



LEONARDO CYBER & SECURITY SOLUTIONS

ECOS E-CONNECT MANAGEMENT SUITE

DMR networks play an important role in mission critical and business critical sectors, having the constant management and control of the infrastructure is vital to keep the network in exercise, provide effective services to users and support operations.

E-Connect is a suite of applications that improves the user experience and the management of ECOS apparatus and systems. E-Connect can be used both to manage simple systems (a single radio channel) or to manage complex systems such as EPS-based systems, conventional radio systems composed of several radio channels (Analogue FM, DMR, APCO P25), DMR trunked radio systems (single site or multi-site)

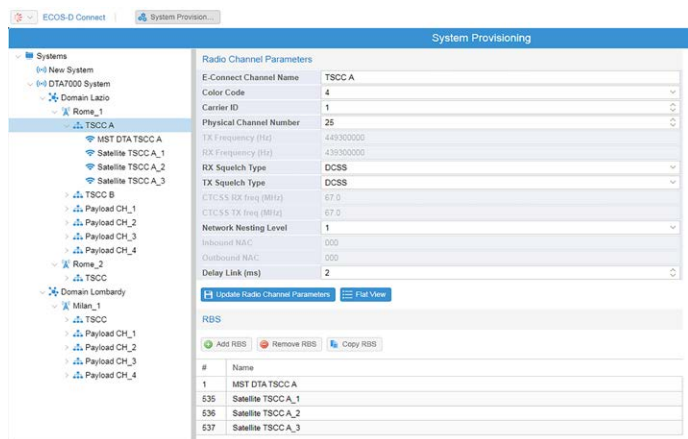
E-CONNECT ECOS MANAGEMENT SUITE

A COMPLETE SUITE

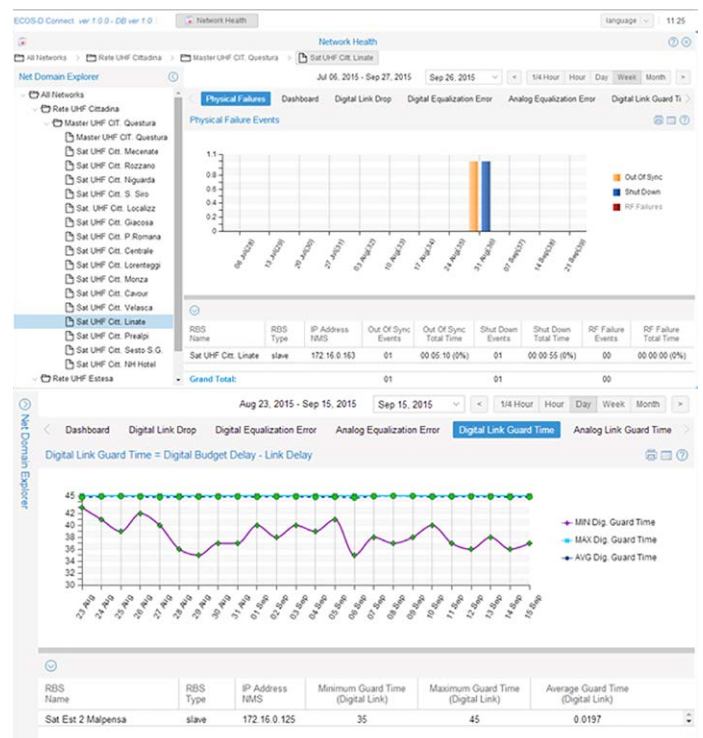
E-connect allows to keep the whole network under control verifying the correct behavior, monitoring key performance parameters and performing device programming operations in a secure way. A set of APPs implement main tasks and operation supporting network administrators in their work

SYSPRO (SYSTEM PROVISIONING) App for the management of DTA RBS delivery process allowing network administrator operators to quickly implement a structured radio system supporting:

- Configuration of the entire stand alone system
- Automatic Licenses generation as required
- Automatic download of remotely generated System configuration and codeplugs
- Traceability of results based on SN Bar code and ESN (Electronic Serial Number), thus ensuring the traceability of the HW released in the field for the purposes of maintainability and easy of management.



NETWORK HEALTH A diagnostic App that and providing network administrator operators with information to quickly identify network system issues periodically collecting, processing and visualizing network data and RBS data such as Physical Failures, Network Equalization issues, Drop of Digital burst, Link disconnection events and Link Guard Time. Network Health Analysis tool provides several statistical information of the network, allowing operator /administrator to query the stored data to identify issues that could have an impact on the service



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EPS SERVICE ANALYSIS to monitor the performance and regular functioning of network traffic through the EPS domains present in a radio system. While a dashboard provides synthetic information about the overall status of the system, detailed views allow drilldown on user activities, registration, call logs and talk groups

Timestamp	Call Duration (sec:ms)	Owner Type	SIP ID	Call Type	Target	Priority	Codec	Termination Status	EPS IP	Source IP
5:52:07.62.43	05:18.1	225	4070000	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195
5:52:07.65.38	05:03.9	225	20998	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195
5:52:07.67.23	00:00.0	225	20998	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195
5:52:07.67.37	00:00.0	225	4070000	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195
5:52:07.67.58	00:00.0	225	20900	PCMU	10.7.9.121	1	PCMU	✓	10.7.9.121	10.7.9.195
5:52:07.68.11	00:18.1	225	4070000	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195
5:52:14.27.48	00:00.0	225	20900	PCMU	10.7.9.121	1	PCMU	✓	10.7.9.121	10.7.9.195
5:52:14.27.48	01:12.8	225	4070000	DMR L2	10.7.9.121	1	DMR L2	✓	10.7.9.121	10.7.9.195

SUBSCRIBER MANAGER that allows to provision all the users/elements of an ECOS system and upload data to the RBSs belonging to the system. It allows the creation, management and provisioning of all entities composing an EPS network. These entities include ECOS network elements (EPS servers, gateways and controllers) subscribers (handhelds and vehicular terminals), groups, dispatchers, SIP phones, gateways toward external systems.

System Name	Dial Plan	Number Prefix	Fleet Number	DGNA by Control Room
Sys9021	Flat scheme	0	0	<input checked="" type="checkbox"/>

OTAP (OVER THE AIR PROGRAMMING) configuration App that allows to remotely configure subscribers operating in Trunked Mode under an EPS-based system taking advantage of template definition containing all relevant applicable parameters and application of templates to selected subscribers

Name	Template Name	Consistency Warning	Job Status	Radio ID (SIP)	Radio Status	Task Content	Execution Info
Radio 1	My Template	OK	Write successfully	1	OFFLINE	...	9/20/16, 07:45:04
Radio 2	My Template	OK	Write scheduled	2	OFFLINE	...	Waiting for Otap Service
Radio 3	My Template	OK	Write scheduled	3	OFFLINE	...	Starts in 0d 14h 55m 43s
Radio 4	My Template	OK	Unreachable (W)	4	OFFLINE	...	9/20/16, 07:47:04
Radio 5	My Template	OK	Write successfully	5	ONLINE	...	9/20/16, 07:45:15
Radio 6	My Template	OK	Write successfully	6	ONLINE	...	9/20/16, 07:42:41
Radio 7	...	OK	Unknown	7	OFFLINE
Radio 8	...	OK	Unknown	8	OFFLINE
Radio 9	...	OK	Unknown	9	OFFLINE
Radio 10	...	OK	Unknown	10	OFFLINE

ENCRYPTION KEY LOADER allowing to manage and configure Voice and Data Encryption Keys of a ECOS system. Depending on the type of operation and dispatchers used the infrastructure need to terminate encryption in order to correctly deliver messages. The APP allow the definition and association of Keys and Key lists to network elements.

Encryption Key List Name	Type
My Second Key	AES 128

NETWORK MANAGEMENT SYSTEM allowing to monitor the status of all ECOS network elements dealing with network element reachability, alarms and measures. NMS takes advantage of SNMP protocol to collect information of connected network element. A map based and color coded visualization allow the immediate understanding of the status of the network. Detailed inventory and drill down operations are possible to investigate status and alarm of interested elements.

Net Name	Device Name	Device Type	Net Sts	Running For / Unavailable From	Sts	Alarms	Max Severity	Time Since Last Update
System 2	Master ST	Master RNFPE	OK	0d 0h 33' 06"	OK	4	OK	0d 0h 09' 20"
ICP System	Site 1 - CH1	Master RNFPE	OK	0d 0h 15' 45"	OK	2	OK	0d 0h 10' 22"
ICP System	Site 1 - CH2	Master RNFPE	OK	0d 0h 15' 35"	OK	1	OK	0d 0h 10' 12"
ICP System	Site 2 - CH5	Master RNFPE	OK	0d 0h 15' 25"	OK	1	OK	0d 0h 11' 08"
System 2	Slave ST	Sub-Master	OK	0d 0h 33' 10"	OK	2	OK	0d 0h 10' 22"
EPS ICP System	EPS Core Slave CH1	Master	OK	0d 0h 15' 40"	OK	0	OK	0d 0h 10' 22"
Miscellaneous	Site 1 Switch	EtherWAN 24	OK	0d 0h 15' 40"	OK	0	OK	0d 0h 07' 56"

MAIL TICKETING a graphical interface to set all the required parameters to activate the Mail Ticketing Service. Through this service the user can activate the sending of email reports (called tickets) with all the alarms that has been signaled in the network.

LICENSE MANAGER management App that allows to unlock ECOS Connect features

TRUNKED KPI diagnostic App that allows to monitor the status of each DMR Trunked radio site

FW UPLOAD AND RESTORE POINTS management App that allows to upload the FW on all RBS belonging to a E-Connect system and allows to restore previous configurations in ECOS

DEEPLY CONNECTED TO THE NETWORK

E-Connect does not need any configuration to operate and manage a system: e.g. it does not need neither the configuration of the network element (RBS) nor a database SQL configuration. By means of the E-Connect protocol activation on each ECOS network element, the Radio base station s talk spontaneously to the E-Connect server machine. The server machine, based on the received information, updates an SQL database and it is able to organize RBSs in Radio Channels and aggregates of Radio channels (Networks)

E-Connect can be used to manage all the ECOS systems:

- Analog FM conventional networks
- Dual mode Analogue FM / DMR Tier II conventional networks
- Dual mode Analogue FM / APCO P25 Phase 1 conventional networks
- DMR Tier III Trunked Networks
- Mixed networks based on EPS architecture

AISIP and EPS

Leonardo ECOS solution is a fully distributed Tier II and Tier III network that can interoperate with external entities such as analog, P25, IP and PSTN. Clever software protocols and a reliable architecture are the pillars ECOS networks are built upon. AISIP is Leonardo proprietary SIP based protocol managing complex multi system interactions and external systems interoperability providing interface for voice calls, data calls and signaling services. The EPS (Embedded Proxy-Server) is a SW entity running on the ECOS platform that implements a distributed and embedded AISIP server functionality taking care of main Core Network functionalities including registration, mobility management, call and messaging routing, interconnection with external entities

DEPLOYMENT CONFIGURATION

E-Connect is a web based platform. Once the software components of the server are installed and running on a server machine such as Microsoft 2012 Server or Windows 11 Machine, the user can use a PC (Windows, Linux, Mac) and an internet browser (Internet Explorer, Chrome, Mozilla) and point the IP address of the server machine to access all the E-Connect applications (Connect Apps).

E-Connect SW is released as a Virtual Machine (VM). This allow a fast set up of the server because all the SW components are already installed, tested and ready to be used. The requirements/characteristics of the VM the following:

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VM	File format	.ova
	Virtual hardware version	11
RAM	Minimum	4GB
	Recommended	6GB
DISK	space	40 Gbyte
CPU	Minimum	4 vCORE
	Recommended	6 vCORE
Networking	One Ethernet connection vNIC	
	Static IP address	
Environment	A single server with ESXi hypervisor (version 6.7)	
	Two servers in HA with VmWare Essential plus kit	

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LDO_IT24_00692 02-24