

LONG TERM EVOLUTION/EVOLVED PACKET SYSTEM

OVERVIEW & IMPLEMENTATION

The LTE/EPS training was excellent and described all the migration issues from our existing 2G/3G network to the new LTE network."

- Jesper Simons, Senior RAN Expert, Tele2 Sweden

Course Description

The course "LTE/EPS System Overview and Implementation" is intended for telecom professionals with the task of implementing the mobile system standards based on 3GPP LTE. Therefore the focus is set on understanding the LTE system from a mobile operator's perspective, addressing the implementation issues and challenges.

A thorough system overview of the LTE/EPS (Long Term Evolution / Evolved Packet System) is featured along with all the details on the Network functions, interfaces and radio capabilities of the system. Furthermore a number of traffic cases are studied and several comparisons are made to the existing WCDMA technology. In addition, network migration and spectrum re-farming strategies are discussed.

Content

Trends and drivers for mobile broadband

Players in the LTE standardization arena

Important LTE spectrum related issues like

- Spectrum allocations
- Spectrum flexibility
- Spectral efficiency
- Spectrum migration and re-farming
- Capacity and coverage planning aspects



The overall EPS, Evolved Packet System

- EPS overall architecture
- EPS interface overview
- Interfaces and protocols on X2 and S1
- Radio nodes and functional allocation
- Core Nodes and functional allocation
- IMS Nodes and functional allocation

The roaming and non-roaming network scenarios

Mobility between 2G/3G and EPS networks

The LTE user device capabilities

The EPS radio network E-UTRAN, and specifically:

- The general protocol architecture in E-UTRAN
- Layer 3 - NAS and RRC
- Layer 2 - PDCP, RLC and MAC
- Layer 1 - The physical layer OFDMA
- The concept of radio bearers
- eNB synchronization aspects
- Shared E-UTRAN scenarios

The channel structure in E-UTRAN

- E-UTRAN logical channel structure
- E-UTRAN transport channel structure
- Physical layer channel structure
- The details of the E-UTRAN, Physical Layer
- Pros and cons with OFDM compared to WCDMA
- Radio access modes

OFDMA and SC-FDMA comparison

- Transmission bandwidths and throughput
- Slot structures and physical resources
- Downlink and uplink physical resource handling
- HSPA and LTE parameter harmonization

Multi-antenna techniques specified for LTE

- Benefits of multi-antenna techniques
- Multi-antenna configurations
- Multiple receive/transmit antennas
- Receive/transmit antenna diversity
- Transmitter-side beam-forming
- Spatial multiplexing and principles for 4x4 MIMO

Mobility management overview

- Mobility in IDLE mode
- Cell reselection principles
- Mobility in ACTIVE Mode
- Intra E-UTRAN mobility with X2 support
- Mobility with other non-3GPP access systems
- Inter (3GPP) system mobility

Radio Resource Management overview

- RRM Functions in E-UTRAN
- Idle and active state Radio Resource Management
- Establishment of LTE radio bearers
- Idle state

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EPC, Evolved Packet Core features and protocols

- Policy charging and control, PCC
- VCC, Voice Call Continuity and CS fallback/interworking
- LTE QoS classes and mapping to IP Diffserv classes (DSCP codes)
- Authentication and security in EPC
- EPC traffic cases
- Registration and session initiation
- Mobile phone call set up (VoIP call session initiation)

Traffic cases in LTE/EPS

- Network registration – initial procedure
- Detach procedure
- Session setup procedures
- Dedicated bearer activation
- Paging and location update procedures
- Handover within E-UTRAN
- Throughput calculations with MIMO and 5-10-20 MHz radio channels

Target audience

The course targets engineers with the task of implementing the mobile system standards based on 3GPP LTE.

Pre-requisites

The participants should have a good understanding and working experience from WCDMA and GSM Systems.

Course length

2 days

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