

# RF Design Workshop: Part 2 – VoLTE and Small Cells

Instructor Led | Duration: 2 Days | Course Number: LTE\_416

4G LTE

With the expected introduction of LTE features such as Voice over LTE (VoLTE), multi-frequency, Small cell deployment, and LTE-Advanced features such as carrier aggregation, the existing RF design process needs to be enhanced. This workshop provides a foundation for the features such as VoLTE, carrier aggregation, Heterogeneous Networks (HetNets), and small cells. The course revisits the data traffic driven link budget and enhances to reflect the VoLTE performance requirements and the differences for Small cells. The antennas being planned to accommodate multi-band deployments are discussed. Various RF parameters related to cell selection/re-selection and handover are discussed for proper load distribution in cases of multi-carrier and small cell deployment. **In summary, this workshop provides detailed understanding of RF design enhancements for VoLTE, LTE-Advanced and Small Cell.**

## Intended Audience

This workshop provides practical examples and intertwines the exercises at every stage of the RF design process and is intended for RF designers, RF systems engineers, network engineers, deployment and operations personnel.

## Learning Objectives

After completing this workshop, the student will be able to:

- Enumerate design considerations of deploying LTE in different bands, for different services, and using different cell types
- Identify the key features of LTE-Advanced such as Carrier Aggregation, HetNet, eICIC, and SON and their impact on RF design
- Step through the link budget and planning process for VoLTE, multi-frequency, and Small cell deployment
- Sketch various antenna configurations
- Calculate the air interface capacity needs for data and VoLTE traffic
- Describe configurations of RF design parameters related to cell selection, re-selection, and handover

## Required Equipment

- PC laptop with administrator privileges

## Suggested Prerequisites

- [TRND103] Overview of OFDM (eLearning)
- [LTE\_102] LTE Overview (eLearning)
- [LTE\_415] RF Design Workshop: Part 1 - LTE

## Course Outline

### 1. LTE Radio Network Design Review

- 1.1. Radio network design goals, inputs and outputs
- 1.2. LTE radio network planning process

### 2. Link Budget for Small Cells

- 2.1. Review LTE link budget for macro network
- 2.2. Small Cell considerations
- 2.3. Impact of Tx power, frequency, # of antennas
- 2.4. Pathloss for UL and DL
- 2.5. Exercise: Link budget walk-through

### 3. RF Design Considerations

- 3.1. RF design guidelines
- 3.2. RF design tool configuration
- 3.3. Coverage prediction
- 3.4. Exercises: Coverage and interference

### 4. Link Budget for VoLTE

- 4.1. Link budget differences for VoLTE and data
- 4.2. SINR requirement for VoLTE
- 4.3. Use of RBs for VoLTE
- 4.4. Pathloss for UL and DL
- 4.5. Exercise: Link budget walk-through

### 5. Antenna Considerations

- 5.1. Multi-band antenna considerations
- 5.2. 4x4 MIMO considerations
- 5.3. TMA and RRH deployment configurations
- 5.4. Integrated antenna considerations

### 6. Advanced Features of LTE

- 6.1. Carrier aggregation
- 6.2. HetNet and eICIC support
- 6.3. SON features