

Course ID
SHORTRANGE
Course Duration
3 days

Course Title
**Short-Range Wireless Survey: WiFi, WiMedia, Bluetooth,
and ZigBee**

Aimed At Those who are developing or deploying a short-range wireless system or involved in the selection of the optimal short-range wireless technology for their application will benefit from this course.

Group Size 5-25

Prerequisites None

Course in a Nutshell This three-day course covers the key concepts and techniques of short-range wireless network design, deployment, and operation. You will study indoor signal propagation characteristics, advanced modulation techniques, and network connectivity options. Next, the IEEE 802.11a/b/g WLAN, WiMedia high-rate WPAN, IEEE 802.15.1 Bluetooth, and IEEE 802.15.4 ZigBee low-rate WPAN specifications will be examined in detail, and their operations compared.

If you are developing short-range wireless networks or are shifting your focus to WLAN or WPAN engineering, you will benefit from the emphasis to propagation, data transmission, and network operation given in this course. Systems engineers will gain insight into the tradeoffs associated with the different wireless specifications. Detailed operations of the various short-range networks will be especially useful to those who must determine the best solution for their wireless needs.

Customize It! Let us know your reason for studying the short-range wireless technologies so we can customize the course to your specific needs. The course can be tailored for audiences such as equipment or application developers, systems engineers, and less technical audiences such as management, marketing/sales, and others. It can also be modified to provide more in-depth coverage of technologies of particular interest to you or to focus on a particular application area such as healthcare.

Learn How To

- Calculate useful range using large scale path loss models
- Calculate the vulnerability of a network to eavesdropping
- Describe solutions to impairments caused by multipath and interference
- Understand the pros and cons of various modulation techniques
- Compare the modulation process of various short-range wireless networks
- Select the best channel access method for a given set of requirements
- Describe the operation of IEEE 802.11a/b/g, WiMedia, Bluetooth, and ZigBee networks in detail

Course Outline

Day One

- Overview of Short-Range Wireless Networks
 - Wired vs. wireless communications
 - Categories of information transmission
 - Summary of operations
 - Advocacy groups
- Short-Range RF Propagation
 - Review of decibels
 - Link budget equation and path loss model
 - Calculating maximum range
 - Partition attenuation and primary ray tracing
 - Eavesdropping vulnerabilities
 - Multipath characteristics and mitigation
- Digital Communication Fundamentals
 - Basic modulation using OOK, FSK, and PSK
 - Advanced digital modulation methods
 - Orthogonal Frequency Division Multiplexing (OFDM)
 - Spread spectrum techniques
 - Ultra-wideband modulation
 - Error control coding
- Networking Fundamentals
 - General network topology
 - Channel access techniques
 - Throughput comparisons

Day Two

- IEEE 802.11a/b/g WLAN Operations
 - Network architecture
 - The 802.11 radio
 - Frame composition
 - Medium access control
 - Comparison of 802.11b, 802.11a, and 802.11g
 - IEEE 802.11i security operations
 - IEEE 802.11e quality of service
 - IEEE 802.11n higher data rates
- WiMedia High-Rate WPAN Operations
 - Piconet structure
 - PHY proposals and UWB operations
 - Frame composition
 - Medium access control
 - Applications

Day Three

- IEEE 802.15.1 (Bluetooth) Operations
 - Bluetooth usage models and protocol stack
 - Basic data rate and enhanced data rate modulation
 - The Bluetooth radio
 - Baseband operations
 - Link management
 - Profile interaction
 - Qualification
 - Secure simple pairing
- IEEE 802.15.4 (ZigBee) Low-Rate WPAN Operations
 - Piconet structure
 - Hardware examples
 - The 802.15.4 radio
 - Frame composition
 - Medium access control
 - Applications
- Wrap-up
 - Course recap and Q/A
 - Evaluations

How You Will Learn

- A seasoned presenter well versed with a verity of short-range wireless technologies will present this course in participative lecture format.
- Along with the lecture, we will use discussion and exercises to enrich the instruction and clarify the important points.
- If you already know something about a short-range technology, we will build on that knowledge base. We'll compare and contrast what you know with what's new, making the new ideas easier to grasp.
- If your background is less technical, we will use examples and analogies to simplify the complex subject matter.
- You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and apply it on your job.

Revised

April 28, 2008f