



Measurements and Simulation of Human Exposure to Electromagnetic Fields (EMF)

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EMF Measurements and Simulations for Public Safety

Wireless communications technology, such as LTE/UMTS/GSM/TETRA cellular radio systems, Broadcast, WLAN and WiMAX, has raised concerns about possible adverse health-effects in humans. To protect against the potential health effects government regulations placed limits on public and worker exposure to radio frequencies set out in national and international safety guidelines, standards and regulations. To ensure public and workers safety, measurements, simulations and evaluations of human exposure to electric, magnetic and electromagnetic fields are essentially.

LS telcom offers to national regulators, operators, municipalities and all other stakeholders which control the human exposure to Electromagnetic Fields (EMF) the complete portfolio of EMF studies, based on EMF predictions, measurements and monitoring. These are based on the standards of the International Commission for Non-Ionizing Radiation Protection (short ICNIRP), the World Health Organization (WHO) and the EU Commission.

LS telcom services related to

Electromagnetic Emission Compliance Reporting

Short-term & long-term measurement, simulation and evaluation of human exposure to electromagnetic fields

- Policy development for EMF safety
- Expert studies on EMF safety
- RF site audits and tower inspection
- Creation of electromagnetic emission compliance reports
- EMF & human exposure measurements

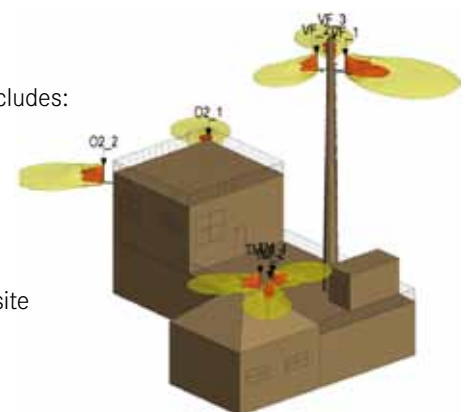
The electromagnetic emission compliance report includes:

- Instrument description and calibration information
- Site documentation
- Measurement points photo documentation
- Measurement procedure
- Measured values (E-field (V/m) and power density (W/m²))
- Minimal and extrapolated maximum exposure value per service/ operator and/or cumulative per measurement point
- Format, content and style can be customized.

- EMF simulation and prediction

The electromagnetic emission compliance is shown per site in a report includes:

- Services under consideration
- Vertical and horizontal cut plane or 3D pattern
- Tabulated values of horizontal and vertical safety distances
- Accurate sketches of buildings, rooftops, access routes, ladders, lattice masts and many other architectural features
- Fraction of exposure limit on a predefined height surrounding the site
- Format, content and style can be customized.

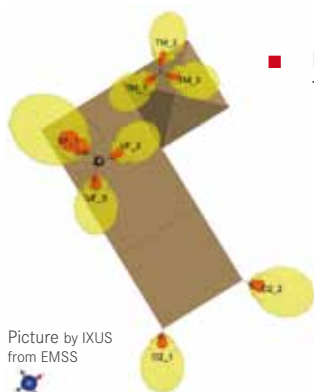


Picture by IXUS from EMSS

EMF Training Course

Offer training to your staff on EMF regulations and measurements of human exposure to RF electromagnetic fields. Our courses provide you with everything you need to know about the regulations and standards and what's behind the exposure limits. Course participants will learn to perform measurements of RF exposure of different radio services following standard measurement methodologies.

Follow our scheduled course or ask us for customized training from individual to group training as well as capacity building for your organization. You have full flexibility on dates, location and course content.



Picture by IXUS from EMSS

EMF Measurements & Monitoring

The transmitters of RF services produce electromagnetic emissions people may be exposed to. For assessing people's safety, the exposure must be measured and compared with limits. Complying with relevant standards demonstrates a commitment to protect the health of staff and the public community and satisfies the legal safety requirements.

Regular EMF measurements can confirm site certificate procedures and EMF simulations. LS telecom carries out short-term wideband and narrowband EMF measurements and long-term EMF monitoring. The measurement results will then be analyzed and compared with the exposure limits imposed by the relevant standards or regulations and be documented in a detailed report.

Human Exposure Measurements

Short-term measurements are performed using handheld measurement instruments with the following optional extrapolation to the maximum traffic radiation. The performance of reliable wideband and narrowband EMF measurements campaigns are based on proven measurement procedures on international standards and recommendations.

Wideband measurements to determine the overall band exposure at a certain time or in time duration or to detect a spatial maximum exposure measurement point for succession selective measurements.

Selective narrowband measurements are made selectively to assess the effects of each source separately and with sufficient sensitivity. When it comes to assessing safety, the question is: What proportion of the overall field strength is coming from which source?

Maximum traffic extrapolation

The problem when measuring the electromagnetic fields emanating from mobile phone base stations is that the output power level of the traffic channels varies according to traffic load. This means that the field strength also varies. However, at least one channel per base station in GSM and UMTS networks outputs at a constant, known power level.

This is the BCCH (Broadcast Control Channel) in GSM and the P-CPICH (Primary Common Pilot Channel) in UMTS. So it is now possible to extrapolate the exposure level at maximum output power (full traffic, all licensed transmitter on) in the situation from a measurement of the reference channel.



Continuous EMF Monitoring with LS OBSERVER

EMF Monitoring is an option in heavily frequented public places or in locations where the fraction of exposure limit is particularly high. Then you may want to measure EMF continually to proof that exposure limits are not exceeded at these locations.

For this case our EMF Monitoring Services for long term measurements and data storage on points of interest based on the LS OBSERVER system is the perfect choice. LS OBSERVER has a very small footprint and can be set up literally anywhere to monitor the EMF on a permanent basis.



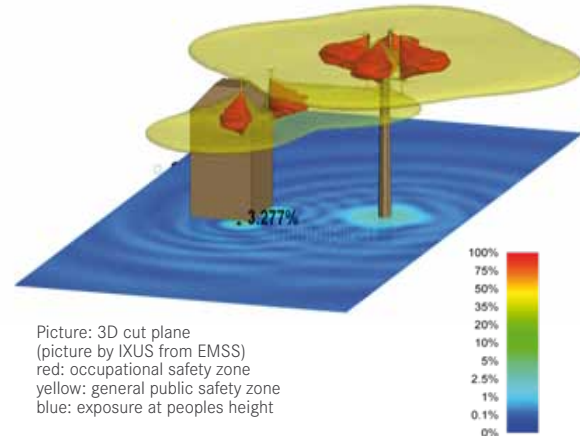
Computer based EMF Simulation and Prediction

Computer-based simulation and prediction of electromagnetic fields (EMF) and exposure distribution - analyzing single transmitter sites as well as entire radio networks.

EMF Site & Safety Zone Analysis

With this analysis the safety distance for occupational and general public exposure around a transmitter site can be determined with respect to international standards. EMF compliance calculations determine non-compliance zones very accurately and display them in 3D on the building model. The safety zones can be predicted for yagis, grid antennas and for a single or several multi-band antennas on one site.

- Performance of scientific-technical EMF studies
- Determination of the safety distance with respect to the standards (e.g. ICNIRP)



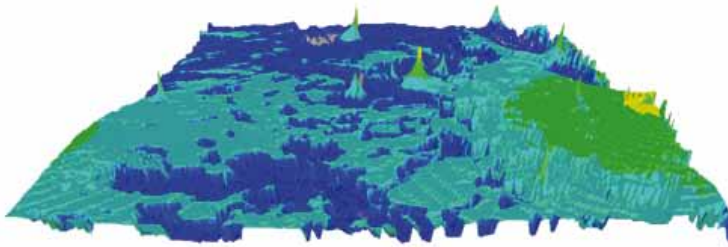
Picture: 3D cut plane (picture by IXUS from EMSS)
red: occupational safety zone
yellow: general public safety zone
blue: exposure at peoples height

EMF Network Analysis

This analysis allows computer-based EMF simulations and predictions of entire radio networks sections. The network wide analysis includes the field strength and the cumulative fraction of exposure limits for all common radio services, such as broadcast and telecommunications.

The calculated exposure results can be overlaid on street maps or Google Earth to show the fraction of exposure limit at a certain location in a city.

Also different network designs can be checked and compared from an exposure point of view.



Picture: Fraction of exposure limits (General Public Exposure)

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