

eUTRAN Protocols Tracing and Optimization

SYNOPSIS

- Hands-on Seminar: LTE air interface technology, physical layer, radio channel structure, physical layer procedures and radio parameters tuning.
- Focus on tracing LTE-FDD radio technology, access protocols, radio access network configuration and parameters optimization.
- Recognize radio parameters that influence service performance and QoS.
- Discuss EUTRAN Radio Resource Management.

DURATION

5 Days

PREREQUISITES

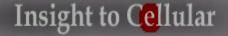
Familiarity with LTE and/or UMTS terminology.

TARGET AUDIENCE

- Test planers and Testing Engineers, Field Engineers and troubleshooters.
- Radio Optimization engineers, Network planer, technical staff being responsible for O&M, Drive Test Engineers.
- · System architects, software engineers.

COURSE TARGETS

- The participants would be able to develop, deploy, test, optimize and troubleshoot eUTRAN equipment and LTE protocol software.
- They would gain insight to LTE radio channels, bearers, measurements, resource allocation scenarios and handover scenarios.
- The participants would gain insight to eUTRAN architecture and protocols, understand the message flows and recognize important parameters.
- They would experience analyzing S1AP, X2AP, and GTPv1-U/GTPv2-C traces as well as mobile radio protocol logs, including systematic trace investigation, mapping between trace and standard specification, correlating between different interface views and issuing fault/performance investigation.



LTE Radio Optimization

1. LTE-EPC Architecture and Protocols

a. LTE Release Evolution Core and Radio Capabilities

b. LTE Architecture and Protocol principles Mobile Identities

c. Releases and Mobile Capabilities, USIM Enhancements, Roaming

d. Basic Service Scenarios (Registration, Packet Data)

2. LTE Radio Technology and Radio Channels

a. Radio Propagation and Principles Modulation, Multiple-Access

b. LTE Technology Enablers OFDMA/SC-FDMA,MIMO,MC

 LTE Radio Technology (modulation, channel estimation, channel coding, time/frequency mapping)

d. LTE Radio Channels organization physical,transport,logical

e. LTE Physical Layer Procedures Cell Search/Synchronization,TA, UL/DL Power Control, RL Failure

f. PRACH Operation

g. Measurements for Resource Allocation (UE+eNB)

h. Location Techniques and Measurements (UE+eNB)

i. LTE Cell Configuration (small cells, eICIC)

j. LTE Cell Coverage and Link Budget (Voice/Data, Coverage/Capacity)

k. Drive Testing and MDT

I. LTE-Advanced features Overview

3. eUTRAN Transport and Scheduling

. eUTRAN Architecture RAN Sharing, S1,X2, S1-Flex,

GTP-U Tunnels

b. Shared Channel Scheduling PD-CCH, DRX,SPS

c. MAC Protocol + Hands-On

d. RLC Protocol + Hands-On

e. PDCP Protocol

f. eUTRAN Bearer Transport GTPv1-U

g. Traffic Quality Monitoring Hands-On

eUTRAN Control Protocols Optimization

4. Radio Resource Management Scenarios

a. RRC Protocol

b. RRC State Model (Multi-RAT) State Transition Scenariosc. Idle Selection/Reselection Parameters Intra/Inter Frequency/RAT

d. SIB Structure and Parameters + Hands-On

e. RRC Message structure

f. Measurements for Mobilityg. RRC Connection ScenariosEvents and ParametersBearer Setup, Mobility

h. Radio Bearer Configuration

i. RRC Procedures Hands-On

j. Radio Protocol Parameters Optimization

k. Optional: eMBMS Technology and Parameters

I. Optional: Wi-Fi Offloading and ANDSF

m. Optional: Femtocell-Infrastructure and Femto Specific Scenarios

5. eUTRAN Protocols and Parameters Optimization

a. IP fundamentals for eUTRAN IPv4/IPv6, Sigtran, DiffServ,

b. eUTRAN Bearer Model

c. Sigtran Hands-On

d. S1AP Protocol

e. eUTRAN Bearer and Mobility Procedures Intra/Inter Frequency/RAT

f. S1AP Bearer Allocation & Mobility Hands-On

g. X2AP Protocol
h. Cell Configuration Parameters
i. SON scenarios and protocols
X2 Handover
eNB O&M
ANR, RLF

LTE NAS Protocols and End-to-end Scenarios

6. ePS-Core Registration Scenarios

- a. EPC Architecture and Protocols
- b. PS-Core and EPC migration
- c. NAS Messages Structure
- d. NAS eMM Protocol
- e. S6a/Diameter Basic Procedures
- f. Registration and Roaming Scenarios
- g. LTE Security contexts

and continuity upon Handover

h. Registration Scenario Hands-On

7. ePS-Core Bearer Allocation

- a. PDN Connectivity and ePS Bearers
- b. NAS eSM Protocol
- c. GTPv2-C Protocol and Basic Procedures
- d. Bearer Allocation and Service Scenarios
- e. Bearer Setup and Mobility Hands-On
- f. Inter-3GPP Bearer Mobility Scenarios and Parameters

8. Service Scenarios over LTE

- a. CSFB Parameters and Service Scenarios
- b. LTE Messaging alternatives and RCS
- IMS Services over LTE-EPC bearer
- d. IMS VoIP Service Scenarios (MMTel, SRVCC)