

LS telcom is a member of the

■ TETRA Association



Becoming a member of the TETRA Association was for LS telcom a logical consequence of the continuous increase in its international activities in the field of Public Mobile Radio. The TETRA Association was established in December 1994 to create a forum which could act on behalf of all interested parties, representing users, manufacturers, application providers, integrators, operators, test houses and telecom agencies. Today the TETRA Association represents more than 150 organisations from all continents of the world.

■ PMeV (Verband Professioneller Mobilfunk e. V.), the German association for public mobile radio



The PMeV pursues integrated approaches to the use of standardised technologies for the needs of PMR users. In collaboration with the appropriate standardisation bodies and in close consultation with regulatory authorities and users the PMeV is a proactive contributor to the standardisation and further development of PMR services. ←

LS telcom plans TETRA Network for Saudi Aramco

LS telcom plans the TETRA network for Saudi Aramco in the Eastern Provinces of Saudi Arabia on behalf of Sumitomo Corporation. During the planning, particular attention is paid to assure continuous network coverage at operational sites, including refineries, administrative sites, on- and offshore oil-production sites and along pipelines.

The existing analogue network will be replaced by a highly available and secure TETRA network.

The complete project, which is managed by the Japanese Sumitomo Corporation, includes the planning, design, installation and launch of the new network, as well as the migration from the existing analogue network to the newly-designed TETRA network. The indoor coverage of operational sites and tunnel systems, data transmission and special requirements for end-user terminals are another focus of the project.

The first phase of the project involves the determination of planning objectives and specifications, the coordination of planning parameters and the definition of

outdoor and indoor coverage goals.

The network is then planned step by step going through different design reviews until the network design is finalised.

Based on this final network design the sites and necessary infrastructure are prepared in the second project phase. The base stations and repeaters are constructed and put into operation. Finally more than 7.600 end-user terminals are connected to the new TETRA network.

A peculiarity for radio network planners is the network design in Shaybah, one of the world's major crude oil and gas producing regions. It is situated in the South East of Saudi Arabia and borders on the United Arab Emirates (UAE). The whole region is made up of solidified desert and sand dunes. The production sites are located 70 metres above sea level in salt flats, so-called 'Sabkhas' forming along arid coastlines. They are all surrounded by dunes which are between 180 and 200 metres high. 95 % of network coverage for this area will now be provided by base stations

and outdoor repeaters.

Several drive tests at an outdoor temperature of 50 degrees Celsius were necessary in order to guarantee meticulous network planning. Shaybah is one of the hottest desert areas in Saudi Arabia.

Saudi Aramco is a state-owned oil company of the Kingdom of Saudi Arabia. The Saudi Aramco story began in May 1933 with signing a concession agreement between the government of Saudi Arabia and the Standard Oil Company of California (Socal). The company was then owned by four American oil-producing companies. The company name was changed to Arabian American Oil Company (Aramco) in 1944. Between 1973 and 1980, the Saudi Arabian government acquired an economic interest in Aramco's operations in stages. In 1980, essentially all of Aramco's assets were transferred to the government.

In 2000 Saudi Aramco was declared for the eleventh time the largest crude oil production company in the world by the trade journal Petroleum Intelligence Weekly. ←

Indoor Coverage for PMR Workshop

Together with Axell Wireless LS telcom ran a well-attended workshop on indoor coverage addressing the participants of the different project teams dealing with the BOS network (the network for German Security Authorities and Organisations).

In the two-day workshop the participants from ten federal states of Germany – representatives from Interior Ministries, fire brigades, police and the Federal Agency for Digital Radio of Security Authorities and Organisations (BDBOS) learnt about everything you need to know about indoor coverage in the BOS network. The workshop covered the basics of radio planning for buildings, tunnel systems and

train stations, etc. Several possibilities of indoor radio communication as well as risks and limits were presented together with specific solutions. This included the illustration of different steps in the planning process from network design, coverage planning to full analysis of the chosen system-solutions. Finally, the integration of indoor-systems into the overall TETRA network was shown. A system provider, the company Cassidian, gave a presentation about the system delivery and different concepts of equipment implementation. ←

Terms & Expressions:

BOS = German Security Authorities and Organisations;

→ 'BOS' often refers directly to the digital TETRA network which is being installed for the German Security Authorities and Organisations. The 'BOS network' is the new nationwide digital network which replaces the technically obsolete analogue radio system currently used by security authorities.

The Federal Agency for Digital Radio of Security Authorities and Organisations (BDBOS) is responsible for this network.

For more information, please check: <http://www.bdbos.bund.de>

TETRA-Coverage in Buildings and Tunnel Systems

In order to guarantee consistent communication everywhere and at all times at the premises of Saudi Aramco (also see article page 1), a great number of buildings and tunnel systems have to be equipped with TETRA indoor-systems.

Indoor coverage objectives are already taken into account when the overall outdoor network is planned. This way indoor coverage for many of the buildings can already be provided through the initial outdoor network infrastructure.

However, outdoor network infrastructure quickly meets the limits when it comes to the indoor coverage needs of explosion-proof buildings, bunker- and tunnel systems. These structures often have to be equipped with repeater systems to ensure seamless indoor communication.

Whether additional indoor infrastructure for a certain site is necessary, is determined during the overall outdoor network planning and is based on computer simulations and measurements. Possible interferences or repercussions of indoor radio communication on the overall outdoor network are analysed at the same time. The complete planning, dimensioning and implementation of indoor systems are realised by experts of LS telcom. ←

LS telcom plans TETRA Network Infrastructure for the Underground „Rheinbahn“ of the German City of Düsseldorf

On the occasion of the switchover from analogue to digital radio, LS telcom is currently planning the complete new integrated antenna system for the underground part of the Metropolitan's "Rheinbahn".

First of all, the actual situation was analysed, preliminary studies were evaluated and the exact requirements were defined. A detailed action plan was then developed in a step-by-step approach in coordination with all the participating authorities and other professional consultants. This plan together with a cost budget calculation, which was set up in parallel will be the basis for the preparations of the tender process.

LS telcom will now be support for the bid evaluation and at a later stage for the quality and cost control of the network installation. ←



Indoor Coverage - Communication Everywhere!

Especially fire brigade and police place high demands on indoor coverage

Mobile networks for security applications in particular have to be available indoor as well as outdoor. The coordination of action forces, for instance, requires smooth communication in buildings, too. 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 solutions are necessary for individual building types.

Vendor independent and experienced, LS telcom assists you in any kind of coverage project:

■ System Design, Planning, Analysis and Optimisation:

- Distributed antenna systems
- Leaky cable
- Cell enhancer
- RF over fibre

■ System Implementation:

- Procurement process
- Project management and documentation
- Commissioning
- Measurements



TETRA-Coverage in Hamburg's Underground

For underground emergency operations, LS telcom plans the indoor tunnel coverage and capacity for the "Hamburger Hochbahn", the Underground of the City of Hamburg. At the beginning of the project, all participating parties assembled and agreed on the requirements and the constraint conditions. After that a detailed planning concept was set up including a cost budget. In order to realise the project in the most economic way, the consultants also set

great store by synergy effects through the use of existing infrastructure. Finally, once the network is constructed and installed, LS telcom will support the "Hamburger Hochbahn" with acceptance and type approval procedures, by accompanying the coverage measurements and through the evaluation and documentation of the measurement results. ←



Photo: Hochbahn

LS telcom optimises BOS Digital Radio Network in Berlin

LS telcom radio experts analysed the achieved coverage of the BOS digital radio network in Berlin which is currently running in a test phase.

During the project different optimisation solutions are examined and further proposals for potential improvement are made including cost optimisation. Network coverage and achieved coverage capacity were analysed by LS telcom experts using the TETRA planning tool xG-Planner. The analysis was also based on measurement data, which was collected during test drives, carried out by a partner company. In a second step, these results were used to elaborate tangible optimisation approaches together with the "Projektgruppe Digitalfunk-BOS Berlin", the project group responsible for the preparation, implementation and launch of the digital network for German security authorities and organisations (BOS) in Berlin. ←

Expert Knowledge in BOS Digital Radio Network Planning

LS telcom delivers speech at the 8th Technical Seminar organised by the Fire Brigade Academy (Feuerwehr Akademie) Hamburg

„Experience in Planning TETRA Networks“ was the title of the presentation given by Roland Götz, Chief Operating Officer at LS telcom, who was invited to the seminar by the Fire Brigade Academy of Hamburg. The presentation covered case studies from different national and international TETRA projects carried out by LS telcom, in addition to particularities in planning the BOS network in the area of Hamburg, which was also planned by LS telcom on behalf of the Ministry of Interior. ←

TETRA-Survey in Saudi Arabia

In a study commissioned by Radicon Gulf Consult the TETRA networks in the regions of Jeddah, Abha and Jizan were examined by LS telcom to find sensitive areas with regards to network coverage and capacity.

The study was based on computer simulations and measurements, which were used to carry out coverage, interference and intermodulation calculations to find optimal network solutions for the improvement of the network. The aim is to cope with increasing challenges of the digital radio network and to guarantee safe communication – especially in the harbour area, around the airport and along pipelines. ←



Photo: Nokia

TETRA System for Sasol in South Africa

LS telcom carried out a TETRA planning project for Sasol at their Secunda facilities.

Sasol is an integrated energy and chemicals company. They use coal, oil and gas to produce liquid fuels, fuel components and chemicals. In a hazardous environment of chemical production with high operational costs, secure and reliable communication between the different production facilities and the coal mining

sites is indispensable. It is obvious that in such an environment the accuracy of the network design is particularly critical. LS telcom was responsible for the RF planning tasks which included the microwave link and TETRA planning. The TETRA and the microwave link equipment was supplied by Rohde & Schwarz and Nera respectively.

The project included the replacement of the old analogue two way radio system

by the new TETRA system and the planning of a new TETRA network providing in addition the secure radio communication at the main plant and between the different coal mines. The network is now installed and in operation. As the planning achieved the required accuracy, LS telcom was also selected for the TETRA network planning of other production sites in South Africa. ←

Network Planning for Authorities and Emergency Forces in the Federal State of Schleswig-Holstein, Germany

LS telcom plans the digital mobile radio access network for the police in the federal state of Schleswig-Holstein in Germany. The project includes the set up of the network design, the specification of tender requirements and bid evaluation. Project management and documentation during the system construction phase is also under the responsibility of LS telcom.

In the last months LS telcom radio experts have designed the complete access network, connecting all the existing TETRA base stations. This will essentially be done through microwave link technology. The planning includes the necessary site surveys and the verification of line of sight between the base stations. At sites currently without antenna mast, the line of sight will be

checked with a balloon or by means of a man lift. In addition to microwave technology Dataport's existing fibre optics network will be used to guarantee the most economic network design. As the new digital network should not exclusively serve the security forces, planning experts also check on possible synergy effects through joint network usage by federal state authorities and BOS in order to increase cost efficiency. Although "reliability and security of the network have first and foremost priority", was made clear by Roland Götz, Chief Operating Officer of LS telcom.

The realisation of such a project is by no means anything new to LS telcom experts. They have indeed planned digital police networks in many other German federal states ("Länder") such as in

Hamburg, Brandenburg, Saxony and North Rhine-Westphalia. At the moment they are planning the microwave transmission network for the Security Authorities and Organisations (BOS) in Baden-Wuerttemberg. "Our strong and convincing references demonstrate our high performance and professionalism", commented Roland Götz visibly pleased. A large part of the planning work as well as the procurement process for system technology and network installation have been completed successfully on time and in line with the budget. At the moment, LS telcom experts are focussed on project management, controlling and documentation. ←

Radio Coverage for Digital PMR Networks

The main objectives and challenges of radio network planning are obviously to achieve or exceed coverage and network quality specifications with minimal costs involved; and this is especially important when introducing a nationwide digital TETRA network.

Optimal results will only be achieved through meticulous planning adapted to each coverage condition and area, adjusting planning parameters according to each individual coverage calculation task. Precise planning is the guarantee to not only achieve the expected quality and network coverage, but at the same time to ensure the most cost-effective network design as well as the most profitable network operation.

The following case study illustrates how an optimised transmitter configuration can increase the quality of service while keeping the same number of sites.

Table 1 consists of different coverage categories for a typical TETRA network together with the actual coverage per category for the complete area under study (in percentage), taking into consideration a standard configuration (Omni-antenna with 7,5 dBi gain) for all sites.

Coverage Category	% of coverage for the whole area
Deep Indoor	62,9 %
Indoor Belt	88,9 %
Indoor Head	98,7 %

Table 1: Coverage categories of Reference Network - Standard configuration

Through detailed planning and the optimisation of the configuration of each single site, it was possible to increase coverage quality considerably for the area under study – while keeping the same number and the same position of sites. The new extended network coverage is shown in table 2:

Coverage Category	% of coverage for the whole area
Deep Indoor	90,1 %
Indoor Belt	98,7 %
Indoor Head	99,8 %

Table 2: Coverage categories of Reference Network - optimised site configuration

For the coverage category 'Indoor / Terminal at Waist-Height' coverage was increased by 9,8% and for the coverage category 'Deep Indoor', which is in particular difficult to realise, coverage was even increased by 27,2%.

In terms of technology this is facilitated by an optimised site configuration for which the maximal path loss of a base station to be bridged was improved on average by 6dB. This led on the one hand to a greater reach and on the other hand to an enhanced coverage quality within the cell area (increase of the average signal level by 6dB)

If, otherwise, the same network performance and coverage quality had to be realised with a standard site configuration, one would have to increase the number of sites by a factor of 1,6 (see diagram 1).

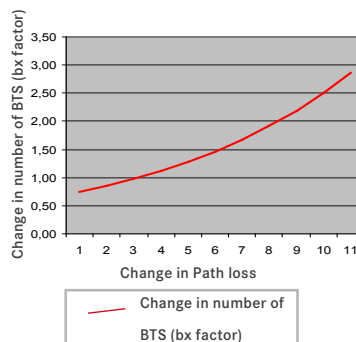


Diagram: Correlation between the change in path loss in dB and the increase of the number of base stations

The cost for the realisation of a site with an optimised antenna configuration is only about 23% higher than for a site with the standard configuration; but only 60% of the number of sites will be needed in this case.

Therefore it can also be estimated, that by applying an optimised site configuration while keeping the initial network coverage quality, a potential of 26% of investment expenditure can be saved as well as 20% of operational expenditure over a ten year operating time.

Efficient radio coverage planning with an optimal configuration of each individual transmitter is therefore the basis of any cost-effective digital PMR network design and operation. It guarantees at the same time that network quality and coverage are maximised. ←

Visit us at our Booth...

TETRA Association Congress 2011 Abu Dhabi, UAE

25th January 2011
Booth no.: 15

TETRA World Congress 2011 Singapore

25th - 27th May 2011
Booth no.: C102

PMRExpo 2011 Cologne, Germany

22nd - 24th Nov 2011

Training and Seminar Courses

PMR/TETRA Training Week

28th-29th March 2011

(PMR - Professional Mobile Radio)

30th March - 1st April 2011

(Radio Network Planning for PMR/TETRA Networks)

Individual training dates on request.

Our complete Training Calendar can be downloaded from our website:
www.LStelcom.com

Alternatively you may contact Ms Sandra Lahm by email to SLahm@LStelcom.com or by tel: +49 (0) 7227 9535 482 for further information on our seminars or for our customised training programmes.

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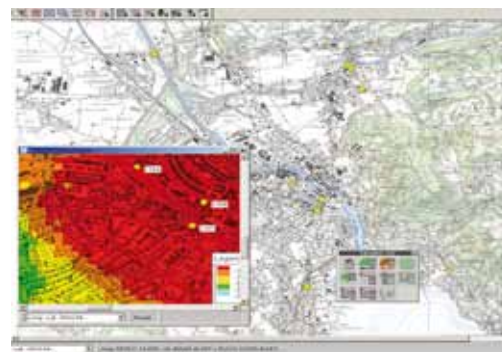
Amtsgericht Mannheim,
HRB 211164

Board: Dr. Manfred Lebherz,
Dr. Georg Schöne,
Dipl.-Ing. Roland Götz
USt-IdNr.: DE211251018

xG-Planner – The Radio Planning Tool for PMR-Networks

The radio network planning tool xG-Planner is a commercial of the shelf product that has been continuously improved over the past 12 years to plan and optimise digital mobile networks.

It is used by numerous customers and also by LS telcom experts who are working on consulting and engineering projects, for the planning and optimisation of mobile networks, such as GSM, UMTS, DMR, TETRAPOL and TETRA networks.



The Key Features and Benefits of xG-Planner:

The software is optimised for the design, planning and analysis of PMR networks

- User friendly GUI (graphical user surface)
- Convenient GIS-functionality (graphic information system)
- Powerful site database
- Field strength predictions in a broad frequency range
- Network analysis and simulation modules
- Extensive interference calculations
- Modern frequency allocation algorithms
- Flexible and easily customisable system
- Individual training in English and German
- Budget-conscious hardware conditions through the use of user-friendly Windows PCs with low purchasing, operating and maintenance costs
- Flexibility through purchase, hire purchase and leasing options. System installation and operation within a few days.
- Used worldwide in numerous operative radio networks

LS telcom – The Perfect Partner for Your PMR Project!

Our professional services for your success!

Vendor independent, on schedule and in line with your budget

■ Longstanding, International Experience

- Almost 20 years of experience in radio planning, telecommunications, PMR and TETRA
- Successfully conclusion of projects in more than 80 countries.

■ Radio Network Planning

- Network design and conception
- Coverage planning, coverage prediction
- Capacity-, frequency- and spectrum planning
- Site planning
- Indoor coverage (underground, tunnels, buildings, etc.)

■ Planning and Design of Access Network Structures

- Topology planning
- Microwave planning
- Redundancy concepts for optimised availability
- Technical and financial comparison of different transmission media

■ Management Consulting

- Business case evaluation
- Cost assignments
- CAPEX, OPEX scenarios

■ Technical Consulting

- Feasibility studies and audits
- Migration concepts: from analogue to digital
- Simulation, analysis and evaluation of network scenarios
- Controlling of the network implementation and all relevant planning parameters

■ Procurement and Implementation Process

- Concept development & initial / network design
- Specification of tender requirements, tender preparation and bid evaluation
- Project management and cost assessment

■ Impressum

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Headquarters

LS telcom AG,
Germany

Im Gewerbegebiet 31-33
D-77839 Lichtenau
Germany

☎ +49 (0) 7227 9535 600
☎ +49 (0) 7227 9535 605

Subsidiaries

LS telcom Limited,
Canada

1 Antares Drive, Suite 510
CDN-Ottawa, ON, K2E 8C4
Canada

☎ +1 (0) 613 228 4112
☎ +1 (0) 613 228 4113

LS telcom SAS,
France

4, av Morane-Saulnier, Bât. A
F-78140 Vélizy
France

☎ +33 (0) 1 3926 8585
☎ +33 (0) 1 3926 8586

LS of South Africa Radio
Communications (Pty) Ltd.

131 Gelding Ave, Ruimsig,
Roodepoort, 1724 Johannesburg
South Africa

☎ +27 (0) 11 958 5153
☎ +27 (0) 86 569 1419

Info@LStelcom.com www.LStelcom.com