ELECTRONICS DIVISION

LEONARDO

DEFENCE COMMUNICATIONS PRODUCTS AND CAPABILITIES

WHATEVER THE ENVIRONMENT: CONNECTIONS ENABLED

In an increasingly complex and challenging battlespace, Leonardo is at the forefront of a transformation that is allowing armed forces to act quickly and decisively in response to both conventional and emergent threats.

We are committed to providing integrated and interoperable defence communications to meet the most demanding land and naval applications, and our capabilities already proved to enhance the efficiency of Armed Forces in the most challenging operational theatres.

Our activity on communications systems began with Guglielmo Marconi's early radio experiments. Our technological leadership led us to an overarching commercial portfolio encompassing a wide range of capabilities.

Today, we have a world-class capability to supply communications systems and are recognised for our advanced and field-proven communication products tightly integrated into communications solutions for military forces.

The company has the experience and expertise to design and deliver complete solution for different areas of applications.

Our turn-key communications systems provide forces on the battlefield with unprecedented operational flexibility, and allow for full scale interoperability among fixed, deployable, mobile and dismounted units.

Our experience is complemented by a complete portfolio of advanced and battle-proven products including ground-based radars, fire control systems, mounted and dismounted optronics systems, persistent surveillance networks and mission planning systems. All of these assets can interoperate through our high data rate, secure and robust communications products.

We are recognised as a market leader in the development of interoperable and net-centric solutions for land and defence applications, underpinning the operational capability of Italian, UK and other allied armed forces.

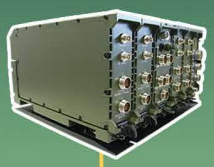
Our family of military radios form the building blocks for Network Enabled Operations within the modern digital battlefield. Our systems ensure rapid sharing of key data within all mobile, ground, air and maritime assets, in parallel with ad hoc switched and IP voice based communication services.

Investments in innovation drive our range of solutions for modern armed forces. We constantly develop and enhance our portfolio of solutions and are committed to maximising the user-experience for military operations. Key features include responsiveness, ease-of-use and ergonomics.

LAND COMMUNICATION SYSTEMS


Satellite Link
NMS-2K
MSR115
Landing Force
LAN
SENTINEL
MULTILEVEL CYBER SECURITY
VEHICLE COMMS EQUIPMENT
SAT Terminal
TSO102/D X Ka
MSR165E
Multirole
Vehicle
Armoured
Vehicles
Low Echelon Units
VHF/UHF Waveforms
Ground: STANAG 4204/4205, Sincgars, Easy II
New IP: SelfNET SBW, NBAW, HCDR, Essor HDR
GAG: Sincgars, HQ, Saturn
SAT: SATCOM DAMA
HF Waveforms
HF DATA MIL-STD-188-110B
HF ALE 2G MIL-STD 188-141B
HF ALE 3G STANAG 4538
HF STANAG 4285, 4529, 4538
STANAG 5066, STANAG 4444
WB HF MIL-STD-188-110C
SOLDIER COMMS EQUIPMENT
PRR, FSR, HH-E
MOBILE AD HOC
NETWORK
Infantry Units

COMMUNICATIONS SYSTEM FOR ARMOURED COMBAT AND RECONNAISSANCE VEHICLES



Swave VQ1

Swave MB1

Turma

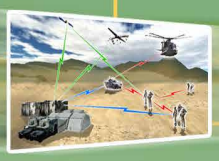
SECURE RECONFIGURABLE COMMS

- Type 1 Wideband up to Four Channels Radio Node
- Type 1 Wideband Two Channel Lite Radio
- Vehicle-Adapted Handheld Radio
- Combat Net Radio
- 4G Wireless Connectivity
- Radio embedded Programmable Crypto Sub-System

New Generation IP WFs:SBW, NBAW, ESSOR HDR, S-HCDR
VHF/UHF STANAG/MIL WFs:VULOS, SINCGARS, HQ I/II, TACSAT
HF STANAG/MIL WFs:MIL-STD-188-110-B, STANAG 4285,
STANAG 4538, STANAG 5066, WB HF

NETWORKING AND INTERNAL COMMS

- Ad-Hoc multi-service enhanced router
- Intra-vehicle networking
- Wide heterogeneous wireless connectivity
- Integrated Radio control functions
- QoS for the mission critical applications
- Embedded IP Calling Suite
- Enhanced Information and Dissemination Services
- NFFI Gateway



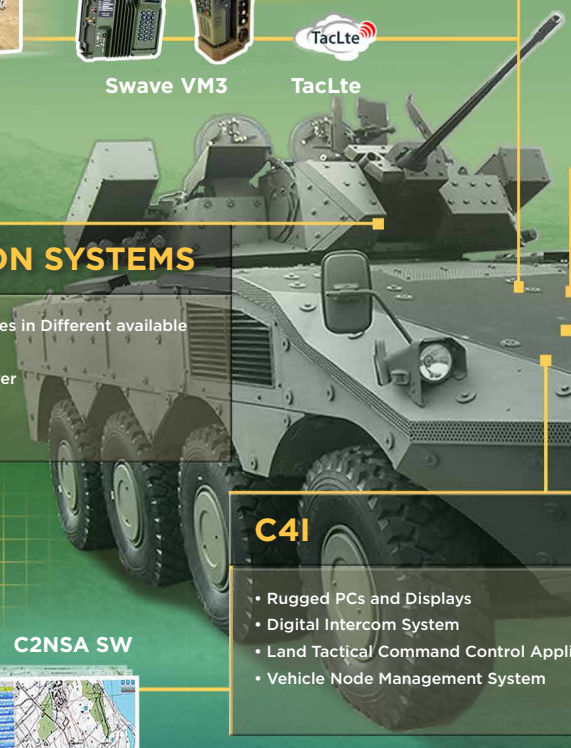
WFs

Swave VM3

TacLte

TacLte

Sentinel MSR165E



PROTECTION SYSTEMS

- Counter-RCIED Devices in Different available configurations
- Laser Warning Receiver

ON-THE-MOVE SATELLITE COMMS

- X Band SOTM terminal
- Ka Band SOTM terminal
- In-radio Integrated TACSAT communications

TS0102D X

C4I

- Rugged PCs and Displays
- Digital Intercom System
- Land Tactical Command Control Applications Suite
- Vehicle Node Management System

Web VEMS

C2NSA SW

UIS379D

LRT451/D

LRT350/D

LRT350/D

Service and Device Aware Mission System Integration

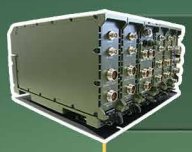
Sensors and Effectors: IR detectors, weapons, EW protection, RALM, IFF, BTID

Situational Awareness for navigation: cameras and displays

Vehicle Diagnosis, Maintenance and Logistic: platform automotive

Scalable and Open Vehicular Architecture

COMMUNICATIONS SYSTEM FOR TACTICAL AND LOGISTICS VEHICLES



SECURE RECONFIGURABLE COMMS

Swave VQ1

- Type 1 Wideband up to Four Channels Radio Node
- Type 1 Wideband Two Channel Lite Radio
- Vehicle-Adapted Handheld Radio
- Combat Net Radio
- 4G Wireless Connectivity
- Radio embedded Programmable Crypto Sub-System

Swave MB1

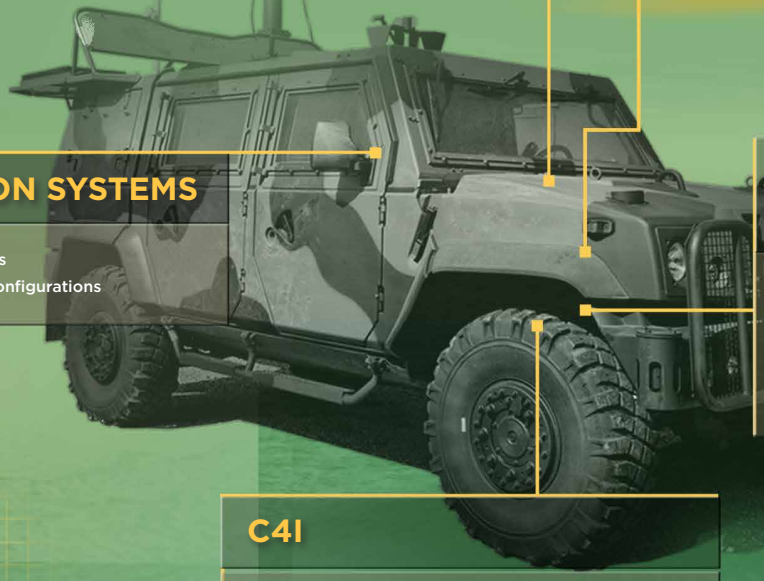
New Generation IP WFs:SBW, NBAW, ESSOR HDR, S-HCDR
VHF/UHF STANAG/MIL WFs:VULOS, SINCGARS, HQ I/II, TACSAT
HF STANAG/MIL WFs:MIL-STD-188-110-B, STANAG 4285,
STANAG 4538, STANAG 5066, WB HF

WFs

NETWORKING AND INTERNAL COMMS

- Ad Hoc Multi-service Enhanced Router
- Intra-vehicle networking
- Wide heterogeneous wireless connectivity
- Integrated Radio control functions
- QoS for the mission critical applications
- Embedded IP Calling Suite
- Enhanced Information and Dissemination Services
- NFFI Gateway

Sentinel MSR165E



PROTECTION SYSTEMS

Counter-RCIED Devices
in different avaliable configurations

ON-THE-MOVE SATELLITE COMMS

- X Band SOTM Terminal
- Ka Band SOTM Terminal
- In-radio Integrated TACSAT communications

TS0102D X
From T4 Upward

C4I

- Rugged PCs and Displays
- Digital Intercom System
- Land Tactical Command Control Applications Suite
- Vehicle Node Management System

C2NSA SW

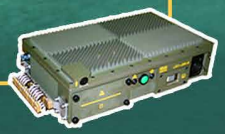
Web VEMS

UIS379D

LRT451/D

LRT350/D

LRT350/D



Service and Device Aware Mission System Integration

Sensors and Effectors: IR detectors, weapons, EW protection, RALM, IFF, BTID
Situational Awareness for navigation: cameras and displays
Vehicle Diagnosis, Maintenance and Logistic: platform automotive
Scalable and Open Vehicular Architecture

NAVAL COMMUNICATIONS SYSTEMS

Application / Services

TVCC/IP
CAM NW Monitoring

Plain / Secure Video
& Teleconference

Large Screen
Display Workstation
and PC

Automatic
Message Handling

Management System
- Dynamic System Configuration
- Performance Management
- Security Management
- Fault and Damage Management

External Communications

Briefing Interactive
Board Room

LF/MF/HF
Reconfigurable Radio
Comms System

V/UHF
Reconfigurable Radio
Comms System

HF Waveform Set

VHF/UHF
Waveforms Set

VOICE / DATA / VIDEO

LEONARDO CAPABILITIES

WAVEFORMS DEVELOPMENT ON RECONFIGURABLE SWAVE SDR RADIOS

- HF DATA MIL-STD-188-110C
- HF ALE 2G MIL-STD-188-141B
- HF ALE 3G STANAG 4538
- HF STANAG 4285, 4529, 4538
- STANAG 5066
- Waveform “WB HF”
- VULOS STANAG 4204/05
- SelfNet SBW, HDR
- MIL 188-220 C
- HaveQuick I/II STANAG 4246
- SATURN STANAG 4372

Internal Communcations

UHF/C/X/Ku/Ka Satcom

Satcom / Sincgars SDR Radio

Airborne Intercommunications System

Tactical Data Links (Link 11,16,22)

Voice/Data Encryption

Wired Multifunction Terminal Sentinel

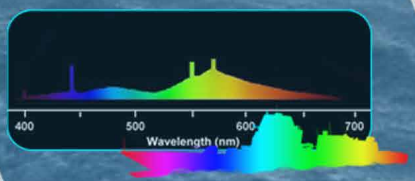
Tactical LTE

Wireless Communications

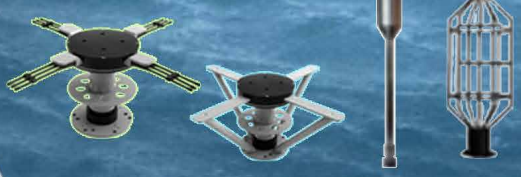
Switch and Router/Radio Gateway

COMMUNICATION SYSTEM

EM STUDIES



ANTENNA DESIGN



MARITIME COMMUNICATION SYSTEMS

LONG RANGE COMMS

SHORT RANGE COMMS

INTERNAL COMMS & SERVICES

SATCOM WFs

Counter Piracy Missions

HH-E

Remote
Shore Station

Boarding
Team

VHF/UHF Comms System

MIL Land Services
IMM/ICAO Civil Communications

MH500
Radio Relay

HF Infrastructure

H7700 RSCU

HF Automation ALE 3G/4G

MARITIME MISSION BASE

LLF/MF/HF RADIOS

UHF/C/X/Ku/ Ka SATCOM

TacLte

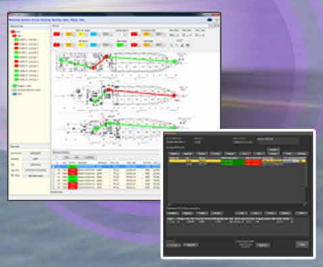
Tactical Wireless LTE

Tactical
VOIP Terminal

Radio Gateway

SENTINEL

MNG & MH SYSTEMS



HF Waveform
HF DATA MIL-STD-188-110B
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HF ALE 3G STANAG 4538
HF STANAG 4285, 4529, 4538
STANAG 5066
WB HF MIL-STD-188-110C

VHF/UHF Waveforms
Land : Sincgars
New IP: SelfNET SBW, HCDR, Essor HDR
GAG: Sincgars, HQ, SATURN
SAT: SATCOM DAMA

Cyber Security Room

TacLte

Tactical LTE

Secure SCIP
Phones

SOLDIER RADIOS

ROBUST AND RECONFIGURABLE RADIOS FOR THE DISMOUNTED SOLDIERS

Today's theatre of conflict is a dynamic asymmetric battlespace, with forces on the ground often involved in simultaneous operations. Leonardo is committed to providing integrated and interoperable soldier communications to meet the most demanding land and battlefield requirements.

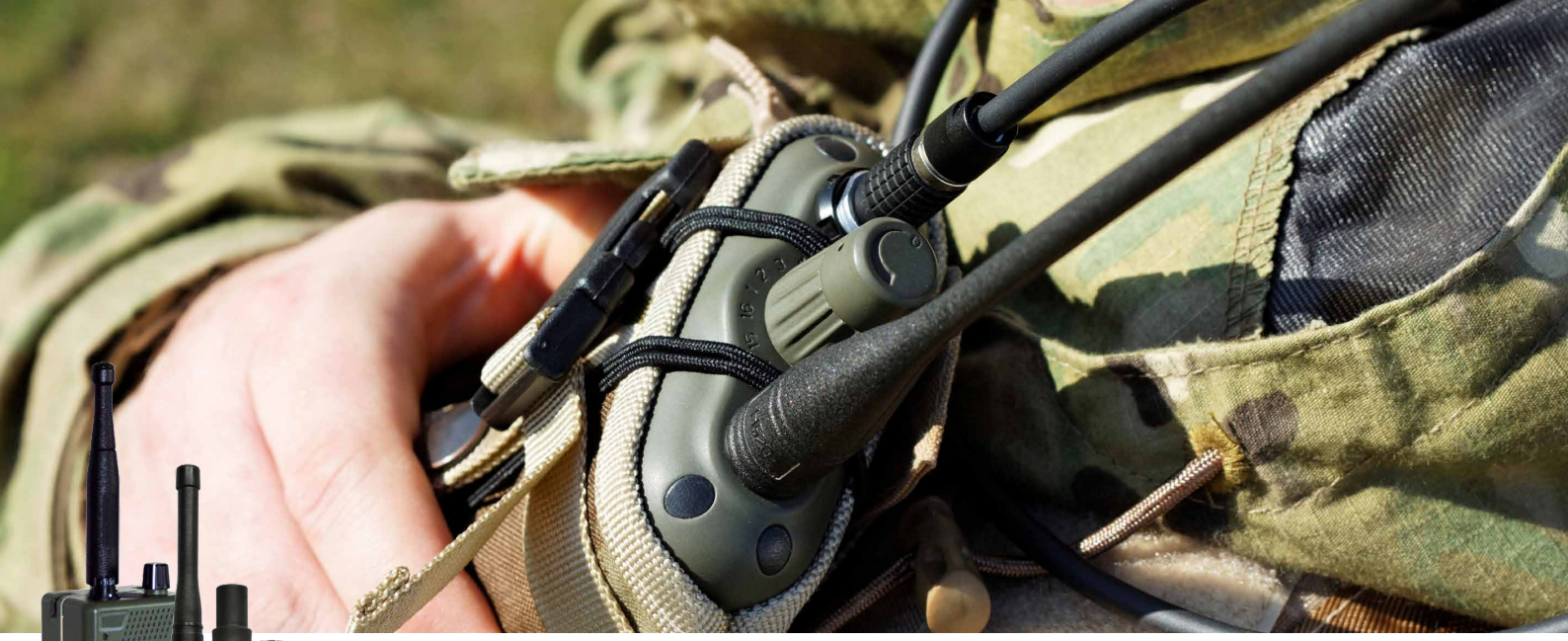
Our family of radios for the dismounted warfighter are designed to deliver safe, secure, and reliable voice and data services under the most extreme conditions.

Our aim is simple - to protect and support deployed forces with the best military communication equipment possible, which translates into the capacity to exchange voice and data whilst enduring the rigours of today's complex physical and electronic battlefield environments.

Thanks to the company's recognised role in the Software Defined Radios technology (SDR), we offer a state-of-the-art reconfigurable soldier radio that can be tailored and programmed for every mission according to the different needs of the dismounted units and complying with the widest range of operational requirements.

Our portfolio is complemented by a family of combat-proven personal soldier radios which enhance combat effectiveness for the front line soldier and replaces traditional methods based on hand signals and shouting.

Current users of our soldier radios vary from high-intensity close combat infantry troops, through coalition peace-keeping/peace support operations, to specialist forces and armed police. Environments include desert, jungle, urban, rural, vehicle and helicopter-borne operations.



Single Channel Hand Held SDR

The SWave Handheld (HH) is a single-channel handheld Software Defined Radio operating in the 30MHz-512MHz frequency range. Based on the Software Communications Architecture (SCA), the radio can support both legacy and new waveforms thus providing interoperability with fielded radios and C4I systems. The SWave Enhanced Handheld (HH-E) employs a smaller, ruggedised, lightweight chassis and provides today the smallest reconfigurable radio in the market.

Dual Channel Manpack SDR

The SWave Manpack Bi-Channel (MB1) is a two-channel Type 1 radio for dismounted use. The unit is suitable for operational use by soldier and commander in either Squad/ Platoon or Section level scenarios. It offers two simultaneous RF channels, each one in the 30MHz to 512MHz frequency band and a maximum output power up to 20W, even at the tactical edge of the battlefield network.

Personal Role Radio

The Personal Role Radio (PRR) is an innovatively packaged tactical soldier radio using advanced 2.4GHz spread spectrum technology. It is easy-to-use, unobtrusive and comfortable to wear, yet is rugged enough to sustain operationally harsh environments. A soldier can operate the radio without removing his hands from his weapon and users on active service confirmed that the PRR had a profound effect on the operational effectiveness of infantry troops.
Building on the same design, the Soldier System Radio (SSR) Plus introduces additional networking functionalities and capabilities and the enhanced version of the radio (EZPRR) further improves performance in terms of encryption, range, and data communications.

Frontline Soldier Radio

The Frontline Soldier Radio (FSR) is a next-generation compact soldier radio system which provides all-informed encrypted voice communications together with data communications and computing backbone for Command & Control systems.
Its focus is to provide efficient and effective communications at Platoon and Section level, giving the soldier enhanced capability, whilst limiting the physical and mental burden. Key features of the FSR include dual-net operations, automatic position reporting, relay capabilities and full interoperability with the company's SDR radios.

VEHICLE RADIOS

NEXT GENERATION VEHICULAR EQUIPMENT TO DELIVER THE EXPECTATIONS OF TODAY'S COMPLEX OPERATIONAL THEATRES

A key feature of digitalised platforms is the timely receipt, processing and dissemination of battlefield information. The availability of advanced and robust tactical communications systems within each asset is a crucial consideration in realising this.
Leonardo has a world-class capability to supply communications systems for military vehicles and our solutions ensure rapid and seamless sharing of key data among all the assets in the battlespace. All of our radios accomplish external communications among vehicles and with the upper and lower command levels.
Within our wide catalogue of vehicular radios, the SWave Software Defined Radios (SDR) achieve and maintain on-the-move in-mission land communications through both HF/VHF/UHF standard waveforms and new generation networking waveforms for multi-hop self-healing and self-forming secure multimedia services. Based on previous experience with the European Secure Software defined Radio program (ESSOR) from its beginning in 2009, we now offer a complete family of vehicular SDR systems which provide access to different frequencies and can implement multiple protocols for voice, data and command and control applications.
Our offer is complemented by standard vehicular Combat Net Radios and on-the-move satellite communications systems.

Four Channel Reconfigurable SDR System

The SWave® VQ1 is our solution for vehicular SDR communications. It is a four-channel vehicular radio providing secure voice and data services for current and future tactical communications needs. The radio features a modular HW architecture that allows up to four radio channels to be configured within a common chassis with a shock mounting base. Each channel can operate from 2MHz to 2000MHz and provides extensive support for HF/VHF/UHF narrowband and wideband waveforms.

Two Channel Reconfigurable SDR System

The SWave® VB1 is a two-channel vehicular radio which provides secure voice and data services in a package the size and weight of a conventional combat net radio. It has been specifically designed to fulfil the needs of modern light and medium/mechanised infantry units. Each of the two channels can operate in the 30MHz to 512MHz frequency range with 20W peak RF output. 50W power upgrade involves the use of an ancillary HPA device.

Single Channel Reconfigurable SDR System

The SWave® VM3 is a vehicle variant of the company's Hand Held single-channel SDR. It has been designed for those vehicular applications where a single channel radio is sufficient to cover the vehicle communications needs as well as provide the necessary link to dismounted soldiers.
The radio operates in the 30MHz to 512MHz frequency range and supports both legacy and new waveforms in VHF and UHF frequency bands.

Combat Net Radio

The TURMA Vehicular is the company's combat net radio for vehicular installations. With an extended frequency range from 1.6MHz to 59.975MHz, TURMA allows any range of tactical data and voice communications in the HF or VHF band.
It offers features including radio localisation (position, speed, unit identifier, time of transmission, data quality), selective calls, broadcasting in both plain and secure mode, and e-mail on HF.

LONG RANGE COMMUNICATIONS AND ACCESS NETWORKS

THE DIGITAL BACKBONE FOR TACTICAL AND STRATEGIC MILITARY NETWORKS

Modern digitalised Armed Forces require easily and quickly deployable communications infrastructures to provide connectivity among all echelons of command. Leonardo has the experience and background to configure and deliver highly survivable deployable terrestrial communications networks composed of both WAN and LAN nodes.

Our solution for land networking is complete and battle-proven. It consists of specialised solutions for long-range terrestrial communications interconnecting geographically dispersed units. This capability may be provided through long range HF transmissions, radio relays, or both.

The company has a wide range of radio bearers in HF spectrum for land tactical Command Posts. HF Radios operate Beyond-Line-Of-Sight (BLOS) links providing both voice and data services.

These products meet the performance standards for modern long range military radio communications enabling reliable operations over HF channels. Using BLOS radio links, deployed or fixed Command Posts are provided with secure and reliable multimedia communications at great distances. Short-range mobile wideband access capability can be then provided in selected areas of operation with our solutions for 3G/4G, LTE and WiMAX, allowing the exchange of real-time data among vehicles, soldiers, shelter and fixed command posts.

At the network layer, our Sentinel family of solutions create an All-IP solution for tactical area voice and data communications. Complete Wide Area Systems (WAS) may be configured, with as many Local Area Networks (LANs) as needed to meet the requirements of each specific mission and operation. High capacity networks may be thus implemented among distributed Command Posts, together with a comprehensive suite of applications to support voice, video and data communications.

Beyond-Line-of-Sight (BLOS) Communications

The range of Low Power HF radios (SP2295/6, SRT2007, SRT600) provide both voice and data services. Our HF2000 Network Solution supports both tactical and strategic communications and guarantee automated HF networking, removing the need for a dedicated and specialised radio operator.

The HF2000 is complemented by a family of solid-state, broadband high power HF/SSB Transmitters, designed to meet the new standards of software reprogrammable radios to satisfy the performance required in the use in modern, digital communication systems.

Mobile Wideband Access Solutions

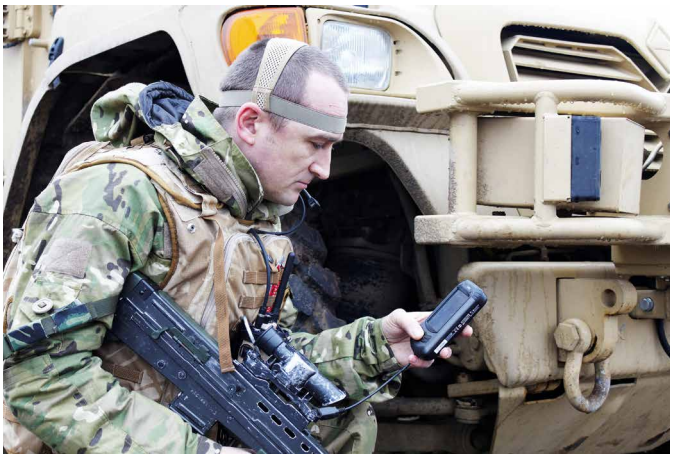
The Leonardo Tactical LTE (TacLTE) provides simple, performing and light solution for deployable operational scenarios: Headquarters, Command Posts and Forward Operating Bases can be covered by 4G Network Infrastructure and Base Station with single and/or multi cell deployment.

Different user applications are overlaid over the network infrastructure providing an effective instrument to increase operational effectiveness of the units. Support to video sharing and massive data exchange greatly enriches the Situation Awareness capability of all the actors in the battlefield, from dismounted squad soldiers to commanders in the Command HQ.

Radio Relay Terminals

The MH500 series is a new-generation of radio relay terminal designed to support tactical communication systems. It meets the need for high-capacity, mobile, radio-based networks and provides reliable data transmission services in support of Command & Control applications.

The tactical MH500 enables high quality connectivity also in the presence of electronic warfare attacks. The family of relays includes terminals working in the NATO Bands I, III+, IV, with an overall throughput in excess of 8Mbps, available in Compact or Split versions to meet different deployment profiles.



IP-Based Communications Services

The company's SENTINEL range is a suite of products used to create an All-IP solution for tactical area voice and data communications. It can be used to create a complete Wide Area System (WAS), with as many Local Area Networks (LANs) as needed to meet a user's requirement for a modern tactical communications network.

The full suite consists of dedicated IP Software including a comprehensive suite of applications to support voice, video and data communications, Desk Access Units (DAU) providing 10/100Mbps Ethernet connections for tactical LANs, LAN distribution systems, VoIP phones, Radio Interface Units (RIU) for connecting IP phone users to VoIP network (with terminal adapters in case of legacy phones), and Mobile Broadband Base stations exploiting 3G mobile networks.

SATELLITE COMMUNICATIONS

VERSATILE AND EASILY TAILORED SOLUTIONS FOR LONG DISTANCE COMMUNICATIONS

With more than 35 years experience in the area of satellite communications and proven knowledge of advanced satellite technologies, Leonardo has a consolidated portfolio of systems and products which includes fixed, deployable, flyaway, vehicular, naval and man-portable terminals.

We may configure and deliver a complete ground-based solution integrating a mix of fixed anchor stations in the Country, even operating in different frequency bands, and a number of terminals to be deployed in the operational theatre (fixed, flyaway, on-the-move, naval and man-portable).

Dedicated applications for monitoring, control and management guarantee the requested quality of services and allow the dynamic management of the communications services for the different requirements that may be encountered in operation.

The company also has experience covering advanced satellite technologies such as modems, satellite management software, Modelling and Simulation Laboratories for analysis and planning of satellite communications, mobility applications and IP-Over-Satcom.

Fixed Solutions

Leonardo has two different families of fixed satellite terminals - the TFS Anchor Stations and the TSF VSAT systems. Anchor Stations operate on both X and EHF bands and exploit multi-link capabilities to forward data, voice and trunk services to remote stations or fixed strategic earth stations. The smaller-sized VSAT terminals operate on EHF or Ka bands and are typically employed in operations since they are designed for connecting communications nodes to central hubs.

Deployable and On-The-Move Solutions

Leonardo provides both transportable satellite terminals (TSM family) and on-the-move solutions (TSO family). Our transportable satellites are designed to establish voice, video and data long range communications for strategic and tactical field operations. They are qualified to operate in tactical scenarios and severe environments. The systems are multi-band and provide simultaneous operation on C, X and Ku bands with both integrated and flyaway antennas. On-the-move satellite terminals are designed for vehicular applications and have the capacity to maintain satellite communication while the vehicle is moving. They are based on state of the art active Phased Array Technology which allows for rapid satellite acquisition and tracking. On-the-move terminals are available for both X band and Ka band.

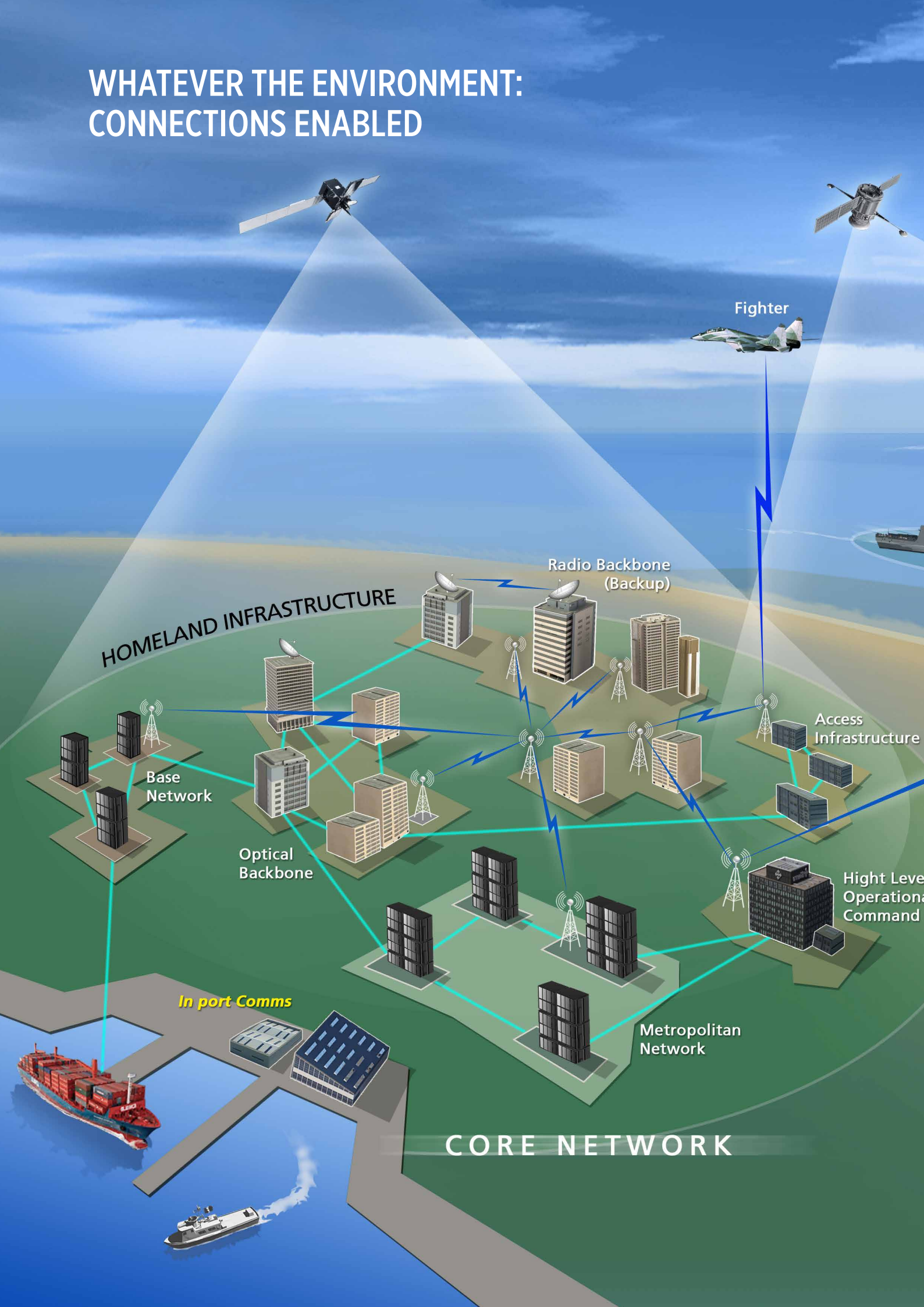
Flyaway And Man-Portable Solutions

Our offer for transportable satellite solutions (TST family) include a range of lightweight terminals specifically designed for the needs of a dismounted soldier or first responder. We offer both multi-band terminals capable to operate concurrently on X, Ku, and Ka bands, or single-band solutions in Ka band.
All terminals exploit a compact design which facilitates operations in the most sever tactical environments and they need just a few minutes for deployment and activation. The fully operational terminals are contained in few backpacks and hard transit cases or AirDrop cargo bags are available as options.

Naval Solutions

A family of naval satellite solutions includes both UHF and multi-band Ka/X/Ku systems (Ka as standard configuration and X/Ku bands as options, either civil or military versions). All the products allow fully-meshed, starred and hybrid connectivity with all terminals served by the ship network control centre for both voice and data services.
The systems support both single or dual antenna configurations, in case the satellite line-of-sight may be obstructed by the ship frame in condition of operation.

WHATEVER THE ENVIRONMENT: CONNECTIONS ENABLED




In navigation
Task Force Command
BLOS Comms
Deployable
Network
Mobile
Segment
Combat Net Radio
Combat Net Radio
Command Post
IN THEATRE

ELECTRONIC WARFARE SOLUTIONS

MILITARY PROVEN SOLUTIONS FOR LAND EW APPLICATIONS

For over 30 years, Leonardo has supplied Electronic Warfare (EW) and Electronic Counter Measures (ECM) capabilities to different Armed Forces, including UK and Italy.

Building on many years of activity in Land EW, our offer takes advantage of the significant operational EW experience brought by our specialist staff. We bring also over 40 years' experience in the supply and support of advanced antenna systems used on a variety of military platforms.

In the last decade we have developed and fielded an ECM capability package that counters the threat of Remotely Controlled IEDs, providing a form of 'electronic armour' by blocking the radio transmission used to detonate improvised explosive devices such as roadside bombs.

Originally designed to meet the demanding requirements of a soldier on a foot patrol, the system was further developed and packaged for a range of roles including vehicle and fixed site.

Our solutions provide a modular and flexible approach to meet the subtle differences between the protection requirements that are needed for Very Important Person (VIP), Explosive Ordnance Disposal (EOD) and Force Protection (FP) roles. Fully reprogrammable by the customer, the ECM family allows the customer to remain agile in response to new and emerging threats.

Our offer is complemented by military proven SIGINT, COMINT and electronic attack (EA) systems addressing targets of interest within multiple bands of operation.

RCIED Suppression

The Leonardo family of ECM products provides security forces with enhanced protection against Radio Frequency (RF) initiated Remotely Controlled Improvised Explosive Device (RCIED) threats. The company manufactured over 20,000 units of ECM, the bulk of which have been used by Combat Troops in Northern Ireland, Iraq, Afghanistan and the Lebanon. The system is available on both soldier man-portable configuration and vehicle version, where it can be rapidly configured and supported by a range of ancillaries.

Through Direct Digital Synthesis technology all the characteristics of the ECM signals can be fully programmed for optimum effectiveness. Jamming waveform techniques, such as wideband/barrage and spot, can be simply created using the Human-Machine Interface (HMI).

EW/COMINT Systems

As a result of cooperation with Leonardo DRS, we offer the Tactical Manpack COMINT Direction Finding (DF) system. This provides unmatched performance in a small, operator friendly, mission flexible package well suited for a wide range of demanding operational scenarios.

The system requires very few cables and slips packs into a standard rucksack, providing warfighters with unmatched signal detection and increased situational awareness, anywhere they go.

Communication Denial Systems

The Communications Denial Sub-System (CoDeSS) delivers unparalleled powerful sophisticated jamming capability to the user. Designed for stand-alone operation or integration into a wider battalion-level EW system, CoDeSS is a military proven state-of-the-art electronic attack (EA) system addressing targets of interest within the HF to UHF Communication Bands.

NAVAL COMMUNICATIONS

FIELD-PROVEN SOLUTIONS FOR MARITIME COMMUNICATIONS

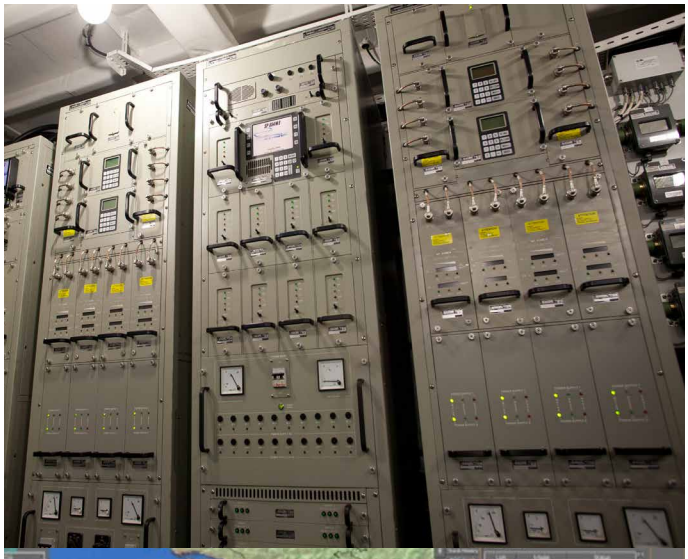
The company has a strong tradition in the supply of naval systems, having supplied the first naval communications to Italian and Royal Navy ships in 1896. Since then, we have delivered communications systems into naval programs in Italy, the UK and over 40 countries including the USA, France, Turkey, China, Malaysia and New Zealand. Over 250 naval platforms have been fitted with the company's equipment.

Based on this experience, the company is well placed to deliver battle-proven, modular, scalable and secure naval communications systems, designed to function at the heart of naval and joint operations.

With the experience acquired in several naval communications programs, we provide strategic communications systems, satellite communications, messaging and information systems, cryptographic equipment, naval radios, maritime networks, Navy shore stations, specialist antennas and electromagnetic modelling.

LF/MF/HF/VHF/UHF Radios

Leonardo has designed a family of multi-band and multi-function transceivers for both long range communications and Line of Sight ship-to-ship or ship-to-aircraft military communications. The family comprises single-channel LF/MF/HF transceivers (compatible with Tactical Data Link 11/22/Y), LF/MF/HF modular and multi-channel naval cabinets, and a VHF-UHF system with multi-band and multi-role capability. All systems provide synchronous 3rd Generation Automatic Link Establishment and an advanced architecture enabling the highest number of RF channels per antenna. In case of HF communications the system may also exploit our HF2000 maritime system for automated networking.



Multi Data Link Processor

Our solutions for Naval Communications include a Multi Data Link Processor (MDLP) which guarantees the capacity to manage multiple tactical data links in a simplified way with support from many automatic functions..The solution integrates a number of different links (including 11 a/b, Link 16, Link 22, J-REAP e VMF) and provides the naval platforms with the possibility to exchange with air and ground assets, in real time, tactical data coming from the sensors as well as position information and status of weapons, for the creation of shared picture of the tactical situation.

Naval Software Defined Radios

Leonardo Naval SDR have been designed in the first instance to support external long range communications, but alongside HF BLOS communications our portfolio also encompasses VHF/UHF communications for delivering Navies with High Speed Mobile Ad Hoc Networking Waveforms, IP-over-Air waveforms and NATO HaveQuick I/II, Saturn and SATCOM waveforms. Today, our SWave family of Maritime Radio SDR equipments includes a number of radio transceiver units (150W HF, 1KW HF, 2KW HF, 100W VHF/UHF) and dedicated rack mounted maritime multi-channel radios.

Naval Networking

Based on the company's proven Sentinel Soft Switch solution, our naval tactical Voice Distribution System (VDS) manages voice distribution over an IP network and it also includes the purpose built low-cost naval Tactical Voice Terminal (TVT).
Due to its open, non-proprietary design, the VDS can be hosted on the user's own server system and also gives the user the ability to upgrade a communications capability within an existing architecture without significant additional costs.

NETWORKING PRODUCTS

SUPPORTING DYNAMIC NETWORKS IN TACTICAL SCENARIOS

The increasing demand for data traffic generated by near-real-time data and Command & Control applications, combined with the need for security features in networks, set new requirements for switching systems and networking protocols.

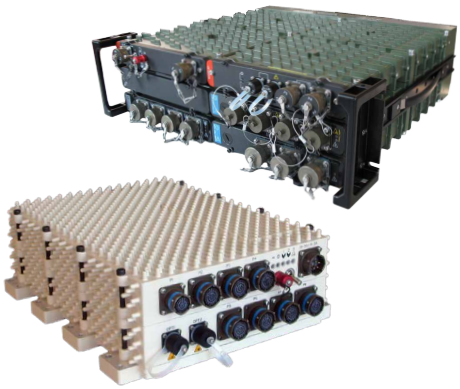
Our offer for military communications includes a complete range of products designed for providing broadband switching services in both tactical and infrastructure environments. All of our products combine outstanding throughput performance with innovative services and protocols support in an extremely scalable architecture.

Our networking products implement a complete and robust full-IP solution for voice, video and data services.

In addition to standard IP protocols, specific networking solutions are introduced for faster system topology convergence and graceful network performances degradation upon link failures or nodes disruption or rapid nodes mobility, which is a crucial capability in case of tactical deployments with both dismounted and vehicles in operation.

Similarly, along with standard policies for Quality-of-Service (QoS), advanced bandwidth reservation mechanisms are implemented in support of mission critical applications, such as real-time and near-real-time data.

Secure networking is supported by specific features like IPSec Virtual Private Networking. Access control, connectionless integrity, data origin authentication, protection against replays (a form of partial sequence integrity), confidentiality (encryption), and limited traffic flow confidentiality are provided at the IP layer, offering protection for IP and/or upper layer protocols through the use of multiple traffic security protocols.



Switch/Routers

Our family of MSR Multi-Service Switch Routers includes a number of rugged, secure and highly resilient networking solutions for both Wide Area Network, Local Area Networks and vehicular applications.
They provide the capability to establish networks between IP military-based C4I systems using tactical bearer equipments such as HF/VHF/UHF radios, radio relays, WiMax and satellites. The products are designed to meet very stringent mechanical, environmental and electromagnetic stresses in accordance with the applicable MIL-STD specifications.

Interoperability Points

The Sentinel Multi-Service Interoperability Point (MSIP) is a Gateway available in different formats for tactical and strategic scenarios.
It is built to seamlessly integrate legacy military and civilian networks, and provides flexible adaptation capabilities between non-IP and IP networks supporting a guarantee of QoS for connection oriented traffic.

Local Area Networks

The company's Sentinel LAN solution uses a cost-effective Ethernet infrastructure and our proprietary Sentinel IP software to provide high-speed access for data and voice, both as converged or separated services. The solution leverages a simple plug-and-play mechanism which minimises set-up time, resources and training.
The LAN is thus self-organising and adapts itself to any routing topology. Data terminals and VoIP devices access the LAN through the Sentinel Desk Access Units (DAU) and start operating without any pre-planning. Voice communication can be provided by our Sentinel Voice over IP (VoIP) phone, while dedicate terminal adapters guarantee access for legacy phones.

NETWORK MANAGEMENT

ADVANCED MANAGEMENT SERVICES FOR MODERN MILITARY NETWORKS

Communications networks play a key role in warfare and defence systems and today's military networks can no longer be dependent upon manual administration approaches. The company has developed a suite of Network Management products for configuration and supervision of both Land and Maritime networks, as well as dedicated Monitoring & Control solutions for satellite communications' ground stations.

Our Solutions use advanced software design concepts and technologies to implement network management functions at different levels, from network configuration and planning to status monitoring.

The main advantage of adopting our products relies on the possibility to manage in an integrated and effective way all the activities and task that are required for effective operation of a military network, including set-up, accounting, performance check and security.

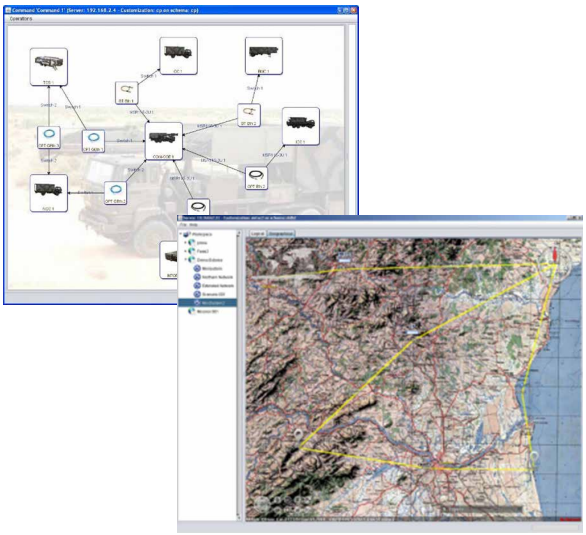
Company solutions for network management are natively mission-independent being tailorable to the widest set of missions. Network devices are automatically configured, system operation monitored and timely recovery actions are undertaken.

Our military network may also support remote management using simple and intuitive graphical user interfaces and standard mechanisms such as the Simple Network Management Protocol.

In tight connection with NMS operation, our Secure Message Handling Software dispatches orders and operational notices in conformance with the appropriate Information Security Level.

Network Management System

NMS-2K is a Network Management System for planning, configuration, provisioning, control and dynamic management of tactical communications. The system is designed for fully scalable architectures ranging from a few nodes to a distributed wide area infrastructure with multiple cooperating units, and it manages all the domains of operations. i.e. dismounted, vehicular, and deployable. NMS-2K is a distributed system, typically redundant, with no single point of failure.
NMS-2K can be tailored to the operators' requirements according to functional, organisational or geographical criteria. The system can grow with the managed network, both in terms of size and network technology, simply by adding specific modules and HW platforms.
NMS-2K is composed of a modular configuration comprising a core software package, common to all applications, incremented by a set of modular components dedicated to specific functions.

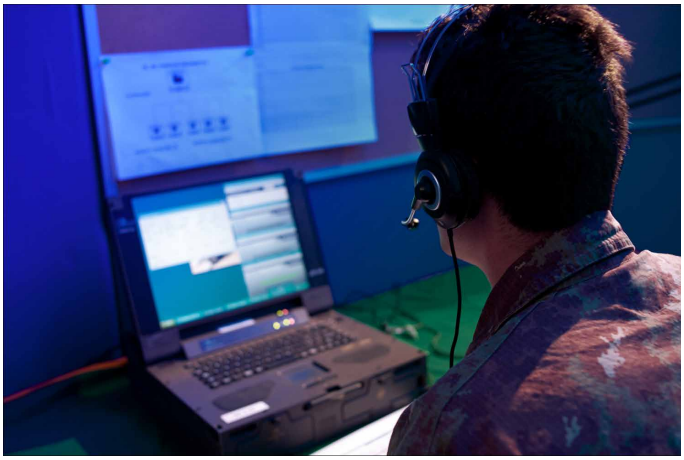


Monitoring & Control Of Satellite Communications

Leonardo offers general purpose a general purpose Monitoring & Control (M&C) for both large and small satellite ground stations. Through dedicated and configurable hardware infrastructures and SW applications,
it allows periodic polling and dedicated management interventions on all equipment, with significant benefits in terms of improved availability and reduced operational cost. It also records all significant events, logging information, as well as commands and status changes, in order to trace the station history or to perform historic trouble.

Military Message Handling Systems

The company Military Message Handling System (MMHS) is a suite of applications dedicated to convey military message services (e.g. e-mails) among organisations and individuals.
The core system supports a number of standards for user accounts, profiles configuration and administration, Active Directory and Service Directory. Standard protocols may be extended as necessary by a set of adds-on such as message conversion or support to specific gateways.



NETWORK ENABLED OPERATIONS

COMMUNICATIONS REQUIREMENT FOR DIGITALIZED FORCES

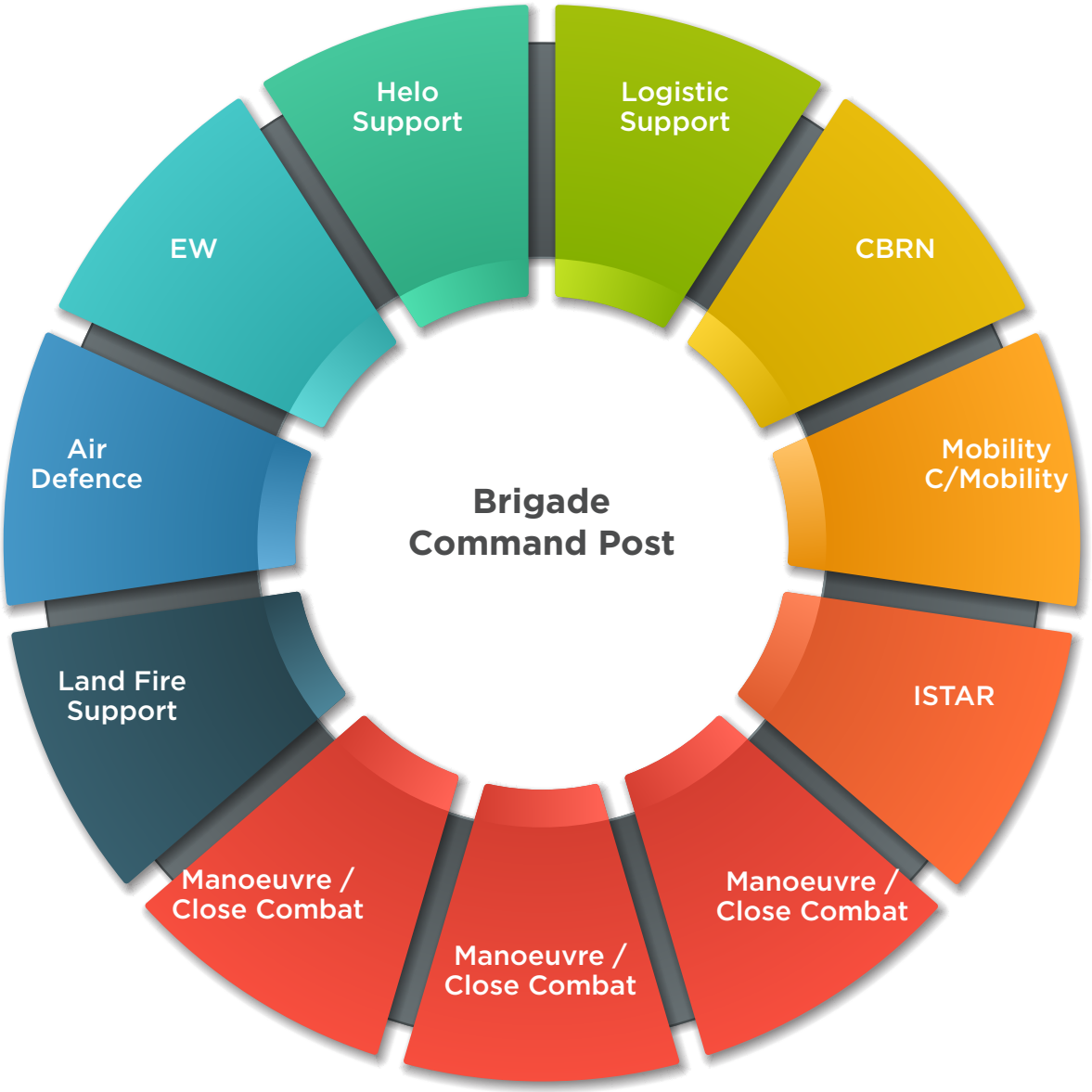
Today technology has transformed military assets into ‘battle centres’ for the sharing of voice, data, images and video. As a result, networked and digitalised forces maintain a better understanding of their position in the battlespace and reach higher levels of mission effectiveness.

The fundamental enabler of the network centric transformation is an advanced and integrated Tactical Communications System, capable to providing secure and reliable communications among in-theatre units and able to provide situation awareness superiority through automated localisation, messaging and navigation.

External communications for deployed units require a set of heterogeneous waveforms which can be delivered through reconfigurable Software Defined Radios. Broadband connectivity may be established through the use of On-The-Move satellite communications terminals or point-to point trunk connectivity among deployed Command Posts.

Extensions beyond Line-of-Sight and reach-back demand for satellite communications terminals. These technologies are complemented by Tactical 4G, which provides a relatively simple and effective approach for extending broadband access to geographical deployment. LAN technologies and Desktop Secure Phones offer digital high-level mobile security for voice and data communications according to SCIP protocol.

Information Assurance assumes a major role in modern network enabled operations and this requirement may be addressed by multi-level security approach and high grade IP protocol encryption, complemented by wideband bulk encryption and protected WANs ensuring traffic flow confidentiality against spoofing and eavesdropping attacks.



FIELD PROVEN SOLUTIONS FOR NETWORK ENABLED OPERATIONS

We have proven and in-service, modular, scalable, secure systems, designed to operate at the heart of modern military missions and enabling interoperability with allies, joint forces and civil authorities and the effective exploitation of information.

The company added value is built from strength points as the Italian “Forza NEC” experience, which is the largest Joint Digitisation Program of the Italian MoD, the dominant position in the Soldier Radio market segment and the complete communication product portfolio, ranging from low cost Personal Role Radios to high end Software Defined Radios, Radio Relays, SATCOM Terminals and Military-Grade Networking devices.

To enable true transformation of Armed Forces towards Network Enables Operations, we provide our Customers with a complete suite of solutions including intra-team and extra-team soldier communications, dissemination of C2 and Situational Awareness information, soldier to vehicle integration, vehicle to Command Post integration, and a turn-key End-to-End connectivity using heterogeneous communication technologies (HF/VHF/UHF bearers, Tactical Radios, SATCOM Terminals).

As far as interoperability among C4I applications is concerned, our solution is based upon the combination of different approaches which include the implementation of a Service Oriented Architecture with both standard and Leonardo proprietary Digitisation Services, and integration of standard middleware for data dissemination on the battlefield.

SITUATIONAL AWARENESS

ENHANCING THE UNDERSTANDING OF THE TACTICAL SCENARIO

Mission critical C4I systems (Command, Control, Communications, Computer, Intelligent) are the enabling components for Information Superiority and Network Enabled Capabilities.

Based on the experience achieved on a number of modernisation programs, today our suite of deployable, mobile and dismounted C4I solutions guarantee effective collaboration and sharing of C2 information among tactical units in the battlefield.

Our applications feed the Local and Common Operational Pictures gathering positional data of friendly, neutral and hostile elements within the scenario, enabling on-time and effective coordination of tactical operations.

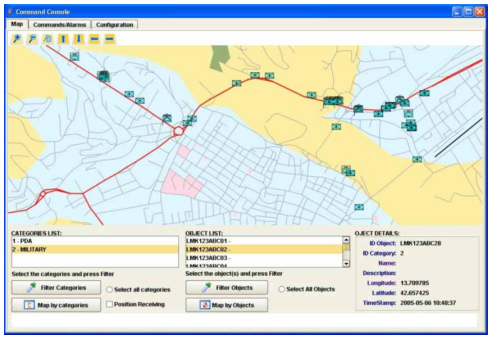
The company developed a range of systems for both stationary, on-the-move and dismounted units. Before the mission, they support effective mission planning as well as configuration of C2 applications, equipment, and radio devices. This includes preparation and loading of digital maps of the area of operation.

During the mission the same systems generate, update and present the operational picture and contribute to the implementation of a shared understanding of the tactical situation.

Dedicated applications support navigation and manoeuvre with routes and waypoints, whilst commanders are provided with easy-to-access functions for managing orders, formatted messages and reports. All of the products guarantee secure and robust transmission of voice and data services, as well as soldier-to-vehicle and vehicle-to-HQ integration.

Battlefield Management System (BMS)

The company offers general purpose Monitoring & Control (M&C) for both large and small satellite ground stations.
Through dedicated and configurable hardware infrastructures and SW applications, it allows periodic polling and dedicated management interventions on all equipment, with significant benefits in terms of improved availability and reduced operational cost. It also records all significant events, logging information, as well as commands and status changes, in order to trace the station history or to perform historic trouble.



Blue Force Situational Awareness (BFSA)

Our C2N-BFSA (Command Control and Navigation - Blue Force Situational Awareness) is the Command and Control application for non-Combat terrestrial Units. Functionally similar to the BMS, this system is focused on tracking friendly forces on the tactical map and enhancing the C2 capabilities of ground forces. C2N-BFSA allows to exchange information between several moving vehicles, also when they belong to different hierarchical levels of the C2 chain.

Dismounted Soldier Combat Information System

Our C2SA system for dismounted soldiers supports the warfighters in performing Command & Control functions and by enabling information exchange with other units, sensors and other subsystems. It consists of a set of lightweight easy to use Apps, running on Android rugged smartphone platform, implementing the C2 services for providing constantly updated Situational Awareness to the Dismounted Soldier.
Dedicated C2 functions are assigned to distinct operational roles, ranging from Commander to team members, and taking into account even degraded scenarios. When operating under TAC LTE coverage, the application can access a private Android Military Market for planned operational configurations and Apps updates.

SDR LAB / WAVEFORMS

LEADERS IN THE DEVELOPMENT OF ADVANCED SDR WAVEFORMS

Software Defined Radio (SDR) technology, a versatile broadband communication tool whose functions and aspects can be modified via software, brings a true revolution to the field of military radio communications. Advanced SDR waveforms are paving the way of the future of Tactical Communications and waveform portability is today recognised as a valuable benefit of the usage of the SDR products.

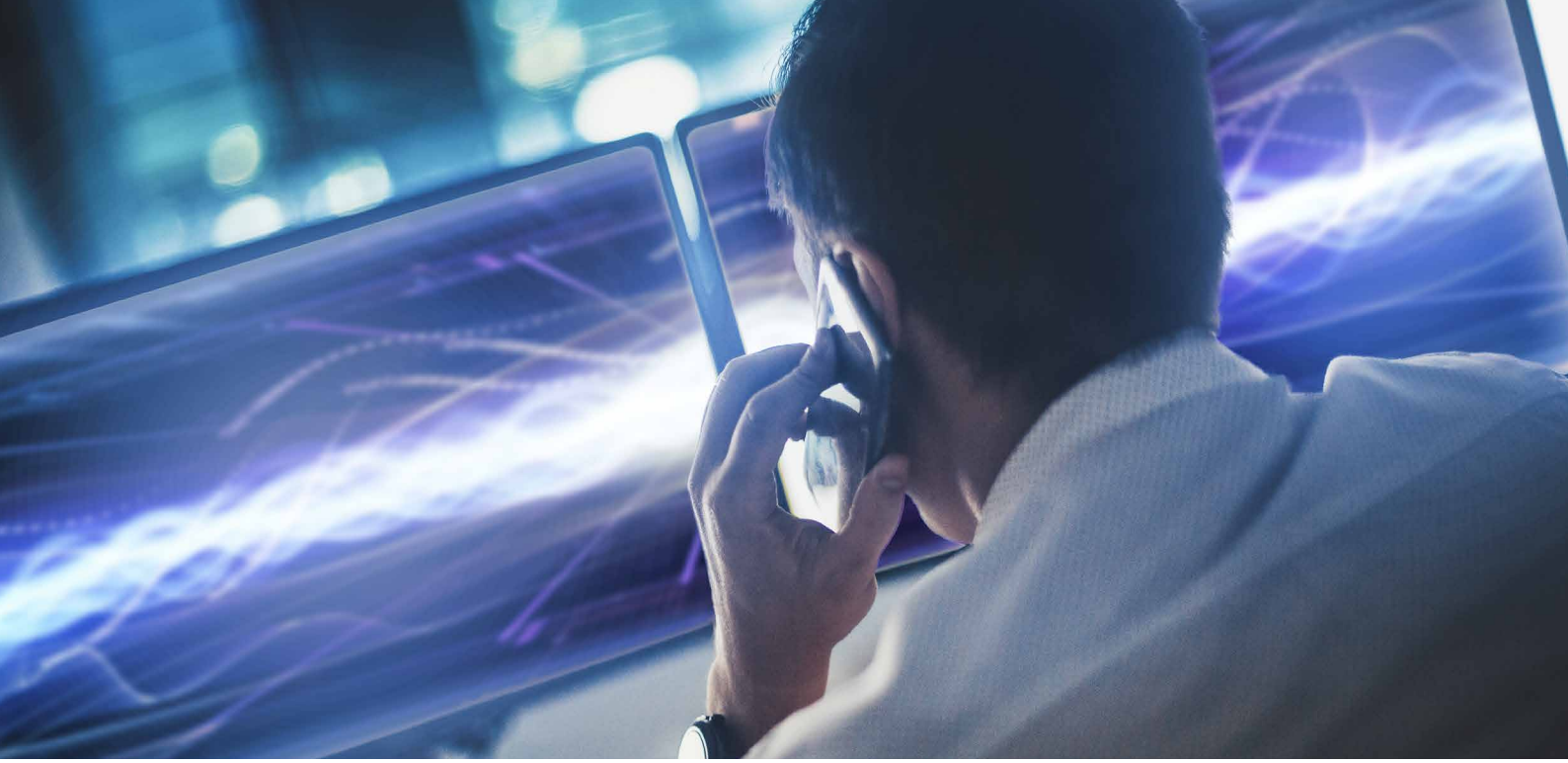
At the same time, however, many nations have still their own legacy radios and may benefit from re-designing their communications in the form of SDR waveforms to exploit the advantage of higher data rate capabilities whilst maintaining interoperability with the currently in-service radios.

Leonardo has the capability and experience to support the operational employment of SDR products for modern Armed Forces.

We can establish a tailored-for-use Waveform Development Laboratory at customer premises for developing local waveforms and then port them on our reconfigurable radio platform.

The company has been a pioneer in SDR and we started working in our Waveform Development in early 2000. Our current level of expertise has been reached to in-house grown design and development capabilities but also with participation to several international activities.

The list of our main achievements in this domain includes the development and fielding of a set of proprietary SDR Waveforms, i.e. the Soldier Broadband Waveform (SBW) and the Narrow Band Adaptive Waveform (NBAW), as well as the implementation of the standard European Secure Software Defined Radio (ESSOR) High Data Rate Waveform (HDR). All of these are today available within our family of SWave SDR.



CUSTOM SOLUTIONS FOR EVERY END USER REQUIREMENT

Through the implementation of a Waveform Development Laboratory, our customers are put in condition to design and test specific communications waveforms for their SDR equipment, customised according to their operational requirements, expected performance levels, national regulations.

Dedicated SDR Waveforms may be developed in order to support different end user applications such as Command & Control, Close Air Support, Combat Identification, intra flight communications.

The typical process for the development of a new waveform or for the porting of a legacy waveform into the SDR domain consists of a number of steps for which the company may provide full training and support.

The process starts with the definition of the target Waveform (WFM), which shall be compliant with the Software Communications Architecture (SCA-WFM), and foresees a structured sequence of design, development, tests and validations.

INFORMATION ASSURANCE AND CRYPTO

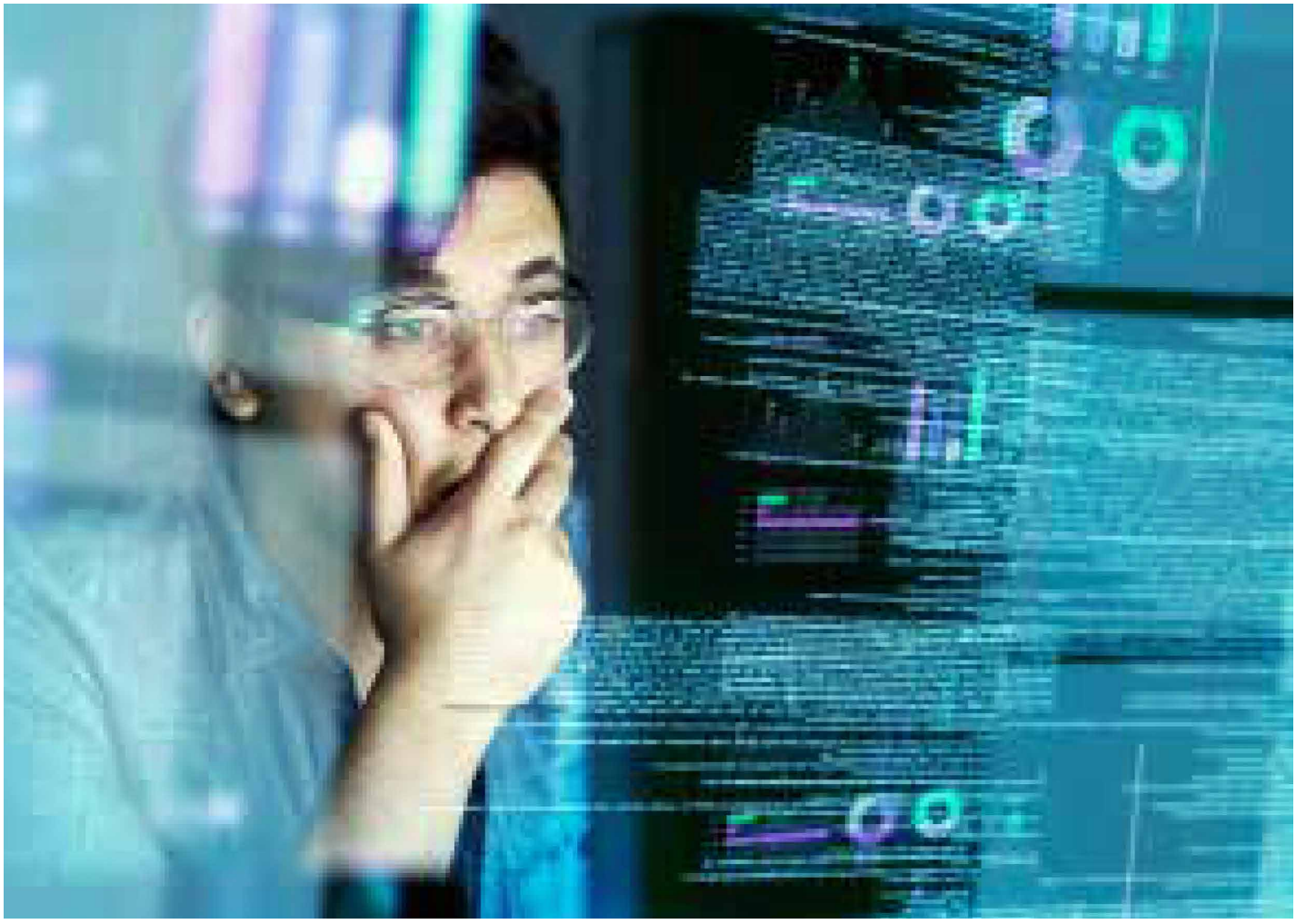
ASSURING SECURITY TO NETWORKED OPERATIONS

The future of Network Enabled Operations foresees distributed units in the battlefield which disseminate and access tactical and operational data in real or near real time. The concept of networked military assets sharing data about the battlespace, however, raises evident concerns about security of the forces and information assurance.

Leonardo has been investing on the information assurance domain for more than 30 years and this guarantees today a worldwide best-in-breed product portfolio for both Armed Forces and para-military organisations. We have the expertise to update our solutions in accordance to the security challenges coming from the new threats and the consequent evolution of the operational scenarios.

Our long-term roots in encryption systems made us a recognised leader in Link/IP encryption and smart crypto devices. We provide also secure network Solutions such as Electronic Keys Management Systems (EKMS) and Multiple Independent Levels of Security (MILS) messaging systems.

We also have certification capabilities for COMSEC, COMPUSEC and INFOSEC, and may provide laboratories for crypto algorithm customisation, crypto tempest laboratories and crypto–algorithm training courses.



Crypto Devices

The company offers programmable solutions for voice and data encryption which provide maximum information protection over any type of communication media including narrowband, wideband and IP high speed.
The wide range of interfaces and available encryption algorithms make our products suitable to any network architecture and traffic requirements, while the mechanical design permits different types of installation in shelters, vehicles, vessels, flyaway assemblies, tents and open air.

Network Encryption

Leonardo IP Networks Encryption System is a comprehensive set of IP encryption devices, ancillaries and SW Management for creation and management of Secure Virtual Private Networks to protect IP traffic over untrusted networks.
Our devices have National, NATO and EU approval to manage classified information up to NATO SECRET security level. The devices can be equipped with standard encryption algorithms but in any case our Customers are provided with the necessary training and equipment to replace them with National algorithms.

Cross Domain Solutions

The company's IP Networks Encryption System is a comprehensive set of IP encryption devices, ancillaries and SW Management for creation and management of Secure Virtual Private Networks to protect IP traffic over untrusted networks.
Our devices have National, NATO and EU approval to manage classified information up to NATO SECRET security level. The devices can be equipped with standard encryption algorithms but in any case our Customers are provided with the necessary training and equipment to replace them with National algorithms.

ADVANCED TECHNOLOGY CENTRES

COMNECT LAB

Innovation is fundamental to Leonardo. It is coded into the DNA of our business, and enshrined as one of our corporate values. In a market where technological leadership is a critical market discriminator, innovation plays a key role in delivering true advantage.

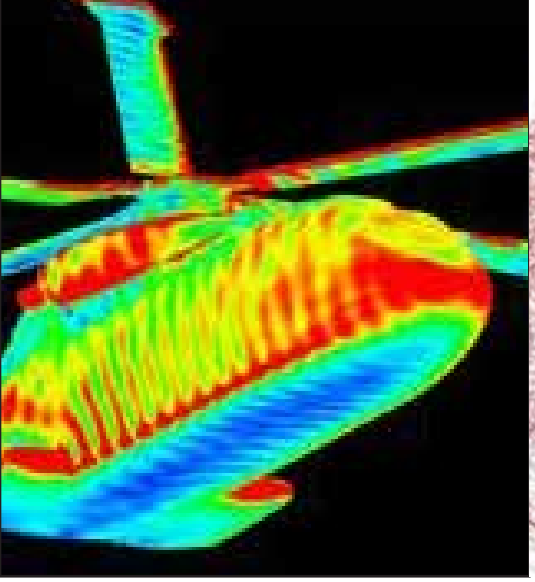
We strive to maintain our edge in communications systems in order to create true mission-focused solutions tailored to the diverse requirements of our customer base. And we seek to exploit new technologies and techniques so as to provide the answers required by the emerging operational scenarios of the Network Enabled Capabilities.

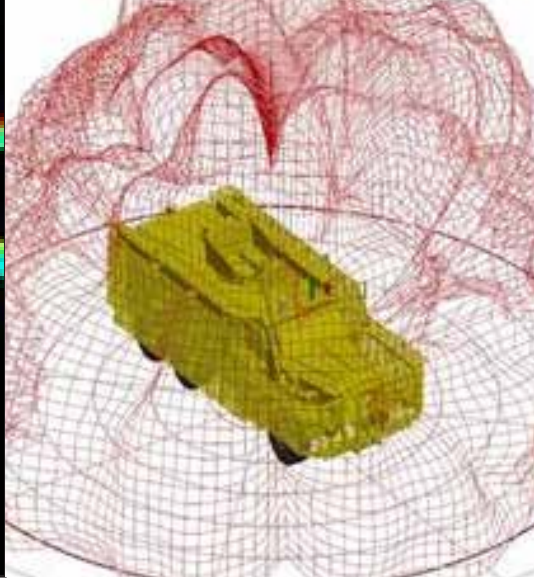
Our ComNECT Lab is the advanced technology centre where new integrated solutions for communications are conceived, prototyped and validated.

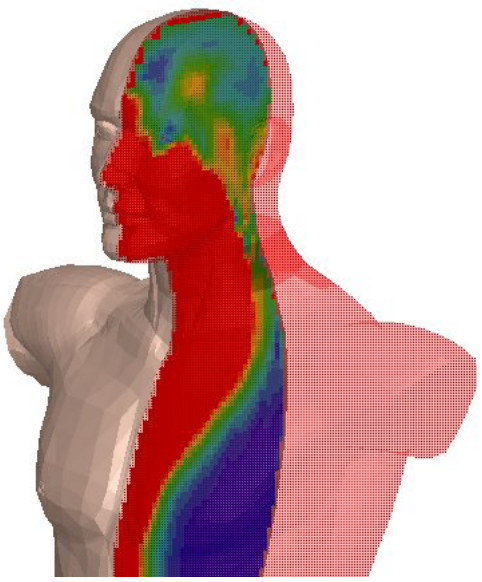
The laboratory supports all the key requirement for modern communications and information systems, spanning from large command posts to mobile platforms, down to the individual soldier solutions.

The main technological areas that we manage in the laboratory include: conventional and Software Defined radios, satellite systems, antennas, network management and networking devices, radio relays, ruggedisation and integration of COTS products, electromagnetic analysis, modelling & simulation for communications.

The ComNECT Lab is also available to support dedicated studies and validations for our Customers. Among the typical services that we provide we mention architecture design and development (with support of standard Architectural Frameworks), integrated test beds , support to installation, training and maintenance.







ANTENNA DESIGN CENTRE

The company retains over 150 years of extensive and practical experience in design, development and test of antennas for communications. Our antenna systems are fitted for applications ranging from body-worn communications through platform installations such as aircraft, ships and armoured fighting vehicles.

Leonardo owns a centre of excellence for the design of Integrated Antenna Solutions (IAS), in which our specialists plan, develop and manufacture bespoke antenna solutions for a wide range of fixed, mobile and man-portable platforms.

The goal is to deliver antenna systems that comply with all installation and physical constraints whilst achieving the best radio performance. Our specialised capabilities provide a fast route to market by analysing the total requirement, antenna specification, target application and the deployed environment or platform.

Capabilities of the centre include prediction of the performance of installed antennas (via measurements and models), Electronic Counter Measures (ECM) antennas, discrete antennas, advanced EM modelling.

The latter is particularly important for configuring combat or logistic platforms which are equipped with different radio systems and that typically have severe RF collocation issues. The mutual interference that the different waveforms determine for each vehicle may in fact severely limit overall radio performance.

Rapid on-site prototyping provides fast insight into the physical solution once the initial analysis and simulation stages have been passed. Our design and manufacturing facilities include a secure outdoor antenna test range with a vehicle turntable and workshop.

For more information:
infomarketing@leonardocompany.com

Electronics Division
Via Tiburtina
Km 12.400
00131 Rome - Italy
T +39 06 41501
F +39 06 4131133

MM08772 10-21

leonardocompany.com

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