

CYBER & SECURITY SOLUTIONS

TRANSPORT SOLUTIONS

Transport Authorities require complex solutions, employing state-of-the-art technologies where effectiveness, reliability, safety and security aspects are crucial.

Continuous evolution of the transport requires more and more the technological support to improve operations and user experience: next gen of eco-sustainable buses, the stringent need to decongest traffic prioritizing the use of public transports that have to become accessible and comfortable to increase user engagement and experience, standardization in ITS data exchange (ITxPT). Vehicle digitalization, integration and interoperability among different information, communication and cyber security systems are the key drivers to the management of the future transportations.

COMPLETE SOLUTIONS

Leonardo has proven expertise in the provision of cutting-edge security, communications and IT systems to metro/ railway operators and bus transport companies.

The approach is hybrid and flexible: most of the components are internally designed and manufactured and first class external equipment and sub systems are integrated into a powerful system. Leonardo proposes a complete offer for:

BUS AND ROAD PUBLIC TRANSPORT

- **Operational Control Centre platforms** for fleet and service management, video surveillance and security and smart maintenance
- **Advanced all-in-one on board unit with 5G and AI empowering for systems integration, on board services management, location and communication**, security, infotainment, passenger counting, diagnostics and driver support
- **Smart stop systems** integration and management

METRO AND RAILWAYS

- **Operational Control Centre platforms** for SCADA automation, safety & security of the infrastructure, secure communications dispatching, data intelligence
- **Design & Build of SCADA systems** for automation and control of traction power, stations and line
- **Solutions for stations and infrastructure: Design & Build of safety & security**, infotainment and communications
- **On board solutions for cab radio** (TETRA, GSM-R/ FRMCS) and systems integration on train coaches: location and communication, video surveillance and security, infotainment, counting, etc.
- Cyber protection of the infrastructure

BENEFITS

Leonardo solution can provide significant advantages for Rail, Mass Transit and Buses transports:

- Improvements in efficiency providing with our platforms the advanced support to optimize all the operational phases and assets management
- Making vehicles and trains intelligent, connected and secure with our innovative all-in-one on board solution, enhancing the user experience and supporting all the customer staff
- Increase reliability of the infrastructure and the level of safety and security with our SCADA, integrated security platform, cyber protection
- Innovative, secure, standard and effective communication board-to-ground (TETRA, GSM-R, FRMCS, 5G/LTE, Wi-Fi)
- Safeguarding of technological investments, standard ITS integration, energy saving and optimization to a better sustainability and the realization of a green transport.



Our dedicated suite MATRICS for Road Transport is designed to manage vehicles of a public transport network in a simple and effective way, providing the operator with powerful and clear representations of the service, together with highly effective tools for operations centers, on-board systems, depots and stops. Integrating latest new technologies (Artificial Intelligence, 5G and others), our solutions are oriented to upgrade existing and next generation fleets of vehicles to make them connected and to support operation centers in planning, monitoring of service, control and reporting. Our modular solution includes applications for smart maintenance and to enhance safety and security onboard, at stops and for other infrastructures such as depots.

SOLUTIONS FOR BUSES AND URBAN PUBLIC TRANSPORT	
MATRICES-AVM for Operational Control Center	AVM Control Centre collects data from vehicles and depots and monitors the services in real-time, detecting delays with respect to timetables, checking the operative status of all the vehicles and providing operators with a wide range of functionalities for monitoring, communicating, and planning, practically all that is required for the management of a modern public transport network.
eNOBU AI for always connected vehicles (bus, tramway and road transport)	The enhanced new generation On-Board Unit is an all-in-one system that integrates in a single device all the useful modules to make buses and tramways digital vehicles: network management, geolocation, board-to-ground communication, systems integration, video surveillance, and smart maintenance. Our modular, advanced and secure-by-design AVM software allows the transport agencies to manage the entire on-board ecosystem and interact with external systems also according to new standards and technologies (ITxPT, GTFS, etc.).
NG-OP-AVM driver console	The New Generation Operator Unit (NG-OP-AVM) is the Intelligent Driver Display, specifically designed to be installed on the vehicle cockpit, close to the driver. NG-OP-AVM can be integrated with eNOBU or used as a stand-alone device able to integrate and manage on board systems such as satellite geolocation, public announcement, video surveillance, driver –to –center communication and many others.
eNOBU AI light for Smart Stop	eNOBU AI – LIGHT is specifically designed and built for the on field applications. In particular, stop have been made smart by adding intelligent functions such as video surveillance with the support of AI to increase the information content for the control center (passenger counting, safety events), timely information to passengers, infotainment, support for disabled and visually impaired people, control and diagnostics of systems and any charging stations.



Our experience in transport sector allows us to specialize and extend our suite MATRICS for the railway and metro sector both for rolling stock and for the management and monitoring of tunnels, stations and railway lines.

ONBOARD SOLUTIONS FOR METRO AND RAILWAYS TRAINS	
eNOBU (AI ER) for metro and railways trains	The enhanced new generation of AI On-Board Unit is also certified according to railway standards and represents a core unit for the management of all systems on board railway and metro carriages: network management, video surveillance, emergency call, public announcement and information on displays, passenger counting, infotainment.
f-RaCE: CAB Radio Dual (GSM-R/FRMCS)	Leonardo is a front runner in the development of the standardization of Future Railway Mobile Communication System (FRMCS) and already provides a platform able to support the current GSM-R standard functionalities. The new Cab Radio is connected to the GSM-R infrastructure for point-to-point, group and emergency calls. f-RaCE guarantees operation in the entire GSM-R band, in accordance with the last GSM specifications and makes available the functions required by the latest version of EIRENE/MORANE specifications. The added value of the solution is the readiness for 5G (and 4G) interfacing to guarantee the functionality required by the FRMCS standards which will come into force in the next few years. Leonardo FRMCS offer is completed by the platform based on our MCX solution and deployable on LTE/5G private network or over-the-top public networks to support operation and maintenance personnel.
VS4000: CAB Radio TETRA for metro and railways	VS4000 is the combination of a powerful and field proven VS4000 TETRA radio unit, a DC/DC converter suitable for Railways power feed requirements and related cabling. VS4000T provides DMO (Direct Mode Operation) Repeater/Gateway, Air Interface and End-to-End Encryption features and integrated GPS receiver that allows to fulfil the most demanding mobile communications requirements of mission critical users.



Metro and railways require an extensive infrastructure, distributed personnel to contact in different locations and has core elements in the communication system that become critical to ensure operations and reliability.

Leonardo develops and supplies secure, integrated and interoperable turnkey communication solutions for voice and data transmission, acting both as a technology provider and system integrator in order to provide turnkey business critical communication infrastructures.

Leonardo can supply multi-technology voice & data radio communications (Tetra, GSM-R, LTE, with a path to FRMCS) for onboard to ground interoperability and emergency calls, but is able to design & build multiservice networks to support integrated security and entertainment, SCADA systems, and more.

COMMUNICATION NETWORKS FOR URBAN TRANSPORT AND RAILWAYS

<p>GSM-R/FRMCS</p>	<p>The implementation of the Future Railway Mobile Communication System (FRMCS) will allow the transfer of a greater amount of data, enabling new possibilities for rail and public transport about operation & maintenance and passenger experience. Leonardo is front runner in the implementation of FRMCS and already provides in the proprietary solution named FR_linX, MCX 3GPP standard services applied to the railway world on which FRMCS is based.</p>
<p>TETRA</p>	<p>The Adaptanet® is a complete modular, scalable suite of TETRA products, satisfying requirements of high performance and secure encrypted communications of a transport network. The solution provides all the essential core equipment and services for voice and data calls, as well as a comprehensive range of supplementary and enhanced services (Core network, Base Stations, terminals and cab radio, Network Management System, dispatcher, and more).</p>
<p>Hybrid networks</p>	<p>LTE and 5G will play a strong role in professional communications in the coming years, but it is widely accepted that a long period where several communications technologies will co-exist is going to characterize the Critical Communications sector both in the mission and the business critical sector. Leonardo multi-technology hybrid network platform (MOSAIC) is a solution designed for long lasting integrated narrowband-broadband infrastructure supporting professional network evolution. The MOSAIC core network provides coordination and control functions for the integrated network and core network services for TETRA, DMR and MCX components.</p>

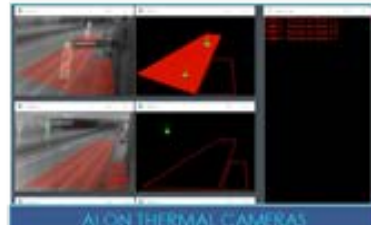


Safety and security in public transport and railways are essential as they protect lives, ensure efficient operations, and boost public confidence in using these systems.

Leonardo security platforms are designed to provide a common operational picture for Command & Control, security management, situation awareness and resilience, creating a handling center for safety and security monitoring and control in-vehicle operations, stops and stations, railways, depots and all the necessary assets both for urban public transports and metros or railways.

Leonardo can provide an integrated control center solution where security authorities can easily supervise the infrastructure, quickly assess, and proactively respond to an alert, with a high level of cooperation between all the involved entities.

SECURITY INFORMATION MANAGEMENT FOR ONBOARD, STOPS AND INFRASTRUCTURE	
SC2	<p>A very flexible, scalable and reliable solution to manage security with a high level of configurability and the possibility to create a federate architecture connecting different sites. The solution allows complete situational awareness with all info, resources and alarms, actionable on a geo-localized map. Different systems of various brands can be included and operations can be also enhanced by AI Video analytics.</p> <p>Dozens of brands for many different security systems are integrated. The solution also provides the possibility to command and control drones and robots, mobile app, body worn camera and voice communication to coordinate on field resources.</p>
Ganimede	<p>Ganimede is Leonardo advanced framework for managing AI-based algorithms for analysis of audio/video sources, live or recorded.</p> <p>A single platform with more than 20 algorithms easily configurable and applicable on already existing multi-brand video sources. Possibility to apply multiple algorithms on the same streaming.</p> <p>Implementation and training of algorithms in Leonardo labs specialized in AI, scalability on projects up to 10,000 cameras with 20 different algorithms</p> <p>Natively integrated in Leonardo platforms, Ganimede provides interfaces for integration in third party systems.</p>



SCADA (Supervisory Control and Data Acquisition) systems are vital for the efficient and safe operation of railways and metro systems: traction power control, cooperation with signaling and train control systems, supervision of electromechanical assets (lighting, HVAC, lifts, escalators, utilities) and IT and network systems

SCADA APPLICATION FOR METRO, RAILWAYS AND TRANSPORT ASSETS

SCADA Application

The Leonardo GRS SCADA application is designed to provide:

- Real-Time Monitoring on all the different components enabling operators to control and respond to issues promptly.
- Enhanced Safety by detecting anomalies helping prevent accidents and ensures passenger safety.
- Automation of processes reducing human error and improving overall efficiency.
- Early detection of faults minimizing downtime, repair costs, and potential fines.
- Advanced analysis on historical collected data to improve maintenance schedules and operational strategies.

Beyond the basic SCADA functionalities, Leonardo solution provides important and unique capabilities to control both simple infrastructures and very large and complex systems (>600K tags) supporting SIL-2 certification and security –by -design.

Possible application in innovative road public transport infrastructures to oversee and control assets such as recharging stations and infrastructure components.



Cybersecurity is crucial for companies and agencies managing road transport, metro and railway services to protect passengers, infrastructures and data. Worldwide, nations are developing specific regulations and require compliancy to standards to increase cyber resilience of transportation.

Failure to address security risks could lead to serious injury or fatality, disruption or damage to systems, impact upon business operations, reputation damage, loss of revenue, financial penalties or litigation.

Leonardo can help transports make changes to their cybersecurity posture and develop stronger, risk-based cybersecurity approaches through a wide offer portfolio.

Leonardo's services and platforms guarantee the monitoring and predictive, proactive protection of strategic data and assets. Architectures and secure-by-design systems, Artificial Intelligence and Big Data, virtualization and supercomputing techniques play a central role in detecting and analyzing cyber threats, as well as in responding to and resolving cyber-attacks.

CYBER SECURITY AND RESILIENCE ONBOARD AND FOR INFRASTRUCTURE	
Advisory and Consulting Services	Leonardo consulting services are focused on supporting organizations in: governance management, definition of procedures, compliance with standards and regulations, penetration tests and risks management, vulnerability analysis, assets and supply chain management. Leonardo supports customers with Design & Build services based on a proprietary approach and an established process for implementation of security management infrastructures (SOC, CERT, IOC).
Global Cybersec Center and Advanced Managed security services	Leonardo managed security services allow us to configure and monitor IT/OT systems' security status with the aim of promptly identifying any breach of security policies and applying appropriate actions.



The importance of exploiting big data with analysis and global monitoring for Mass Transit agencies, especially considering the large amount of heterogeneous data they generate from multiple IT systems, is a relevant opportunity that opens to the following advantages:

- Enhanced Efficiency: By analyzing traffic patterns, passenger flow, and operational data
- Predictive Maintenance by identifying potential issues before they cause disruptions.
- Improved Safety identifying high-risk areas and accident-prone zones, allowing for targeted security measures
- Increasing Real-Time Monitoring to optimize operation performance and quality of service

Leonardo global monitoring solution provides superior situational awareness, complete coordination and control of operations in the management of day by day operational status, activity trend and critical situations.

GLOBAL MONITORING PLATFORMS	
Global Monitoring and Data Intelligence	genesiX advanced global monitoring platform is able to correlate large quantities of data from heterogeneous sources in real time to enable the georeferenced situational awareness, prevention, forecasting, multidata correlation and analysis, onfield coordination, synoptic table & dashboarding, dossier & reporting. Forge2Know is the platform engine designed to automate and streamline data governance, data ingest and big data processing, interacting seamlessly with third-party applications. Platform agnostic and flexible in its supportability, Forge2Know includes an AI/ML module, providing a robust platform for machine learning model development and deployment.



HIGHLIGHTS

Leonardo designs and deploys effective, secure and reliable solutions matching the challenging requirements of transportation sector.

The Leonardo long experience in the Railways and Urban Transports domain, the wide solutions portfolio and the leadership in technology and innovation are the elements on which our offer for a digital, multimodal and secure future mobility is built.

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