

## LS telcom joins the TETRA Association

By joining the TETRA Association LS telcom particularly stresses the continuous increase of 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. The goal for the TETRA Association is to provide a forum for all those interested in TETRA to encourage adoption of the standard and support initiatives to obtain appropriate levels of spectrum such that growth in operational TETRA systems is not restricted by regulation. ←

## TETRA System for Cape Town International Airport

LS telcom was successful together with Integcomm to design, supply and install a TETRA system for the Cape Town International Airport. LS telcom was responsible for the RF network design and the major task was to ensure the largest possible coverage of all the operations at the airport. The supplier of the TETRA system is EADS. ←

## TETRA-System for Sasol

*LS telcom performed a TETRA planning project for Sasol at their second plant in South Africa.*

Sasol is a large petroleum manufacturer who uses coal for the source of the petroleum manufacturing process. It is obvious that the accuracy of the design of a network for this environment is critical as it affects many lives and millions of operational cost. LS telcom was responsible for the RF planning tasks which included the mi-

crowave link and TETRA planning. The TETRA equipment used for the project was supplied by Rohde & Schwarz and the microwave link equipment was supplied by Nera. The TETRA system was introduced to replace the old analogue two way radio system which was installed some years ago. The new TETRA network was planned to provide secure radio communication at the main plant and between the main plant and the coal mines that provide the coal

for the petroleum manufacturing process. The project has already been implemented and put into operation. LS telcom received an excellent feedback on the planning accuracy and for this reason was again selected for doing the planning for a second petroleum plant in South Africa during the coming months. ←

## LS telcom and Dataport are planning the Network for Authorities and Emergency Forces in Schleswig-Holstein

*The access network of the digital mobile radio for the police in the state Schleswig-Holstein is planned by LS telcom. Besides the set up of the net design also the specification of tender requirements, bid evaluation as well as the project management and documentation belong to the task 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 where there is no antenna mast yet, the line of sight will be checked with a balloon or by means of a man lift. In addition to microwave technology also

Dataport's existing fibre optics network will be used to guarantee most economic network design.

As the new digital network should not exclusively serve the security forces, one task of the planning experts is to check on possible synergy effects through joint usage of network resources - by federal state authorities and BOS - in order to increase reliability and cost efficiency "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 "Länder" (states) 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 in Baden-Wuerttemberg. "Our strong and convincing references demonstrate our high performance and professionalism," commented Roland Götz visibly pleased.

In the meantime besides a large section of the planning work also the procurement process for the system technology and network installation have been successfully completed in-time and in-budget. In the currently running network implementation phase, project management, controlling and documentation is the main focus of LS telcom's experts. ←

## Planning of TETRA-Infrastructure for Underground „Rheinbahn“ in Düsseldorf

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

First of all, the actual situation and already existing infrastructure has been analysed,

preliminary studies have been evaluated and the exact requirements have been defined. After that, a detailed action plan containing several planning phases has been developed in a step-by-step approach in coordination with all the participating. The final infrastructure plan and the cost calculation

are now being used as the basis for the procurement process of the infrastructure, construction and installation services. LS telcom will also be of support for the bid evaluation and at a later stage for the project steering, quality and cost control of the network installation. ←

## Digital Radio Coverage in Tunnels of the Local Public Transport

LS telcom gave a lecture at the ATI Symposium(\*) in Bonn.

During a presentation at the ATI Symposium in Bonn LS telcom informed about the challenges of planning and realising indoor radio coverage in tunnelling for security authorities and organisations (in German: BOS). The paper was read by LS telcom following an invitation of ATI's Chairman, Jürgen Wemmel. The significance and technical challenges of the BOS indoor coverage planning for tunnelling and underground stations were discussed and technical solutions were proposed. Besides the technical part, the presentation also illustrated the organisational difficulties of such a project, as for example, the coordination between several participating parties in the planning process and during realisation, the ownership structure, respective responsibilities and the assumption of costs. A case study about an accomplished project at the Hamburger Hochbahn, the Underground of the City of Hamburg, delivered the practical experience.

\* = Ausschuss für Telematik und Informationssysteme im Verband Deutscher Verkehrsunternehmen, English: Committee for Telematics and Information Systems at the Association of German Transportation Companies). ←

## Coverage Everywhere – Communication also in Buildings

*Especially fire brigade and police put high demands on the in-house coverage.*

Particularly mobile networks for security applications must not only be available outdoors. For example the coordination of action forces requires a smooth communication even in buildings. Depending on the kind of building and distance to the next base station a complete coverage ‚from outside‘ is not possible. Custom-tailored, optimal solutions for individual object classes are in demand. As experienced, neutral partner LS telcom can support you with your special coverage project:

### ■ System design, optimisation and planning:

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

### ■ Project management:

- Contract management and negotiation
- Resources control and work scheduling
- Project management and documentation
- Commissioning



## BOS-Digital Radio in Hamburg's Subway

*Consulting and planning services for the „Hamburger Hochbahn“, the Underground of the city of Hamburg.*

For underground emergency operations, LS telcom plans the indoor tunnel coverage and capacity for the “Hamburger Hochbahn”.

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. After completion of the construction and installation services, 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

## Radio Coverage for Digital PMR Networks

*Efficient Radio Network Planning through optimised Site Configuration*

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

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

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.

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 in 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 per-

formance and coverage quality had to be realised by a standard site configuration, one would have to increase the number of sites by a factor of 1,6. 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 would 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 approximately 26 % of investment expenditure can be saved as well as around 20 % of operational expenditure over a ten years 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 simultaneously that network quality and coverage are maximised. ←

## LS telcom becomes Member of PMeV

The PMeV (Verband Professioneller Mobilfunk e. V.), the German association for professional mobile radio has accepted LS telcom as a full member.



Through this new membership LS telcom reinforces its commitment and initiatives in the area of PMR. The admission also fits perfectly into LS telcom's industry networking and partnership policy: Through its memberships with renowned industry associations and expert communities. The PMeV is the German association for professional mobile radio services, and comprises leading providers and users of communications systems for professional mobile applications – including manufacturers, systems and applications houses, operators, and users. Focusing on the optimisation of value-adding processes within user organisations, the PMeV provides a forum for dialogue with market partners, policy makers, authorities, and institutions. The association promotes standards for PMR services and is a proactive contributor to their further development. The PMeV is also the German partner of the TETRA Association. ←

## TETRA Eastern Cape (Police Service)

This project is currently being implemented for the police service in the Eastern Cape province of South Africa. LS telcom was mainly involved in the design of the WiMAX network that integrates into the TETRA system. ←

## TETRA Network for the Bermuda Islands

LS telcom was engaged by SITA B.V., Germany, to contribute to the planning of a TETRA network for the Bermuda Islands. LS telcom determined link budgets and planning parameters for handheld and car mounted handhelds for the used TETRA system. Also coverage planning, network design and a computer-based selection of possible site candidates had been performed by the LS telcom experts. ←

## Services for Public Mobile Radio

*Professional services from neutral competent hands.*

*To make it work – on schedule and budget-conscious!*

### ■ Radio network planning

- Network design and conception
- Coverage planning, coverage prediction
- Capacity-, frequency- and spectrum planning
- Site planning
- Indoor coverage (metros, tunnels, buildings, etc.)
- Realisation of network concepts

### ■ Planning and design of access network structures

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

### ■ Planning and procurement process

- Concept development
- Initial planning
- Approval planning
- Implementation planning
- Tender preparation
- Tender evaluation
- Project controlling and cost assessment

### ■ Technical consulting

- Feasibility studies and audits migration concepts analogue – digital
- Simulation, analysis and evaluation of network scenarios
- Controlling of the network implementation and all relevant planning parameters

### ■ Management consulting

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

### ■ Support in the procurement process

- Specification of tender requirements
- Preparation of tender documents
- Answering of bidder questions
- Bid evaluation

## TETRA Network for "Stadtwerke" Baden-Baden

*LS telcom was assigned a contract for the planning of a TETRA network for the Municipal Utilities Company of Baden-Baden, the "Stadtwerke".*

The objective was to find the technically and financially best network solution and to define the exact requirements for a tender. The radio planning engineers investigated on the suitability of the proposed antenna sites, calculated the optimal antenna configuration as well as the corresponding costs.

With France and other licence regions adjacent, it was also necessary to check regulatory coordination obligations and to adjust the configuration of the antenna sites accordingly. The planning results were presented in an extensive report which will support the Stadtwerke Baden Baden to prepare the tender for the acquisition of network equipment and the roll-out. ←



Photo: Nokia

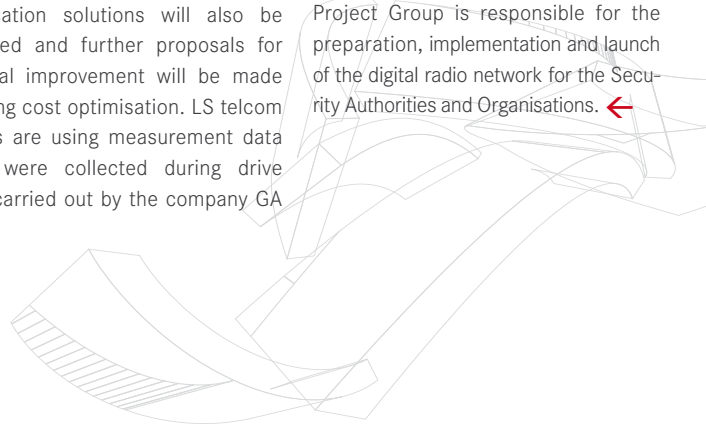


## Optimisation of BOS/TETRA Network in Berlin

*LS telcom radio experts are currently analysing the reached coverage of the BOS-TETRA network (digital radio of Security Authorities and Organisations) in Berlin.*

The network in Germany's capital city Berlin is currently running in a test phase. During the project different optimisation solutions will also be examined and further proposals for potential improvement will be made including cost optimisation. LS telcom experts are using measurement data which were collected during drive tests, carried out by the company GA

Netztechnik GmbH. The data were used in LS telcom's TETRA planning tool xG-Planner to simulate and check the achieved network coverage. In a second step, these results will be the basis to elaborate practical optimisation solutions together with the "Projektgruppe Digitalfunk-BOS Berlin": The Project Group is responsible for the preparation, implementation and launch of the digital radio network for the Security Authorities and Organisations. ←



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## Training and Seminar Courses

- **PMR - Professional Mobile Radio**  
07.-08.06.2010 (German Course)  
13.-14.09.2010
- **Radio Network Planning for  
PMR/TETRA-Networks**  
09.-11.06.2010 (German Course)  
15.-17.09.2010
- **PMR/TETRA Planning  
Exercises using xG-Planner**  
08.-09.12.2010
- **Planning & Coordination of  
Microwave Links**  
16.-17.11.2010
- **Measurements of Human Expos-  
ure to RF Electromagnetic Fields**  
(incl. practical measurements)  
22.-24.11.2010  
04.-06.04.2011

Individual training dates on  
request.

Our complete Training Calendar  
can be downloaded from our  
website:  
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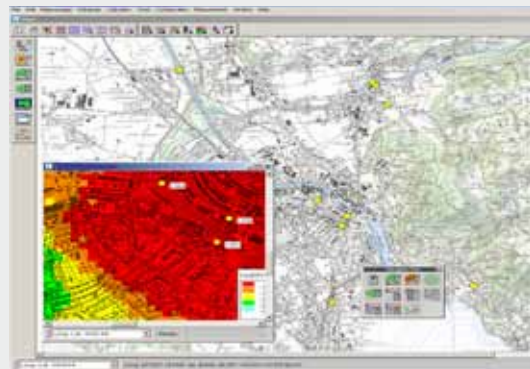
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## xG-Planner – The Radio Planning Tool for PMR-Networks

The radio network planning tool xG-Planner is a commercial product that has been continuously improved over the past 12 years to plan and optimise digital mobile networks. It is used by numerous customers in operative networks and with projects in the consulting and service field, if for example GSM, UMTS, DMR, Tetrapol or TETRA-networks are to be planned or optimised. Within the scope of introducing BOS digital radio it has been and still is used in projects for the interior ministry of the federal states Hamburg, Baden-Wuerttemberg, Berlin, Saxony and Brandenburg as well as in several international projects.



The software solution is characterised by the following points:

- Optimised for design, planning and analysis of PMR-net works
- Unique features and functions
  - User friendly graphical user surface
  - Convenient GIS-functionalities
  - 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 fast customisable system
- Individual training in English and German language
- English and German speaking support group consisting of radio network planners and software engineers
- Budget-conscious hardware conditions by using user friendly Windows PCs with low purchasing, operating and maintenance costs
- Flexibility by purchasing, hire purchasing and leasing options. Fast availability, if necessary the system can be installed ready for use within a few days.
- Used worldwide in numerous operative radio networks

## LS telcom – The Perfect Partner for your PMR Project!

To make it work – on schedule and budget-conscious!

- Longstanding, international experience
  - More than 17 years experience in radio planning and telecommunication.
  - More than 15 years experience in the fields of PMR and TETRA.
  - Successfully concluded projects in more than 80 countries.
- Extensive, complex experience in the field of PMR/TETRA/BOS
  - Audits, feasibility studies and technical consulting
  - Radio planning (coverage, spectrum, capacity, etc.)
  - Preparation and evaluation of tender documents
  - Network implementation
  - Extension and optimisation of already existing TETRA/BOS networks
- Solid and reliable partner
  - Established project organisation
  - A large number of relevant staff
- Services from one hand
  - Radio and fixed network planning
  - Cost assessment
  - Consulting
  - Planning tools
  - Geo- and cartographical data
- Competence
  - Highly qualified, experienced staff
- Neutrality
- Flexible, unbureaucratic project handling

### Impressum

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