directional N connector	5150-5975	14	vertical
	SPOT-S	1356.17.0076	directional 2 x N connector	5150-5925	9	+/- 45 °
	SPOT-S MIMO	1356.35.0003	directional 3 x QMA-W connector	5150-5935	8	vertical and +/- 45 °

Depending on the installation options right angle cable plugs are sometimes needed. HUBER+SUHNER recommends to connect the antennas via flexible and customised cable assemblies as listed below:

Cable	Connector	Item no.	Right angle cable plugs	Item no.	Interface
SX_04172_B-60 (jumper cable)	11_QMA-W50-4-3	84023153	16_QMA-W50-4-5	84023140	QMA-W
ENVIROFLEX_400 (jumper cable)	11_N-50-3-59	84092122	16_N-50-3-27	22642847	N

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ISO 14001, ISO/TS 16949 and IRIS.

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