



Wireless for Businessmen
Duration: 2.5-3 Days
Detailed Course Outline

(Day 1)

Part 1: Cellular Systems Design and Components

- **Introduction**
 - The cellular concept and objectives
 - 1G, 2G, 2.5G, 3G and 4G overview
- **Performance criteria**
 - Voice quality
 - Data quality
 - Service quality and call load
- **Radio signal propagation**
 - Basic channel modeling
 - Signal strength vs distance
 - Impediments to propagation
- **Interference**
 - Co-channel interference
 - Carrier-to-interference ratio
 - Adjacent channel interference
- **Frequency reuse and planning**
 - Cellular hexagonal grid concept
 - Distance to reuse
 - Handoff
- **System components**
 - Mobile telephone
 - Base station
 - Interconnection to the public switched telephone network (PSTN)

Part 2: Foundations of cellular telephony (GSM, IS-95)

- **Pre-2G cellular: AMPS**
 - Modulation and channel use
 - In-band control signals
- **Digital modulation characteristics**
 - Bandwidth efficiency
 - Clarity
 - Effect of bit error rate on speech quality
- **Speech coding**
 - Tradeoff in rate vs quality
- **GSM**
 - Time division multiple access (TDMA)
 - Architecture
 - Channels and channel modes
 - Call processing and management
- **IS-95 CDMA**
 - Code division multiple access (CDMA)
 - Call processing and management
- **2G data systems**
 - SMS, HSCSD, GPRS, EDGE, iDEN

Part 3: 3G Cellular (WCDMA/UMTS, cdma2000)

- **Operation and comparison of 3G systems**
 - Architecture
 - Channels and multiple access
 - Speech coding
 - Call processing and management

(Day 2)

Part 4: 4G Broadband Wireless Access (WiMAX and LTE)

- **Concept of orthogonal frequency division multiplexing (OFDM)**
 - Extension to orthogonal frequency division multiple access (OFDMA)
- **BWA basics**
 - Requirements and user expectations

- **WiMAX and LTE**
 - Features and standards summary
 - Mobile operation
 - OFDMA uplink and downlink
- **Wi-Fi: The first BWA**
 - Range and data rates
 - Comparison to WiMAX and LTE

Part 5: Base Station Antennas

- **Basic antenna characteristics**
 - Effective isotropic radiated power
 - Polarization
 - Directivity and gain
- **Antenna types and selection**
 - Transmit and receive antennas
 - Downtilt
 - Sectoring antennas
- **Advanced antennas for base stations**
 - Receive diversity
 - Transmit diversity
 - Beamtilt
 - Modular high-gain antennas
 - Higher order sectorization
 - Fixed and steerable array antennas
 - Antenna technologies for enhancing system capacity

Part 6: Base Station Towers

- **Tower types**
 - Monopole
 - Free standing
 - Guyed
- **Methods of disguising towers**
- **Tower lighting and marking**
- **Tower co-siting and collocation**
- **Maintenance**

Rev 1 (3/3/10)

(Day 3)

Part 7: Cellular System Regulation

- **Market regulatory structure in the US**
 - MSA and RSA
 - Tier A and Tier B carriers
 - Role of the FCC
- **Overview of regulation in other markets**
 - Europe (ETSI)
 - Overview of other regulatory agencies