Course ID
WIMAX-2DT
Course Duration
2 days

Course Title
WIMAX: A Two-Day Tutorial

Related Courses

- WIMAX: A Comprehensive Three Day Course (WIMAX-C3DC, 3 days)
- Principles of OFDM and MIMO (OM, 3 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)
- LTE: Technology, Business, and Competitive Landscape (LTE-BIZ, 2 days)
- LTE: A Comprehensive Tutorial (LTE-CT, 3 days)
- LTE: A Comprehensive Three Day Course (LTE-C3DC)

Aimed At

This course is aimed at technical professionals who are familiar with 2G, 3G, and/or other 4G (such as LTE) wireless technologies and desire a quick overview of the WIMAX technology. For a more in-depth treatment of the topic, please consider WIMAX-C3DC, the three-day counterpart of this course.

Group Size

5-25

Prerequisites

Familiarity with 2G/3G technologies or LTE.

Course in a Nutshell

The course begins with a review of the modulation schemes, RF propagation issues, performance enhancement techniques, and multipath mitigation methods. This is followed by a discussion of the principle of OFDM, IEEE 802.16 physical layer, and WiMAX signaling. The course concludes with a look at the network architecture and link budget calculations.

Customize It!

We can customize this course to suit the needs of audiences such as hardware designers, application developers, service designers, sales engineers, marketing/sales personnel, radio planners, and persons involved in defense and homeland security applications relating to WiMAX.

Course Outline

- **Review of Modulation Schemes**
  - Complex envelope representation
  - BPSK, QPSK, 16-QAM, 64-QAM
  - BER performance comparison
  - Coherent detection
- **Propagation Channel Modeling**

- AWGN, Rayleigh/Ricean fading
- Delay spread, frequency selectivity
- Lognormal fading
- Path loss comparison (indoors vs. outdoors)

- **Performance Improvement Methods**
  - FEC (convolutional) codes
  - Antenna diversity (receive - MRC and optimal combining)
  - Antenna diversity (transmit - STBC, MIMO)
  - Adaptive Antenna Arrays (AAA)
- **Multipath Mitigation**
  - TDMA vs. CDMA vs. OFDMA
  - Discussion of throughput vs. data rate
- **OFDM Principles**
  - Transmission and modulation (IFFT, S/P)
  - Sub-carrier discussion
  - Reception and demodulation (FFT, P/S)
  - Cyclic prefix
  - Comparison with 3GPP LTE (uplink and downlink)
- **IEEE 802.16 Physical Layer**
  - HARQ (comparison with HSDPA and LTE)
  - Uplink channels discussion
  - Adaptive modulation
  - TDD and FDD principles
  - Downlink channels discussion
  - Bandwidth tradeoff
  - DL/UL subframe time ratios
  - Segments and sectoring
  - MIMO/AAS scenarios
    - General overview
    - How are these modes selected and enabled?
  - Power control
- **WiMax Signaling Discussions**
  - Higher layer signaling
    - Handover Procedures
      - Fast handover description and when it is used
      - Overall handover sequence
  - Sleep/idle modes
    - When is it used
    - How is it initiated and how to exit mode
  - MAC functionality
  - Security architecture: Authentication, integrity
    - Explanation of overall architecture and security protocols in general
    - Time of establishment and which security associations are used when

- What is encrypted besides MAC PDU
- CLEAR's security and encryption package

- **System Analysis**
  - Network architecture
  - Operating frequency bands
  - Link budget
- **Wrap-up: Course Recap and Discussion**

How You Will Learn

- A highly qualified engineer/instructor, well-versed in a number of 4G and 3G wireless technologies, will present this course in an interactive lecture format.
- Along with the lecture, we will employ discussion, group activities, and case studies to help you understand the major points.
- If you already know something about 3G/4G technologies, we will build on that knowledge base. We'll compare and contrast what's already known to you with what's new, making the new material easier to learn.
- If your background is less technical, we will use appropriate examples and analogies to convey the complex subject matter in understandable terms.
- You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and use it on the job.

2010 Oct 28f