

## LTE TDD Training, TDD LTE or TD-LTE Training

LTE TDD Training, Time Division Duplex Long Term Evolution (TDD LTE) or TD-LTE covers 3GPP LTE TDD specifications. Learn about TD-LTE principles, technologies, TD-LTE air interface and LTE TDD and LTE FDD similarities and differences. LTE TDD training course provides knowledge on TD-LTE architecture, TD-LTE protocols, PHY and MAC layers of the TD-LTE air interface and E-UTRAN operations including: acquisition, system access, data session setup, traffic operations, handover scenarios, QoS/QoE and security.

### Learning Objectives

Upon completing of this course, the attendees will be able to:

- Describe TDD LTE or TD-LTE business models and services
- Explain the motivations for TD-LTE
- Explain key TD-LTE concepts and terminology
- List the key features in TD-LTE networks
- List TD-LTE network components and building blocks including OFDM, MIMO, and All-IP
- Sketch TD-LTE network architecture
- Specify TDD LTE or TD-LTE air interface protocols including PHY and MAC layers of the TD-LTE air interface
- Describe PHY Type 2 frame structure and resource mapping for DL and UL
- Describe operations in DL and UL at the PHY/MAC layers
- Explain TD-LTE operational scenarios, system acquisition, synchronization setup procedure
- Describe cell reselection and handover procedures
- Explain what Converged LTE TDD/FDD is
- Describe new concepts in TD-LTE including LTE-Advanced, devices, customers experience, HetNet, VoLTE, Multimode Multiband (MMMB), IoT, eMBMS, E2E and global roaming



### Who Should Attend

TD-LTE is a technical course focusing on concepts and technologies designed for engineers, designers, managers, testers, and field operations.

### Course Content

#### Introduction to TD-LTE or TDD LTE

- Motivation, goals and requirements of TD-LTE
- LTE network architecture
- LTE nodes and interfaces
- Comparison between FDD LTE & TDD LTE
- TDD/FDD tradeoff
- TDD download capacity
- Common LTE FDD and LTE TDD technology ecosystem
- TD-LTE air interface protocols
- Flexible Downlink/Uplink ratio
- Spectrum
- Network and terminals

### **Overview of the LTE TDD technology**

- Frequency bands
- TD-LTE technology overview
- LTE TDD physical layer
- TD-LTE physical layer design
- TD-LTE Access techniques
- OFDMA and SC-FDMA
- TD-LTE frame structure
- TD-LTE Type 2 frame structure
- Uplink/downlink configurations
- S- Subframe and subframe patterns
- TD-LTE DL/UL configurations
- Resource structure
- PHY channels and resource mapping
- DwPTS, GP, UpPTS
- Hybrid-ARQ control signaling

### **TD-LTE Channels**

- Physical channels
- Physical downlink shared channel (PDSCH)
- Physical downlink control channel (PDCCH)
- Physical hybrid ARQ indicator channel (PHICH)
- Uplink channels – Physical uplink shared channel (PUSCH)
- Physical uplink control channel (PUCCH)
- PUCCH transmission
- Physical random access channel (PRACH)

- Random access preamble format
- Physical signals
- Reference signal
- Primary and secondary synchronization signal (P-SYNC, S-SYNC)
- Uplink signals
- Demodulation reference signal
- Sounding reference signal

### **TD-LTE Operational Scenarios**

- System Acquisition
- DL synchronization in TD-LTE
- System selection and access operation
- UL synchronization
- TD-LTE random access procedure
- TD-LTE preamble configurations
- RRC connection establishment
- TD-LTE call setup
- Initial attach
- EPS bearer setup
- DL transmission process
- Channel quality reporting
- DL scheduling and resource allocation
- DL operations with MIMO
- Uplink Operations
- UL scheduling and resource allocation
- UL operations with MIMO
- Mobility scenarios
- Tracking area update
- Cell reselection
- Paging
- Handover
- Power control

### **Advanced TD-LTE Concepts**

- TD-LTE device configuration parameters
- Common operator UE/device requirements
- TDD Home eNode B (HeNB)
- Single USIM

- Handover between TD-LTE and LTE FDD
- Common operator requirements for eNB
- Harmonized 2.6 GHz UE ecosystem
- Network planning
- Coverage planning
- Estimation of TD-LTE coverage
- Propagation model and link budget calculation
- Antenna configuration
- Penetration loss of different frequency
- Multi-Antenna Solutions & Specifications (MASS)
- Common requirements for TDD multi antenna
- Dynamic eMBMS
- eMBMS deployment in TD-LTE
- Push supply chain (e.g. chipset) to support eMBMS
- Multi-Mode Multi-Band solution
- Voice Solution for TD-LTE handset
- Beamforming (BF) infrastructure and antenna
- IOT and Terminal Test
- Coexistence of WiMAX (Band 41) and LTE (Band7 and Band38)