

LTE INDOOR PLANNING WITH RADIO PERFORMANCE

"Since we launched our LTE service and got experience from the network, many questions emerged. The whole team had their questions answered and were taken to a higher level by Widermind's LTE Advanced Features and Performance training"

- Tony Oldén, Manager Radio Network Planning, TeliaSonera Sweden

Course Description

The course "LTE Indoor Planning" covers the important features and parameters that influence LTE performance, typically throughput capacity, coverage, intra-LTE interference and co-existence with legacy 2G and 3G systems. A number of implementation scenarios are presented with the focus on indoor coverage and planning.

Long Term Evolution, LTE, is being rolled out as the new 4G system. Multiple 4G networks already run commercial services, as they have been operational for a couple of years.

The initial design and tuning of these 4G networks was towards macrocell based coverage and single band, single service implementations. As 4G becomes more dominant in terms of traffic volume and spectrum utilization, capacity upgrade based on indoor solutions will be crucial to handle the demand and economics. Optimizing the mobile network for higher indoor performance will require thorough understanding of the features and parameters that influence important KPIs and end-to-end user experience.

The 4G/LTE radio characteristics and its performance is described thoroughly, together with the new features that support radio self-optimization, self-tuning and self-healing.

HETNET is addressed and related to the new LTE advanced features. The impact of eICIC, Femtocells, Relay nodes, multiband and multi-standard support is analyzed and future scenarios are discussed.



Above: Widermind fiber optic repeater coverage project in Swedish iron ore mine 1500 meters below ground level.

Different operator strategies on spectrum re-farming, extended LTE capacity and new feature implementations like carrier aggregation and dual band are presented and discussed.

Furthermore, the indoor coverage and planning aspects are covered in detail. Indoor MIMO multilayer support is elaborated together with Repeater and Distributed Antenna System planning for indoor installations. Different indoor cases like tunnel-, elevator- and high building office solutions are studied in terms of exercises. Requirements for Femto-Macro cell mobility in terms of Data Session and Voice Call Continuity is also addressed.

Content

ENHANCEMENTS IN LTE-ADVANCED R10

- The major differences between LTE and UMTS systems
- eNodeB features and the OFDMA principles for capacity management
- Intra-LTE mobility principles for idle and connected mode
- Radio bearers and the mapping to QoS Classes in LTE and UMTS
- End-to-end Sessions
- Call-set up principles related to EPS and radio bearer setup
- Automatic Neighbor Relation function and basic SON features
- The role of MME for intra- and inter-LTE service support
- Available multi-band LTE scenarios and carrier aggregation support

OFDMA RADIO CHARACTERISTICS

- Important differences between WCDMA and OFDMA
- RF channel bandwidth and multiband support
- Peak throughput calculations
- Radio resource scheduling and link adaptations
- Modulation schemes, symbol rates and cyclic prefix lengths
- Advanced antenna features and configurations for diversity and MIMO multilayer
- Neighbor list optimization with/without ANR
- Availability of X2 support for inter-cell interference coordination
- Relay nodes and Repeater options in LTE Radio
- Optimization guide summary: important parameters to consider

COVERAGE REQUIREMENTS AND CHALLENGES

- Cell edge throughput and peak rate requirements
- Interference cancellation and coordination
- Average cell throughput calculations in loaded network
- Hierarchical cell structures with multiband coverage
- Macro cell based indoor coverage requirements
- Femtocell and macrocell integration with ICIC
- Important KPI optimization targets in commercial LTE services

THE RF INDOOR PLANNING BASICS

- The RF planning process
- Isolation challenges and Zone planning
- Combining indoor and outdoor coverage
- Passive vs active iDAS
- RF measurements and evaluation
- Indoor solutions with multi-operator support

CALCULATE RF COVERAGE FROM GIVEN REQUIREMENTS

- Indoor propagation and channel models for LTE
- Gain and loss calculations in uplink and downlink
- Sensitivity calculations with and without TMA
- Repeater gain and capacity calculations
- Indoor link budget calculations for coverage and capacity

PLAN AND DESIGN AN INDOOR SYSTEM

- Passive, active and hybrid iDAS
- Planning the iDAS solution
- Planning the Femto solution
- Introducing the indoor repeater solution
- Planning and designing indoor MIMO
- Configuring the UL/DL power to meet target performance
- Calculating MIMO antenna options and distance separations
- Combining iDAS and MIMO for indoor
- Upgrading existing iDAS
- Introduction of multi-operator support

Target audience

The target audience is Indoor Systems Designers, LTE Radio Planners and Optimizers.

Pre-requisites

The participants must have working knowledge from network operations, planning or design of UMTS and/or LTE systems.

Course length

3 days

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You are warm welcome to contact our representatives at:

Email: training@brightcomms.com or Toll Free + 1-800-490-1089.

Brightcomms
999 Ponce de Leon,
Suite 525, Coral Gables,
Florida, 33134, United States.
Toll Free + 1-800-490-1089.
E-mail: training@brightcomms.com
www.brightcomms.com