



CRITICAL COMMUNICATIONS

If it doesn't work at once, you don't get a second chance.

PUBLIC SAFETY / PPDR
POLICE, FIRE BRIGADES, RESCUE SERVICES

TRANSPORTATION
PUBLIC TRANSPORT, AIRPORTS,
SEA PORTS, MOTORWAYS

UTILITIES
ENERGY, WATER, MUNICIPAL COMPANIES

INDUSTRY
OIL & GAS, CHEMICALS, AUTOMOBILE

**Solutions for the planning
and optimisation of Critical
Communication systems**



Critical Communications - We make it work when you need it most.

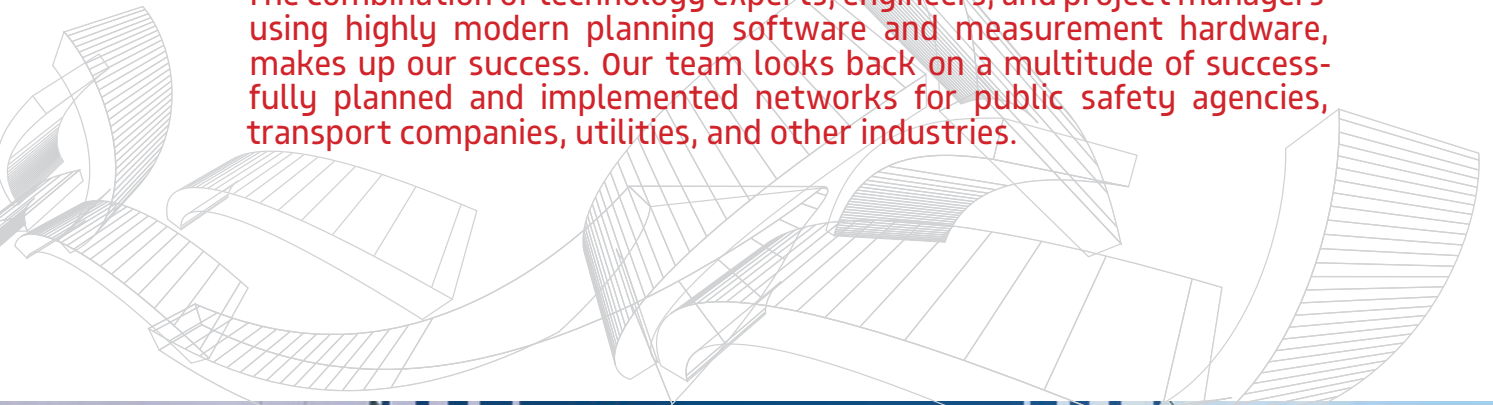
LS telcom is a leading supplier of system solutions, consulting, and engineering services for professional mobile radio networks.

When it comes to secure radio services for professional users accurate planning is all the more important. The planning processes have to be adapted to the specific requirements and conditions of PMR services and use. Reliability and redundancy as well as economic feasibility are critical.

Professional and reliable critical communications network planning is our core competency. We address all steps in the network life cycle, from network design, planning, procurement, and implementation as well as measurement, analysis, evaluation, and optimisation of operational networks.

We design, modernise and optimise networks of all kinds of technologies and for all types of applications, including customised solutions for SCADA, smart grid and telemetry as well as tunnel, indoor and other special coverage planning.

We are infrastructure vendor independent and guarantee the right system component and technology mix tailored to fit your particular needs. The combination of technology experts, engineers, and project managers using highly modern planning software and measurement hardware, makes up our success. Our team looks back on a multitude of successfully planned and implemented networks for public safety agencies, transport companies, utilities, and other industries.



Project Life Cycle Support for Critical Communication Networks

Professional users of various applications in public safety, PPDR, transportation, utilities, and other industries must be able to rely on safe, highly available, resilient, and cost-efficient radio coverage indoor and outdoor.

Full end-to-end encryption, direct mode and repeater operation, group call traffic, ATEX radios and powerful customised applications are only some of the vital features.

Each step in the planning of a critical communications system requires its respective expert supported by the right software and hardware to achieve scope, schedule and cost goals.

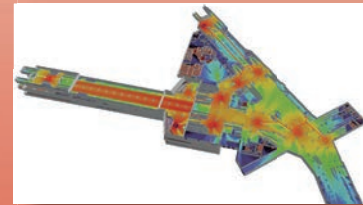
Project launch: Requirements analysis and concept design

We define your coverage, system and other requirements and develop the complete concept, while taking into consideration your budget and initial situation. Which type of coverage do you need? Which network technology fits best? Follow our concept and project schedule and get it right from the very beginning!



System design & network planning

We are your expert in indoor and outdoor system design and planning, and successfully connect your indoor system to the outdoor network. We guarantee reliable and safe communication - everywhere.



Enhance your tendering process

Procurement documents, technical specifications, bid evaluation, vendor pre-selection - benefit from our long-term experience to find the solution that suits your use case best.



Support in network implementation

We cover all the steps in the network implementation process - from project management and cost control to support in network infrastructure construction and network roll-out, and finally system integration and commissioning. We determinedly protect your interests during the entire implementation process.



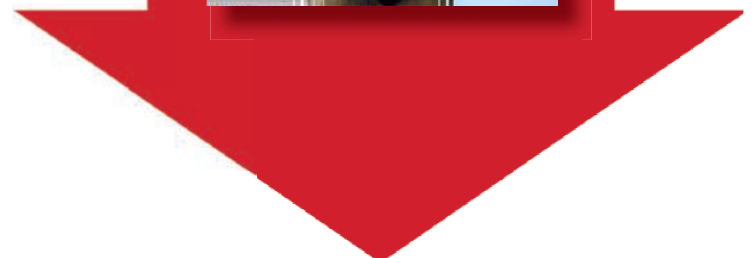
Verification, acceptance and commissioning of your system

From site and factory acceptance tests to measurements - we undertake everything to make sure your live system corresponds to the planned one.



Optimisation of your network

Optimise your existing network in terms of quality of service, coverage, technology cost, operational expenditure, or any other parameter that you would like us to validate.



Technical & Strategic Consulting

Independent & competent

Working hand in hand with our customers is a top priority of our highly trained consultants. They know how to transform their competencies and experience into your benefit.

Typically we carry out the following tasks

- Audits and expert opinions
- Feasibility studies
- Support in technical decision making
- Evaluation of concepts
- Business case development and evaluation
- Support in the procurement process
- Capacity building



Together we find solutions adapted to your needs and business priorities. We also help you in the development of strategies and decision-making.

- Which technology and network structure should be implemented?
- How to best migrate from analogue to digital radio?
- What is the most adapted redundancy concept?
- What are the expected project costs?
- How should the procurement be organised?
- How can the radio network be operated?
- Which and how much spectrum is needed?
- Which frequencies are available?

The topics we cover

■ Data services and applications

The list of applications for critical communications is virtually endless. Applications facilitate the daily work of users.

Organisational workflows and processes enable smooth integration and wireless communications between different departments and users.

Some examples

- Operations control and passenger information system
- Location of vehicles and people
- Logistics and warehouse management
- Retrieval of vehicle owner information

Data applications are bandwidth-hungry and for tailored applications, the availability of enough bandwidth at the right moment is crucial. Future applications will demand even more bandwidth and TETRA systems alone will no longer be able to cover this growing demand.

■ Broadband for Critical Communications

The transmission of data, image, and video is not only useful for police and fire brigade in various ways, but also for the control, maintenance, and security of industrial estates. The tricky issue is to have enough bandwidth at hand for all these applications.

We help our customers to prepare themselves for the future of mobile broadband. We support you in the development of user scenarios, the determination of capacity and spectrum requirements, as well as the selection of the most appropriate technology for your specific case.

■ Spectrum allocation and licensing for Critical Communications

Spectrum is a valuable resource and the ever-increasing demand is stimulating yet more competition. This is why efficient and sustainable frequency use is indispensable. We help you determine your current and future spectrum requirements and support you in demand-oriented frequency allocation. Find your optimal spectrum strategy with our spectrum managers and frequency experts.

■ Telemetry and SCADA (supervisory control and data acquisition)

Many factors come into play, when planning data transmission and SCADA-systems for industrial estates. The response time, the network architecture, as well as the necessary data capacity, which may vary considerably with time and during an incident are only a few of those factors. Above all, the system has to be economically feasible and operate efficiently.

We support you in the design and dimensioning of a system that performs at its best.

■ Smart planning for smart grids and smart metering

An energy and cost efficient smart grid network requires accurate planning. High network availability, data protection-compliant bi-directional connections with short latency periods as well as easy integration of IP-based applications with corresponding data transmission rates are only some of the features, which are crucial in the planning and implementation of smart grid networks.

Take our advice when you introduce smart grid and smart meter technologies. We deliver solutions considering costs, benefits, and security.

We are your smart partner for

- Conceptual design and technology selection for area-wide access networks
- Design of roll-out scenarios for the introduction of smart meters
- Development of appropriate communication platforms
- Traffic analysis
- Examining ways of developing synergy effects through joint use of network infrastructure



LS telcom Training Academy

We offer a vast selection of standard training courses as well as customised training from individual to group training through to complete capacity-building programmes tailored to the needs of your organisation.

Please find more information here:
www.LST.AG/Training



Network Design, Planning and Optimisation

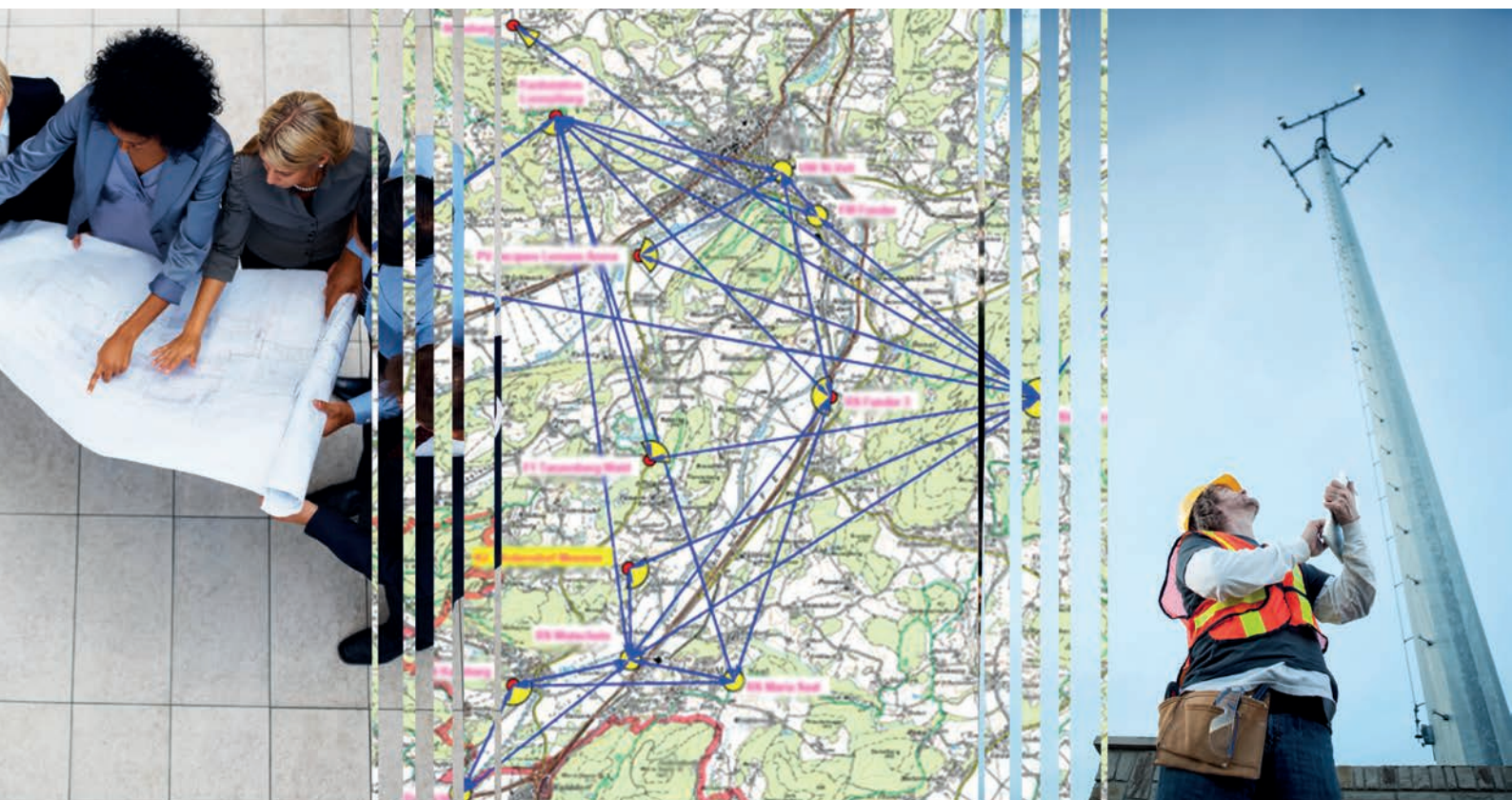
Safe, highly available, reliable, economical, on schedule and in line with your budget...

...that's how we plan your individual network. Our planning is based on long-term international experience in critical communications. A large number of successfully completed projects, in access and microwave planning, SCADA solutions as well as tunnel and indoor coverage planning, demonstrates our abilities.

Our portfolio includes

- Definition and determination of requirements
- Capture of existing infrastructure
- System design and concept
- Pre-planning and cost estimation
- Basic design, approval planning, detailed design
- Coverage, topology, capacity and frequency planning
- Radio, microwave and fixed network planning
- Planning of tunnel and indoor coverage, as well as other special coverage planning
- Concept for SCADA networks
- Cost calculation & cost planning
- Preparation of frequency usage plan
- Digitalisation, optimisation and extension of radio networks
- Quality and coverage measurements
- Interference analysis, localisation of interference and interferers

Find out for yourself how our experts apply advanced planning tools and innovative measurement and monitoring solutions to cater for your particular requirements.



Indoor Coverage / Realising In-Building and Tunnel Coverage

Indoor coverage planning for Critical Communications is highly demanding

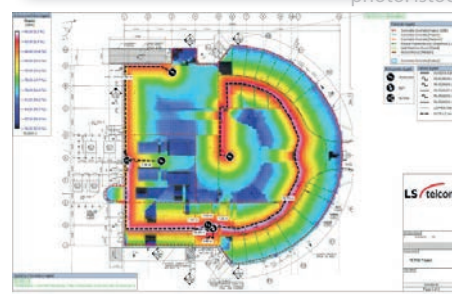
Mobile networks for security applications in particular have to be available indoor as well as outdoor. The coordination of action forces requires smooth communication in buildings, too. In addition to the area-wide outdoor network, radio network coverage has to be available in tunnel systems, railway and underground stations, airports, shopping centres, production sites and other large buildings.

Depending on the kind of building and the distance to the next base station a complete coverage 'from outside' is not possible. In this case, custom-tailored and optimised indoor radio systems are necessary, which have to be individually planned, designed and implemented for each individual building type and premises.

Only a detailed and high-quality planning and design concept will guarantee optimal indoor coverage and the best possible integration with the outdoor network.

Benefit from our know-how!

We support you during all phases of your indoor network planning and implementation project and answer all the questions you may have.



Design

- Basic evaluation
- Definition of requirements
- Capture of existing infrastructure
- Design of indoor coverage
- Development of redundancy concepts
- Basic design

Planning

- Development of link budget and signal plans
- Dimensioning of the radio equipment and DAS (distributed antenna system)
- Dimensioning of the coverage system
- Detailed planning
- Cost assignment and estimation

Procurement

- Support in the procurement process
- Technical specifications
- Creation of tender documents
- Management of bids
- Evaluation of bids
- Proposals for assignment

Implementation

- Project management
- Surveillance of network infrastructure construction
- Support during network roll out
- System integration and commissioning
- Project documentation

We also develop urban and regional concepts for indoor and outdoor PMR/TETRA radio coverage of entire cities and regions.

- Identification of technical and organisational constraints
- Identification of different entities to be equipped with indoor radio and classification according to different indoor coverage types
- Checking of different connection modes for the indoor radio system
- Connection of indoor system to the most appropriate base station

Tender Management and Procurement Support

Imagine a gourmet chef, who does not thoughtfully prepare his banquet meal to match the exquisite taste of his invitees, who does not carefully pick the ingredients from different food and gourmet providers, does not evaluate costs and prices correctly and who does not compile a detailed and perfect shopping list.

The result would not be a gourmet meal!

The same is true when procuring system technology and infrastructure for your critical communications project.

We help you define your requirements for the implementation and operation of your network, analyse costs and prepare all documentation needed for the procurement and tender process.

Benefit from our know-how, well-established standards and experience in procurement to find the network solution that corresponds best to your individual taste.

We support you in the following

- Definition of the tender process
- Technical specifications
- Compilation of quantity structure and bills of material
- Creation of tender documents
- Compilation of bidding documents
- Development of rating matrix and pricing options
- Obtaining, management and evaluation of bids
- Negotiations with bidders
- Participation at public procurement

Supervision and Support during your Project

Once the procurement is successfully completed we help you with the implementation of your network on time and within your budget.

- Compliance check of planned and implemented network
- Coordination of all project participants
- Set up and supervision of project schedule
- Regular site visits
- System commissioning
- Supervision of desnagging of faults located during commissioning
- Accounting control
- Cost control, statement of supplier accounts
- Cost recording
- Compilation of technical project documentation



Planning Software

LS telcom is a leading international supplier of software for radio network planning, design, optimisation and coordination.

Our software supports all kinds of radio technologies and offers coverage, capacity and frequency planning as well as indoor network planning. Engineers can use the software for the planning of single links and base stations, for detailed indoor coverage planning as well as for the dimensioning and analysis of complex nationwide networks. Interference analysis, compatibility checks and national and international coordination complete the range of the software's functionality.

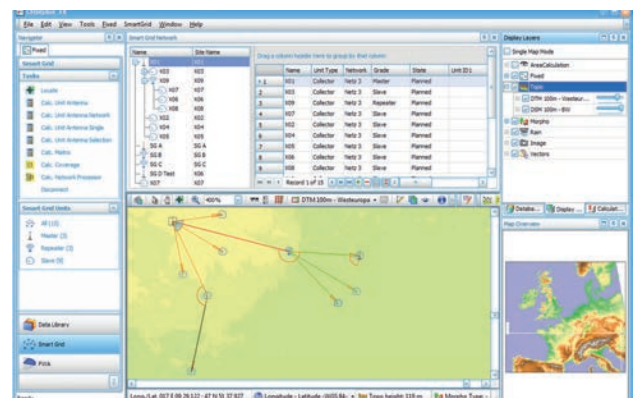
CHIRplus_FX: Planning for smart grid networks

The smart grid module allows network planners to design, optimise, and maintain smart metering and data transmission networks taking into consideration the network hierarchy of master, repeaters and slaves.

Our smart metering module for the utilities was developed in close cooperation between our engineers and customers.

The planer of a smart grid network has to consider many indoor as well as outdoor planning parameters. An important aspect for coverage planning, for example, is the position of the smart meter within the building. The coverage can vary enormously depending on whether the meter is located in the basement of a building, the ground floor or underneath the roof. The planer also needs to pay attention to possible interference between several meters placed adjacently. High-resolution data for optimal planning is therefore indispensable.

Many utility companies already use CHIRplus_FX for the planning of their point-to-point and point-to-multipoint radio transmission links and the simulation of their smart grid networks.



Spectrum Monitoring & Surveillance

Whether you need long-term frequency monitoring of critical radio services, temporary monitoring of special events, direction finding and localisation of interferers or evidence of illegal spectrum use – we offer flexible solutions for long-term monitoring, direction finding and antenna measurements.

Our frequency monitoring system LS OBSERVER consists of a central management unit, software for detailed measurement data analysis and various remote measurement units (RMU). These can be fixed, portable, mobile or flying - depending on the demand.



Key features and advantages of the LS OBSERVER monitoring system

- LS OBSERVER measures the complete frequency range and stores the measurement data for up to two years. Retrieve data for the analysis of frequency use and frequency occupation whenever necessary.
- Various types of measurement units are available for great flexibility. We integrate everything from one monitoring station, several different types of stations to a complete nationwide monitoring network.
- Integrate LS OBSERVER measurement units with existing stations from third-party providers.
- Various possibilities to implement LS OBSERVER depending on the monitoring objective, budget and systems already in place.

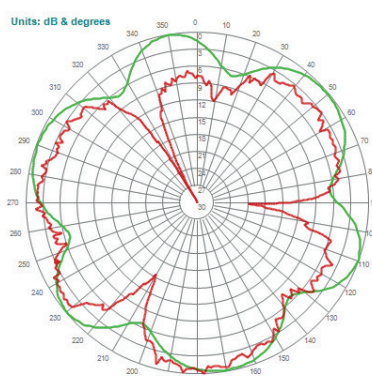
Cost-effective antenna measurements using remotely piloted aircraft

Determine in an easy, quick, and cost-efficient way the true radio frequency radiation characteristics of your TETRA base station using remotely piloted aircraft (RPA).

The remotely piloted aircraft (RPA) technology is adapted to carry a measurement sensor, high-resolution position and orientation sensors, an autopilot, a high-powered processor and storage unit and a telemetry system. The measurement and navigational data is stored on board and streamed to the ground control station in real time.

The RPA flies semi-remote controlled and in accordance with a pre-programmed flight path. Several safety features are built into the system amongst which is a 'return to take-off point' in the unlikely event of failure. Software for data analysis completes the system solution.

The technology determines the horizontal and vertical antenna radiation pattern as well as radiated power. You can identify faulty antennas and installation errors immediately. The measured antenna diagrams can be used in planning tools for the simulation and optimisation of network coverage.



Comparison of planned (green) and measured (red) TETRA frequency range

Summary of our measurement activities

- Planning and implementation of measurement stations, measurement vehicles and nationwide monitoring networks
- Spectrum monitoring of critical radio services, for special events, large scale operations and critical places
- Long-term monitoring
- Evidence of illegal spectrum use
- Direction finding for localisation of interferers and illegal emissions
- Verification measurements of base stations via remotely piloted aircraft
- Electromagnetic compatibility (EMC) measurements





We are a member of...



Our quality is certified...



according to ISO 9001:2008 for development, sales and project implementation of software systems and IT services in the field of spectrum management, radio monitoring, wireless network planning and concepts.

For more information on products and solutions, please visit our website at www.LStelcom.com or contact us:

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