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# INDUSTRIAL WIRELESS FOR ENGINEERS AND TECHNICIANS



## YOU WILL LEARN HOW TO:

- Understand current wireless networking offerings on the market
- Apply today's wireless technology to industrial automation
- Implement your own simple wireless LAN (WLAN) for your office and industrial plant
- Implement simple radio telemetry links for SCADA systems
- Explain the strengths and weaknesses of the different wireless technologies
- Describe standards such as IEEE 802.15.4 and IEEE 802.11
- Implement effective security on your network
- Describe how spectrum and frequency allocation is done
- Understand the basic terminology and jargon used in this area

## WHO SHOULD ATTEND:

This workshop is designed for personnel with a need to understand the techniques required for using and applying wireless communications technology as productively and economically as possible. This includes engineers and technicians involved with:

- Control and instrumentation
- Consulting
- IT personnel
- Process control
- SCADA and telemetry systems
- Design
- Electrical installations
- Process development
- Control systems
- Maintenance supervisors
- Project management
- Equipment manufacturing
- Regulatory and legal issues

## The Workshop

Wireless communications is being rapidly implemented in the industrial environment, with great success, provided certain ground rules are applied. These include ensuring a robust wireless link, correct integration with the wired communications systems, and proper data security.

The most important objective of wireless communications networks must be to achieve similar capacities, bandwidths, responsiveness and availability to that of wire-based communications systems.

Apart from covering wireless basics, the workshop provides an in-depth coverage of the main industrial wireless technologies in use today, viz. radio modems, IEEE 802.11 wireless LANs (Wi-Fi) and IEEE 802.15.4 wireless PAN technology as implemented by a multitude of process control system vendors. WirelessHART is a specific example of this.

The workshop also covers some of the secondary technologies that are not known as industrial technologies per se, but which still find widespread application in industrial environments. These include Bluetooth, LP radio, mobile (cellular) data systems and VSAT.

At the end of the course you should have a clear understanding of the choices available to you in designing and implementing your own industrial wireless network.

### Pre-requisites

A basic working knowledge of data communications and applications is useful, but is not essential.

## Practical Sessions

This is a practical, hands on workshop enabling you to work through practical exercises which reinforce the concepts discussed.

### **Practical sessions include:**

- Set up an IEEE 802.11 WLAN and connect to an Ethernet network
- Troubleshoot simple problems
- Perform a path loss calculation
- Perform a simple analysis of the protocol packets

## The Program

### INTRODUCTION

- Current trends in industrial wireless technology
- Wireless Industrial Networking Alliance (WINA) and ISA-SP100
- Review of the OSI model
- Brief review of Ethernet and the TCP/IP protocol suite

### WIRELESS FUNDAMENTALS

- Radio/microwave spectrum and frequency allocations
- Modulation techniques
- Spread spectrum techniques

### POINT-TO-POINT TERRESTRIAL WIRELESS SYSTEMS

- Terrestrial microwave link design
- Wireless modems
- Point-to-point and point-to-multi-point configurations

### WIRELESS LANS

- WLAN basics
- Specifications (IEEE 802.11 a/b/g/n)
- Medium access control and frame structures
- Industrial WLAN

### WIRELESS MESH NETWORKS

- Mesh basics
- Wi-Fi mesh systems
- IEEE 802.15.4
  - ZigBee
  - WirelessHART

### WIRELESS SENSOR NETWORKS

- IEEE 1451.5

### OTHER RELEVANT WIRELESS TECHNOLOGIES

- IEEE 802.15.1 (Bluetooth)
- Low Power (LP) radio
- IEEE 802.16 (WiMax)
- Cellular data transmission (GPRS, 1xRTT, EV-DO, HSPDA)
- Satellite systems: VSAT

### SECURITY ISSUES

- Physical security
- Authentication
- Encryption

### SUMMARY, OPEN FORUM AND CLOSING