



CYBER & SECURITY SOLUTIONS

MATRICS eNOBU (AI)/(AI-ER)

The Next Generation of
On Board Units for Transport





New communication technologies, artificial intelligence and advanced management features are integrated into a single on-board platform to make complexity manageable, service reliable and public transport a choice, not a necessity.

Electric vehicles, technology to support autonomous driving, high-speed trains, integrated multimodality, improved customer experience, optimization of operations, internal security are the reference elements to overcome the challenge of increasingly efficient public transport in a sustainable and intelligent environment.

The first step towards this goal is to have intelligent and technologically advanced vehicles at the service of operators, passengers and mobility.

Leonardo, a leader in the transport sector, wanted to take a step into the near future by evolving one of its flagship products and proposing the new e-NOBU on-board unit for buses, metro, trains and other public transport systems (light rail, tramways, ...). The challenge is to combine the distinctive features of the existing system with new technologies to propose a unique and cutting-edge solution on the market.

MAIN FEATURES

The new generation of Leonardo's On Board Unit is not only a localization and communication system between the control room and the vehicle, but an intelligent control unit on board trains, buses and subways that integrates in a single hardware device:

- A cutting-edge chipset with high processing power and high storage capacity (Raid 0 or Raid 1 support).
- A complete set of I/O ports to interconnect all on-board systems
- Integrated on-board-ground communications that also include latest-generation technologies (5G)
- Geolocalization via various satellite systems (GPS, GALILEO, EGNOS, GLONASS)
- Managed switch functionality for managing a high-speed on-board network (Gbit LAN)
- Processing unit capable of supporting on-board AI algorithms
- Video surveillance management:
 - acquisition (up to 60 channels),
 - recording,
 - data encryption,
 - standard encoding and live transmission of video streams
- The touchscreen console to provide the driver with service data, interaction with the systems, communication with the control center and the situation on board
- **RAILWAY:** features and compliance with the standards required for electronic devices used on rolling stock in railway applications. Integration of Cab Radio and Train Control Systems.
- **ROAD:** features and compliance with standards for automotive applications and complete data interface to the CAN-bus for evaluating the vehicle status to identify maintenance interventions in advance

The system includes a modular, intelligent, secure-by-design AVM application suite that enables:

- Manage the entire on-board ecosystem (display, speakers, ticket machines, CCTV, emergency call, diagnostics, network, driver console) situation on board
- Provide geolocation, travel information, on-board to ground communications, audio announcements, passenger counting, infotainment, driver services, trip management and video surveillance.
- Ensure compatibility and interoperability with the different hardware and software components used in public transport systems in compliance with the ITxPT standard
- Use AI algorithms for video and data analysis in order to optimize performance and quality of service.

The new eNOBU (AI) and (AI-ER) provide public transport companies with a real advantage in terms of efficiency, reliability and performance of the service and significant benefits for passengers.

MORE EFFICIENT MONITORING AND MANAGEMENT FROM THE CONTROL CENTER

Accurate and up-to-date vehicle location

- Immediate communication (voice and data) with drivers.
- Real-time data collection for service status assessment, performance measurement, vehicle occupancy estimation, and short-term planning.
- Live video streaming from internal and external cameras.
- Post-processing and analysis of all acquired data to improve reporting, service planning and management.
- Interaction for vehicle management and activities in storage areas.

SAFE DRIVERS, ALWAYS INFORMED AND CONNECTED WITH THE CENTRAL

- Authentication on the vehicle and identification of shifts and trips.
- All information easily available in a console specifically designed for drivers (trip data, changes and deviations, vehicle diagnostics, messages).
- One-click mode to communicate with the control center.
- Embedded speech synthesis engine for alerts to passengers on board.
- Live video from cameras on a dedicated monitor to monitor the situation inside, outside and at the exits.
- Innovative features based on Artificial Intelligence and 5G to improve safety and quality of service.
- Security function to send alarms and live video streams from the vehicle to the control center.

RELIABLE SERVICE AND BETTER PASSENGER EXPERIENCE

- Schedules, arrival times, occupancy status, travel times, warnings and alerts already available before boarding the vehicle, at stops or on the smart device APP.
- All travel information visible on displays inside and outside the vehicle and via audio announcements on board (travel data, next stop, vehicle occupancy, etc.).
- Timely information (video, audio, smart device APP) in the event of a critical event with suggestions for alternatives based on the position of the vehicle.
- Integration of emergency systems for any inconveniences
- 5G at the service of passenger safety&security and entertainment

5G and Artificial Intelligence

eNOBU AI is a cutting-edge solution that natively provides an integrated 5G modem and a chipset with a processing unit capable of supporting AI-based algorithms. These unique features enable the device to have integrated solutions for intelligent mobility and AI algorithms applied to video and data analysis to improve safety, predictive diagnostics, intelligent maintenance and service optimization.

TECHNICAL DATA

HARDWARE	
Cooling System	Fanless
Case Material	Aluminum
Operating Temperature	-40°C to +70°C (85°C for 10 minutes)
Operating Humidity	Up to 95% non-condensing
Input Voltage:	• eNOBU (AI) 12VDC/24VDC Automotive • eNOBU (AI-ER) 24VDC to 110VDC Rail
Power	< 160 watts
Dimensions	250(L) x 200(D) x 100(H)
Weight	4.5 Kg (max)
Connector Type	M12, DBx, SMA
PROCESSOR/MEMORY	
CPU	QuadCore with Neural Processing Unit
RAM	2-6 GB RAM
Flash	8GB eMMC
Hard Disk	2x M.2 SSD disk slots
Operating System	Linux for real-time applications
COMMUNICATIONS	
Wifi	802.11 ac/a/b/g/n, AP/Client mode, (MIMO optional)
3G/4G/5G	2 x 4G/5G modules (only one 5G enabled)
Ethernet Connection	• 8 x Ethernet interfaces 10/100Mb/s Standard POE 802.3af • 2 x Ethernet interfaces 10/100/1000Mb/s
Satellite Satellite (optional)	• GPS signal • EGNOS/GALILEO/GLONASS
I/O INTERFACES	
I/O Ports	• 1 ports USB 2.0 • 2 x CAN ports • 8 x digital inputs + 3 x digital outputs • 2x configurable ports (RS-232/RS-485/RS-422)
Video	HDMI connections to external display
Audio	• 2x analog input • 2x analog output • 3x analog output class D at 20W/line Audio Matrix
NVR (NETWORK VIDEO RECORDER)	
Video Acquisition	• Up to 8 directly connected POE cameras (up to 60 or more cameras with external network devices) at various resolutions and frame rates • Dynamic text insertion (date, time, GPS position)
Encoding	• MPEG4/MJPEG formats; • on-disk encryption
Video Stream	• Unicast and multicast over RTSP for recording and extraction • Circular buffers for permanent recording on hard disk • Streaming of recorded videos and sequence extraction
Compliance	Onvif 2.2
Remote control & maintenance	Integrated web server Upgradeable firmware via network
Security	• AES data encryption with 128/256 bit key • User and password access via secure protocol (HTTPS) • Portable SDD protected with double password
CERTIFICATIONS/STANDARDS	
CE mark	• Complies with RED 2014/53/EU • Complies with ROHS 2011/65/EU
Automotive	Complies with UNECE R10, UNECE R118
Railway	Complies with CENELEC EN 50155/EN45545
Vibrations	Complies with CENELEC EN 61373
IP protection	IP 65
ADDITIONAL FEATURES	
Software suite	AVM Driver Console core module SCP Sistema Conta Passeggeri PIS Passenger Information System NVR Video management OBC On Board Communication AFC Automatic Fare Collection interface CAN bus

For more information:
cyberandsecurity@leonardo.com

Leonardo Cyber & Security Solutions Division
Via R. Pieragostini, 80 - Genova 16151 - Italy

This publication is issued to provide outline information only and is supplied without liability for errors or omissions. No part of it may be reproduced or used unless authorised in writing.
We reserve the right to modify or revise all or part of this document without notice.

MM09082 10-25
October 2025 © Leonardo S.p.A.

