LTE/LTE-Advanced Signaling & Protocols on Uu Interface

Course Number: LTE4300-01EN | Duration: 4 Days

Target Audience

- UE/E-UTRAN SW Developers and IOT/System Test Engineers
- Network Engineering & Performance Optimisation Staff

Prerequisites

- LTE/LTE-Advanced Air Interface (LTE4200-01EN)

Learning Objectives

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

- Understand how EMM and ESM failure affect the UE's protocol behavior.
- Describe UE's tasks in priority based intra LTE and Inter-RAT cell reselection .
- Get behind the drawbacks and advantages of CSFB versus VoLTE with SRVCC.
- Explain E-UTRAN measurement events, reasons for handovers & RRC re-establishments.
- Set user plane & control plane parameters to reduce drops related to RLC, RRC & layer1.

Course Outline

1. UE's Idle Mode Procedures
   - 1.1 PLMN/Cell Search and Selection
   - 1.2 Priority based LTE Cell Reselection
   - 1.3 IRAT Priority based Cell Reselection
2. Physical Layer Procedures
   - 2.1 Random Access & PDCCH Order
   - 2.2 HARQ – Open & Closed Loop
   - 2.3 Layer 1 UL & DL Resource Allocation
   - 2.4 SU-MIMO/Spatial Multiplexing (DCI's)
   - 2.5 Beamforming & MU-MIMO (DCI's)
   - 2.6 Paging & System Info Transmission
   - 2.7 Semi Persistent Scheduling
3. RRC Connected Mode Signaling Procedures
   - 3.1 RRC Connection Re-/Establishment
   - 3.2 SRB & Radio Bearer Configurations
   - 3.3 RRC Measurement Controls
   - 3.4 Handover Signaling – RRC & Layer 1
   - 3.5 ANR and CGI Reporting for 4G/3G/2G
   - 3.6 DRX Configuration & Activation
4. LTE NAS & Application Layer Procedures
   - 4.1 EMM Attach & SGs-Discovery
   - 4.2 EMM Combined Attach & Tracking Area Update – Possible Failures, Reactions
   - 4.3 ESM Default EPS Bearer (IPv4v6)
   - 4.4 ESM Dedicated EPS Bearer Setup
   - 4.5 SIP De-/Registration Procedures
   - 4.6 VoLTE Bearer Configuration
   - 4.7 SRVCC from LTE to 2G/3G (CS Only and CS+PS Related Bearers)
5. Inter RAT Changes and Handover
   - 5.1 4G ⇔ 3G Handover (CS/PS)
   - 5.2 Redirections for CSFB and PS
   - 5.3 Redirections with SI and DMCR
   - 5.4 NACC & CCO (4G ⇔ 2G)
6. MAC Functions & Operation
   - 6.1 Transfer of higher Layer SDU's
   - 6.2 MAC Control Elements
   - 6.3 BSR & PHR Reporting
   - 6.4 Prioritised Bit Rate (PBR)
7. RLC Procedures & Functionality
   - 7.1 RLC-SDU Transfer between Peers
   - 7.2 RLC & MAC Interworking
   - 7.3 RLC Status & Retransmissions
   - 7.4 SDU Segmentation & Reassembly
   - 7.5 RLC-Counter, Timer & Max. Retransmission
8. PDCP Functions & Operation
   - 8.1 PDCP Headers – Control & User Plane
   - 8.2 ROHC for TCP/IP & RTP/UDP/IP
   - 8.3 Lossless Handover
   - 8.4 Ciphering & Integrity Protection
9. E-to-E User Plane Protocol Review
   - 9.1 Min. Overhead of MAC/RLC/PDCP
   - 9.2 Max. Possible Throughput per UE Cat
   - 9.3 Handover Delay's & SDU Stalling