Back to Basics

WIRELESS NETWORKING & TELEMETRY SYSTEMS

for Industry

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 Bluetooth (IEEE 802.15) and IEEE 802.11**
- **Implement effective security on their networks**
- **Describe how spectrum and frequency allocation is done**
- **Be able to conduct a site survey in preparation for a WLAN implementation**
- **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**
- **IT Personnel**
- **SCADA and Telemetry Systems**
- **Electrical Installations**
- **Control Systems**
- **Project Management**
- **Regulatory and Legal issues**
- **Consulting**
- **Process Control**
- **Design**
- **Process Development**
- **Maintenance Supervisors**
- **Equipment Manufacturing**

IDC TECHNOLOGIES

Technology Training that Works

THE WORKSHOP

The use of wireless communications is being rapidly implemented in the industrial environment with great success provided certain ground rules are applied such as 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.

This workshop commences with an overview of wireless communications and how radio works. A detailed examination is then made of Wireless Personal Area Networks or WPANs (Bluetooth/IEEE 802.15) which are similar to their wired counterparts but based on radio. Wireless Local Area Networks or WLANs (IEEE 802.11) are then reviewed with a practical comparison to the standard wired LANs. Wireless Wide Area Networks are then examined with an emphasis on how they are expanding to provide broadband services. At the end of the course you should have a clear understanding of the choices available to you in designing and implementing your own wireless network.

PRE-REQUISITES

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

THE PROGRAM

DAY ONE

INTRODUCTION
- Advantages of using Wireless technology
- Definitions and acronyms

WIRELESS FUNDAMENTALS
- Basics of electromagnetic transmission
- Radio block diagrams
- Radio propagation: attenuation, fading, multi-path
- System performance: coverage, error rates, availability, response times
- Quality of Service (QoS)
- Filtering
- Analog modulation techniques: AM, FM, PM
- Digital modulation techniques: ASK, FSK, PSK,QAM
- Spread spectrum techniques: FHSS, DSSS
- Multiplexing techniques: TDM, FDM, TDMA, CDMA
- Cellular concepts: cells, frequency reuse, hand-over, network components
- Spectrum/frequency allocations
- Channel sets
- Classical Radio Telemetry systems

ANTENNAS
- Basic theory
- Directionality and gain
- Path loss
- Distance calculations
- Diversity
- Specific types: half wave dipole, Yagi, parabolic reflector

WIRELESS LAN CONCEPTS
- Topologies
- Single and multiple cell coverage
- Components: access points, bridges, client devices, accessories
- System redundancy
- Wireless LANs (WLANs) versus Wireless
- Personal Area Networks (WPANs)

FIXED SYSTEMS
- Satellite and point-to-point microwave
- LMDS
- MMDS

DAY ONE continued

WIRELESS LANS: IEEE 802.11
- Overall concept
- Specifications: IEEE 802.11, 802.11b, 802.11a
- OSI layer implementation
- Medium Access Control
- System components
- Antennas
- Topologies: BSS, ESS
- Modes: infrastructure, ad hoc
- IP roaming
- Security issues (IEEE 802.1x, WEP, EAP, EAP-TTLS, LEAP, Radius)
- Commercial implementations

WIRELESS PANS: BLUETOOTH/IEEE 802.15
- Overall concept
- Specifications: Bluetooth ™ v1.1, IEEE 802.15.1™ -2002
- OSI layer implementation
- Topologies: Piconets, Scatternets
- Medium Access Control
- Antennas
- Security issues
- Integration into peripherals

SITE SURVEY
- Purpose
- Interfacing with existing
- LAN infrastructure
- Cabling issues
- Mounting issues
- Procedures
- Documentation

FUTURE DEVELOPMENTS - A QUICK REVIEW
- Smart antennas
- Ultra wide band communication
- Orthogonal Frequency Division
- Multiplexing
- Software wireless systems

SUMMARY, OPEN FORUM AND CLOSING