

Course ID
WIFI-TECH
Course Duration
2 days

Course Title
Wi-Fi: Technology, Applications, Design, and Deployment

Aimed At Network and RF planners and designers, hardware and software engineers, equipment and application developers, equipment installers, IT network administrators, managers and executives concerned with strategy and investments, marketers and sales people, and those engaged in designing new or enhanced data applications and services for the subscribers.

Group Size 5-25

Course In a Nutshell Driven by the use of unlicensed spectrum, WiFi has become as pervasive a technology at home as it is at work. WiFi-enabled laptops, PDAs, and other devices continue to proliferate as the prices of access points continue to drop. Whether you are in telecommunications or information technology, WiFi will continue to be an important technology to study for some time to come.

In this course, you will learn about the market landscape of WiFi, the RF principles key to WiFi operation, how WiFi networks work, and the applications of WiFi. We will take an in-depth look at the various standards associated with this technology including 802.11a, 802.11b, 802.11g, and 802.11n. You will also study how WiFi networks are designed, deployed, and optimized. In short, you will learn everything necessary to get the best performance and coverage for your WiFi application.

Customize It! We can customize this course to the needs of specific audience groups to make the course more or less technical or to focus on the particular issues and technology aspects of interest to the audience in question. We perform most tailoring at little to no added charge.

Learn How To

- Summarize the manufacturers, market, and applications of Wi-Fi
- Explain the fundamental principles of RF communication
- List the RF considerations for planning access point coverage
- Describe the various standards associated with Wi-Fi
- Describe the components and operation of a WiFi network
- Differentiate radio related issues associated with operating in different bands
- Explain the fundamentals of CSMA/CA in Wi-Fi networks
- Discuss re-association and mobility management techniques of Wi-Fi
- Design, deploy, and optimize a Wi-Fi network

- Create a network topology and all elements required to support the given traffic requirements and service types
- Develop representative GANTT charts for WiFi deployment
- Discuss WiFi's relationship with technologies such as WiMAX, MIMO, and IPTV

**Course
Outline**

- WiFi: The Market Landscape
 - Market for Wi-Fi
 - Manufacturers
 - Uses of Wi-Fi
 - Installed base and projections
 - Chipset manufacturers
 - Device manufacturers
- Wi-Fi Basics
 - The 802.11 standard
 - History of 802.11 evolution
 - Frequency hopping
 - Direct Sequence Spread Spectrum (DSSS)
 - Carrier Sense Multiple Access (CSMA/CA) with collision avoidance
 - Modulation techniques
 - Frequency bands
 - Interference considerations
 - Frequency hopping
- RF Basics
 - The electromagnetic spectrum
 - RF propagation and fading
 - RF modulation techniques
 - Reflection, refraction, and diffraction
 - Basics of digital RF communication
 - Free space loss
- Technology Overview: 802.11a
 - Operational frequencies
 - Data rates
 - Range
 - OFDM advantages
 - Interference
 - Penetration
 - BPSK, QPSK, 16-QAM
 - IFFT
 - Line of sight
 - Coding rate
 - Compatibility

- Technology Overview: 802.11b
 - Operational frequencies
 - Data rates
 - Range
 - Point to multipoint
 - DSS
 - Complimentary code keying
 - External antennas & outdoor ranges
 - ERP
 - Adaptive rate selection
 - Compatibility
- Technology Overview: 802.11g
 - Operational frequencies
 - Data rates
 - Range
 - Compatibility
 - OFDM
- Technology Overview: 802.11n
 - Current standards update
 - Goals and objectives of the specification
 - Estimated timeline towards release
- RF System Design
 - Indoor design considerations
 - Tools available for design
 - Design considerations
 - Propagation losses
 - Link budget
 - System degradation
 - Limitations of bandwidth
 - Receiver sensitivity
 - RF performance and Key Performance Indicators (KPIs)
 - Optimizing the system performance
 - RF system management
 - Sample link budget calculations
- RF System Deployment
 - Project planning for RF deployments
 - Process of RF deployments
 - Successful and unsuccessful RF deployments
 - Design engineering
 - Traffic engineering
 - RF optimization and performance testing

- Recap of Some Key Concepts
 - Scanning and joining
 - Authentication and de-authentication
 - Associating and disassociating
 - Radio related issues of operation in different bands
 - Basics of CSMA/CA
 - Power saving mode
 - Re-association and mobility management techniques
- Wi-Fi in Operation
 - Original MAC layer
 - BSS
 - AP and STAs
 - Synchronization
 - RTS/CTS
 - Network allocation vector
 - DCF basic access
 - DIFS & back off algorithm
 - SIFS
 - MSDU
 - PCF for controlled, un-contended access
 - QoS limitations with 802.11 MAC
- Exercises
 - Develop a Wi-Fi network design
 - Create a network topology and all elements required to support the given traffic requirements and service types
 - Investigate the RF considerations for planning access point coverage
 - Develop Gantt charts for a representative WiFi deployment
- Future of Wi-Fi
 - Wi-Fi standards evolution
 - Wi-Fi and IPTV
 - Wi-Fi with MIMO
 - Relation to WiMAX
 - WiMAX overview
 - WiMAX applications
 - WiMAX deployment scenarios
- Wrap-Up: Course Recap, Q/A, and Evaluations

**How You Will
Learn**

- An instructor who is also an engineer well versed in WiFi and related technologies will deliver this class.
- The class will be taught as a hands-on tutorial, with interaction, questions/answers, and exercises interspersed throughout the course.
- The instructor will offer real-life examples, applications, scenarios, and exercises to help you relate the subject matter to your job.
- You will receive a participant guide designed to provide a record of the instructor presentation as well as your own notes and insights for later recall, reference, and application.

Revised

April 14, 2007