LTE/LTE-Advanced Air Interface
Course Number: LTE4200-01EN | Duration: 4 Days

Target Audience
- System Design & Customer Support Personnel
- UE/E-UTRAN SW Developers and IOT/System Test Engineers
- Network Engineering & Performance Optimisation Staff

Prerequisites
- LTE/LTE-Advanced Overview (LTE4000-01EN)

Learning Objectives
After completing this course, the students will be able to:
- Know about different LTE releases (Rel. 8, 9, 10, 11) and the major feature additions in each release.
- State UE's optional and mandatory radio access capability parameters and features not tested.
- Understand how Carrier Aggregation operates with different CA Bandwidth Classes.
- Explain E-UTRA transmission modes and suitable antennas to enhance peak and/or cell edge performance.
- Describe LTE's HARQ operation in conjunction with eNodeB's link adaptation to maintain BLER target.

Course Outline

1. Evolved Packet System Network Layout
   - 1.1 E-UTRAN & Evolved Packet Core
   - 1.2 LTE-Uu Characteristics
   - 1.3 NAS & Access Stratum Identifiers
   - 1.4 Basics about Network Access (Signaling)
   - 1.5 HetNet and Relays
   - 1.6 HeNB
   - 1.7 CoMP
2. LTE Air Interface Design
   - 2.1 OFDMA & SC-FDMA
   - 2.2 LTE Bands & flexible Bandwidth Support
   - 2.3 Frame & Subframe Structure
   - 2.4 E-UTRA Transmission Modes & Antennas
   - 2.5 Channel & Bearer Concept
   - 2.6 Layer 1 Processing Steps
3. LTE Resource Allocation
   - 3.1 Resource Element & REG's vs. PRB
   - 3.2 Physical Channels & RE/RB Mapping
   - 3.3 Physical Signals & RE Mapping
   - 3.4 Dynamic Resource Block Assignment
   - 3.5 Uplink PUCCH Resource Assignment
   - 3.6 CQI Transmission
   - 3.7 Ack/Nack Transmission (DL/UL)
   - 3.8 Carrier Aggregation
4. Hybrid ARQ & Link Adaptation
   - 4.1 Convolutional & Turbo Coding
   - 4.2 Retransmission Combining
   - 4.3 MCS Selection & Link Adaptation
   - 4.4 Open Loop vs. Closed Loop HARQ
   - 4.5 HARQ Failure & Block Segmentation
5. MIMO
   - 5.1 Transmission Modes
   - 5.2 SU-MIMO
   - 5.3 MU-MIMO

6. Physical Layer Procedures
   - 6.1 LTE Cell Search
   - 6.2 RSRP & RSRQ Measurements
   - 6.3 System Information Decoding
   - 6.4 Random Access Procedure
   - 6.5 Paging Cycle & Monitoring
   - 6.6 Uplink Power Control (PUSCH/PUCCH)
   - 6.7 Sounding
7. RLC/MAC Operation
   - 7.1 PDCCH Order
   - 7.2 Timing Advance Update
   - 7.3 Scheduler Functionality
   - 7.4 Higher Layer SDU Processing
   - 7.5 RLC Status & L2 Retransmissions
8. PDCP Functionality
   - 8.1 Integrity Protection & Ciphering
   - 8.2 Robust Header Compression
   - 8.3 Lossless Handover
9. RRC Operation
   - 9.1 RRC Establishment Procedure
   - 9.2 RRC Re-establishment
   - 9.3 SRB & DRB Reconfiguration
   - 9.4 Measurement Control & Reporting
   - 9.5 LTE Mobility – Handover & Redirection
   - 9.6 Inter RAT Mobility
10. EMM & ESM Operation
    - 10.1 UE Voice Domain Preference & Usage
    - 10.2 LTE Attach & Default EPS Bearer
    - 10.3 Reasons for Tracking Area Update
    - 10.4 Dedicated EPS Bearer Activation
    - 10.5 IMS Discovery & Registration
    - 10.6 VoLTE & SRVCC Signaling

„Vorsprung durch Spezialisierung"