

## Digital Mobile Radio (DMR) solution Tier II and Tier III



# TRENDS IN PROFESSIONAL RADIO COMMUNICATIONS

Professional users rely on licensed radio spectrum in order to enforce reliability and quality of service (e.g. no interference with non-authorized users); regardless economic crisis, worldwide market of professional communications is expected to grow. The installed base of analogue and digital Land Mobile Radio (LMR) all over the world is expected to increase in next years. Digital radio communications provide clearer voice together with the capability to deliver data supporting for instance location based services.

All professional sectors together with defense and public safety users are looking to digital radio technology with raising interest. For the industry sector, where mining and oil & gas companies can benefit from instant and clear communications, the digital radio technology is crucial to maintain safety and increase productivity.

## THE ROLE OF DMR

Among digital radio technologies, some are characterized by providing interesting features at lower cost than the digital systems traditionally used by Public Safety and industry users such as TETRA and P25; this is the case of DMR (Digital Mobile Radio), a technology standardized by ETSI that can provide effective communications through a rich set of features, capability to support low and high traffic volumes on small and large territory extensions.

Mobile applications based on the DMR digital standard are steadily growing in the world, thanks to the significant advantages of the DMR standard, compared to analogue FM radio systems, and to the low cost, compared to other digital systems previously developed. Analysts say that the DMR radio communications will be the most widespread instrument in the world in the coming years.

Leonardo is a global leader in electronic and information technologies for defense systems, aerospace, data, infrastructures, land security, protection and sustainable solutions. Leonardo has extensive experience in PMR digital systems and deeply knows the operational needs of the Public Safety and industry organizations that operate on a local and national scale.

**ECOS-D (Extended Communication System - Digital)** is Leonardo's DMR solution, a smart radio network system, at the forefront of DMR technology for critical operations; ECOS-D solution is one of the most comprehensive and state-of-the-art DMR solution available today on the market.



The Leonardo's ECOS-D solution includes:

- › Radio networks characterized by “multipurpose” base stations meaning that they are able to work as:
  - Analogue
  - Tier II Conventional DMR
  - Dual-Mode analogue / Tier II
  - DMR Trunking Tier III
- › Embedded logic for system architectures with distributed Core Network functionality (traditional centralized architectures can be supported as well)
- › Web based Network Management System (NMS) application providing network health information, subscriber management and performance analysis
- › Interface (AIS or AISIP based) towards Control Room applications (dispatchers) providing all the relevant services for both voice and data communications monitoring, message exchange, GPS radio localization, cross-patching among radio channels, radio-telephone communications and voice recording.

## DMR AND SIMULCAST

Leonardo has a wide DMR product portfolio covering both Tier II and Tier III network infrastructure together with control room solution providing multi-technology interoperability and command and control tasks. Synchronization, equalization and voting procedures in Leonardo simulcast networks are completely automatic and performed with special DSP (Digital Signal Processing) algorithms in the Radio Base Station without any extra box to be added, performing the highest qualitative level of radio communications in the whole coverage area.

Leonardo DMR solutions are characterized by a high degree of scalability and flexibility that allows selecting the configuration that best matches Customer's requirements.

Conventional Tier II Leonardo solutions employ the simulcast technique that allows the coverage of large areas with a reduced set of frequencies; for high traffic demand Tier III configuration may be deployed.

In DMR Tier III, multiple frequencies are used in the same network and frequency selection is automatically managed by a network controller. Leonardo DMR Tier III solutions support cellular deployments (that employ a large number of frequencies) and trunked simulcast deployments (virtual macro cells consisting of multiple frequencies automatically managed that cover large areas).

The ECOS-D family encompasses radio base station and radio gateways even in high power configuration (110W); Leonardo control room solutions feature the **CSP (Communication Service Platform)** that allows multi-technology communications including DMR, TETRA, LTE, Analog and VoIP phones for efficient and effective network integration.

Leonardo equipment are complemented by a set of services that allow customer and partner to design and deploy long lasting and efficient DMR infrastructures; these services include network planning, design and configuration, training warranty and post-sales support.

### SIMULCAST TECHNIQUE

Simulcast systems, both analogue and digital, represent the best solution for LMR applications when it is necessary to have more than one repeater for the radio coverage and few frequency pairs are available.

Each Radio Base Station (RBS) of a simulcast network uses a single transmission frequency (F1) and a single receiving frequency (F2): therefore the whole simulcast network can be considered as a “single virtual repeater”.

Fast call set-up, dedicated channel access and open-channel communications are guaranteed, along with automatic hand-over and roaming, as required for LMR applications.





# ECOS-D RBS4000 RADIO BASE STATIONS

ECOS-D RBS4000 automatic Dual Mode analogue and digital DMR Tier II or in Tier III. It provides the maximum network expandability and flexibility due to the several interfaces supported. ECOS-D RBS4000 meets DMR regulation ETSI TS 102 361-1/2/3.

ECOS-D RBS4000 is available with 12.5/20/25 kHz programmable channel spacing. It is designed for Simulcast network using embedded DSP units for signal processing while working in analogue way (for voting, equalisation and synchronisation).

ECOS-D RBS4000 is easy to maintain due to its modular structure, embedded MMI with display and keypad, secure firmware remote upgradability and I/O back card - each one separately removable from the back.

## 25W RF OUTPUT POWER

The ECOS-D RBS4000 core configuration is with 25W RF output power. It can operate within VHF frequency band 136-174 MHz and UHF frequency band 400-470 MHz, operating in full band with no need of tuning operation.

ECOS-D RBS4000 with 25W RF output power in both VHF and UHF frequency configuration.

## 110W HIGH RF OUTPUT POWER

ECOS-D RBS4000 is available with a 110W RF output power configuration allowing to increase the performance of ECOS-D A<sup>2</sup>T Simulcast DMR multi-channel systems. This RBS configuration is available in VHF frequency band 136-174 MHz and in UHF frequency band 450-526 MHz operating in full band with no need of tuning operation.

## ADVANTAGES AND UNIQUE SELLING POINTS

DMR ECOS-D solutions grant flexibility, scalability and reliability: from a small area with low density traffic that can be served by a conventional Tier II Simulcast DMR, to a heavy traffic urban area served by a Tier III Cellular DMR to a region on nationwide network that can be served by Tier II and Tier III technologies.

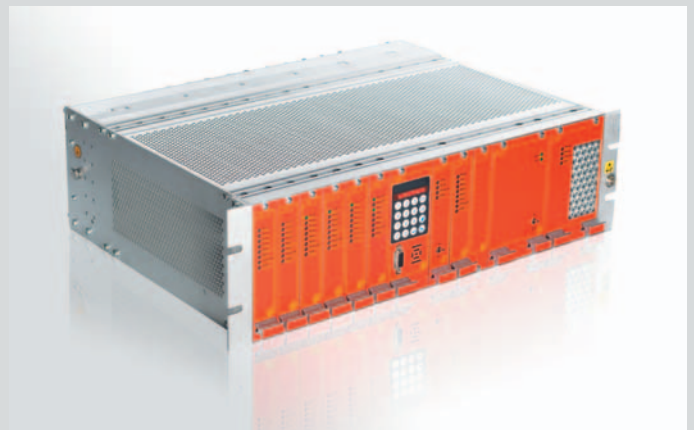
Leonardo can supply the solution according to Customer's.

- › Leonardo support all the available configuration modes (FM, Tier II, Tier III, simulcast, cellular) in native way without the need of adding hardware modules. Leonardo Tier III don't require a high cost network controller.

- › Reliability is intrinsic in Leonardo solutions, in case of failure of critical network elements (i.e. master station for simulcast or control-channel manager for Tier III) other network element automatically take over without any network impact.
- › Our network solutions address security as a main requirement: conventional Tier II infrastructures implement secure from unauthorized users accessing the network (Tier III solutions uses the DMR standard authentication). In addition the solution supports AES 256 encryption mechanisms towards gateways and dispatchers for an entirely secure solution.



ECOS-D RBS4000-25W



ECOS-D RBS4000-110W



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