

LTE Technology Overview

Instructor Led | Duration: 2 Days

LTE

Long Term Evolution (LTE) is a radio technology based on OFDM and MIMO technologies. LTE provides much higher data rates (over 100 Mbps) to users while reducing the cost-per-bit for service providers. This is very exciting to wireless operators who are eager to deploy multimedia rich Internet content over a wireless medium with seamless access anywhere at any time. This course describes the simplified architecture of LTE and moves on to OFDM and MIMO. The course also covers the downlink and uplink frame structure, OFDM operations at the physical layer, and resource management and scheduling considerations at the MAC layer. It steps through system acquisition, call setup, traffic operations and handover. The deployment and interworking issues with 2G/3G wireless networks are also explored. In summary, this course provides a comprehensive overview of LTE technology.

Intended Audience

This course provides a comprehensive overview and a technical introduction to LTE. It is suitable for engineers in network planning and design, product design and development, network deployment, network performance, and network operations.

Learning Objectives

After completing this course, the student will be able to:

- List the requirements and capabilities of LTE
- Explain the network architecture of E-UTRAN and EPC
- Sketch the architecture of security, policy and charging control (PCC), and IP Multimedia Subsystem (IMS) and their interactions with EPC
- Describe the use of OFDM and multiple antenna techniques in LTE
- Describe the key concepts in the LTE air interface
- List steps for network acquisition and data session/connection
- Describe the traffic operation in DL and UL
- List mobility and handover procedures
- Describe various ways to support voice and SMS services in LTE networks
- Explain LTE interworking with 2G/3G wireless networks
- Identify the planning aspects of deploying an LTE network

Suggested Prerequisites

- LTE Overview (eLearning)

Course Outline

1. Introduction

- 1.1. 4G technology and market drivers
- 1.2. Goals and requirements of LTE
- 1.3. LTE/EPC building blocks

2. LTE Architecture and Protocols

- 2.1. E-UTRAN and EPC networks
- 2.2. Role of eNB, MME, S-GW, P-GW, HSS
- 2.3. Key interfaces: S1, X2, S6a, S5, S11
- 2.4. Role of IMS in LTE networks
- 2.5. Evolution path from current networks

3. LTE Air Interface

- 3.1. Key concepts of orthogonality
- 3.2. Use of OFDM in LTE
- 3.3. MIMO (SU-MIMO, MU-MIMO)
- 3.4. LTE air interface channels

4. Initial LTE Connection

- 4.1. System acquisition
- 4.2. Random access procedures
- 4.3. RRC connection
- 4.4. Initial attach
- 4.5. Authentication and security
- 4.6. Default bearer setup
- 4.7. IPv4/IPv6 address allocation

5. QoS Support in LTE

- 5.1. PCC framework
- 5.2. EPS bearers and SDFs
- 5.3. Dedicated bearer setup
- 5.4. QoS in LTE
- 5.5. Traffic operations in DL and UL

6. Mobility and Handovers

- 6.1. Idle mode operations
- 6.2. Cell reselection
- 6.3. Tracking Area Update
- 6.4. X2 handover
- 6.5. S1 handover

7. Services in LTE

- 7.1. Voice support in LTE: CS-Fallback, VoLTE, and SR-VCC
- 7.2. Support for SMS

8. Interworking and Deployment

- 8.1. Interworking with 2G/3G wireless networks
- 8.2. Deployment considerations
- 8.3. Frequency planning
- 8.4. Capacity planning