



# Indoor Radio Network Planning

Professional Planning, Design and Implementation of  
Radio Coverage in Buildings and Tunnel Systems



# Radio Coverage in Buildings and Tunnel Systems

Buildings are the final frontier before reaching ubiquitous network coverage, which is becoming increasingly important in all countries – including indoor and in-building coverage at airports, in shopping centres, conference centres, tunnel systems and railway stations, etc.

Higher safety standards and new technologies, paralleled by an increasing demand of consumers have placed even more extensive requirements on indoor network coverage.

Depending on factors, such as characteristics and size of the premises as well as its distance to the next base station, indoor coverage of a building or underground facility often cannot be accomplished through the outdoor network. Increasing the density of base stations in order to achieve full coverage is neither an economical nor a technically feasible solution and would only be partially viable. Reinforced concrete constructions, exterior metal wall cladding and mirrored window panes, let alone separate basement areas, explosion proof buildings and tunnel systems, make it even more difficult to implement indoor coverage via the outdoor network. In this case, the limits of technical capability are reached quickly.

This is where tailored indoor network infrastructure comes in, which has to be individually planned, designed and implemented for all 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.

We are vendor-independent and your partner for any advice in indoor network coverage issues. **Quality, efficiency and cost effectiveness** is our priority!





# Consistent and Safe Communication Everywhere - for Property Owners and Radio Network Operators

It's your job to ensure radio coverage inside your facilities?

LS telcom supports you from A to Z and addresses all issues in the planning and implementation of your indoor radio coverage.

## Indoor Radio Coverage for Professional Mobile Radio Networks/Security Authorities

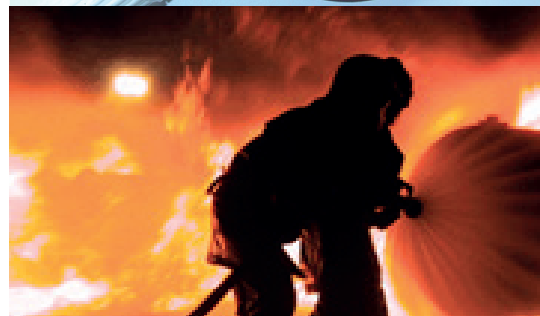
Governments and authorities need professional network indoor coverage for police, fire brigade and rescue forces to communicate in case of emergencies, such as fire, bomb threats or terrorist attacks.

With the transition from analogue to digital networks, indoor radio infrastructure becomes a real issue for property owners and managers as well as planners of large premises.

The planning and implementation of individual indoor radio infrastructure facilities is in general their responsibility because of fire protection and safety issues. The integration of the indoor infrastructure into the outdoor network, on the other hand, remains with the network operator.

The network operator also defines and communicates to the property owners the guidelines, necessary for the indoor radio system planning, such as the connection mode between the indoor system and the outdoor network as well as the repeater performance.

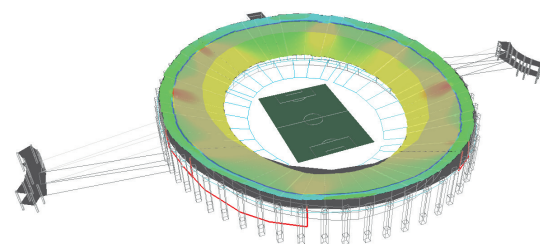
Attention has to be paid, in particular, that the indoor network does not cause interference to the outdoor network.



Photos: Nokia, Photocase

## Indoor Radio Coverage for Commercial Mobile Networks

Customers of commercial mobile telecom operators want to talk on the phone, surf the internet or send text messages, while waiting at the airport, sitting on an underground train or strolling around in a shopping centre. This is why mobile operators have to offer excellent customer service including reliable indoor coverage quality and high data rates to retain their subscribers and generate new profit. This requires the use of latest wireless technologies and a well-planned indoor radio coverage with a sufficient receiving level to be able to achieve the desired data transmission rates.



# Our Indoor Coverage Product Portfolio

LS telcom supports you during the complete network lifecycle of your project



## Design

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

## Procurement

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

## 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

## Implementation & Commissioning

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

Only through conscientious and high-quality planning and design, using state-of-the-art software, can the enormous requirements be met and indoor coverage optimised, while eliminating interference on the outdoor network.

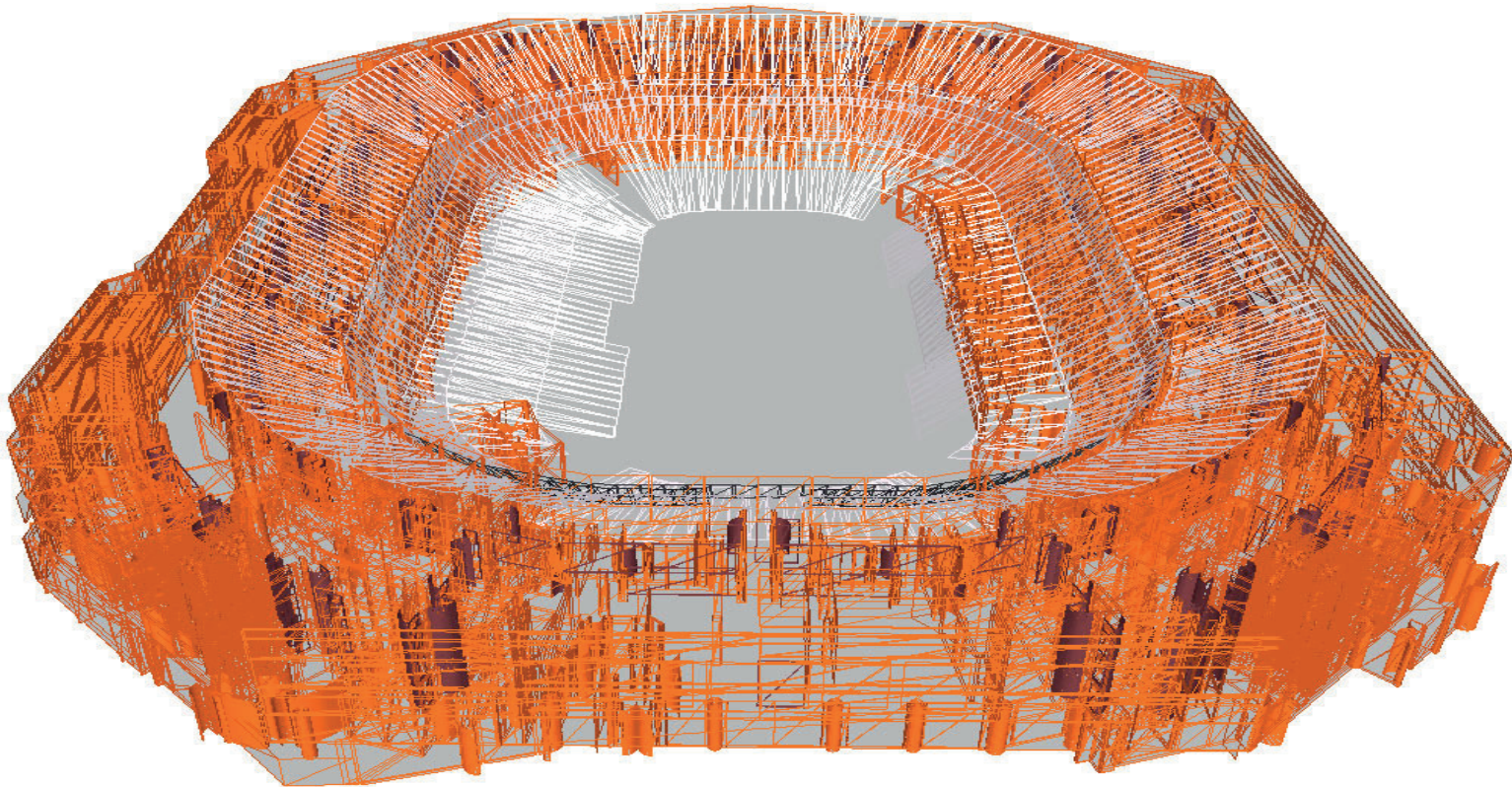
Benefit from our multifaceted and long-standing experience and know-how when planning and implementing your indoor radio network.

We know what it's all about and design, plan and implement your network with pinpoint accuracy in terms of technical and cost efficiency!

# Radio Measurement Services

LS telcom is your powerful and vendor-independent partner for any measurement exercise. We carry out all kinds of radio measurements, including the full radio spectrum and all common technologies:

- Continuous-wave (CW) measurements
- Radio coverage measurements
- Interference measurements
- EMF measurements & electromagnetic emissions compliance reporting
- Spectrum monitoring measurements
- Measurements for commissioning and acceptance testing



Indoor network planning for professional (PMR) as well as private mobile networks will increase in significance. Manifold structures of buildings and indoor premises and very different requirements as well as a large selection of relevant radio services and standards having to operate interference-free and right next to each other, render indoor network planning more and more complex and require well-tailored indoor radio network infrastructure. Only through conscientious and high-quality planning and design, using state-of-the-art software can the requirements be met and indoor coverage be optimised, while eliminating interference on the outdoor network.



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