

LEONARDO 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 V2X (Vehicle-to-everything interconnection paradigm), autonomous driving, 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 have proven expertise in the provision of cutting-edge security, communications and ICT 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. This allows us to provide flexible solutions capable to optimize CAPEX and OPEX. Leonardo proposes a complete offer for:

### BUS

- Operational Control Centre platforms for fleet and service management, video surveillance and security, smart maintenance
- Advanced all-in-one on board unit for systems integration, on board services management, location and communication, security, infotainment, counting, diagnostics and driver support
- Smart stops systems integration and management
- Operations & maintenance and safety & security at depots.

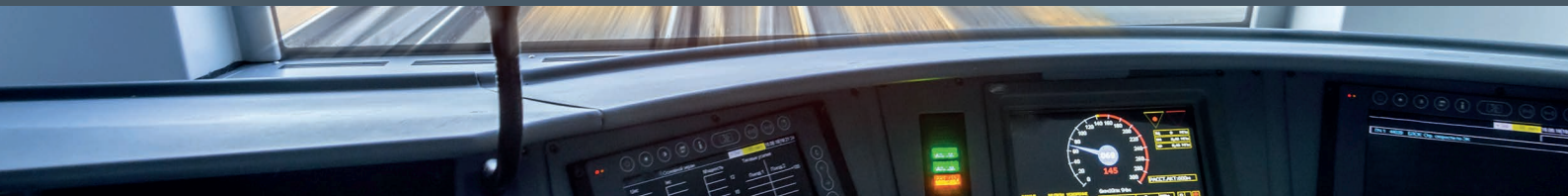
### METRO AND RAILWAYS

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

## 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 Rail, Metro and buses 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 centres, on-board systems, railway line and stations/stops. Integrating last new technologies (Artificial Intelligence, 5G and others), our solutions are oriented to upgrade existing and next generation fleets of vehicles and trains to make them connected and support operation centres in planning, situational awareness, prevention and intervention, data gathering and valorization.

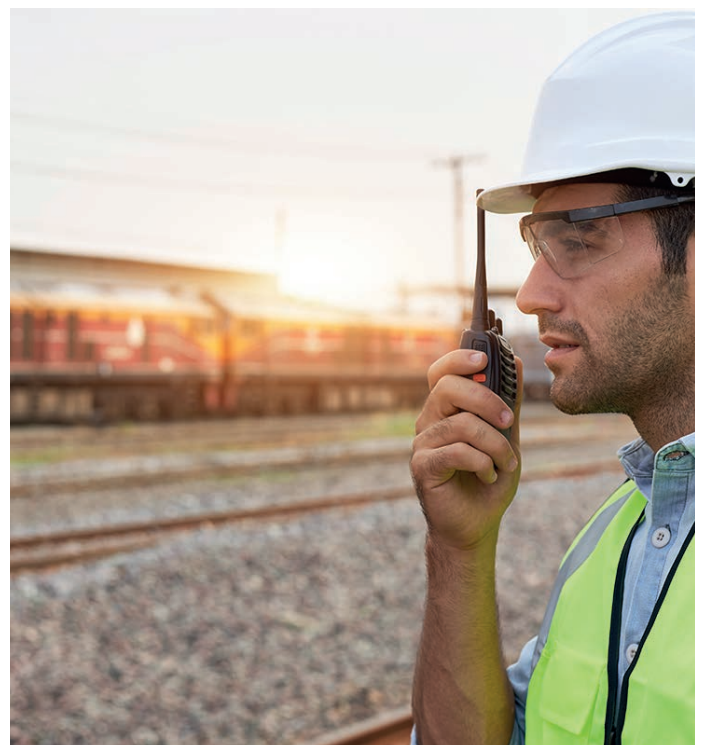
### Solutions for Bus, Subways and Railways

<p>MATRICES-AVM for buses and light rails</p>	<p><b>AVM Control Centre</b> 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 the a wide range of functionalities for monitoring, communicating, and planning, practically all is required for the management of a modern public transport network.</p>
<p>eNOBU for buses, metro and railways</p>	<p>The enhanced new generation of <b>On-Board Unit</b> is an all-in-one core system that integrates in a single hardware device all the useful modules to make buses, tramways and trains digitalized vehicles: network management, geolocation, communication board-to-ground, systems integration, video surveillance, and smart maintenance. Our modular, advanced and secure-by-design AVM software allows to manage the entire on-board ecosystem and interact with external systems also according to new standards and technologies (V2X, IPxPT, GTFS, etc.).</p>
<p>NG-OP-AVM driver console for buses and railways</p>	<p>The <b>New Generation Operator Unit (NG-OP-AVM)</b> 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, communication driver-to-center and many others.</p>
<p>CAB Radio-Race GSM-R for railways</p>	<p><b>RaCE</b> solutions meet the requirements of onboard GSM-R voice and data ground-to-train radio communications. Two advanced systems:</p> <ul style="list-style-type: none"> <li>• <b>e-RaCE2</b> that provides the features of an advanced <b>GSM-R</b> telephone, aligned to Eirene 8/16 requirements, with all the special railway functions for vital data signalling transmission applications.</li> <li>• The <b>e-GSC2</b> provides all <b>EIRENE/MORANE standard</b> features for vehicular radio modules and complies with all environmental safety requirements and the interoperability directive.</li> </ul>
<p>CAB Radio-FRMCS for metro and railways</p>	<p>The <b>European Telecommunications Standard Institute (ETSI)</b> and the <b>International Union of Railways (UIC)</b> are carrying out the standardization of <b>Future Railway Mobile Communication System (FRMCS)</b>. Leonardo is front runner in the development of the solution and already provide a platform able to support all the standard functionalities. The platform is an over the top solution related to communication infrastructure, based on MCX 3GPP standard and supported by Leonardo new evolution of eNOBU.</p>
<p>CAB Radio - TETRA VS4000T for metro and railways</p>	<p><b>VS4000T</b> 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 allow to fulfil the most demanding mobile communications requirements of mission critical users.</p>

Metro and railways has extensive infrastructure, personnel to contact distributed in different locations and has a core element in the communication system that becomes critical to ensure operations and reliability.

Leonardo develop and supply secure, integrated and interoperable turnkey communication solution for voice and data transmission, acting both as a technology provider (TETRA, DMR, Broadband Applications, hybrid networks) and system integrator in order to provide turnkey business critical infrastructures.

Critical Communications	
LTE/5G	<b>LTE infrastructures</b> support data intensive Law Enforcement applications. Leonardo has a system integration approach providing third party infrastructure to supply extensive coverage, integration of commercial networks, hot spots (with tactical system or network-in-a-box configuration).
TETRA	The <b>Adaptanet®</b> is a complete modular, scalable and flexible family of TETRA products, satisfying requirements ranging from single-site to national networks. The system supports technology enhancements with full IP communications, and is complemented by terminals dispatching solutions and service applications.
DMR	<b>ECOS DMR</b> solutions are characterized by a high degree of scalability and flexibility that allows selecting the most suitable configuration for Customer's requirements. The same radio base station can operate in <b>DMR Tier II</b> , with simulcast option and dynamic <b>analogue FM</b> , or <b>DMR Tier III</b> in simulcast or cellular configuration.
Hybrid networks	<b>LTE</b> and <b>5G</b> 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 <b>RIM (Italian acronym for multi-technology hybrid network)</b> is a solution designed for long lasting integrated narrowband-broadband infrastructure supporting professional network evolution. The RIM core network provides coordination and control functions for the integrated network and core network services for <b>TETRA, DMR and MCX</b> components.



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.

Leonardo can provide an integrated control centre 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.

## Physical Security solution

SC2

A very flexible, scalable and reliable solution to manage security with a high level of configurability and the possibility to create a federative architecture between 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 supported by the integration of AI Video analytics and communications.

## SUPERVISION CONTROL AND AUTOMATION



Infrastructure situational awareness, traction power supervision, command and automation for metro and rail, stations and stops systems monitoring are significant aspects for the network reliability.

Energy consumption is another important factor to optimize and supervise to reach emission control target as well as increase effectiveness, safety and efficiency of operations: Leonardo platform and solutions can support these key tasks in road and rail transport.

## Supervision Control and Automation platforms

SCADA Application for metro and railways

The Leonardo SCADA application is designed to provide supervision, control and automation of electric power and traction, electromechanical systems in stations, tunnels, depots, buildings and along railway lines and integration with external systems such as signalling, telecommunications and security. Beyond the basic SCADA functionalities, it provides important and unique capabilities to provide the control of both simple infrastructures and very large and complex systems (>600K tags) supporting SIL-2 certification and security-by-design.

EMODS for metro and railways

**ENERGY MONITORING & OPTIMIZATION FOR DECISION SUPPORT** is an enterprise system supporting consumption assessment, energy efficiency intervention as well as consumption monitoring and management of buildings and infrastructure assets.

The railway and mass transit sector is undergoing a major transformation of its operations, systems and infrastructure due to the digitisation of OT and IT systems and infrastructure, the automation of railway processes, the issues of mass transit and the increasing numbers of interconnections with external and multimodal systems. In this context, it is becoming even more crucial for the railway sector to tackle cyber threats.

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

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

Cyber solutions	
Cyber resilience & 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 management
Design and build services	Design & Build services are based on a proprietary approach and an established process for designing and building security management infrastructures (SOC, CERT, IOC).
Managed security services	Our <b>Security Operation Centers (SOCs)</b> provide a flexible and comprehensive set of management and monitoring services that can be quickly tailored around an organisations specific needs.
Cyber security platforms	<p>Leonardo services (as well as Leonardo projects) take advantage of in house designed platforms helping security operators in their task:</p> <ul style="list-style-type: none"> <li>• <b>Cyber information superiority suite</b> composed by a combination of platforms providing threat intelligence, end point protection and malware analysis is based upon Information Superiority concepts applied to the cyber domain to obtain valuable and actionable information, which can be used to rapidly implement targeted defence and containment actions</li> <li>• <b>Cyber Situational Awareness system</b> is a complete ecosystem specifically designed to keep an organisation's security teams and executive profiles informed of what is happening in terms of Cyber security supporting decision making and security investigation processes.</li> </ul>

## CYBER TRAINING

Cyber threats are constantly evolving and becoming more and more pervasive and sophisticated; this is determining the need of a diffused awareness on cyber security among end user personnel and the necessity of constant training and exercise for cyber security specialists.

Leonardo can support his Customers with both a cyber-training offer and platforms leveraging innovative technologies and learning methodologies.

Cyber Training	
Cyber & Security Academy	An innovative facility in to promote cyber security awareness increase competencies by means of a complete training portfolio delivered by expert trainers leveraging advanced platforms for hands on exercises.
Cyber Trainer	Cloud-based platform to train and keep up to date both security professionals and non-expert users. Managing the whole training process (training needs, formal learning, exercises, certification)
Cyber Range	Integrated environment for immersive realistic simulations of cyber attack/defense scenarios and advanced simulation operation to test cyber resilience of system and infrastructures.

Taking advantage of the integration of in-house developed systems with “best-of-breed” technologies, our Integrated Control Center has been designed specifically to address high-grade requirements of performance and security in railway and mass transit environment leveraging technology to multiply operators’ effectiveness, improving efficiency.

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 emergencies.

### Global Monitoring platforms

#### Ganimede

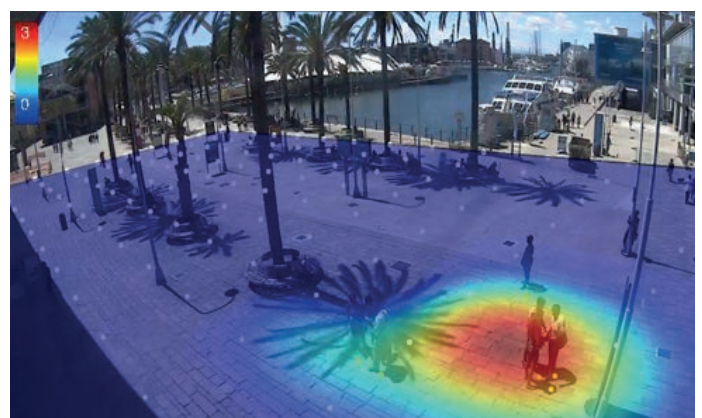
The Leonardo solution for the audio and video analysis based on AI, instantiable through different frameworks on different HW platforms and applicable on live or recorded streams. Leonardo Artificial Intelligence Labs can develop and train customized solutions. Natively integrated in SC2 or X-2030 platforms, Ganimede provides a set of API for applications in third party systems.

#### X-2030

**X2030** is the new “System of systems” implementing a new “Data & Experience-Centric Operating Model”.

- Integration of all existing systems and applications.
- Collection of information from structured (data bases, archives) and not structured (video, sensors, media) data sources.
- Supply of information superiority to operators for effective event monitoring/surveillance/management, also providing operational suggestions.
- Optimize logistics and resource management.

If “Data is the new oil”, X2030 is the innovative solution tailorable according to the specific domain to support infrastructure operation and events management.



## 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.

## ABOUT CYBER AND SECURITY SOLUTIONS DIVISION

With experience in information technology, communications, automation, physical and cyber security, Leonardo Cyber and Security Solutions Division generates synergies by joining its expertise to support enterprises, agencies, public safety, security and emergency organizations. Our offer includes solutions for the security and protection of critical infrastructures, transport infrastructures, major events and stadia, cyber security, integrated networks systems and secure communications that enable reliable and efficient information management.



Secure Cloud &  
Digital



Global  
Monitoring



Mission Critical  
Communications



Cyber Security  
& Resilience

**For more information:**  
[cyberandsecurity@leonardo.com](mailto: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.

2023 © Leonardo S.p.a.

MM08483 04-23