

Course ID

LTE4

Course Duration

4 days

Course Title

3G LTE/4G: A Comprehensive Look at the Next Generation Mobile Networks

Related Courses

- 3G LTE/4G: The Next Generation Mobile Networks (3GLTE-4G, 2 days)
- Future of Wireless (FUTURE, 1 day)
- WiMAX and Mobile WiMAX: An Advanced Tutorial Including 802.16e (WIMAX-TECH, 3 days)
- WiMAX/Mobile WiMAX (802.16/16e) Radio Planning and Optimization: A Comprehensive Workshop (WIMAX5D, 5 days)
- WiMAX: Technology, Business, and Competitive Landscape (WIMAX-BIZ, 2 days)
- Traffic and Capacity Engineering for WiMAX Networks (WIMAX-TRAFFIC, 3 days)
- Wireless Technologies: A Comparative Study (COMPARISON, 2-4 days)

Aimed At

Those with an understanding of UMTS and HSPA who wish to study the evolving 3G LTE/4G technology in depth.

Group Size

5-25

Prerequisites

- UMTS-FDD: Network Architecture, Operation, and Design (UMTS-FDD, 2 days)
- HSDPA: Network Architecture, Operation, and Design (HSDPA, 2 days)
- HSUPA: Network Architecture, Operation, and Design (HSUPA, 2 days)

Course in a Nutshell

In this advanced course, you will undertake an in-depth study of the evolving 3G LTE and 4G wireless technologies.

3G Long-Term Evolution (3G LTE), being standardized by 3GPP and 3GPP2, is the next step up in the evolution of UMTS/HSPA networks. Often dubbed “3.9G”, it will enable wireless networks to support up to 10 times higher data rates and more users than the existing HSDPA/HSUPA networks. Leveraging OFDM and MIMO, it will allow the mobile operators to offer true “quad play” services: voice, high-speed, IPTV, and full mobility.

4G is the successor technology to the 3G era. To address QoS and data rate requirements of the forthcoming applications such as HD-TV and DVB, the 4G working groups, 3GPP and IEEE, have stipulated that 4G be based on an all-IP packet switched network and embody a high degree of spectral efficiency, dynamic use and sharing of network resources, higher data rates and capacity than 3G, and smooth handovers across heterogeneous networks. Several telecom OEMs are

currently testing 4G communication at 100Mbps while moving and 1Gbps while stationary.

In this course, we will study all the latest advances in 3G LTE/4G including SC-FDMA, OFDM and OFDMA as well as MIMO, IPv6, AMC and Software Defined Radios. You will study the overall architecture, protocols, LTE and 4G radio network planning as well as 4G services infrastructures that make very high data rate wireless broadband services possible.

Customize It! This course can be customized to focus on one or more of the following topics:

- LTE/SAE
- OFDM / OFDMA
- MIMO
- SDR
- 4G radio planning
- 4G services

Learn How To

- List the fundamental building blocks of 3G LTE/4G
- Describe the 3G LTE/4G architecture
- Explain the various protocols used by 3G LTE/4G to achieve high data rates
- Explain how OFDM, MIMO, and SDR work
- Describe in detail the air interface of 3G LTE/4G
- Plan and optimize a LTE/4G radio network
- Explain the operation of handovers over heterogeneous networks
- Describe the evolutionary path to 4G services

Course Outline

- Beyond 3G
 - HSDPA
 - HSUPA
 - Fixed-mobile convergence
 - Radio spectrum economics
 - Ubiquity
 - 4G mobile communications
- 3G LTE
 - 3G LTE defined
 - Characteristics
 - Technologies used
 - Architecture and Protocols
 - 3G LTE services

- 4G
 - 4G defined
 - Standardization bodies
 - Radio spectrum
 - 4G implementation and trials
 - 4G characteristics
 - 4G capabilities and services
 - Technological challenges
- 3G LTE / 4G Radio Interface
 - Advanced multiple access techniques
 - Advanced modulation techniques
 - Advanced coding techniques
 - 4G packet schedulers
 - MC-CDMA
 - SC-FDMA
 - OFDM
 - OFDMA
 - MIMO
 - SDR
 - 4G radio transceiver architectures
 - Downlink scheduling
 - Uplink scheduling
 - Spectrum flexibility
 - RLC
 - MAC
 - LTE states
 - Procedure Flows
 - Downlink transmission scheme
 - Uplink transmission scheme
- 4G Access Procedures
 - Cell search
 - Random access
 - Paging
- 4G Mobility Management
 - Radio access
 - Handovers
 - Intersystem handovers
 - Inter frequency handovers
 - Universal and network agnostic roaming
 - Seamless connectivity
 - Ubiquitous access
 - Mobility management procedure flows
- 4G Core Network

- Possible architectures
- Convergence of fixed and mobile access
- Heterogeneous traffic management
- QoS issues
- Radio resource management
- Mobility management
- Throughput
- Latency
- Harmonized all-IP network infrastructure
- IPv4 and IPv6
- Operator service and access management
- Core network planning for LTE and 4G
- Optimization principles of the core network
- 4G Radio Planning
 - OFDM channel planning
 - OFDMA planning
 - MIMO configurations
 - Planning for seamless mobile access
 - Interference minimization techniques
 - 3G LTE and 4G radio network optimization
- Advanced Services for 3G LTE and 4G
 - Service architectures
 - IP and SIP based services
 - Security aspects
 - 3G LTE service business models and scenarios
 - 4G service business models and scenarios
- Wrap-up: Course Recap, Discussion, and Evaluation

How You Will Learn

- An instructor well versed in UMTS, HSPA, and the evolving 4G technologies will present this course in interactive lecture format.
- Along with the lecture, we will use exercises, puzzles, case studies, and interesting group activities to make the material understandable and practical.
- If you already know something about 3G LTE/4G, we will build on that knowledge. We'll compare and contrast what's familiar with what's new, making the new ideas easier to learn.
- If your background is less technical, we will leverage examples and analogies to simplify the complexity of the subject matter.
You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and apply it on your job.

Revised

April 22, 2008f