LEONARDO CYBER & SECURITY SOLUTIONS

RaCE

RAILWAY COMMUNICATION EQUIPMENTS

LEONARDO

Railway operators need to extend the use of GSM-R in voice and data ground-to-train radio communications to obtain the highest level of performance. The many different GSM-R applications are met by these highly cost effective solutions.

We have developed several solutions answering the different requirements for onboard communication equipment. All of them provide EIRENE/MORANE standard features for vehicular radio modules and comply with all environmental safety requirements.

Leonardo is leader in the development of wireless solutions for railway operators: the Company's long experience in digital mobile communications and railway technology has been the basis for advanced development of GSM-R terminals and mobile radio equipment for all customers' needs.

Member of international standards organizations as ETSI and the GSM-R Industry Group, the company provides optimised, convenient and reliable solutions for secure communications along tracks.

Starting from a full equipped Railway Communication Equipment, the customer can choose the most appropriate configuration to exactly fit its requirements, without extra cost.

The shelf includes GSM-R class 2 (ETSI EN 300 910) radio module for voice/data applications.
These solutions provide voice capability, a dedicated key for special functions and a comprehensive user friendly menu.

The GSM-R CAB Radio Systems provides the features of an advanced GSM-R telephone, with all the special railway functions: Advanced Speech Call Items (ASCI) phase 2+, Emergency Call, eMLPP priority features and Functional Numbering.

The Railway Communication Equipment also offers data transmission and shunting operations; it is possible to use a Local Maintenance Tool (LMT) to configure Software Download and diagnostics operations.

The highly flexible Railway Communication Equipment design allows a wide range of customized applications, to meet many different railway operators' needs as integration to the train bus MVB or TCN for services like Driver Safety Device (DSD) or real time positioning and diagnostics.

Software updating through a data port enables easy evolution and integration of future EIRENE/MORANE requirements. CAB is the smartest answer to the railway needs of reliable and cost effective ground-to-train communication.

e-RACE2
RAILWAY COMMUNICATION EQUIPMENT

The **e-RaCE2** Railway Communication Equipment is the in house designed GSM-R CAB radio, e-RaCE2 is an innovative solution to support all GSM-R communications features that provides voice and data transmission for on board applications at the right price.

The e-RaCE2 comprises a 3U 19" standard shelf (radio and control parts) and a graphical MMI. Depending on installation, up to 2 MMIs can be remotized on distances allowing in order to 200 m for each MMI. The MMI can be automatically selected by bench-key or manually by the driver.

The shelf includes:
- a GSM-R class 2 (ETSI EN 300 910) radio modules, with improved characteristics against RF interferences, fulfilling the railway specific receiver requirements ETSI TS 102 933 V 2.1.1
- a power supply module (extended range from 24V to 110V)
- a control card module
- an optional MVB Gateway and UIC interface.

e-RaCE2 provides the features of an advanced GSM-R telephone, with all the special railway functions: Advanced Speech Call Items (ASCI) phase 2+, emergency call, eMLPP priority features and Functional Numbering.

The equipment is aligned to Eirene 8/16 requirements mandatory for interoperability (MI requirements).

The e-RaCE2 provides communications on the train bus (MVB) and it is ready to interface with the driver safety device and the train board recorder system. Configurable digital I/O interface is also available.

An external duplexer unit (inside 3U shelf, 19") is optionally provided when the GSM-R antenna system is installed in close proximity, due to the lack of space on the roof of the locomotive. With this option GSM-R antennas can be positioned at a minimum of 1m distance from each other.

e-RaCE2 equipment configuration

e-GSC2
ETCS DATA ONLY RADIO (EDOR)

For use as EDOR applications, we also provide the **e-GSC2** equipment.

It is designed for vital data signaling transmission applications and provides two EDOR units. Each section uses a radio unit including independent power supply, Euroradio Interface, and duplexer.
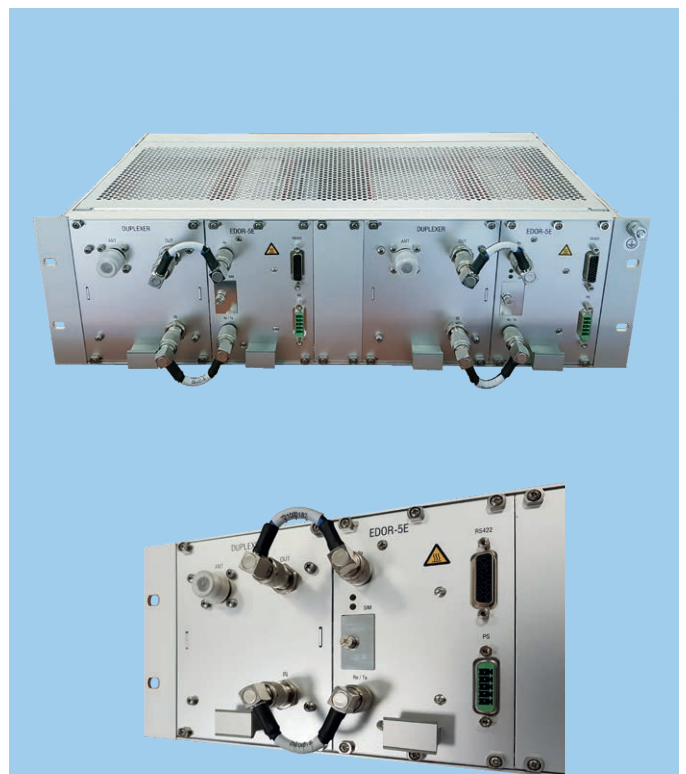
An optional version (e-GSC2L) including radio data logger is foreseen for advanced diagnostics.

The equipment is managed by means of standard and proprietary AT commands exchanged through an RS422 serial interface according to FFFIS for Euroradio V.13. No GUI (Graphical User Interface) is available.

The e-GSC2 provides all EIRENE/MORANE standard features for vehicular radio modules and complies with all environmental safety requirements and the interoperability directive.

In detail the e-GSC2 is fully aligned to Eirene 8/16 requirements for the EDOR class, including ETSI TS 102 933 V 2.1.1, RF receivers, support of CS and PS transmission with EDGE support and serial interface multiplexing. Integrated duplexers allow installation of GSM-R antennas in close proximity, without using external units.

Software updating through a data port enables easy evolution and integration of future EIRENE/MORANE requirements. Access to diagnostic information for the analysis of Quality of Service (QoS) is available.

e-GSC2 equipment

TECHNICAL DATA

	e-RACE2	e-GSC2
Supported services	• GSM Phase 2/2+ CS Bearer services for data transmission • GSM Phase 2/2+ Teleservices • GSM Phase 2/2+ ASCI • GSM Phase 2/2+ supplementary services • Compliant to EIRENE/MORANE specifications	• Transparent. Sec. GSM 04.22 (ETS 300 053) • BS24 Asynchronous data 2.4 kbit/s • BS25 Asynchronous data 4.8 kbit/s • BS26 Asynchronous data .6 kbit/s • CLIP, CoLP, UUS1, eMLPP
Call related functions	• Call authorized users (including controllers) • Railway Emergency Calls • Receive incoming calls • Group and broadcast calls • Terminate calls	• OTDI, cOTDI, USSD, CLIR, CoLR, CFU, CFB, CFNRy, CFNRc, CW, HOLD, MPTY, CUG, AoCI, AoCC, BAOC, BOIC,-exHC, BAIC, BAIC-Roam • 2x fully independent EDOR units • 4x PDP context supported x EDOR

Additional functions	• Select Mobile Radio Network
	• Register and de-register functional number
	• Radio functions (switch radio on/off)
	• Adjust loudspeaker volume
	• Remote unit MMI
	• Red key for direct Railway Emergency Call
	• Tone to warn of incoming calls/messages
		• 2x Diplexers for close positioning of antennas
		• e-GSC2L version include data logger with following additional I/F:
		  – Trace2
		  – GPS in
		  – ODO in
		  – Ethernet
		• PS coding: CS1, CS-2, CS-3, CS-4, MCS5-MCS9

GPRS	GPRS class 8 (1UL + 4DL) (optional)	GPRS class 10 & E-GPRS (EDGE)
Operative frequency band	Uplink (MHz UIC 876-880 / E-GSM 880-915) Downlink (MHz UIC 921-925 / E-GSM 925-960)	
Power supply	24V to 110V (extended range) EN50155 class S2 insulated	
Power consumption	60W max.	40W max.
Power class	GSM-R class 2 (8W)	
Sensitivity	-104 dBm	
RF characteristics	Compliant with interfering signals specified in TS 102 933	

Mechanical features

Mechanical aspects	Standard V.24 / V.11 (RS422) serial interface for data connection	
Protection degree	IP20	
Display	Advanced graphic 7" wide 800x400 RGB colour display	2x LED for status control per EDOR unit
Dimensions (HxWxD)	132.5 x 482.6 x 194 mm [5,22 x 19 x 7,64 in] (Rack 19", 3HE, 84TE 194 mm depth)	
Weight	6 kg [13,23 lb] (only shelf)	8 kg [17,64 lb]

Environmental conditions

Operative temperature	-20°C to +55°C [-4°F to 131°F]
Extreme temp. (with de-rating)	-25°C to +70°C [-13°F to 158°F]
Storage	-40°C to +85°C [-40°F to 185°F]
Altitude	-100 to 1800 m (RSL) ETSI EN50155 and 100% for short periods
Humidity	100% for short periods

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