



## Who Should Attend?

The course is intended for EPS/LTE technical staff and management.

## Course Scope

1. Introduction.
  - 3GPP Mobile Network Evolution.
  - LTE Performance.
2. Network Architecture.
  - EPC: MME, S-GW, P-GW, HSS, EIR, PCRF, Interfaces.
  - E-UTRAN: eNB, S1 and X2 interfaces.
  - Interworking with GERAN/UTRAN: SGSN, S3, S4 and S12 Interfaces.
  - HPLMN Routed Traffic and Local Breakout International Roaming Scenarios.
  - Geographical Network Structure, Identity Numbers.
3. OFDMA and SC-FDMA.
  - Overview of Multiple Access Techniques Used in 3GPP RANs.
  - OFDMA Fundamentals.
  - OFDMA Transmitter/receiver.
  - OFDMA Advantages/disadvantages.
  - SC-FDMA Fundamentals.
  - OFDMA and SC-FDMA Comparison.
4. E-UTRAN.
  - FDD/TDD.
  - Inter-Cell Interference.
  - Basic Transmission Structures and Parameters.
  - MIMO.
  - Channels.
  - Transmission Process.
  - Air Interface Protocol Stack.
5. EPC.
  - MME in pool.
  - Signalling Transport - SIGTRAN.
  - User Data Transport - GTP.
  - Database Communication - Diameter.
  - Default and Dedicated EPS Bearer.
  - QoS.
6. PCC.
  - Policy and Charging Control.
  - PCRF in LTE.
  - Interworking Between EPS/LTE and IMS/VoLTE/RCS via PCRF.
7. Traffic Cases.
  - EPS Attach.
  - TA Update.



- Service Request.
- Connection Release.
- Dedicated Bearer Activation.
- UE Requested Bearer Resource Allocation.
- Intra-LTE Handover.
- Inter-RAT Handover.
- ISR.
- 8. Security.
  - Authentication & Key Agreement.
  - Key Hierarchy.
  - Ciphering.
  - Integrity Protection.
  - Key Chaining.
- 9. SON.
  - Self Organising/Optimising Network – Procedure Examples:
    - eNodeB Self Configuration.
    - Interference Avoidance.
    - Handover Optimisation.
    - Load Optimisation.
- 10. CSFB & SMSoSGs.
  - SGs Interface.
  - Combined EPS/IMSI Attach and TA/LA Update.
  - CSFB MT/MO Call.
  - SMS MT/MO.
- 11. IMS Services.
  - VoLTE and RCS Service Profile.
  - LTE – VoLTE Interworking.
  - IMS Architecture and Principles.
  - IMS Registration.
  - ASs Examples.
  - VoLTE Call.
  - SMS.
  - SR-VCC,
  - Chat.
- 12. A-LTE Overview.
  - CA.
  - MIMO.
  - CoMP.
  - eICIC and HetNet.
  - Relay Node.

## Course Objectives

This training is an excellent choice for engineers who already have experience with previous generations of mobile technology and have begun to work with the new EPS/LTE system. This training course maintains an appropriate balance between the topics related



to E-UTRAN (radio part), EPC (CN part) and LTE based teleservices, allowing the participants to understand the system as a whole. This training also provides the required background knowledge needed to fully participate in more advanced training sessions which focus on particular subsystem or network element issues.

## **Prerequisites**

The participants should have general technical telecommunications/computer science knowledge at university level. Knowledge of GSM/UMTS GPRS services is recommended.

## **Training Structure**

Three-day training divided into logical sessions.

## **Methodology**

Instructor-led training. Exercises and trace analysis.