



LTE Signalling Analysis & Troubleshooting

Covers interfaces, network elements and protocols in the LTE network

Overview

This course focuses on enhancing your understanding of the signaling flows within the EPC and E-UTRAN to provide you with a full end-to-end understanding of the network operation. Your skills in signaling analysis and troubleshooting will be improved through “hands on” exercises using network traces and several tools including a Network Analyser.

You will be able to

- Understand the differences between UMTS & LTE signaling
- Understand the roles of the different protocols in the LTE access network
- Use an analyser to verify signaling procedures
- Troubleshoot signaling faults

Who can benefit

Technical managers, consultants, engineers and communications professionals who need to be able to analyse and troubleshoot message flows in the LTE network.

Pre requisite knowledge

The participant should have successfully completed the “Understanding LTE” program.

Outline

Introduction

- LTE System Capabilities & Features
- LTE standardization Review
- Automatic Neighbor Relation (ANR)
- Inter Cell Interference Coordination (ICIC)
- Multiple Input Multiple Output (MIMO)
- Coordinated Multipoint (CoMP)

LTE Interfaces and Identities

- LTE EPC Architecture
- EUTRAN Architecture and Interface
- EPC Architecture and Interface
- Network Element Functionality
- LTE Identifiers

LTE Air Interface Channel Structure

- LTE Channel Structure
- LTE DL and UL Channel Mapping

LTE Protocol Architecture and States

- Non Access Stratum and Access Stratum
- Functions of RRC Layer
- Functions of PDCP Layer
- Functions of RLC Layer
- Functions of MAC Layer
- UE States & State Changes
- Connection, Session & Mobility Management (ECM, ESM and EMM)

Idle mode Operations

- Broadcast Control Information
- Cell Search Procedure
- Tracking Area and Paging

E-UTRAN Interface Protocols

- LTE Signaling Protocols
- The X2 Interface and Protocol
- The S1 Interface and Protocol

LTE Procedures

- Random Access Procedure
- RRC Related Procedures
- Attach Procedure
- Detach Procedure
- Network Security Procedure

EPS Bearer Operations

- EPS Bearer Establishment & Management
- EPS Quality of Service
- GTP in the EPC
- Policy Control and Charging
- End to End Data Connections
- IPv4/IPv6 Address Options & Management
- DIAMETER Protocol
- Interaction with the HSS

Mobility and Handovers

- LTE Handover Types
- Measurement Control & Reporting
- X2 and S1 based Handovers
- Intra and Inter MME Handovers
- Handover to/from UMTS/GSM Networks
- Handover to/from non-3GPP Networks (WiFi and WiMAX)
- Roaming Architecture

LTE and UMTS comparison

- Signaling Procedure Comparison
- Mobility Management Procedure Comparison
- Session Management Procedure Comparison
- Security Procedure Comparison

Support for Voice & Real-Time Services

- CS Fallback
- Voice over LTE (VoLTE) & IMS
- Voice Call Continuity (VCC/SRVCC)
- Video services and MBMS

Hands-on exercises, analysis of log files, review questions & section summaries throughout

DURATION 4 days

MAXIMUM CLASS SIZE 12