

# LTE Capacity Planning Training

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## LTE Capacity Planning Training Course Description

LTE Capacity Planning Training covers the theory and application of RF planning and designing for LTE RANs. LTE Capacity Planning Training is concentrated on performing RF planning and Design and capacity planning for Long Term Evolution (LTE) based networks. It gives you an in-depth comprehension of how to plan, design and optimize a high quality LTE network. This training helps you to plan and design LTE networks, tools to increase LTE capacity, and how to reduce interference and enhance quality in the LTE network. Through this hands-on training, attendees will use their knowledge of the LTE air interface physical structure and associated principals to measure the link budgets to cover the market and performance standards, and to identify optimal network parameter settings.

LTE suggests noteworthy enhancements over previous mobile wireless systems in regards to data speeds and capacity, by applying technologies such as OFDMA and [multiple antenna techniques](#). But, these improvements are obtained only with precise planning and design in the LTE Radio Access Network (RAN), to increase the productivity of available RF spectrum.

LTE Capacity Planning Training gives the participants the chance to apply real planning inputs and a coverage prediction tool for practices to use their information and skills in real-life case studies.



### Learn About:

- LTE Architecture
- LTE Radio Interface
- Link Budgets for LTE
- Coverage Planning
- eNB Configuration
- IDLE Mode Parameters
- CONNECTED Mode Parameters
- Capacity Planning for LTE
- Coverage Planning for LTE
- Coverage Optimization

### LTE Training Format

LTE Capacity Planning Training includes both theoretical lectures and practical activities. Good portion of the class is dedicated to individuals and group activities, labs, and hands-on workshops. Participants are encouraged to bring in their own sample project to work on, but they also can practice with the real-world examples provided by our instructors in the class.

### Audience

LTE Capacity Planning Training is a 3-day course designed for:

- RF engineers
- OSS & BSS engineers
- Optimization engineers
- O&M engineers & technical support engineers
- LTE RF design and system performance engineers
- Network supervisors
- Manufacturers
- Integrators
- Regulators
- All individuals involved in RF planning for LTE

### **Training Objectives**

Upon the completion of LTE Capacity Planning Training, the attendees are able to:

- Improve, optimize, and maintain network performances
- Explain network potential issues that might happen on the radio and BSS and the core network side
- Identify problems and offer solutions
- Develop a macro view of GSM networks and performance
- Apply a reliable process to radio network planning and design
- Use RSRP and RSRQ measurements to assess LTE RAN RF performance
- Map network standards to corresponding system parameters
- Build uplink/downlink link budgets to meet specific performance requirements
- Apply coverage and capacity standards to regulate the optimal radio network design
- Use multiple antenna approaches to optimize coverage and performance
- Approximate the maximum cell site air interface capacity based on a specific traffic model
- Identify optimum LTE configuration and operational settings to amplify system performance
- Explain the key elements and operations related to customer-specific Inter-RAT deployment
- Assuredly and professionally plan an efficient 4G / LTE Radio network
- Provide much more effectively to radio planning and deployment debate and decisions-making within the organization
- Assess application options for deploying 4G / LTE radio networks – either in green-field scenarios, or as part of an existing multi-RAT (Radio Access Technology) system
- Take advantage of the benefits and enhanced radio performance that 4G / LTE brings to the cellular operator in various scenarios
- Develop radio network solutions in a more holistic way
- Use advanced radio-planning tools in order to improve efficiency in the radio planning processes

### **Course Outline**

## Overview

- LTE definition
- Why LTE ?
- LTE main requirements
- LTE vs other mobile technologies
- Network architecture evolution
- LTE main characters
- Basics of LTE air interface
- Adjustment around LTE air interface
- IMT advanced
- RF application in LTE
- Radio network design goals
- Planning inputs and outputs
- LTE RAN planning process
- Detailed Planning
- Optimization
- LTE services
- QoS characteristics
- Managing QoS
- Interworking Services with GERAN/UTRAN

## Introduction to LTE RF Planning

- Basics of RF
- Radio network design & optimization procedure
- LTE network architecture
- LTE radio aspects / air interface
- Physical layer downlink
  - Orthogonal Frequency Division Multiplexing – OFDM
- Physical layer: down link
- Types of propagation models and their applications
- Physical layer: radio interface channels
- LTE link budgeting
- LTE & NLOS environment
- Frequency reprocess in LTE networks
- Timing and synchronization for LTE networks

## LTE Air Interface

- E-UTRAN architecture
- LTE Physical layer structure
- Air interface resources
- UE measurements (RSRP/RSRQ)
- Propagation principles
- Propagation models for LTE
- Radio coverage planning
  - Gains/losses, link budgets
- The rectangular pulse
- Multi-carrier modulation
- OFDM
- Impact of frequency errors in OFDM
- SC-FDMA
- OFDM transmitter and receiver
- OFDM multiple access
- Subcarriers assignment methods
- OFDM implementation in LTE/ EUTRAN
- LTE/EUTRAN radio frames
- OFDM resource block
- Modulation schemes in LTE/ EUTRAN
- LTE/EUTRAN frequency variants
- MIMO
- DL & UL Peak bit rates

### **RSRP/RSRQ Exercises**

- Market and Engineering Requirements
- Coverage requirements
- Capacity requirements
- QoS requirements
- Engineering requirements

### **LTE Link Budget**

- Cell edge throughput measurements
- Link budget for UL and DL
- Role of RRH and TMA
- UL/DL link budget exercises

### **RF Design and Site Selection**

- RF design process and options
- Morphology definitions
- Propagation models
- RF design tool configuration
- Coverage prediction

### **Radio Network Planning Tools**

- Planning technique
- Tools review
- Frequency planning
- System planning
- Signaling capacity
- Bearer dimensioning

### **Antennas in LTE Networks**

- Multiple antenna techniques
- Downlink feedback (CQI/RI/PMI)
- Deployment considerations
- Coverage prediction exercises
- Antenna vs transmission modes
- Practical antenna options

### **LTE Coverage Planning**

- Coverage vs capacity
- LTE link budget
- Key LTE coverage plots:
  - RSRP, RSRQ, bearers
- Targets and assumptions
  - Practical Planning

### **LTE Capacity Planning**

- Data traffic modeling
- Air interface capacity estimation
- Backhaul capacity planning
- Triggers for capacity planning
- Practical targets
- Cell and eNB quantity
- Factors impacting capacity

- Planning tool simulations
  - Configuring planning tool

### **RF Configuration Parameters**

- Frequency planning
- Sync signal and PCI planning
- Reference signal planning
- RA preamble planning
- PCI and RACH planning exercises

### **Small Cells**

- Small cells definition
- Small cells effect
- Coverage and capacity

### **RF Operational Parameters**

- Cell selection/reselection planning
- Handover planning
- Power control planning

### **Radio Network KPIs**

- User-centric KPIs
- Network performance KPIs
- System utilization KPIs

### **Interworking with 2G/3G**

- System selection/reselection planning
- Inter-RAT handover planning

### **LTE Capacity Planning Training**