Global Spectrum Experience

Enabling Electromagnetic Dominance

Defense and Security

System solutions for spectrum management, spectrum surveillance, system integration, spectrum consulting and training

LS telcom

LS telcom is a leading worldwide solutions provider for spectrum management, spectrum surveillance, electronic warfare, direction finding and geolocation.

We provide hardware and software systems, consulting services and system integration and enable military organizations to achieve spectrum situational awareness and spectrum superiority.

Since its foundation in 1992, LS telcom has supported governmental and military organizations in more than a 100 countries worldwide in tackling the challenges of radio communications.

We ensure to be ahead of technology and standards through the cooperation with international organizations such as AOC, AFCEA and ITU.
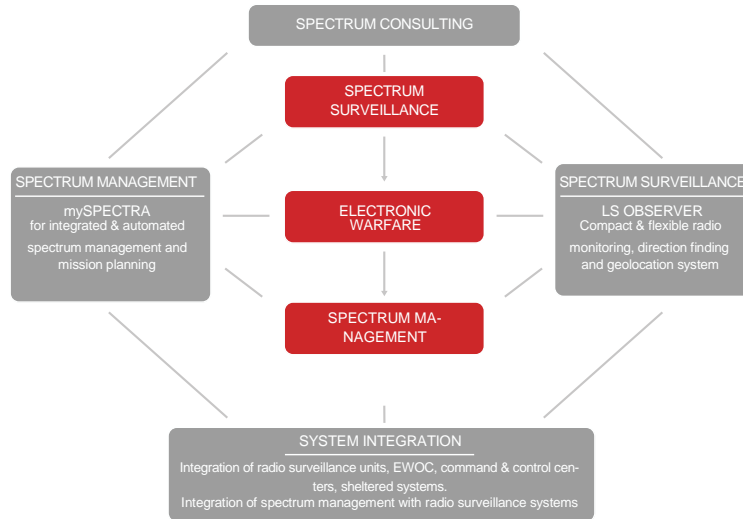
LS telcom also participates in radio frequency spectrum research programs with prestigious universities and research institutes.

With its headquarters located in Lichtenau/Baden, Germany, LS telcom operates worldwide having subsidiaries and partners on all continents.

LS telcom subsidiaries and offices

Enabling electromagnetic dominance

Our systems are based on nearly 30 years of experience and the most advanced software, hardware and information technology available. Systems are able to run in a networked client-server mode, on-site, in a cloud environment, or as a standalone mobile solution. The sophisticated user access and user profile management is set out for highest security standards and respects hierarchy and validation processes.

LS OBSERVER Spectrum Surveillance System

LS OBSERVER is a radio monitoring, intelligent data collection and analysis system. It consists of the central monitoring software in addition to various types of remote monitoring units.

The distributed remote units monitor the radio frequency spectrum 24/7 along borders as well as in areas of responsibility (AOR), areas of operations (AOO) and areas of interest (AOI).

Various ruggedized remote monitoring units are available as handheld, mobile, portable, transportable, fixed and airborne units

Fixed Monitoring Unit

The Fixed Monitoring Unit (FMU) is left on-site for persistent surveillance 24/7 of the operational electromagnetic environment. It measures the spectrum over small or large frequency ranges. The collected data can be stored in the unit itself for up to two years and is accessed locally or remotely in real, near-real or post event.

Transportable Monitoring Unit

The Transportable Monitoring Unit (TMU) is a highly flexible version of the FMU. It is easily transportable for temporary, short term or long time surveillance. Everything is pre-installed in a single weatherproof rack enabling the TMU to be rapidly deployed.

Protected Portable Unit

The Protected Portable Unit is a particular ruggedized solution for frequency measurements in problematic areas like a battlefield.

Airborne Monitoring Unit

The airborne monitoring unit detects frequencies in areas that other surveillance units cannot cover, such as behind the enemy lines. It is able to achieve this by flying at altitude thereby providing increased detection ranges.

Intelligence gathering & data collection

Spectrum situational awareness is the foundation of success for any military operation. The LS OBSERVER intelligent monitoring and data collection system assists military commanders in obtaining a detailed picture of common frequency occupancy and usage in the area of operations.

This is how it works:

The LS OBSERVER distributed radio monitoring units continuously scan the electromagnetic environment and record the spectrum usage data in the area of operations. Each monitoring unit is an intelligent system, which consists of one or several receivers that can perform radio monitoring and direction finding in parallel.

Each unit also includes data processing, data analysis and long-term data storage capacities.

The data measured by the remote receiver is compressed and stored locally in the monitoring unit. The data stored in the unit can be accessed directly on the device or can be transmitted to the central command station. Only limited bandwidth is necessary for the transmission. When data transmission is interrupted, the data can be reloaded from the remote device at any time. Advanced filter functionality allows the operator to quickly select the required subsets of data to be analyzed.

The data recorded by the distributed monitoring system populates a theater specific operational spectrum database with real-time frequency channel occupancy, indispensable for the secure frequency allocation to the armed forces in the operational area.

On the fly threat recognition and reaction

Military staff uses LS OBSERVER's central monitoring software to analyze the recorded data and identify signals of interest and suspicious transmissions, recognize immediate threats and to avoid enemy interference and fratricide. The software visualizes results of indications and warnings (I&W), such as geolocation and direction finding. Should the system detect any new, unusual or unknown signals compared to the stored measurement data or the forces' frequency database, it will trigger an alarm and geolocate the source of the signal with integrated geolocation techniques.
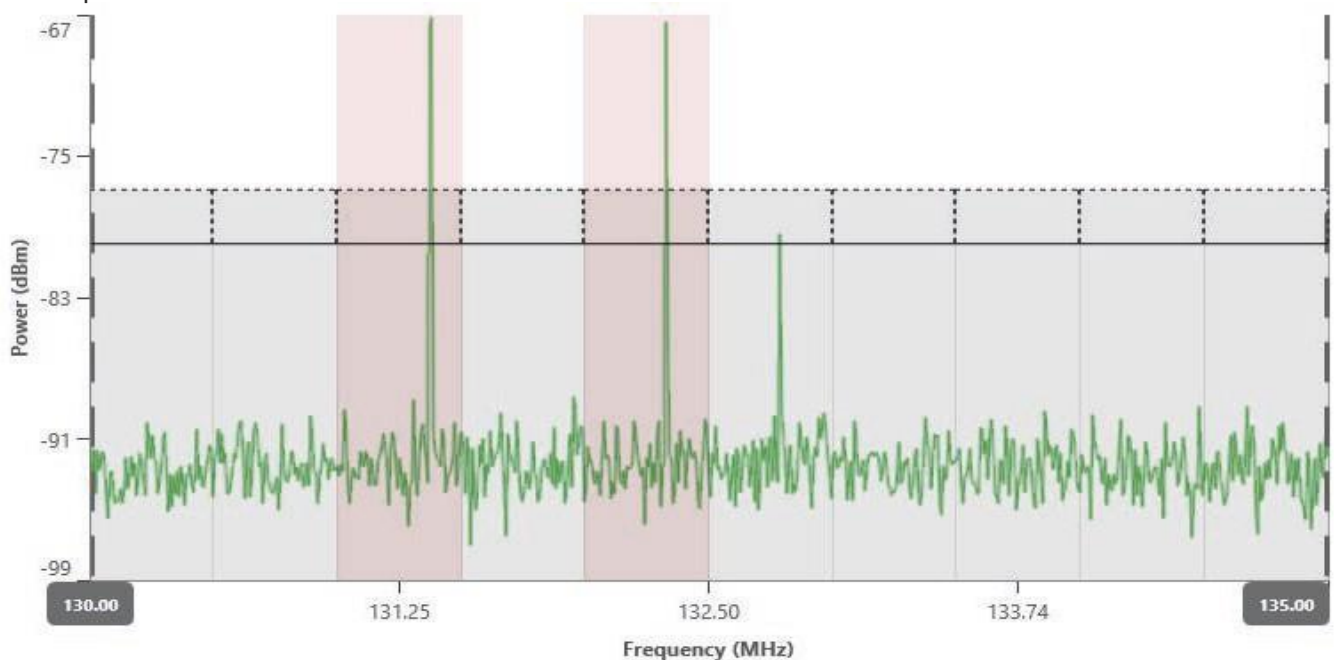
Automatic threat detection

Locate signal sources with higher precision than before

Is it a reflection or are there two signals in the same band? Don't be deceived!

LS OBSERVER's innovative heatmap approach based on several direction finding and geolocation techniques (AoA and GROA+ ®) produces more accurate results than before.

Cross section AoA / heatmap AoA

Multi-spot geolocation

The heatmap and multispot AoA approach takes into account reflections and the possibility of several signals on the same channel. The overlapping of different direction finding techniques allows the consideration of both the main beam and side beams too. The joint display and visualization of beams and heatmaps provide a more accurate and more precise location of transmitting sources.

Locate signals when they are not on air anymore

With the unique DF Time Travel® technology you can track your enemy's emissions and movements, based on signals emitted in the past.

LS OBSERVER scans the radio frequency spectrum continuously and provides the required information for the unique DF Time Travel® technology. Based on the recorded frequency/level/time information in LS OBSERVER, the integrated DF Time Travel® technology can determine the direction of a signal that occurred in the past. The monitoring operator enters a filter sourcing the center frequency and the bandwidth of the signal to be located for a certain timeframe and is provided with the line of bearing. Bearings from multiple units can also be selected.

The system is able to process a much larger frequency range than other systems that provide geolocation in post-processing.

Based on the stored data, LoB(s) will be calculated and displayed
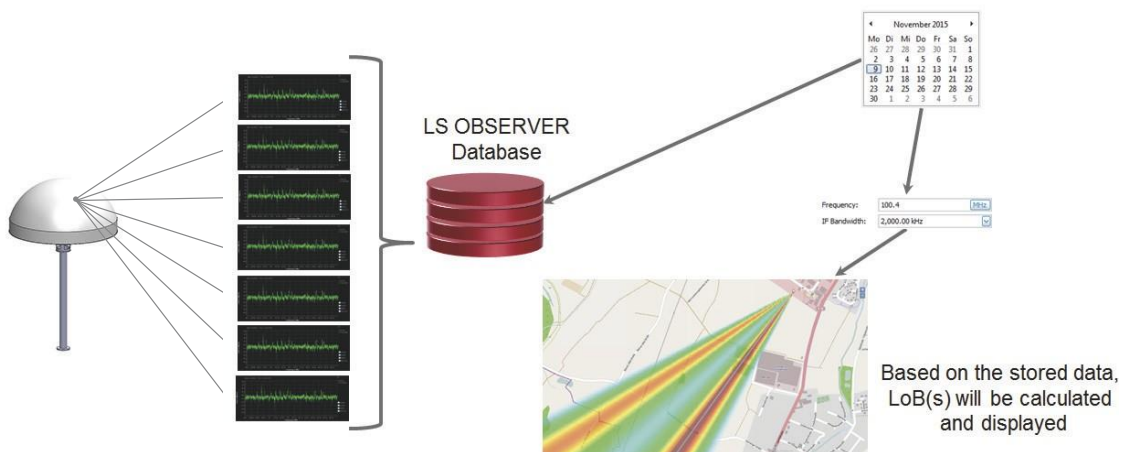
The military use LS OBSERVER for

- Radio surveillance in AOO
- EW operations
- Spectrum operations planning
- Border surveillance
- Maritime security
- Protection of critical sites and areas
  (military bases, ports/airports, critical government sites)

to detect, intercept, identify, locate, record and analyze sources of radiated electromagnetic energy for the purposes of

- Immediate threat recognition
- Geospatial and temporal spectrum surveillance
- Persistent spectrum surveillance
- EW operations (electronic protection, electronic attack, electronic support) and support of reconnaissance
- Direction finding and geolocation to locate hostile or interfering transmitters
- Real, near-real time or post mission measurement analysis of data
- Comparative analysis of 'live' measured data against 'historical' records in the master database
- Area of operations (AOO) frequency channel occupation
- Network coverage measurements
- Spectrum analysis

Surveillance system integration and multi-configuration shelters

LS telcom integrates surveillance, direction finding, radio monitoring and radar units and delivers complete EWOC, ESM & ECM shelters on any desired platform:

- (Armored and protected) vehicles
- Naval and maritime units
- Aircraft and UAV
- (Transportable) sheltered container units
- Maintenance and service entities

We can deliver the units pre-equipped with operational infrastructure only, or deliver complete units including the full purpose-built hardware and software equipment. Installed software is typically for monitoring and spectrum analysis, for network planning, map generation and conversion. A variety of omni and directional monitoring antennas can be mounted for various frequency ranges, in addition to direction finding antennas for HF, VHF and UHF.

EWOC

LS telcom has a team of ex-military personnel who have extensive knowledge in doctrine, planning and operating military hardware. These are backed up by a highly skilled workforce of project managers, designers, engineers and support staff.

The shelter units can be transported by truck, plane and helicopter. They may be equipped with lifting jacks for autonomous lifting and loading and can be crane hoisted or fork lifted. They are built to withstand extreme weather conditions.

Mobile surveillance unit

Operations centre in EWOC

mySPECTRA:
The Military's Automated Spectrum Management & Electronic Warfare System

LS telcom's spectrum management and electronic warfare system mySPECTRA covers all the procedures for electromagnetic spectrum operations from spectrum management, frequency assignment and allotment, policy, host nation and international coordination as well as electronic warfare operations and tactical communications.

It addresses Ministries of Defence, spectrum regulators, border patrol and security services.

mySPECTRA is based on a central data depository that stores all spectrum relevant data and includes task specific software modules to support:

Spectrum situational awareness
Spectrum planning
Frequency supportability
Host nation and international coordination
Frequency assignment and allocation
Battle space planning
Electronic warfare
Mission planning
Tactical communications
Frequency de-confliction
Spectrum mutual interference, jamming, mitigation and resolution
Spectrum sharing

mySPECTRA

Spectrum
Planning

Frequency
Assignment

Spectrum
Engineering

Mission
Planning

mySPECTRA task-specific modules

mySPECTRA is interoperable and interfaces with

- The Joint Restricted Frequency List (JRFL)
- SMIR Online database of NATO through SMADEF XML
- Standard Frequency Action Format (Pub 7 and Pub 8)
- ITU databases (BR-IFIC and SRS)
- Extensive data exchange capabilities:
  - CSV, XML file exchange format
  - Interoperable with allied and friendly forces' systems

Support of net-centric operations

The different task specific software modules in mySPECTRA are seamlessly integrated. Smooth data exchange throughout the different spectrum management entities involved in military spectrum operations and electronic warfare is guaranteed, making the system a true net-centric solution.

Several operational modes

The system can run in a networked client-server mode, on-site or in a cloud environment, or as a standalone mobile solution. The system operates in connected and disconnected mode. The spectrum engineering tools may be used on a laptop in disconnected mode allowing standalone electronic warfare (EW) activities.

The system addresses all levels of warfare

The system addresses all levels of warfare, from strategic to operational and tactical levels. Whatever your position - strategic or tactical spectrum manager, frequency manager, user or requester - with mySPECTRA you can plan, allocate and acquire spectrum.

From the graphical user interface (GUI) and information access to interference analysis, frequency assignments and engineering calculations - the system can be adapted to different user profiles and the exact needs and tasks of each user.

Engineering functions range from sophisticated calculations for high-level long-term frequency management, through to the warfighter's unique engineering and spectrum planning requirements, to 'one-button-operations' for real-time results presentation required by dismounted soldiers.

mySPECTRA supports joint force commanders and the combined joint task force to effectively use the finite spectrum resource, and to satisfy the spectrum needs of all the armed forces, such as battalions and brigades. It takes into consideration exacerbated spectrum demand in areas of conflict due to unknown transmitters and hostile use. The operational command uses the real-time information in the central database to plan communication networks and links, and to automatically identify the best location and power for emitters while minimizing interference.

Maneuver and mission planning with mySPECTRA

With mySPECTRA armed forces on the move can plan and simulate networks, calculate link budget and coverage.

The wizard - the indispensable companion for dismounted units and soldiers

When there is no time to lose, mySPECTRA Wizard Workflow technology provides dismounted units with real-time tactical calculation and engineering results based on their location. The required steps for various complex analyses, such as interference analysis, de-confliction, intermodulation and near field calculations are mapped and stored in advance as so-called "wizards". Dismounted and mounted units can trigger these wizard procedures and obtain immediate calculation results based on their location and latest data collection sets.
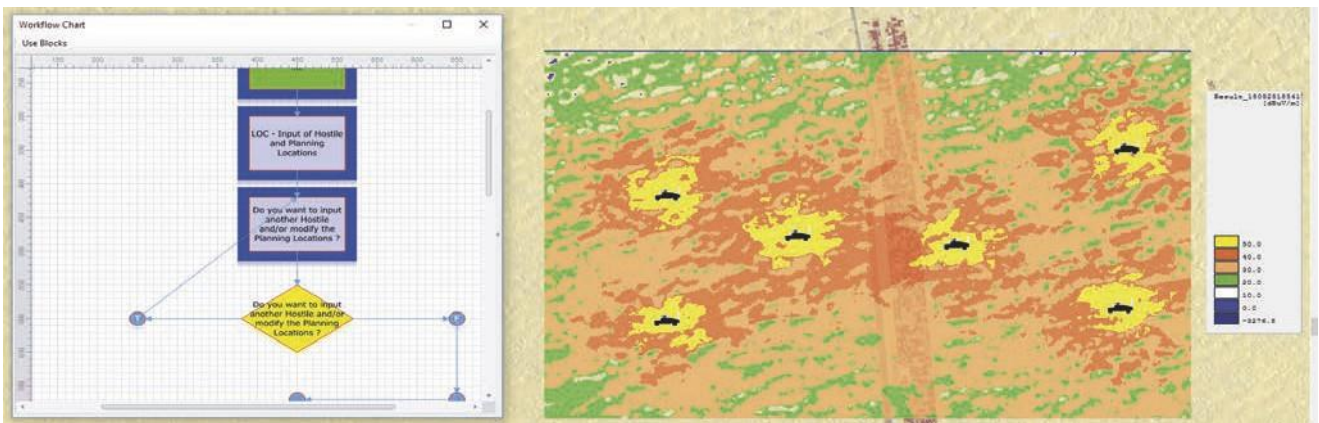

Example of a wizard workflow

Interference analysis and frequency assignment for on the move units

Interference is highlighted on the map and the user can choose from a list of available interference-free channels. Frequencies can be assigned for user-defined entities, based on available frequencies, equipment parameters and equipment location. The frequency assignment functionality also accounts for frequency hopping. It supports all types of equipment operating from single frequency to frequency hopping modes. There is the option of specifying more than one operation mode for equipment, if it works in several modes.

Tactical communications planning and modeling

On the move communication availability check

mySPECTRA provides a communication availability check between dismounted units and headquarters. The integrated on-the-fly link budget calculation enables communication planners to move sub networks or individual stations to new locations and visualize communication paths between headquarters or other units on the map.
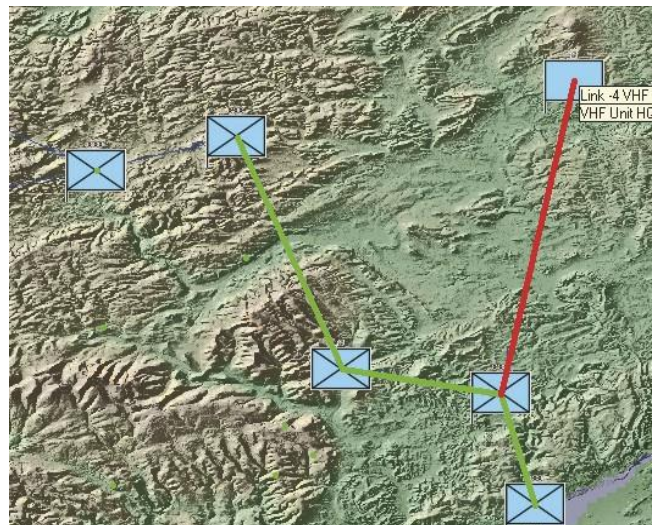
*Visualization of communication paths between units*
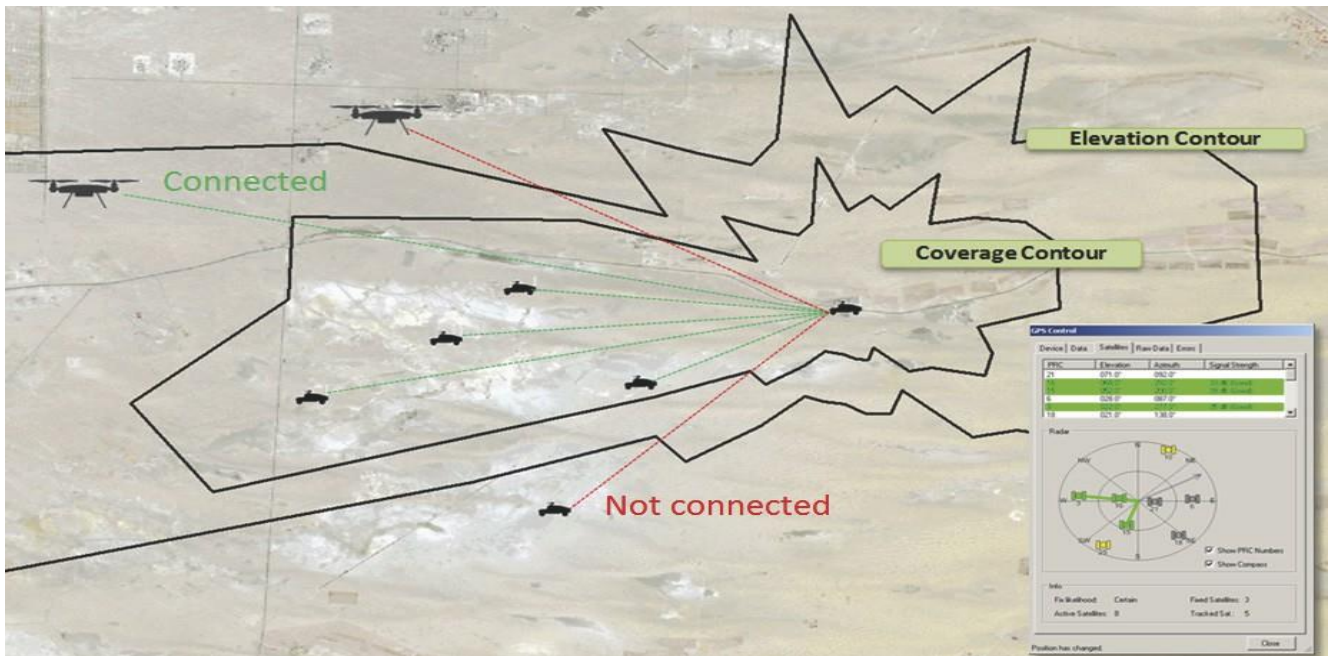
Coverage and elevation contour calculations

While troops are moving, they can check whether they remain connected to other ground and air units. Based on their GPS-location they can trigger one-click coverage and elevation contour calculations.

mySPECTRA supports electronic warfare operations

Operational commanders can simulate electronic support measures, counter measures and electronic protection. These calculations consider any jammers and hostile and friendly emitters identified by LS OBSERVER and registered in the central database.
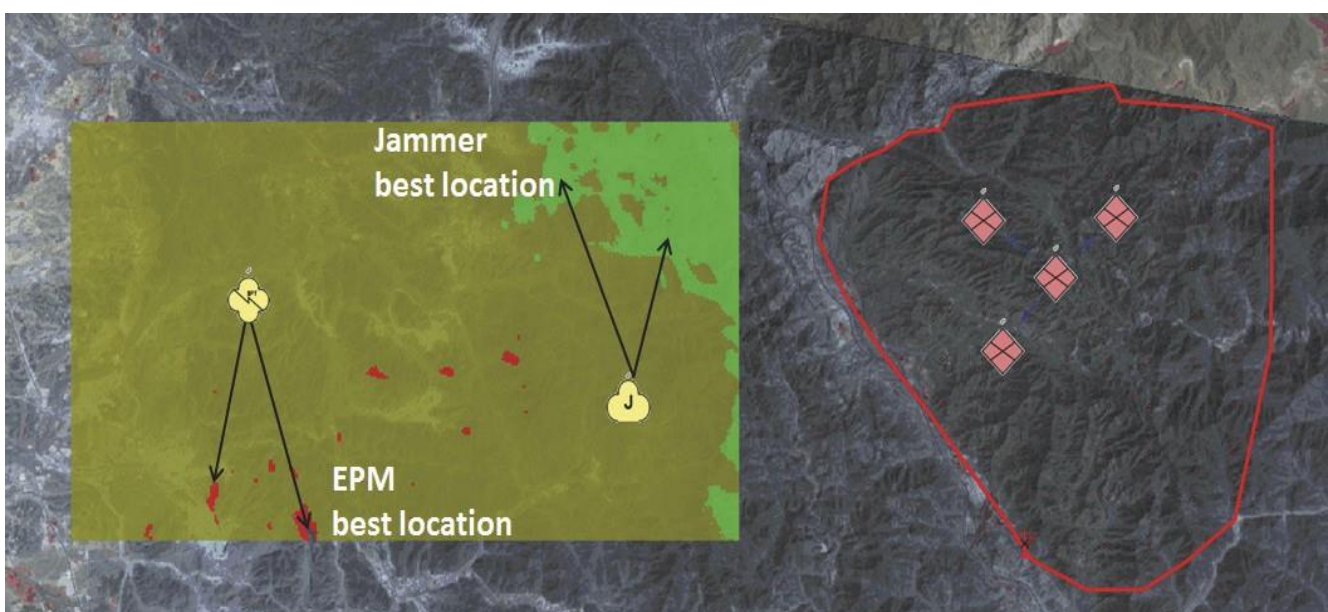

Planning of ECM and EPM

Users can launch one-click calculations to define the best location for jammer or reconnaissance activities (green area) and/or to define the best location to protect receivers from hostile jammers (red area).

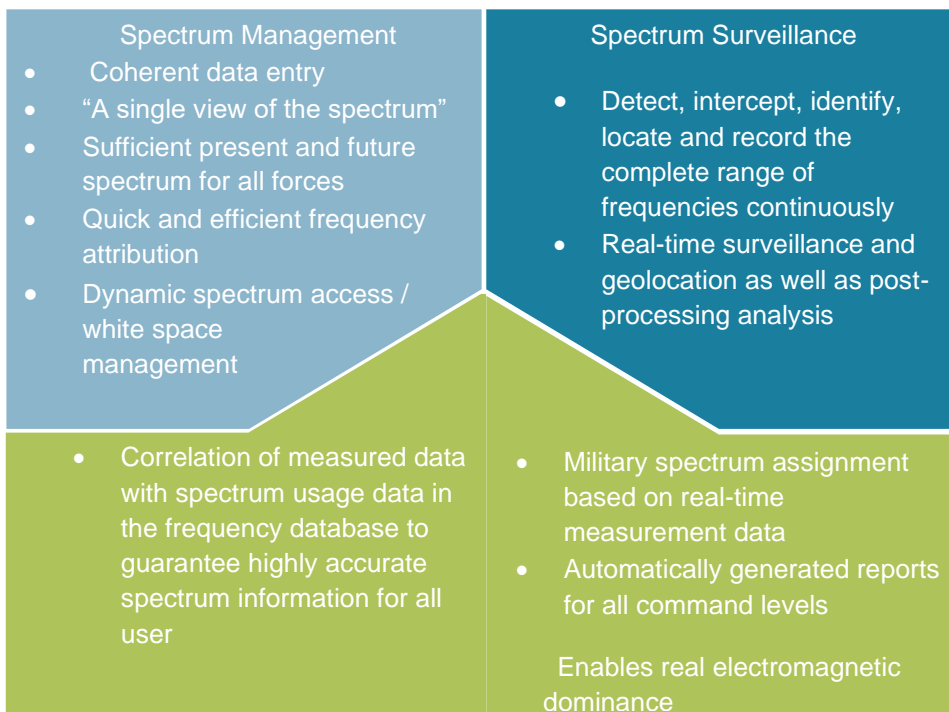# Protection of convoys against attacks of RCIEDs along a planned route

Operators can optimize jammer power, such as the required power to close jammer coverage gaps on the road, or reduce jammer power to avoid the convoy's detection.
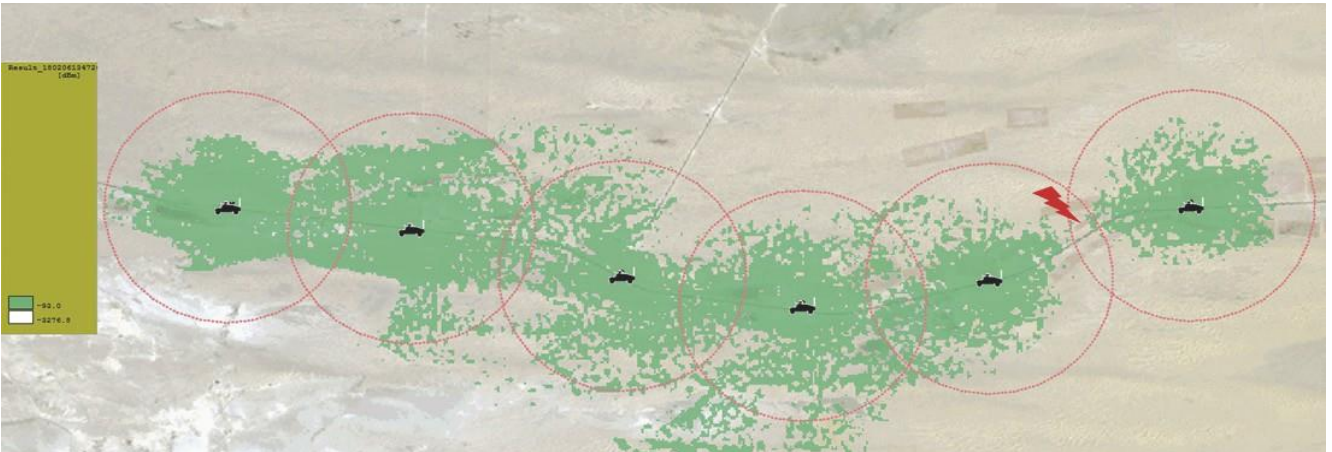
Convoy protection planning

The combined spectrum management and monitoring system

The availability and centralization of measured spectrum and data in the spectrum management database - possible through the combination of both systems, mySPECTRA and LS OBSERVER - is the basis for providing true spectrum situational awareness and electromagnetic dominance to the forces. It is the true enabler for efficient spectrum use and dynamic spectrum managemen

Spectrum Management	Spectrum Surveillance
• Coherent data entry • "A single view of the spectrum" • Sufficient present and future spectrum for all forces • Quick and efficient frequency attribution • Dynamic spectrum access / white space management	• Detect, intercept, identify, locate and record the complete range of frequencies continuously • Real-time surveillance and geolocation as well as post-processing analysis
• Correlation of measured data with spectrum usage data in the frequency database to guarantee highly accurate spectrum information for all user	• Military spectrum assignment based on real-time measurement data • Automatically generated reports for all command levels Enables real electromagnetic dominance

Spectrum and strategy consulting

LS telcom experts help the military to make the most out of the increasingly congested and contested spectrum environment. We implement procedures for better spectrum planning and frequency allocation. We develop tailored and tested spectrum and band sharing opportunities, and recommend improvements for more efficient spectrum use.

Frequency re-allocation which affect the military - WRC-19 and beyond

LS telcom helps the military to understand the re-allocation of different frequency bands planned for 2019 and beyond. A number of the frequency allocation changes are in the millimeter wave (mmWave bands) above 24 GHz in which both new mobile and International Mobile Telecommunications (IMT) allocations are proposed. For the military, a detailed understanding of the new mobile system characteristics is imperative to understand the potential impact it could cause in these and other bands, on the future availability of spectrum for current and future systems.

As a member of ITU, LS telcom closely follows developments in ITU working parties and task groups and can assist military organizations prepare robust spectrum positions for WRC-19, and then understand the implications of its outcomes.

LS telcom has long-standing experience in spectrum planning, capacity building as well as interference and coexistence studies, and has worked in over 100 countries around the world.

LS Training Academy

Our LS telcom Training Academy offers a wide range of training courses for military staff in radio communications, spectrum management, radio surveillance and network planning. Courses are provided by specialist ex-military officers from the maritime, land and air environments.

Trust in more than

30

years of know-how
and experience

Member of

AOC, AFCEA

and

ITU

An

ISO 9001:2015

certified company

**Hardware and software
systems and consulting**

services for

- Spectrum surveillance

- Electronic warfare

- Tactical communications
  and mission planning

- Spectrum management
  and optimization

Customers in more than

100 countries

Our worldwide subsidiaries:

Colibrex GmbH, Winnipeg Avenue B 112/A5, 77836 Rheinmünster, Germany | **LS telcom UK Limited**, Dowgate Hill House, 14-16 Dowgate Hill , London EC4R 2SU, UK | **LStelcomaRadioSoftoperation**,5021HowertonWay,SuiteEBowie,Maryland20715,USA|**LStelcomAustraliaPtyLtd**,SuiteA,39BrisbaneAvenue,BartonACT2600, Australia | **LS of South Africa Radio Communications (Pty) Ltd.**, 131 Gelding Ave, Ruimsig, Roodepoort, 1724 Johannesburg, South Africa | **LS telcom SAS**, 47, boulevard de Sébastopol, 75001 Paris, France | **LS telcom Limited**, 1145 Hunt Club Road, Suite 100 Ottawa, ON, K1V 0Y3, Canada | **RadioSoft Inc.**, 194 Professional Park Clarkesville, Georgia 30523, USA | **LST Middle East FZ-LLC**, Office 2118 (21st Floor), Dubai Media City, Dubai, United Arab Emirates | **Vision2Comm GmbH**, Im Gewerbegebiet 33, 77839 Lichtenau, Germany | **NG Networks Co., Ltd,** Room 1001, Buildung 3, No. 209, Zhuyuan Road, 215011 Suzhou, China | **LS telcom AG MKK,** Köztársaság út 11-13, 2600 Vác, Hungary | **LS Spectrum Solutions PVT Ltd.,** 712, Palm Spring Centre, Link Road, Malad (W), Mumbai- 400064, India | **Smart Spectrum Solutions Providers S.A.L.,** Office C83, Palm Plaza Center, Mtayleb - El-Maten, Lebanon

CFA