Systems & Network Training

Essential 4G core protocols and signalling

A 3 day training course

Save on expenses. This course is also available on your premises.

Description

LTE, Long Term Evolution, as defined in the 3GPP Release 8 through 15 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 course describes the overall protocol structure before focussing on specific protocols; including LTE to Ue protocols including PDCP, RRC, RLC and MAC, the inter-eNodeB protocol X2, the S1 protocol between the E-UTRAN and the EPC and the evolved GTP for LTE.

Key outcomes

By the end of the course delegates will be able to:

- ✔ Describe the use of the following:
  - S1-AP for Non-Access Stratum Messaging
  - Initial Attach Request message
  - GTP-C between the MME and SGW
- ✔ Describe the use of MME temporary identities.
- ✔ Describe the eNodeB Temporary Radio Identities.
- ✔ Explain support for Quality of Service in LTE/EPC.
- ✔ Explain the use of the SrS interface.
- ✔ Explain the basic operation of VoLTE.
- ✔ Explain dedicated and default EPS bearers.

Training approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning.

Details

Who will benefit?
Technical staff working in 4G environments.

Prerequisites
Essential 4G

Duration: 3 days

Customer rating: New Couse

Generic training	Small class sizes	Hands On training	Our courseware	Customise your course
Generic training complements product specific courses covering the complete picture of all relevant devices including the protocols “on the wire”.	We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.	The majority of our courses use hands on sessions to reinforce the theory.	We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.	Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.
“*Friendly environment with expert teaching that teaches the why before the how.*” G.C. Fasthosts	*“Excellent course. The small class size was a great benefit...”* M.B. IBM	*“Not many courses have practice added to it. Normally just the theoretical stuff is covered.”* J.W. Vodafone	*“Comprehensive materials that made the course easy to follow and will be used as a reference point.”* V.B. Rockwell Collins	*“I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on.”* S.R. Qinetiq

Essential 4G core protocols and signalling

Course content

An Overview of the Evolved Packet System
- 3GPP releases
- LTE air interface overview
- System Architecture Evolution (SAE) overview

LTE/SAE Protocol Architecture
- Service data flow concepts
- GPRS Tunnelling Protocol (GTP)
- GTP-C & GTP-U
- Default EPS bearer
- Dedicated EPS bearer
- Quality of Service (QoS)

Non-Access Stratum - NAS Signalling
- 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
- MAC architecture
- Mapping 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 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 structure and entities
- Functions
- PDCP procedures
- Data transfer
- Re-establishment
- Status report

Radio Resource Control – RRC
- RRC states and state transitions
- RRC procedures
- System information
- Connection control
- Inter-RAT mobility
- Measurements
- PDU formats

S1 Application Protocol
- S1AP services
- S1AP functions
- S1AP procedures
- E-RAB management
- Context management
- Handover signalling

X2 Application Protocol
- X2AP services
- X2AP functions
- X2AP procedures
- Handover
- Global procedures: Load and error indication

Evolved GTP: GTPv2-C
- GTP stack
- GTP format
- Messages
- Path management
- Tunnel management
- Mobility management

4G Core in a Non-Standalone 5G Environment
- NSA architecture
- NSA NR & LTE configuration
- Air interface bearer options