

Course ID
**WIRELESS-
BIZ**
Course Duration
3-5 days

Course Title
**History, State-of-the-art, and Future of Wireless: Wireless
Technology and Applications for Businessmen**

**Related
Courses**

- State-of-the-art of Wireless Communications for Non-engineering Professionals, Managers, and Executives (2-4 days, WIRELESS-EXEC)
- 3G LTE/4G: The Next Generation Mobile Networks (2 days, 3GLTE-4G)
- WiMAX: Technology, Business, and Competitive Landscape (2 days, WIMAX-BIZ)
- State-of-the-art of WiFi for Non-engineering Professionals, Managers, and Executives (1 day, WIFI)
- State-of-the-art of Satellite Communications for Non-engineering Professionals, Managers, and Executives (1 day, SATCOM- EXEC)
- State-of-the-art of VoIP Technology for Professionals, Managers, and Executives (1 day, VOIP-EXEC)
- GSM: A Technology Overview (1 day, GSM-B)
- iDEN™: A Technology Overview (1 day, IDEN-O)
- Wireless Network Structure, Operation, and Technologies (3 days, WIRELESSNET)
- Wireless Technologies: A Comparative Study (2-4 days, COMPARISON)

Aimed At

Are you an executive, investor, or businessman who needs to have a thorough understanding of the technology and business of wireless communications to be able to effectively interface with or manage technical personnel or exploit the emerging technologies for new services and applications? If so, this course is intended for you.

Group Size

5-25

Prerequisites

While there are no formal prerequisites for this course, a degree of ease with technology-related issues will be helpful.

**Course
in a Nutshell**

This two-to-five day course (the duration depending on the desired topics and depth of coverage) will not only help you master the jargon of wireless but also place the rapidly evolving wireless technology in its historical perspective. The course will discuss wireless in layman's terms, but without sacrificing the technical depth or accuracy.

We will begin by learning the key concepts, techniques, and principles that underlie analog/digital communications and networking, and how they all came together in the "cellular" revolution that led to today's wireless networks. We will also learn about the drivers, capabilities, and key applications of the emerging 2.5/3G and 4G technologies now under implementations around the world.

Upon course completion, you will have acquired a broad understanding of how wireless networks work, the forces that drove the evolution of the technology from one stage to the next, and the future of wireless – both from the technical and business perspectives. This will help you pose the correct questions and make the correct business decisions.

Customize It!

This course is offered in multiple versions with varying levels of emphasis on technical and business issues for audiences such as investors, analysts, management consultants, strategists, marketers, policy makers, regulators, executives, general managers, attorneys, and others in need of a nontechnical review of wireless from a businessman's perspective. Let us know how we can adapt this course to serve your agenda.

Learn How To

- Explain the important telecommunications, networking, and cellular communications concepts and techniques that underlie all wireless networks
- Define the important terms related to wireless networks and technologies
- Explain how wireless evolved, the various technology families, their geographic distribution, and their interrelationships
- Describe the strengths, limitations, and operation of each of the major wireless technologies now in use around the world
- List the factors that are driving the emergence of 2.5G, 3G, 4G, WiFi, and WiMAX technologies
- Describe how 2.5G/3G, 4G, WiFi, and WiMAX technologies fit into the wireless marketplace

**Course
Outline**

- **History of Radio Telephony**
 - The early pioneers
 - Wireless telegraphy and the maritime industry
 - Worldwide wireless regulatory issues
 - Business case for a mobile telephone service
 - Mobile Telephone Service: Land and maritime
 - The INMARSAT organization

- Improved Mobile Telephone Service – 1965
- Development of cellular radio telephony: 1947-1982
- Early beginnings of digital cellular: Global System for Mobile Communications (GSM) begins work in Europe – 1982
- The Chicago cellular system is born – 1983
- ETSI assumes control of the GSM effort
- Technology challenges and industry politics
- Cellular system economics
- Struggle for radio spectrum in the early years
- Section summary and discussion

- **Analog Beginnings, or First Generation Wireless (1G)**
 - The cellular market regulatory structure in the U.S., Europe, and Asia
 - Different technical approach for U.S and Europe (AMPS vs. GSM)
 - What makes cellular system “cellular”: Cellular defined
 - The analog FM radio technology base
 - Frequency reuse and planning
 - Distance to reuse issue explained
 - Call handoff
 - Fundamental cellular system components
 - Criteria for cell placement
 - The Advance Mobile Phone System (AMPS)
 - Radio frequency channelization and the paired channel idea
 - Forward and reverse radio channel concept
 - Antenna selection and design tradeoffs
 - Antenna types and functions
 - Sectorization explained
 - The control and traffic channel function
 - Traffic capacity and subscriber density economics
 - Technical challenges that underlie the mobile environment
 - Handoff of the mobile user between cells
 - Absorption
 - Free space loss
 - Fading
 - Multipath signals
 - Carrier to interference ratio
 - Interference: Inter-channel and co-channel
 - Inter-market frequency planning
 - Allowable power levels
 - Tower selection and site surveys
 - Quality of service (QOS) planning
 - Cell site equipment and signal flow
 - Interconnection to the Public Switched Telephone Network (PSTN)
 - Cellphone call processing

- **1G Wireless: Services and Applications**
 - In the beginning, there was Voice ...
 - Voice mail

- Call forwarding
- Cellular Digital Packet Data (CDPD): Used primarily by law enforcement
- **Inter-section Review and Discussion**
- **Cell Phones Go Digital, or 2G and 2.5G Wireless: D-AMPS (IS-136), IS-95, and GSM, GPRS, and EDGE**
 - Two incompatible standards emerge in the U.S. and the impact on world markets
 - Europe (ETSI) proceeds with a single TDMA GSM standard
 - Emergence of the standards wars
 - The advantages of a digital voice compression standard vs. analog voice channels
 - Overview of TDMA (IS-136)
 - Overview of IS-95 (cdmaOne or just CDMA)
 - Why two incompatible standards, TDMA and CDMA?
 - World market share advantage emerges for GSM
 - The building of a future CDMA dynasty and Qualcomm
 - Business case for GSM in a world market
 - GSM and the evolution to 2.5G technologies for broadband data services
 - General Packet Radio Service (GPRS) for e-mail and Internet access
 - Enhanced data Rates for Global Evolution (EDGE)
 - Ericsson and Nokia market presence
 - Formation of the CDMA development group (USA)
 - IS-136 (TDMA): A non-technical overview
 - How it works
 - Advantages over analog cellular (1G)
 - Subscriber capacity per unit of radio spectrum
 - Superior voice quality
 - The development of Personal Communications Services (PCS) in the US – 1994
 - The auctions for PCS licenses
 - The PCS markets
 - Metropolitan and basic trading areas
 - PCS marketing and service areas
 - Wireless capable Internet access
 - Wireless data interface: Cellular Digital Packet Data (CDPD)
 - Enhanced Specialized Mobile Radio (ESMR, later iDEN™)
 - Emergence of iDEN on a global scale
- **2G Wireless: Services and Applications**
 - Improved voice quality using digital signaling and voice compression
 - Higher subscriber capacity per unit of radio spectrum
 - GPRS and EDGE introduced the first broadband packet-switched data services
 - E-mail applications

- Broadband Internet access
- Development of the Wireless Access Protocol (WAP) for mobile Internet browsing
- Short Message Service (SMS)
- Mobile IP: A major breakthrough for the mobile office
- Development and integration of GSM position location services: Supplier such as SnapTrack, Ericsson Mobile Positioning System (MPS), CellPoint

▪ **Inter-section Review and Discussion**

▪ **The Quest for a Universal Standard I, or 3G and 3+G Wireless: cdma2000 (1xRTT, EVDO, EVDV) and WCDMA (UMTS, HSDPA, HSUPA, 3GLTE)**

- International Mobile Telecommunications (IMT) initiates the search for a global standard in 2000
- The One Global Standard turns into a family of compatible standards
- The ITU approves five international standards in 1999
- Sixth standard (IP-OFDMA) submitted by the WiMAX forum in 2007
- WCDMA and cdma2000 are competing world 3G standards
- The Third Generation Partnership Project (3GPP) collaboration agreement
- Basic rationale for CDMA as a world radio access standard
- GSM evolution to UMTS/WCDMA
- Releases 98 through 7: History and basic features
- UMTS and GSM deployments and market size
- The migration to an all-IP based packet-switched data and voice network
- Why the migration to IP for multimedia applications?
- The evolution of WCDMA to higher data rates for multimedia applications
 - High Speed Downlink Packet Access (HSDPA)
 - High Speed Uplink Packet Access (HSUPA)
 - 3GPP LTE (3GLTE)
- cdma2000: The U.S. face of 3G evolution
- The evolution of IS-95 to cdma2000
- cdma2000 and the 3G Evolution: Key incentives and business model
- 3GPP2 organization charter
- Review of the 3GPP2 and cdma2000 standardization process
- cdma2000 evolution 1xRTT (cdma2000 Release 0)
- cdma2000 Release A
- cdma2000 Release B
- cdma2000 Release C and D (1xEVDV)
- cdma2000 vs. WCDMA: Market hype and reality tests
- Operational and technical benefits of 1xEVDO
- Evolution of 1xEVDO (Data Only)
- 1xEVDO Revision 0
- 1xEVDO Release A
- 1xEVDO Release B

- 1xEVDO Release C (Ultra Mobile Broadband or UMB)
- CDMA2000 and UMTS deployments to date
- **Dawning of the Age of Wireless Multimedia: 3G Wireless Services and Applications**
 - Major improvements to uplink and downlink data rates for multimedia applications
 - Download music and video clips/movies
 - Interactive gaming
 - Digital camera and JPEG forwarding of pictures
 - IP multimedia system (IMS) enters the content market
 - Opening for cellular VoIP convergence with Internet land-based VoIP
 - Enhanced positioning services:
 - Buddy Beacon (with GPS embedded technology by Samsung)
 - Greater accuracy for E911 emergency location services
 - Multimedia Messaging Service (MMS) images, audio, video, rich text
- **Inter-section Review and Discussion**
- **4G and Beyond: The Future of Wireless**
 - What is (or is not) 4G as defined by the ITU?
 - 4G goals and business objectives (when and how)
 - OFDM evolution from CDMA: What does it all mean?
 - 4G initiatives by Samsung (Korea) and DoCoMo (Japan)
 - Mobile WiMAX (Sprint U.S.)
 - Business implications for 4G: Who wants it?
 - WiFi and WiMAX: The alternatives to cellular
 - Market outlook for WiMAX
 - Other 4G potential technology winners explained
 - Qualcomm MediaFLO System based on FLO technology
 - Internet Protocol (IP) TV
 - Ultra-Wideband (UWB)
 - 802.16 Mobile WiMAX
 - Software defined radio (SDR)
 - Mult-antenna systems (MIMO)
 - VSF-OFCDM (DoCoMo)
 - IP V6
 - High Speed OFDM Packet Access (HSOPA) is a proposed as part of 3GPP's Long Term Evolution (LTE)
- **Wireless Applications: Analysis and Projection**
 - Higher speeds and lower latency will continue to evolve on wireless networks
 - Mobile VoIP convergence with land-based VoIP
 - Video conferencing: Major market growth opportunity
 - E-commerce
 - Broadband Internet access: Higher speeds for your down- (and up-) loads
 - MediaFlow video multicasting (Qualcomm) deployment begins (2008)

- Push (location-based) applications based on a user's profile and "trigger zones"
- How IP Multimedia system(IMS) will expand to other wireless platforms
- IPv6 to routes data packets to the handset: Using IPv6 location determination feature
- Telegeoprocessing: A combination of Geographical Information Systems [GIS] and GPS for public safety, search and rescue
- Push-based services for public safety
- Buddy services: Who is logged in? Where are they?
- **What Is Needed to Build Future 4G Networks?**
 - More coordination among spectrum regulators around the world
 - Standardization of wireless networks internationally
 - Global roaming among all networks
 - Non-disruptive implementation from 3G to 4G architectures
 - Smart antenna applications
 - Better market needs cost/benefits analysis: Why move to 4G if 3G meets my needs?
 - Cost-competitiveness with similar land-based services
- **Roundtable Discussion and Course Wrap-up**
 - Roundtable discussion: Issues, concerns, services, and applications of interest to the participants
 - Course recap
 - Questions/Answers
 - Course evaluation

How You Will Learn

- You will learn in interactive lecture format from an instructor who's an expert on a range of wireless technologies as well as an excellent teacher.
- If you already know something about wireless, we will build on that knowledge. We will use interesting examples and analogies to simplify the complex subject matter and relate it to your business agenda.
- The Participant Handbook will provide you with a structure to which you can add the information and insight gained in real-time, turning it into a valuable reference aid that you can take back to your job.

Revised

June 1st, 2007