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 IP link management between RBSs
- 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).
**GENERAL**

Dimensions 3 RU compatible with 19" rack mounts

Weight From 13 kg [28.6 lbs]¹

Supported modulations  › FM/PM for analogue mode
  › 4FSK/C4FM for digital mode with I&Q modulator/demodulator

Frequency generation Synthesized

Channel spacing 12.5 kHz / 25 kHz²

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) Transmission 3

  VHF: 6A
  UHF: 7A
  800: 7A
  900: 7A

Standby 3

  VHF: 0.9A
  UHF: 0.9A
  800: 0.9A
  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  › From Built-in GPS (1+1 option available on request)
  › From incoming IP GMC/BC/OC PTP IEEE 1588v2

**TIER II CONVENTIONAL / ANALOG FM CONVENTIONAL**

Configuration mode Stand-alone repeater

Simulcast configuration

  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 configuration

  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  › VHF: 136-174
  › UHF: 450-526
  › 800: 806-894
  › 900: 896-941

Output impedance 50 Ohms

Output Power Programmable from 10W up to 110W

Maximum Deviation

  (RSD)

  ±2.5 / ±4 / ±5 kHz (12.5/25 kHz)

Adjacent channel power

  < -60 dB@12.5 kHz / < -70 dB@25 kHz

Spurious and harmonic emission

  VHF/UHF:
    < -36dBm < 1GHz
    < -26dBm > 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  › VHF: 136-174
  › UHF: 450-526
  › 800: 806-894
  › 900: 896-941

RF input impedance 50 Ohms

Analog FM sensitivity

  (12.5 KHz): < -109.5 dBm @ 20 dB

  SINAD psfo

Digital sensitivity

  › 4FSK (12.5 KHz): < -115 dBm @ BER = 1x10⁻²
  › C4FM (12.5 KHz): < -115 dBm @ BER = 1x10⁻²

Adjacent channel selectivity

  >60 dB/70 dB (ETSI) (12.5/25 kHz)

Spurious and image response rejection

  >70 dB (ETSI)

Audio response

  +1, -3dB; 300-3.000 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

Digital 4FSK 7K60FXD/7K60FXE

Digital C4FM 8K10F1D/8K10F1E

**COMPLIANCES**

FCC  CFR Title 47 - Part 90, Part 15B - Part 22

ISED  RSS-119 - ICES-003

Specifications subject to change without notice

¹ Depending on RBS equipment

² According with the national regulations where RBS is used

³ Value is to be intended for a fully equipped RBS configuration

Not all variants and features might be available in all countries or in all geographic areas
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

<table>
<thead>
<tr>
<th>RBS4000H-A-B-A0C1-4W0-E100-N-F-L-010 (VHF)</th>
<th>RBS4000K-A-B-A0C1-4W0-E100-N-F-L-000 (UHF/800/900)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3110 110W VHF (136-174 MHz)</td>
<td>U2110 110W UHF (450-526 MHz)</td>
</tr>
<tr>
<td>U2110 110W UHF (450-526 MHz)</td>
<td>U4110 110W 800 (806-894 MHz)</td>
</tr>
<tr>
<td>U4110 110W 800 (806-894 MHz)</td>
<td>U5110 110W 900 (896-941 MHz)</td>
</tr>
<tr>
<td>V3000 Receive only VHF (136-174 MHz)</td>
<td>U2000 Receive only UHF (450-526 MHz)</td>
</tr>
<tr>
<td>U2000 Receive only UHF (450-526 MHz)</td>
<td>U4000 Receive only 800 (806-894 MHz)</td>
</tr>
<tr>
<td>U4000 Receive only 800 (806-894 MHz)</td>
<td>U5000 Receive only 900 (896-941 MHz)</td>
</tr>
<tr>
<td>B W Single receiver</td>
<td>D Receiver Diversity</td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>N S0 No SoIP piggy-back</td>
<td>F V0 No Vocoder</td>
</tr>
<tr>
<td>S1 With one SoIP piggy-back</td>
<td>V1 AMBE 3003 multi-vocoder board</td>
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<td></td>
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<tr>
<td>L G0 no GPS receiver</td>
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</tr>
<tr>
<td>G1 Single GPS receiver</td>
<td></td>
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<tr>
<td>G2 Dual GPS Receiver</td>
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</table>

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

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