

LEONARDO CYBER & SECURITY SOLUTIONS

CRITICAL COMMUNICATIONS





Cutting edge telecommunication solution

Leonardo is a world leader in the supply of communications systems for the protection of communities and infrastructures. With over 100 years of experience, we develop integrated and interoperable cutting edge telecommunication solutions for military, civil and institutional customers.

The company is acting both as a technology provider and system integrator to provide turnkey mission-critical infrastructures to professional customers.

We develop in-house technologies including TETRA, DMR, broadband applications and network integration infrastructures.

Our networks solutions employ latest technologies and are characterized by a secure by design approach with enhanced security and reliability characteristics.

- Over 50 countries rely on our integrated mobile communications.
- We support public safety and emergency services, civil protection agencies, transportation bodies, utilities and homeland security authorities.
- We provide secure, integrated, reliable and interoperable multi-technology communications solutions.

TERRESTRIAL TRUNKED RADIO (TETRA)



TETRA is the communications standard of choice for organisations or groups that require immediate access to reliable, secure communications. Engineered for the emergency services, it is ideally suited to a number of other requirements.

The versatility of TETRA technology makes it an ideal solution for several markets both in public safety, industrial and transportation sectors.

TETRA is perfectly suited to scenarios where security and reliability of communications are priorities. Leonardo TETRA product portfolio is based on full-IP solution (**Adaptanet**[®]) with the capability to support also our previous TETRA TDM version (ElettraSuite) for mixed technology infrastructures.

The complete line of TETRA services, includes:

- Individual communications
- Group communications
- Broadcast communications
- Mobile data communications including Short Data Services (SDS) file transfer and internet access
- Mobile data services taking advantage of multi-slot packet data for narrowband communications
- Integration with broadband data-intensive communications.

Leonardo TETRA offer is composed by:

- Radio base stations (**BS Node** series and **DTA node** series) for TETRA coverage and deployment on territory.

- SwMi (TETRA Switching and Management Infrastructure composed by CPS ecosystem) intrinsically ready for multi technology integration.
- Control room equipment including recorders and dispatchers.
- Gateways for interconnection with external networks (PSTN, ISDN, and packet data).
- Peripheral terminals such as handhelds, mobile and fixed stations.
- Applications including Location services, encryption and network management systems.

Leonardo solutions value can be summarized as follows:

- **Full IP** distributed or centralized architectures
- **Scalable** from single site to nation-wide
- **Fast** deployable and **easy** to install
- **Resilient** reliable and secure
- **Native** broadband integration
- Standard hardware and protocols open to **virtualization and cloud**.

DTA BASE STATIONS

DTA is the new family of Leonardo convergent modular multi-technology radio base stations, leveraging powerful hardware modules, increased security and high degree of flexibility.

Designed in TETRA and DMR version that share the same architectural approach, allow the building of complex networks combining a basic (TETRA or DMR) building block called DTA carrier implementing a complete transceiver in terms of computational power, synchronization capabilities, radio and terrestrial interfaces to which filters and branching units are added as needed.

DTA base stations (including **DTA-Node TETRA** and **DTA7000 DMR**) maintain full compatibility with existing BS-Node and RBS4000 models and can be employed in mixed configuration infrastructures.

VS4000 ECOSYSTEM SOLUTIONS

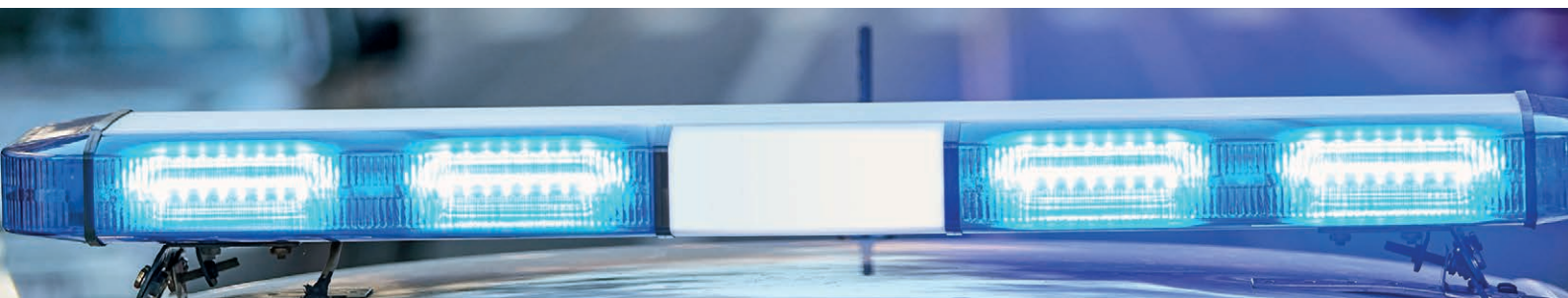
The **VS4000 ecosystem** solutions combines the powerful and performances of the TETRA radio unit (VS4000) with the flexibility and user-friendliness of **FPG3 Plus** front panel.

Features such as LAN interface and Wi-Fi access point extend connectivity options.

VS4000 is also the core upon which TETRA fixed radio station (**FC4000**) and Radio dispatcher unit (**RDS4000**) are built.

VS4000 supports TETRA DMO (Direct Mode Operations) thus allowing communication services even in the absence of a conventional infrastructure.

With the Wi-Fi within a FPG3 front panel inside the vehicle, it is possible for smartphones and tablets to become a secure entry point into the professional network.



DIGITAL MOBILE RADIO (DMR)



DMR is the ETSI standard for digital radio communications. It introduces a 2 slot TDMA channel access feature, doubling the communication capability and making simultaneous voice and data applications possible.

The company's "dual-mode" **ECOS-D** and **ECOS-E** (conventional Tier II) network are able to work in analogue and digital modes.

This feature allows the use of existing analogue terminals with the possibility to gradually substitute them with new digital terminals as required.

DMR solutions encompass both Tier II conventional Simulcast and Tier III trunking networks.

Leonardo DMR solutions operate on VHF and UHF frequencies bands, feature a full-IP system architecture and are IOP certified for primary vendors DMR terminals. DMR multi-site solutions allow versatility in network architectures supporting several configurations and different inter-site links (IP, E1, 4W-EWM and RF).

DMR networks can be used to support SCADA applications as well as operational communications over large areas using the same physical channel, due to the 2-slot TDMA air interface structure.

DMR solution includes:

- Repeaters for standalone, conventional, simulcast and "trunking" configurations (**ECOS-D RBS 4000** and **ECOS-E DTA 7000**).
- Dispatchers and control room terminals.
- Network management applications.



SIMULCAST

Simulcast (Simultaneous Broadcasting) networks are the best solution for professional mobile radio applications requiring the coverage of large territories with low-medium traffic density and only a small number of frequencies available.

The company designs and manufactures conventional DMR Tier II and Tier III Simulcast solutions that are used by Italian and world PMR organisations in both the public and private sectors.

In a Simulcast network, repeaters are spread over the territory to make a sort of virtual repeater covering the whole served area and offering a transparent communications handover. The main challenge when designing a Simulcast DMR system is to manage the delay spread that characterises overlapping areas.

The company has wide experience designing networks using radio coverage and delay spread analysis – this provides optimised system performance.

TRUNKING

Tier II solutions are complemented by **DMR Tier III "trunking"** solutions designed to cope with higher traffic volumes given the capability to manage multiple frequency pairs and instructing terminals in automatic tuning operations by means of a control channel.

Trunking solutions includes:

- Single site system
- Simulcast multi-site system (number of frequencies and channels is the same in each site)
- Cellular multi-site system.

Leonardo DMR solutions value can be summarized as follows:

- **All-in-One** base station including all supported configurations.
- **Powerful DSP** based design for simulcast issues
- Efficient Simulcast over IP (**SoIP**) protocol ensuring signal quality
- **Switchless** architecture (DMR Tier III) with embedded controller in base stations supporting multi system/multi protocol centralized or distributed configurations
- **Versatility** in radio base station configuration
- Auto adaptive/multiple link technology (A2T)
- Embedded UHF link (CST).

BROADBAND (LTE AND 5G)



Broadband is constantly gaining importance in professional communications market both in the mission-critical and business critical sectors driven by the ever increasing use of data and multimedia.

While relying on third party equipment for access and core network, Leonardo is focusing on service core network and applications in order to provide professional broadband services and integration with narrowband infrastructures.

Our award winning **CSP-MCX** is a complete solution compliant with 3GPP Standard MCX. It includes features from MC PTT, MC Video and MC Data providing users with the next generation platform for professional communications over **4G/5G** networks.

Based on a microservices architecture, CSP-MCX is a cloud native solution ready to be deployed on networks and 5G slices.

While being able to interact with existing IMS systems (as possibly existing in commercial networks) our solution features an embedded SIP core for small deployments.



Leveraging system integrator capabilities, Leonardo broadband offer can be summarized as:

TACTICAL SYSTEMS

- Employing selected third party system for deployable installation providing communications in underserved areas or integrating existing networks.

NETWORK INFRASTRUCTURES

- A wide range of solution ranging from Private Mobile Networks covering a site such as a factory or a plant, to large scale networks in cooperation with Public Telecom Operators according to the MVNO model.

PUSH-TO-TALK SOLUTIONS

- 3GPP standard (CPS-MCX) or proprietary (XPTT) solutions that can be deployed in an OTT fashion over commercial networks or fully integrated in private infrastructures taking full advantage of Mission Critical functionalities foreseen by the standards.

Leonardo broadband solutions value:

- **System integration** approach and capability.
- Partnership with primary LTE/5G Vendors
- **Scalability** in business approach (from tactical system to Secure MVNO)
- **Narrowband integration** solution
- Professional ecosystem including control room and applications
- **Cyber security services** (Secure by design, MSS).



HYBRID NETWORKS



Most narrowband evolution projects foresee narrowband/broadband coexistence. Interoperability is a key for smooth evolution. **RIM (Italian acronym for multi technology heterogeneous radio network)** is Leonardo framework for broadband transition. Providing a convergent approach for narrowband/broadband integration, RIM allows to design and deploy future proof infrastructures that taking advantage of existing technologies allow the phased introduction of new functionalities in a seamless way maintaining a unified network and users' management and control.

Leonardo RIM is an integrated multi-technology network that provides unified services to professional users. RIM network model foresees heterogeneous access networks coordinated by an integrated core network that provides technology independent access to control room and applications.

RIM ACCESS LAYER

Is composed by Leonardo narrowband infrastructures (TETRA and DMR) and third party broadband networks.

RIM CORE LAYER

Built upon Leonardo CSP ecosystem provides:

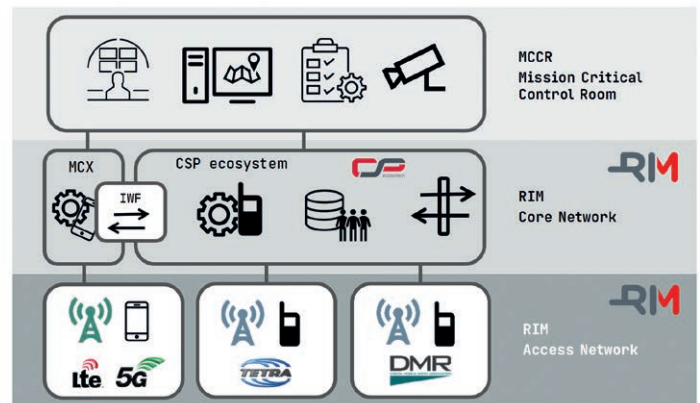
- coordination and control functions for the integrated network
- core network services for TETRA and DMR
- standard MCX components and standard LMR-IWF for narrowband/broadband integration.

RIM APPLICATION LAYER

Contains multi-technology control room where LMR dispatching functions are extended to multi-technology environment and can be enriched with multi-media and video services.

Leonardo RIM solution value can be summarized in:

- **Convergent approach** for narrowband/broadband integration
- **Unified** user management and provisioning
- **Unified multi-technology** enabled control room providing voice messaging and location based services
- Standard based and legacy solutions **coexistence**
- Enhanced **availability and reliability**
- Enhanced **security**.



RIM basic scheme of the Layer's concept





CSP ECOSYSTEM

CSP (Communication Service Platform) ecosystem is an implementation of the Next Generation Network designed for the professional Sector. Providing PMR/Mil multimedia services independently of the technology access and allowing integration of legacy Networks with new generation access networks such as 4G/LTE and 5G.

The CSP integrates not only infrastructures, but also subscribers in order to obtain a single, unified and homogeneous physical and logical network.

- API/Service layer provides unified network model to applications that can be written in a network-agnostic mode.
- Communication Manager deliver unified voice, video, Messaging, Data pipe and File transfer communication services.
- Adaptation layer translates individual payload and signaling into a common format.

CORE NETWORK	CSP-CM Communication Manager	Voice/data services for integrated networks
	CSP-SMN Service Management Node	Subscriber management
	CSP-GW Gateway	Interface with other networks (specialized according type)
CONTROL ROOM	MCCR Mission Critical Control Room	Enhanced technology agnostic dispatching and command/control
	CSP-REC Recorder	Server/Client multi-protocol recorder
	CSP-CRIS Control Room Interface Server	Application server for third party control rooms
MNGT	CSP-NMS Network Management System	Network management application and functions



HIGHLIGHTS

Leonardo develops state-of-the-art integrated and interoperable telecommunications solutions for military, civil and institutional customers.

Leonardo operates both as a technology provider and as a system integrator to provide turnkey infrastructures capable of meeting the most challenging requirements of professional clients.

Technologies developed internally by Leonardo include TETRA, DMR, broadband applications and network integration infrastructure.

Operations room and management applications complement network infrastructures for a true professional communications ecosystem.

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

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

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