

Scandinavian Academy Training Center

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Riyadh - Al Khaleej District - Sheikh Abdul Aziz Bin Abdul Rahman Bin Bishr Street - 13223 - Office No. 5 | P.O.BOX : 13224

# Course: LTE Signalling and Protocol

| Code | City | hotel | Start | End | price | Language - Hours |
|---|---|---|---|---|---|---|
| IT-429SA | Abha | Hotel Meeting Room | 2027-05-23 | 2027-05-27 | 9950 SR | En - 25 |

## Overview

LTE, Long Term Evolution, as defined as Release 8 through Release 10 of the 3GPP specifications, consists of the eUTRAN and the SAE /EPC. There are a considerable number of protocols and signalling messages being passed during system operation, between Uu and eUTRAN as well as between eUTRAN and EPC.

This three day course describes the overall protocol structure before focussing on specific protocols. The protocols examined include LTE to Ue protocols including PDCP, RRC, RLC and MAC, the inter-eNodeB protocol X2, the S1 protocol between the E-UTRAN and the evolved packet core and the evolved GTP for LTE.

This course is intended for telecom professionals working in the areas of LTE hardware and software development, LTE system engineering and in the testing and verification field.

## Objectives

### On completion of this course the delegate will be able to:

- Describer the use of S1-AP protocol for Non-Access Stratum Messaging
- Decribe the Initital Attach Request message
- Describe the use of GTP-C messaging between the MME & SGW
- Understand the temporary identities issued by the MME
- Understand the Temporary Radio Identities issued by the eNodeB
- Understand support for Quality of Service in LTE/EPC

- Understand the use of SrS interface
- Understand Circuit Switched Fallback procedures
- Explain the basic operation of VoLTE
- Understand & explain Dedicated & Default EPS Bearers

# Modules

### An Overview of the Evolved Packet System (3 topics)

- 3GPP Releases
- Overview of the LTE Air Interface
- Overview of the System Architecture Evolution (SAE)

### LTE/SAE Protocol Architecture (7 topics)

- Service Data Flow Concepts
- An introduction to GPRS Tunneling Protocol (GTP)
- GTP-C & GTP-U
- Packet Scheduling & Packet Filtering Algorithms
- Default EPS Bearer
- Dedicated EPS Bearer
- Quality of Service (QoS)

### Non-Access Stratum - NAS Signalling (8 topics)

- NAS Protocol States and Transitions
- NAS Security
- Integrity Protection
- Non Access Stratum Protocols
- Evolved Mobility Management - EMM
- Evolved Session Management - ESM
- Mobility Management across EMM States
- EMM Procedures

## Medium Access Control - MAC Protocol (8 topics)

- MAC Architecture
- Mapping of Logical Channels to Transport Channels
- MAC Procedures
- Random Access
- Uplink Time Alignment
- Downlink Data Transfer
- Uplink Data Transfer
- PDUs and Formats

## Radio Link Control – RLC (9 topics)

- RLC Structure
- Transparent Mode - TM -Entity
- Unacknowledged Mode - UM - Entity
- Acknowledged Mode - AM - Entity
- Functions
- Procedures
- Data Transfer
- ARQ Procedures
- Formats

## Packet Data Convergence Protocol – PDCP (6 topics)

- PDCP Structure & Entities
- Functions
- PDCP Procedures
- Data Transfer
- Re-establishment
- Status Report

## Radio Resource Control – RRC (7 topics)

- RRC States & State Transitions
- RRC Procedures
- System Information
- Connection Control
- Inter-RAT Mobility
- Measurements
- PDU Formats

## S1 Application Protocol (6 topics)

- S1AP Services
- S1AP Functions
- S1AP Procedures
- E-RAB Management
- Context Management
- Handover Signalling

## X2 Application Protocol (5 topics)

- X2AP Services
- X2AP Functions
- X2AP Procedures
- Handover
- Global Procedures: Load and Error Indication

## Evolved GTP: GTPv2-C (6 topics)

- GTP Stack
- GTP Format
- Messages
- Path Management
- Tunnel Management
- Mobility Management

## Interworking with Pre-Release 8 Networks (2 topics)

- Signalling for UMTS Networks
- Signalling for non-3GPP Networks

**The Scandinavian Academy for Training Center** adopts the latest scientific and professional methodologies in training and human resource development, aiming to enhance the efficiency of individuals and organizations. Training programs are delivered through a comprehensive approach that includes:

- Theoretical lectures supported by PowerPoint presentations and visual materials (videos and short films).
- Scientific evaluation of participants before and after the program to measure progress and knowledge acquisition.
- Brainstorming sessions and practical role-playing to simulate real-life scenarios.
- Case studies tailored to align with the training content and participants work nature.
- Assessment tests conducted at the end of the program to evaluate the achievement of training objectives.

Each participant receives the training material (both theoretical and practical) in printed form and saved on a CD or flash drive. Detailed reports, including attendance records, final results, and overall program evaluations, are also provided.

Training materials are prepared professionally by a team of experts and specialists in various fields. At the end of the program, participants are awarded a professional attendance certificate, signed and accredited by the Scandinavian Academy for Training Center.

**Program Timings:  9:00 AM to 2:00 PM**

**The program includes:**

- A daily buffet provided during the sessions to ensure participants comfort.
- A closing ceremony on the final day to distribute certificates and celebrate participants achievements.
- **Note: All prices are exclusive of 15% Value Added Tax (VAT).**

# Our Success Partners

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