
MCNS
Mobile | Cloud | Network Services
MCNS Training Program
LTE (4G) RAN Signaling Analysis
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LTE (4G) RAN Signaling Analysis

LTE (4G) RAN Signaling Analysis will offer delegates a good and deep understanding on the trace log files analysis, RRC & MAC protocols, signaling flows, messages and signaling procedures, LTE RAN QoS and security, idle mode, connected mode, handover, CSFB, SRVCC, WiFi call, VoLTE

COURSE REVIEW

This LTE(4G) training course leads the audience into a deep dive towards **LTE signaling protocols**, messages and procedures. Participants will be able to study the LTE RAN signaling flows with extensive message and protocol analysis, based on log files extracts with intuitive exercises, and will exploit the overall idle mode and connected mode functionality.

Emphasis will be given to both **RRC signaling** as well as **MAC signaling analysis**. Moreover **LTE QoS** and **security signaling** will be explained. Finally the course will discuss in details the handover signaling flows and procedures, properly presented using signaling diagrams together with optimization procedures on log files.

AIMED AT

LTE (4G) RAN Signaling Analysis is mainly aimed at a technical audience. It is suitable for technical professionals, **RAN engineers**, **RF engineers**, **system engineers**, **RAN optimization engineers**, **Research Institutes**, **defense sector**, who currently are or will be involved in LTE RAN deep signaling analysis and troubleshooting procedures aiming to network optimization by analyzing log files and trace logs

Prerequisites: Those wishing to take this course should have a good and solid understanding of **LTE RAN air interface** and **LTE RAN functional Procedures**

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Course Benefits for individuals (Professionals)

- Understanding LTE RAN signaling procedures
- Gain a competitive advantage by developing a greater understanding of **LTE trace Log Analysis** and troubleshooting.
- Get insight into the **RRC** and **MAC** layer protocols and parameters
- Explore the LTE RAN signaling flows.
- Dive into LTE RAN system information, **RACH procedures**, **DL** and **UL** data operation, mobility and **fallback procedures**.
- Understand the **LTE EPC QoS** and **E2E service Quality**
- Practice on trace logs for signaling analysis, troubleshooting and/or optimization.
- Delegates will have an opportunity to **explore the topic by industry expert driven content.**

Course Benefits for your Organization

- Equip organization engineers with the necessary knowledge to accomplish difficult and complex tasks related to **LTE RAN optimization**, **troubleshooting and analysis**.
- **Keep ahead of competitors** in offering well optimized and operating network with high quality customers' LTE services, **preparing also for 5G NSA migration**
- Prepare for future network expansions and quality performance optimization
- Enhance your team's technical skills and understanding of **LTE RAN Log Analysis**
- Lear how to run trace log campaigns and do benchmarking analysis, proposing LTE RAN network optimization changes
- **Real world case studies and scenarios are used** to ensure delegates can practically apply their knowledge

Training Format

Instructor-Led Training
On-Site Classroom: 3 days
Web delivered (Virtual): 3 days
Excellent and descriptive course material (pdf file) will be provided

Customer Tailored!

We can tailor the included topics, tech level, and duration of this course right to your team's technical requirements and needs

Section 1: LTE Network Support

Course Program Outline

Module 1: LTE Architecture Review

- 3GPP standards for LTE Network
- 3GPP rel. 8 to 14 overview
- LTE EPC Architecture
- LTE RAN architecture
- LTE EPC nodes functional description
- UE context in MME

Section 2: LTE Idle Mode Procedures

Course Program Outline

Module 2: LTE idle mode

- LTE initial synchronization (Sss & Pss)
- LTE Cell specific RS measurements
- LTE RAN initial cell selection criteria
- LTE RAN cell reselection
- LTE RAN priority based cell reselection

Module 3: LTE RAN System Info Analysis

- LTE PBCH and MIB
- LTE RAN MIB content
- LTE RAN SIB content analysis
- LTE SIB on-demand SIBx procedure
- Trace log analysis presentation

Section 3: LTE RAN Connected Mode Procedures

Course Program Outline

Module 4: LTE EPC QoS

- LTE EPC QoS
- LTE QoS Bearers
- LTE QoS terms and definitions
- Trace log file exercises with message analysis

Module 5: 5GC Security procedures

- LTE security overview
- LTE authentication signaling flow
- LTE NAS security procedures
- LTE AS security procedures
- Trace log analysis with exercise

Section 3: LTE RAN Connected Mode Procedures

Course Program Outline

Module 6: 5G SA Layer 3 procedures

- LTE NAS procedures
- LTE NAS RRC protocol messages
- LTE RRC general procedures
- LTE RRC connection establishment analysis
- LTE MIB and SIB transmission and message contents
- LTE RAN security message analysis
- LTE RAN Bearer analysis
- LTE RAN signaling flow analysis
- LTE RRC parameters and optimization
- Trace log analysis with exercise

•Module 7: 5G SA L2 procedures

LTE PDCP protocol & procedures

- LTE RLC protocol & procedures
- LTE RLC ACK/NACK ARQ procedure & parameters
- LTE MAC protocol and parameter optimization
- LTE MAC RACH procedure (CBRA vs CFRA)
- LTE MAC Msg1-Msg4 signaling flow & content analysis
- LTE MAC scheduler procedures
- UL Time Alignment Maintenance
- LTE MAC PHR, BSR, SR reports
- LTE MAC UL power control procedures
- Measurement gap handling
- LTE MAC CA activation/Deactivation
- Trace log analysis with exercise

Section 3: LTE RAN Connected Mode Procedures

Course Program Outline

Module 8: LTE RAN Radio Connection Supervision procedures

- LTE RAN Inactivity
- LTE RAN measurements
- LTE RAN RLC radio link failure
- LTE MAC timers
- LTE RLC, MAC protocol parameters
- LTE RAN synchronization problems
- Trace log analysis with exercise

Section 4: LTE RAN mobility

Course Program Outline

•*Module 9: LTE mobility*

•LTE events

•LTE RRC reconfiguration

•LTE intra-frequency handover signaling flow

•LTE inter-frequency handover signaling flow

•LTE Inter technology handover signaling flow

•LTE Release with Redirect procedures

•LTE CSFB analysis

See next box

•*Module 9: LTE mobility*

(cont'd from previous box)

•LTE CSFB procedure and signaling flow

•LTE CSFB parameters and optimization

•LTE SRVCC analysis

•LTE SRVCC procedure and signaling flow

•LTE SRVCC parameters and optimization

•LTE WiFi call flow and procedures

•Trace log analysis with exercise

Section 4: LTE RAN mobility

Course Program Outline

Module 10: LTE VoLTE

- LTE IMS platform
- VoLTE solution
- VoLTE signaling flows
- VoLTE parameters and optimization
- VoLTE and Connected mode DRX