



LEONARDO CYBER & SECURITY SOLUTIONS

# RBS4000-110W

ECOS-D  
RADIO BASE STATION

**ECOS-D RBS4000 (110W)** is a modular voice and data Radio Base Stations (RBS) designed to meet and exceed the requirements of professional and land mobile radio systems.

Its high quality, combined with state of the art reliability and outstanding modularity makes the ECOS-D RBS4000 110W a digital based equipment, able to support analogue FM, digital DMR conventional Tier II and digital DMR trunking Tier III.

The ECOS-D RBS4000 110W can be used in a real time dual mode Analog FM/Digital DMR conventional Tier II or in digital DMR trunking Tier III mode.

All the modes of operation of the ECOS-D RBS4000 110W support natively the flagship simulcast technology by the company without any external ancillary. The ECOS-D RBS4000 110W can be used from stand-alone repeater to conventional simulcast to digital multi-site trunking with a configuration change only. ECOS-D RBS4000 110W can be connected to build a system natively with IP links.

## MAIN FEATURES

- 3 RU device designed to be hosted in 19-inch rack
- Available in VHF, UHF frequency bands at 12.5 kHz/25 kHz programmable channel spacing
- RBS and stand-alone repeater mode of operation:
  - Conventional **analog FM** only
  - Digital **DMR conventional Tier II** only
  - Real Time Automatic dual-mode conventional **analog FM/digital DMR** conventional Tier II with priority mode setting
  - Digital **DMR Trunking Tier III** (embedded trunking controller).
- Designed to natively support Simulcast technology:
  - **Multi-site simulcast support:** available for both conventional and trunking operations
  - **Simulcast Master, Sub-Master, Slave** mode within the same device (virtually no limits in the number of RBS per simulcast channel)
  - **Reliable fall-back mode:** Slave in-cabinet repeating and Backup Master automatic reconfiguration
  - **Synchronization:** GPS and/or Precise Time Protocol IEEE 1588v2 with fall-back

- **Voting:** analog FM and digital DMR best in class voting:
  - **Auto Adaptive Technology (A2T):** each RBS “adapts” itself to the time and frequency response of the backbone and automatically compensate time variant differences
  - **Redundant link** management between RBSs (4W+E&M and IP)
- Provides **high levels of protection** from access by unauthorised radio users, via the Unauthorised Access Protection procedure
- Embedded AMBE+2 vocoder for DMR Tier II clear or encrypted (ARC4) voice communications from a local microphone (embedded loudspeaker).
- DMR Data transmission ports (RS232/RS485/LAN), digital I/O and analog inputs available.

## MAINTENANCE

- Display and keypad for easy local maintenance and fault handling
- Modular structure for easy front and back cards replacement. In the event of failure, all modules are individually removable
- Digital I/O, Analog inputs, power supply, antenna connectors and backbone interfaces hosted on dedicated back-cards, easily removable from the back and insulated from voltage overload
- Remote Firmware upgrade over LAN with integrity control (embedded dual-flash memory for storage of two firmware)
- SNMPv2c Network Management System (each RBS is a SNMP agent) and MIB availability for integration with thirdparty NMS system.

## INTEROPERABILITY

Interoperability (IOP) certificates with DMR major terminals vendors in Tier II and Tier III modes of operations (for further details, please visit the DMR Association website at:

[www.dmrassociation.org](http://www.dmrassociation.org)



Easy access to modules of the base station by front side

## TECHNICAL DATA

General											
Dimensions	3 RU compatible with 19" rack mounts										
Weight	From 13 kg [28.6 lbs] <sup>1</sup>										
Supported modulations	<ul style="list-style-type: none"> <li>FM/PM for analogue mode</li> <li>4FSK/C4FM for digital mode with I&amp;Q mo/ demodulator</li> </ul>										
Frequency generation	Synthesized										
Channel spacing	12.5 / 25 kHz <sup>2</sup>										
Mode of operation	Simplex / Half-Duplex / Duplex										
Digital data gross bit rate	9600 bps with 4FSK/C4FM digital modulation in 12.5 kHz channel										
Temperature range	From -30° to +60°C [-22°F to +140°F]										
Power supply	48 Vdc (galvanically insulated)										
Input current (at 48 Vdc)	<table border="0"> <tr> <td>Transmission<sup>3</sup></td> <td>Standby<sup>3</sup></td> </tr> <tr> <td>VHF: 6A</td> <td>VHF: 0.9A</td> </tr> <tr> <td>UHF: 7A</td> <td>UHF: 0.9A</td> </tr> <tr> <td>800: 7A</td> <td>800: 0.9A</td> </tr> <tr> <td>900: 7A</td> <td>900: 0.9A</td> </tr> </table>	Transmission <sup>3</sup>	Standby <sup>3</sup>	VHF: 6A	VHF: 0.9A	UHF: 7A	UHF: 0.9A	800: 7A	800: 0.9A	900: 7A	900: 0.9A
Transmission <sup>3</sup>	Standby <sup>3</sup>										
VHF: 6A	VHF: 0.9A										
UHF: 7A	UHF: 0.9A										
800: 7A	800: 0.9A										
900: 7A	900: 0.9A										
CTCSS	(Tx/Rx split-Tones) Yes. 67–254.1Hz (with 0.1Hz step)										
DCSS	(Tx/Rx split-Tones) Yes										
Backbone interface	1xLAN port 10/100 Base T (SoIP Link, remote firmware upgrade and SNMP NMS)										
I/O ports	LAN, RS232, 4 digital inputs, 4 digital outputs, 2 analog inputs										
Synchronization											
RBS main clock	OCXO (Oven Controlled Crystal Oscillator) 20 ppb temperature stability with programmable zero-offset compensation										
Simulcast synchronization	<ul style="list-style-type: none"> <li>From Built-in GPS (1+1 option available on request)</li> <li>From incoming IP GMC/BC/OC PTP IEEE 1588V2</li> </ul>										
TIER II Conventional / Analog FM Conventional											
Configuration mode	Stand-alone repeater										
Simulcast config. wide coverage Virtual repeater	Radio Base Station: macro-cell Master/ sub-Master/slave										
TIER III Trunking											
Configuration mode	Radio Base Station with embedded Trunking Controller: control channel RBS/Traffic channel RBS										
Simulcast config. wide coverage Virtual repeater	Radio Base Station macro-cell Master with embedded Trunking Controller/macro-cell Master for Traffic Channel/sub-master/ slave										
Transmitter											
Frequency bands	<ul style="list-style-type: none"> <li>VHF: 136-174</li> <li>UHF: 450-526</li> <li>800: 806-894</li> <li>900: 896-941</li> </ul>										
Output impedance	50 Ohms										
Output power	Programmable from 10W up to 110W										
Max. Deviation (RSD)	±2.5 / ±4 / ±5 kHz (12.5/25 kHz)										
Adjacent channel power	<ul style="list-style-type: none"> <li>&lt; -60 dB@12.5 kHz</li> <li>&lt; -70 dB@25 kHz (ETSI)</li> </ul>										
Intermodulation attenuation	>40dB (ETSI)										
Spurious and harmonic emission	VHF/UHF: <-36dBm < 1GHz <-30dBm > 1GHz 800/900: <-36dBm < 1GHz <-26dBm > 1GHz										
Audio response	+1, -3dB; 300-3000 Hz										
Audio distortion	< 3% @ 1000Hz; 60% RSD										
S/N	>45dB (12.5 kHz) / >50dB (25 kHz)										
Frequency stability	± 0.02 ppm										

Receiver	
Frequency bands	<ul style="list-style-type: none"> <li>VHF: 136-174</li> <li>UHF: 450-526</li> <li>800: 806-894</li> <li>900: 896-941</li> </ul>
RF input impedance	50 Ohms
Sensitivity (analog FM)	(12.5 kHz): ≤ -109,5 dBm @ 20 dB SINAD psfo
Sensitivity (digital)	<ul style="list-style-type: none"> <li>Digital 4FSK (12.5 kHz): ≤ -115 dBm @ BER = 1x10<sup>-2</sup></li> <li>Digital C4FM (12.5 kHz): ≤ -115 dBm @ BER = 1x10<sup>-2</sup></li> </ul>
Adjacent channel selectivity	(12.5/25 kHz) >60 dB/70 dB (ETSI)
Intermodulation rejection	(12.5/25 kHz) >70 dB (ETSI)
Spurious and image response rejection	>70 dB (ETSI)
Audio response	+1, -3dB; 300-3000 Hz
Audio distortion	< 3% @ 1000Hz; 60% RSD
S/N	>45dB (12.5 kHz) / >50dB (25 kHz)
Line output	-10 dBm
Emission Designators	
Analog FM/PM	8K50F3E/8K50G3E, 11K0F3E/11K0G3E 16K0F3E/16K0G3E
Digital 4FSK	7K60FXD/7K60FXE
Digital C4FM	8K10F1D/8K10F1E
Compliances	
ISED	RSS-119-ICES-003
FCC	CFR Title 47 -Part 90, Part 15B, Part 22
Not all variants and features might be available in all countries or in all geographic areas	

Specifications subject to change without notice

<sup>1</sup> Depending on RBS equipment

<sup>2</sup> According with the national regulations where RBS is used

<sup>3</sup> Value is to be intended for a fully equipped RBS configuration



## ENCODING CRITERIA

The following legend defines the coding rules for the products derived from the archetypes. It is specific for an ECOS-D RBS4000 110W.

The model name for each product derived from the archetype, is obtained by assigning to the variables (letters in yellow colour) one of the values listed here.

Models available

ECOS-D RBS4000H **ABA0C14W0E100NFL-010** (VHF)  
ECOS-D RBS4000K **ABA0C14W0E100NFL-000** (UHF/800/900)

	V3110	110W VHF (136-174 MHz)
	U2110	110W UHF (450-526 MHz)
	U4110	110W 800 (806-894 MHz)
	U5110	110W 900 (896-941 MHz)
<b>A</b>	V3000	Receive only VHF (136-174 MHz)
	U2000	Receive only UHF (450-526 MHz)
	U4000	Receive only 800 (806-894 MHz)
	U5000	Receive only 900 (896-941 MHz)
<b>B</b>	W	Single receiver
	D	Receiver Diversity
<b>N</b>	S0	No SolP piggy-back
	S1	With one SolP piggy-back
<b>F</b>	V0	No Vocoder
	V2	AMBE 3003 multi-vocoder board
	G0	no GPS receiver
<b>L</b>	G1	Single GPS receiver
	G2	Dual GPS Receiver



Leonardo S.p.a. is Chair of the DMR Association and member of the DMR Association Technical Working Group (TWG)

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