



# LTE RF Optimization: Part 4 - Carrier Aggregation and Load Balancing

LTE\_431x | Expert-Led Live | LTE and VoLTE | ⚙️⚙️⚙️

Course Duration: 1.5 days

This workshop (part 4 of 4 parts series) provides insights into the symptoms and possible causes of field performance issues in LTE radio networks using UE logs. RF measurements related to coverage and interference are discussed to analyze coverage holes and overlapping regions. Students analyze LTE signaling messages through UE logs and map them to success and failure events. Students perform root cause analysis and gain an in-depth understanding of these signaling events to network performance. LTE RF optimization areas such as Intra-LTE and IRAT handover operation. This knowledge transfer is obtained through hands-on experience using UE based diagnostic tools and scanner tools.

## Intended Audience

This workshop is primarily intended for RF and systems performance engineers involved in LTE design, performance, and optimization.

## Objectives

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

- Identify the network and UE capabilities to support Carrier Aggregation
- Step through the successful operation of Carrier Aggregation using UE logs
- Identify various LTE signaling events that map to success and failure operational counters
- Identify the opportunities of load balancing in the idle and connected mode
- Analyze UE logs for root cause analysis of successful and failure events
- Map above events to operational counters and corresponding KPIs

## Course Prerequisites

[LTE RF Optimization: Part 1 - Coverage and Accessibility](#)

## Outline

1. Workshop Overview
  2. DL Carrier Aggregation Essentials
    - 2.1 CA operation overview
    - 2.2 UE category and CA support capabilityExercise: Analysis of 'UE Capabilities Response' message
  3. Carrier Aggregation Operations
    - 3.1 PCell setup signaling
    - 3.2 SCell configuration & typical criteria
    - 3.3 SCell configuration signalingExercise: Signaling log showing PCell setup & SCell configuration
  - 3.4 SCell activation & typical triggers
  - 3.5 DL CA traffic operations
  - 3.6 SCell de-activation & typical triggers
  - 3.7 SCell de-configuration & typical criteria
  - 3.8 Typical KPIs for DL CA
4. Inter-Frequency Idle Mode Load Balancing
    - 4.1 Inter-frequency cell re-selection operationsExercise: SIB 3, 4, 5 parameter analysis
  - 4.2 Strategies for inter-frequency idle mode load balancing
  - 4.3 High priority to largest bandwidth
  - 4.4 Sticky carrier
  - 4.5 Dedicated Priorities
5. Inter-Frequency Connected Mode Load Balancing (IFLB)
    - 5.1 Event A4/A5 for IFLB handovers
    - 5.2 Measurement gaps and UE capability
    - 5.3 IFLB behavior with VoLTE
    - 5.4 Typical KPIs for IFLB