



LEONARDO CYBER & SECURITY SOLUTIONS

MATRICS-eNOBU

ENHANCED NEW
GENERATION OF ON-BOARD
UNIT FOR THE TRANSPORT
OF THE FUTURE



New technologies, advanced solutions and intelligence are integrated into a single on-board platform to make complexity manageable, everyday reliable and comfortable, and the future at your fingertips.

Mobility as a Service (MaaS), electric and autonomous vehicles, integrated multimodality, information exchange (5G, IoT, Artificial Intelligence, V2X communication) are the reference elements to win the challenge of an increasingly reliable public transport for sustainable cities.

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

We are leader in the transport sector and we want to take a step into the near future by evolving one of its flagship products and proposing the new eNOBU on-board unit for buses, metro, trains and other public transport systems (light, rail, people mover, etc.). The challenge is to combine the qualities of the previous version with new features that make the solution unique and at the forefront of the market.

MAIN FEATURES

The enhanced new generation of On-Board Unit is not just a localization and communication system between the control room and the vehicle, but an on-board intelligent control unit that integrates the following features in a single hardware device:

- A cutting-edge chipset with high computing 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 air-to-ground communications that also include latest generation technologies (5G)
- Geolocation through different satellite systems (GPS, GALILEO, GLONASS)
- Embedded network switch capabilities for managing a high-speed on-board network (Gbit LAN)
- Video surveillance management:
 - acquisition (up to 60 channels),
 - recording,
 - data encryption,
 - standard encoding and live transmission of video streams
- The one-touch driver console for authentication, interaction with the system, communication with the control unit, view of the situation on board.
- **Railway Environment:** characteristics and compliance with the standards required for electronic equipment used on rolling stock in railway applications. Cab Radio integration and train control systems.

- **Public Transport:** characteristics and compliance with standards for automotive applications and complete data interface to the CAN-bus for assessing the state of the vehicle and the predictive identification of maintenance interventions

Our modular, intelligent and secure-by-design AVM software integrated into the eNOBU allows to:

- Manage the entire on-board ecosystem (systems, audio / video / data communications, diagnostics, network, driver terminals)
- Interact with external systems also according to new standards and technologies (V2X, IPxPT, GTFS, etc.)
- Use artificial intelligence techniques to optimize performance and quality of service.

MORE EFFICIENT MONITORING AND MANAGEMENT FROM THE CONTROL CENTER

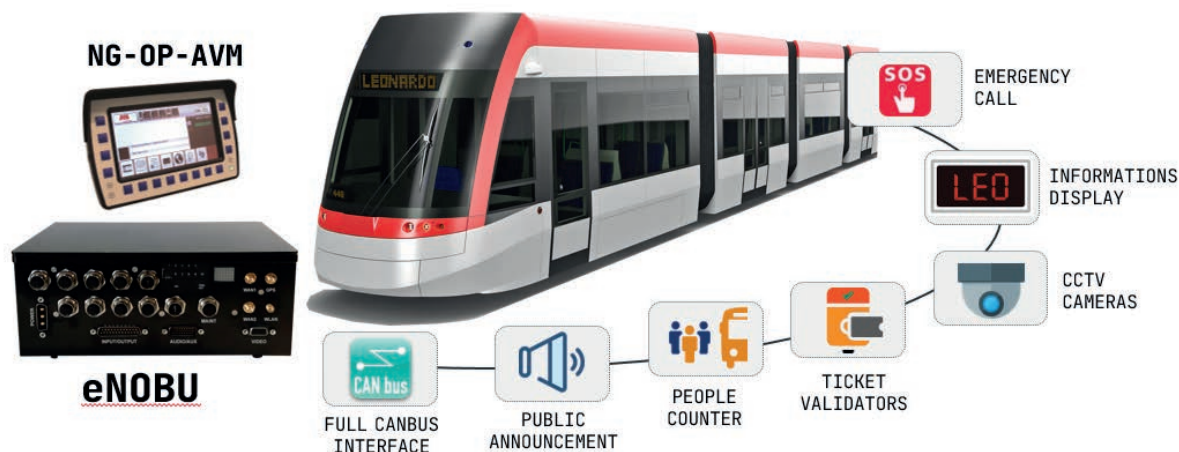
- Updated and accurate vehicle position
- Immediate communication (voice and data) with drivers.
- Real-time data collection for assessing the status of the service, measuring performance, estimating vehicle occupancy, planning also at short-term.
- Live video streaming of internal and external cameras.
- Management and a posteriori analysis of all the data acquired to improve the final accounting and the planning and regulation of the service.
- Interaction for the management of the vehicle and the activities in the depots areas.

DRIVERS ALWAYS INFORMED AND CONNECTED WITH THE CENTRAL

- Reliable authentication on the vehicle and identification of shifts and runs.
- All information available at a glance in a console specifically designed for drivers (run data, modifications and diversions, vehicle diagnostic, messages).
- One-click mode to communicate with the control center.
- Native speech synthesis engine for on board announcements.
- Live video from cameras on a dedicated monitor to watch the situation indoor, outdoor and on the doors.
- Innovative features based on Artificial Intelligence and 5G to improve safety and quality of service (remote obstacle detection, anomalous situations on board).
- Security functions to send alarms and live video streams from vehicle to control center.

RELIABLE SERVICE AND BETTER EXPERIENCE FOR PASSENGERS

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



TECHNICAL DATA

Hardware	
Cooling system	Fan less
Case material	Aluminum
Operative temperature	-40°C ÷ +70°C (80°C for 10 minutes) [-40°F to 158°F / 176°F for 10 min.]
Operative humidity	up to a 95% not condensing
Input Voltage	9-36 V DC
Power	<160 W
Dimensions (HxWxD)	100x250x200 mm [3,94x9,84x7,87 in]
Weight	4.5 Kg (max) [9,92 lb]
Connector type	M12, DBx, SMA
Processor/Memory	
CPU	Imx8 QuadCore a 1.6 GHz (automotive range)
RAM	2GB RAM
Flash	8GB eMMC
Hard Disk	2x M.2 SSD disk slots
Operating System	Linux 5.4.47 to enable real-time application
Communications	
Wi-Fi	802.11 ac/a/b/g/n, AP/Client mode
3G/4G/5G	up to 2 modules UMTS/HSPA/LTE (only 1 5G enabled)
Ethernet	<ul style="list-style-type: none">• 8 x Interfacce Ethernet 10/100Mb/s Standard POE 802.3af• 2 x Interfacce Ethernet 10/100/1000Mb/s
Satellite	<ul style="list-style-type: none">• GPS signal accuracy ± 10m, typical ± 1.5m, better with EGNOS support• GALILEO Positioning Service (option)• GLONASS Positioning Service (option)
I/O Interfaces	
I/O Ports	<ul style="list-style-type: none">• 1 ports USB 2.0• 1 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	<ul style="list-style-type: none">• 2x analog input• 2x analog output• 3x analog output class D a 20W/linea• Audio Matrix
MVR (Mobile Video Recorder)	
Video surveillance capture	<ul style="list-style-type: none">• Up to 8 POE camera directly connected to eNOBU (up to 60 or more cameras with external networking devices) at various resolutions and frame rates• Dynamic text insertion (date, time GPS position)
Codec	supported recording formats: MPEG4/H264/H265/MJPEG, H264 encryption on disk
Video Streaming	<ul style="list-style-type: none">• Unicast and multicast over RTP recording and extracting• Circular buffers for permanent recording• Streaming of recorded videos• Extraction of sequences (standard container)
Configurability	Onvif 2.2 compliancy
Remote control and maintenance	Built in web server and upgradeable firmware via network
Security	<ul style="list-style-type: none">• AES Data encryption with a 128/256 bit key• Login with user name and password via secure protocol (HTTPS)• Portable HDD protection with double password
Certification Compliance	
CE marking	<ul style="list-style-type: none">• Compliant with RED Directive 2014/53/EU• Compliant with ROHS Directive 2011/65/UE
Automotive	Compliant with UNECE R10, UNECE R118
Railway	Compliant with CENELEC EN 50155/EN45545
Vibrations	Compliant with CENELEC EN 61373
IP Protection	IP 65
Additional features	
Software suite	AVM, OBC, PIS, MVR, PCS, CAN, SDK

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