

# Critical Communications



# Cutting edge telecommunication solutions

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 and network integration infrastructures.

- › 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 sectors such as:

- › Public Protection & Disaster Relief (PPDR)
- › Critical Infrastructures
  - Utilities
  - Oil & gas
  - Industries
  - Airports, ports, highways etc.
- › Transportation
  - Metro, bus, railways
- › Military

TETRA is perfectly suited to scenarios where security and reliability of communications are priorities.

Leonardo TETRA product portfolio is based a full-IP solution (ElettraSuite 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 infrastructure is composed by:

- › Radio base stations (BS Node series) for TETRA coverage and deployment on territory.
- › SwMi (TETRA Switching and Management Infrastructure) 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 Automatic Vehicle Location (AVL) and network management systems.



## 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.

Optional features such as CAN bus 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.

## PUMA T4 HANDHELD TERMINALS

The PUMA T4 family introduces a new concept of handheld device, with a modular design combining reliable and secure communications with new value added services that greatly enhance efficiency in daily operations and emergency situations.

An Android based general purpose core provides computing, ancillaries and MMI functions integrated with radio communications provided by a modem component.

The company's TETRA solutions are part of the CSP (Communication Service Platform) ecosystem multi-technology platform infrastructure that is a key component of the professional network evolution.

## 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 (conventional Tier II) network is 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 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 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 solution includes:

- › Repeaters for standalone, conventional, simulcast and “trunking” configurations
- › 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.

# **LONG TERM EVOLUTION (LTE)**

LTE is the preferred technology for the provision of broadband to the Professional Market.

LTE provides data communication services in combination with existing narrowband PMR voice services. At a later stage (depending on international standardisation activities) LTE technology could include PMR class voice capability and become the dominant technology for professional application.

While relying on third party equipment for access and core network, Leonardo is focusing on service core network (also including MCPTT- Mission Critical Push-to-talk, MC Data and MC Video) in order to provide professional broadband services and integration with narrowband infrastructures.

## **CHARACTERISTICS**

Acting as a system integrator and a technology provider Leonardo realizes professional broadband solutions whose main characteristics may be summarized as:

### › **Overlay and Integration**

- This guarantees PMR users high-speed data integrated with classic TETRA or DMR voice services.

### › **Scalability**

- Public Safety Agencies, Utilities and Industries will be able to scale the system as appropriate for their broadband network.

### › **Effectiveness**

Leveraging the know how in TETRA networks:

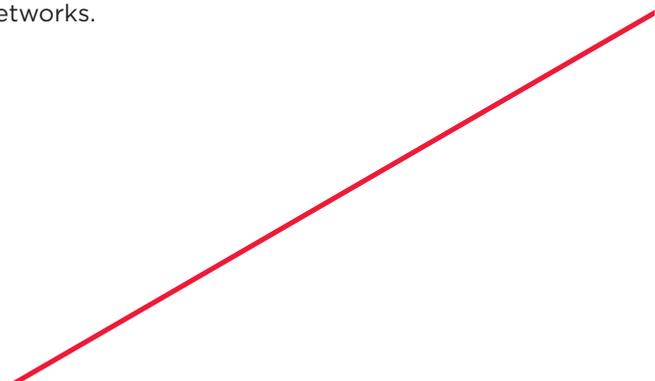
- The company has integrated the LTE to assure PMR-like performance in its broadband data services.

### › **Flexibility**

- The LTE solution allows the use of different business models depending on the context. This can range from the integration of self-managed broadband to the deployment of LTE (where allowed) on public infrastructures under the control of a private PMR core.

### › **Network management**

- Network traffic management is essential in many mission critical scenarios in order to maintain an acceptable level of network quality and resilience.
- LTE allows Public Safety Agencies to control critical features of the network even if integrated with other TETRA or DMR networks.



# COMMUNICATION SERVICE PLATFORM (CSP)

CSP (Communication Service Platform) is an implementation of the Next Generation Network designed for the professional sector, including PMR/LMR users such as first responders, Police and defense.

These environments tend to be characterised by performance and reliability issues that are often experienced in spite of feature availability.

By contrast, commercial environments (enterprise and public networks) offer versatile and feature rich solutions that are built around COTS technologies. As such they can lack the quick response and reliability characteristics that are essential in mission critical environments.

CSP ecosystem aims to combine the best of both solutions, by delivering the features enjoyed by the commercial environment with the adaptability, scalability and performance of the professional environment. This will bring increased effectiveness without compromising performance or reliability. In addition, CSP will integrate with existing equipment and infrastructures in the new critical communication solution.

CSP provides PMR/Mil multimedia services independently of the technology access and is open to integrate legacy Networks with new generation access networks such as 4G/LTE.

In a CSP network, multimedia services such as video-conferencing, conference call and high speed data transfer (via LTE) are available together with conventional PMR services.

The CSP integrates not only with PMR/Mil and TLC networks, but also their subscribers in order to obtain a single, unified and homogeneous physical and logical network.

The CSP reference model aims to surpass the traditional stovepipe organisation where each application had to deal with specific control plane and access plane for each communication technology used embracing the Next Generation Convergent Network approach.

There is a single control that interacts with access technologies on the lower side and offers a unified virtual network model to upper side applications. In the unified control plane, professional services are implemented and “adapted” to underlying technologies according to technology features and possibilities. The control plane contains interfaces for access to other communication services.

CSP offers a communication services applicable to a number of communication technologies for a number of high level applications.





From an architectural point of view, each single technology is interfaced by means of a gateway that translates the specific legacy signaling into the common extended IP/SIP languages and also deals with the codec negotiation as appropriate.

A common call manager (modelled on the TETRA call manager) deals with communication control and service implementation.

The CSP can be used in several operational contexts ranging from multi agency coordination centers for big events to day-by-day activities where operators need to integrate narrowband with broadband technologies.

This model can be scaled up to a large region or wide network and can be scaled down to a small site or even a single vehicle that can act as an emergency control room for unplanned events of disaster conditions.

It can also be used to integrate different TETRA implementations or even different vendor TETRA networks.

CSP benefits:

- › Multimedia communication services
- › Professional communication services
- › Technology interworking that allow the same services in a multi technology domain
- › Unified command and control support that eases multi agency operations
- › Unified network management and unified subscriber management that translates into operation efficiency
- › Scalability - in sense of size and time
- › Incorporation of new standards as soon as they are available.



For more information please email:  
securityandinformation@leonardocompany.com

Leonardo S.p.a.  
Via delle Officine Galileo, 1 - 50013 Campi Bisenzio (FI) - Italy  
Tel. +39 055 89501  
Fax +39 055 8950600

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