Course ID	Course Title
LTE-FUND	**LTE/SAE Fundamentals**
Course Duration	
2 days	

Related Courses

- OFDM and MIMO (3 day(s), OM)
- LTE: Technology & Business (2 day(s), LTE-BIZ)
- LTE for Managers (1 day, LTE-EXEC)
- LTE Radio Access (LTE-RADIO, 3 days)
- LTE/SAE NGN Transport (LTE-SAE-NGN, 3 days)
- LTE Core Network (LTE-CORE, 5 days)
- LTE Tutorial (3 day(s), LTE-CT)
- LTE (LTE-C3DC, 3 days)
- LTE Air Interface Techniques (3 day(s), LTEAI)
- LTE Planning Considerations (4 day(s), LTEPLAN)
- LTE/SAE Technology (3 day(s), LTE-TECH)
- LTE: RF Network Design (5 day(s), LTEWK)
- 4G LTE: Next Generation Mobile Networks (4 day(s), LTE4)
- HSDPA (2 day(s), HSDPA)
- HSUPA (2 days, HSPA)

Aimed At

This course is aimed at a technical audience and is suitable for personnel at all levels from technician through manager who are involved in implementing LTE/SAE or who wish to keep up with the evolving 4G wireless technologies.

Group Size

5-25

Prerequisites

Those wishing to take this course should have a basic knowledge of UMTS and HSPA.

Course in a Nutshell	LTE is a fourth generation mobile communication technology standardized by the 3GPP which enables support for broadband connectivity to mobile devices, permitting the delivery of demanding multimedia information to any device, anywhere, anytime. In support of this, changes to the core network are also defined as System Architecture Evolution (SAE), providing an all-IP bearer platform for delivery of services.

This course will provide you with a comprehensive understanding of the development, design, and capabilities of LTE/SAE. The course will begin with a review of existing 3GPP and alternative technologies. The LTE access and core network elements are studied in detail, and methods for implementing the logical interfaces are discussed as well. The air interface is examined from a technology viewpoint as well as a procedural perspective. The course finishes with a study of signaling, interworking with non-3GPP networks and the security capabilities of LTE/SAE. |
| **Customize It!** | This course is designed to put LTE/SAE into perspective and includes a review of both its radio access and core network aspects. However, if we can customize it to emphasize certain topics of interest to you or to include additional topics from the Related Courses (see that section), please let us know. All reasonable customization is included at no added cost. |
| **Learn How To** | • Describe the motivation for LTE

• Describe the architectural structure of LTE and SAE

• Understand the LTE physical layer technologies and principles

• Understand the LTE protocols and procedures

• Consider migration to LTE and SAE within your network |
| **Course Outline** | • Review of the 3GPP UMTS and HSPA Evolution

   ◦ UMTS architectural components
   ◦ Migration to all-IP packet mode
   ◦ HSDPA, HSUPA, HSPA+
   ◦ Problems with the UMTS approach
   ◦ The LTE approach
   ◦ The drivers for LTE
   ◦ Capability goals and performance aims

• LTE Radio Access Network

   ◦ Architectural considerations
   ◦ Evolved NodeB (eNodeB)
   ◦ eNodeB functionality
   ◦ The radio interface requirements |

- Interfaces: X2, S1
- Implementation of the interfaces
- Backhaul options

- LTE Core Network

  - Why change the UMTS core?
  - Major change items
  - EPC entities and functionality
    - Mobility management entity
    - Serving gateway
    - Packet data network gateway
    - Interfaces
    - Bearers and signaling
    - Protocol stacks
  - Service delivery and IMS
  - Additional interfaces and entities for interworking

- LTE Air Interface Fundamentals (Physical Layer)

  - Frequency spectrum and bandwidth
  - Spread spectrum method and purpose
  - Modulation schemes and error correction
  - OFDM in the downlink
  - SC-FDMA in the uplink
  - Radio frame structure
  - Resource blocks
  - Reference signals
  - Scheduling considerations
  - Resource allocation
  - Physical, logical, and transport channels
  - Radio channels and their usage

- Interworking

  - Interworking with UMTS and earlier 3GPP networks
  - Interworking with WLANs
  - Interworking with trusted non-3GPP networks (CDMA)
  - Handovers
  - Handling voice

- Wrap-up

  - Course recap and Q/A
  - Evaluations

DCN NTDR-Ltp-vf