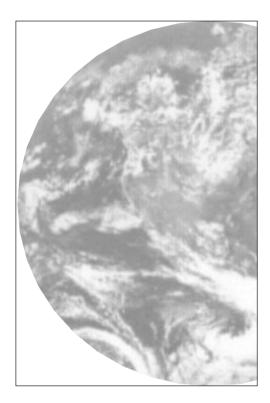# Practical
# TCP/IP* &
# ETHERNET NETWORKING
## for Industry

**\*Transmission Control Protocol/ Internet Protocol -**
The fundamental suite of protocols on which the Internet is based.

## YOU WILL LEARN HOW TO:

- **Construct a robust TCP/IP based network**
- **Troubleshoot TCP/IP networks**
- **Operate and maintain a robust network**
- **Set up a simple firewall**

## WHO SHOULD ATTEND:

**This is not an advanced workshop - but a hands-on one.**

**Anyone who will be designing, installing and commissioning, maintaining or troubleshooting TCP/IP and Intra/Internet sites will benefit including:**

- **Instrumentation Engineers**
- **Technicians**
- **Design Engineers**
- **Network Engineers**
- **Engineering Managers**
- **Electrical Engineers**
- **Network System Administrators**

**IDC**
**TECHNOLOGIES**

*Technology Training that Works*

# THE WORKSHOP

The Internet has made a substantial impact on the way you do business and now is impacting on the plant and factory environment. One of the great protocols that has been inherited from the Internet is TCP/IP and this is being used by most automation and process control systems today.

SCADA systems, Programmable Logic Controllers and even low level instruments are using TCP/IP and Ethernet to transfer information. The reasons are not hard to find. TCP/IP and Ethernet are truly open standards available to competing manufacturers and providing the user with a common standard. In addition, the cost of TCP/IP and Ethernet is low.

The workshop has been structured to cover the main areas of TCP/IP and Ethernet in detail, while going through the practical implementation of TCP/IP in computer and industrial areas and practical use of the Internet and intranets. Troubleshooting and maintenance of TCP/IP networks and communication systems in an office and industrial environment are also covered.

# WORKSHOP OBJECTIVES

The workshop is designed to give technicians and engineers a superb fundamental grounding in TCP/IP and the Internet as applied to industrial automation and process control. The objective is to give you a useful and practical toolbox of skills that you can apply immediately to your plant or facility.

**When attending this workshop you will:**

- gain a practical understanding of the application of TCP/IP
- learn how to construct a robust Local Area Network (LAN)
- learn the basic skills to effectively troubleshoot TCP/IP and LANs
- be able to improve the performance of your network
- install a typical firewall
- understand how to set up an Intranet
- understand how to connect your LAN or Intranet to the Internet
- how to apply the appropriate Network Management tools

# PRACTICAL SESSIONS

There are at least **ten practical sessions** where you will get hands-on training to take advantage of the material covered in the class:

- Connect simple networks together
- Configure network parameters
- Communicate over network
- Configure IP addresses and Subnet Mask
- Use Ping Utility and observe ARP working
- Web based view of network
- Analysis of ARP/ICMP/IP/UDP/TCP
- Router configuration using Windows NT
- Tracert and Route commands
- Use of Hosts File
- Set up and analyze FTP sessions
- Quick analysis of packets using protocol analyzer
- Construct simple Local Area Network using 10BaseT/10Base2

# THE PROGRAM

## DAY ONE

### INTRODUCTION
- Terms and definitions
- LANs, WANs, VLANs and VPNs
- Open Systems Interconnection, OSI and ARPA models

### ETHERNET
- Fundamentals
- 10Mbps Ethernet systems
- Fast and Gigabit Ethernet
- Collisions and performance
- Full duplex, deterministic and dual redundant Ethernet

### INTERNET LAYER PROTOCOLS
- IPV4
  - addressing
  - subnetting
  - supernetting and CIDR
  - fragmentation
  - header structure
  - ARP
  - ICMP
  - routing protocols
- IPV6
  - addressing modes
  - header structure
  - extension headers

### HOST-TO-HOST LAYER PROTOCOLS
- TCP/IP
  - ports and sockets
  - sequence and acknowledgement numbers
  - establishing and closing connections
  - sliding windows
- UDP

## DAY TWO

### PROCESS/APPLICATION LAYER PROTOCOLS
- BOOTP, DHCP, TELNET, FTP, TFTP, NFS, SMTP, POP3, HTTP, SNMP, DNS

### TCP/IP UTILITIES
- Ping, arp, tracert, netstat, ipconfig, winipcfg, etc

### CONNECTION DEVICES
- Repeaters, hubs, bridges, switches, routers, gateways

### THE INTERNET AND COMMUNICATIONS
- Creating an Intranet
- Connecting to the Internet
- VoIP

### SECURITY CONSIDERATIONS
- Authentication
- Routers
- Encryption
- Firewalls

### CONFIGURING AND TROUBLESHOOTING ETHERNET AND TCP/IP
To be covered during the practical sessions:
- Configuration
- Use of TCP/IP and third party utilities
- Use of protocol analyzers

### SATELLITE COMMUNICATIONS
- Essentials of satellites
- Challenges with TCP/IP

### TYING IT ALL TOGETHER
- Current and future trends
- Critical areas of focus

> **"**
>
> *Gave good, creative practicals & had very good knowledge of subject matter. Having just completed a large project with a lot of networking, it demystified the technology for me. As good as I hoped!!!*
>
> E. Tolster
>
> *Excellent overview. Giving a good understanding of ethernet in general. Detailed course notes for further reference.*
>
> Lynne Kelly
>
> **"**