

Course ID  
**3G&BEYOND**  
Course Duration  
**2-5 days**

Course Title  
**3G and Beyond: Advanced Wireless Technologies**

**Related Courses**

- Wireless Technologies: A Comparative Study (COMPARISON, 2-4 days)
- GPRS: Network Architecture, Operation, and Design (GPRS, 3 days)
- EDGE: Network Architecture, Operation, and Design (EDGE, 2 days)
- iDEN™: Network Architecture, Operation, and Design (IDEN, 4-5 days)
- CDMA Technology and Its Evolution to cdma2000 (CDMA, 3 days)
- 1xRTT: Network Architecture, Operation, and Design (1XRTT, 2 days)
- 1xEVDO: Network Architecture, Operation, and Design (EVDO, 3 days)
- UMTS-FDD: Network Architecture, Operation, and Design (UMTSFDD, 3 days)
- UMTS-TDD: Network Architecture, Operation, and Design (UMTS-TDD, 2 days)
- 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)
- HSDPA: Network Architecture, Operation, and Design (HSDPA, 2 days)
- HSDPA: An Advanced Tutorial (HSDPA-ADV, 2 days)
- HSUPA: Network Architecture, Operation, and Design (HSUPA, 2 days)
- RF Propagation Models, Fading Characteristics, and Link Budget Analysis (RFPROP, 3 days)
- Cell Planning and Site Development (CELLPLAN, 3 days)
- Traffic Engineering Models for Network Design (TRAFFIC, 3 days)

**Aimed At**

Those familiar with the basic architecture and operation of wireless networks as well as the GSM and CDMA technologies who wish to learn about the advanced wireless technologies including 3G, 4G, and beyond.

**Group Size**

5-25

**Prerequisites**

- Wireless Network Structure, Operation, and Technologies (WIRELESSNET, 3 days)
- GSM: Network Architecture, Operation, and Design (GSM-I, 5 days)
- cdmaOne/IS95: Network Architecture, Operation, and Design (IS95, 2 days)

You should have at least a year of experience in the field of wireless communications including exposure to GSM and CDMA or knowledge equivalent to that provided by the above courses.

## Course In a Nutshell

This course, intended as a sequel to our *Wireless Structure, Operation, and Technologies* (WIRELESSNET, 3 days) course, builds on the GSM and CDMA knowledge provided in that course to discuss the advanced wireless technologies, including 3G, 4G, and beyond.

Covered are WCDMA (UMTS, HSDPA, HSUPA, 3G LTE), cdma2000 (1xRTT, 1xEVDO, UMB), WiMAX, OFDM, MIMO, and more. This survey of advanced technologies will help you better understand the complex landscape of current and emerging wireless technologies. It will also equip you with the basic knowledge you need to undertake a deeper study of the technologies that are of particular interest to you.

## Customize It!

We can customize this course to your specific needs at little-to-no additional cost. It can be customized to the varying needs of audiences such as network, equipment, or application designers as well as less technical audiences such as managers, executives, business planners, sales and marketing specialists, and operations and support personnel.

While the course can be taught in as few as two days, expanded versions of 3-5 days duration, that provide a greater depth and/or breadth of technology coverage, are also available.

This course can also be combined with its prequel, *Wireless Structure, Operation, and Technologies* (WIRELESSNET, 3 days), for an integrated 5-day treatment of the architecture, operation, and technologies from 2G to 4G and beyond.

## Course Outline

- **Getting Our Bearings**
  - 2G technology landscape
  - Concepts of GSM important to WCDMA development
  - Concepts of CDMA central to all 3G/3G+ technologies
- **2G to 3G: Evolution of GSM to WCDMA**
  - Paving the way for WCDMA/UMTS (2.5G): GPRS and EDGE
  - WCDMA: Key concepts
  - WCDMA physical channel structure
    - Transport channels and their Mapping to the physical channels
    - Spreading and modulation
    - User data channelization
    - Signaling channelization
    - Physical layer procedures
  - HSDPA: High Speed Down-Link Packet Access
    - Important features of HSDPA
    - Added physical channels
  - HSUPA: High Speed Up-Link Packet Access
    - Important features of HSUPA
    - Added physical channels
  - Looking beyond HSPA
    - 3G Long Term Evolution (3G LTE)
    - Evolved-UTRA (E-UTRA)

- **2G to 3G: Evolution of cdmaOne to cdma2000**
  - Key features of cdma2000 1xRTT
  - Physical layer structure
    - 1xEVDO Rev A
    - 1xEVDO Rev B
- **4G and Beyond**
  - General
    - Outlook for advanced wireless technology
    - What is (and what is not) 4G?
    - Emerging broadband wireless standards
    - Standards based technologies
      - 3GPP and 3GPP2: What role do they play?
      - IEEE wireless standardization process
  - WiMAX
    - WiMAX and WiFi
    - WiMAX versus Mobile WiMAX
    - WiBro: “South Korea’s Mobile WiMAX”
  - Ultra Mobile Broadband (UMB): 1xEVDO Rev C
  - Long Term Evolution (LTE) to 4G
  - OFDM and MIMO
  - Proprietary broadband wireless technologies
    - Burst technology from ArrayComm
    - Flash-OFDM from Flarion (now Qualcomm)
- **Wrap-up**
  - Technical and marketing challenges for future broadband wireless systems
  - Course recap, discussion, and evaluations

### **How You Will Learn**

- You will learn in interactive lecture format from an instructor who’s well versed in a variety of 2G, 3G, and 4G technologies.
- Along with lecture, we will employ exercises, puzzles, case studies, and group activities to enhance the class and drive home the key points.
- If you already know something about the technology, we will build on that. We’ll compare and contrast what’s familiar with what’s new, making the new material easier to learn as well as more job-relevant.
- If your background is less technical, we will use meaningful and ingenious examples and analogies to simplify the complex material.
- The Participant Handbook will provide you with a base to which you can add the information and insight provided in real-time, turning it into a useful reference resource you can take back to your job.

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