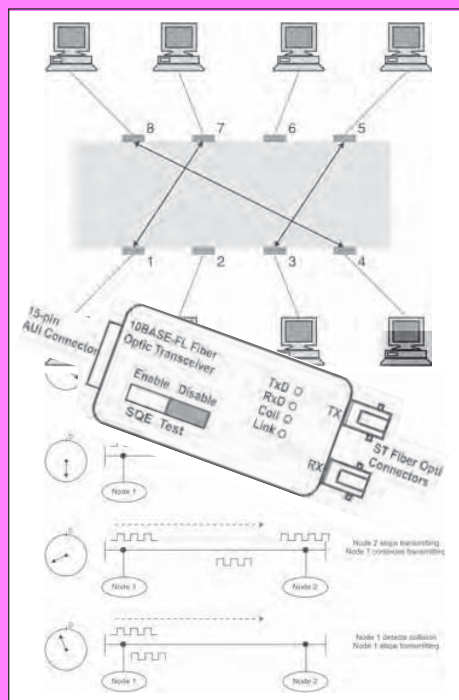


# TROUBLESHOOTING INDUSTRIAL ETHERNET AND TCP/IP NETWORKS



## YOU WILL LEARN HOW TO:

- Install and configure a simple industrial Ethernet and TCP/IP network
- Troubleshoot and fix Ethernet network problems
- Use a protocol analyser to analyse Ethernet network activity
- Use the utilities supplied to fault find TCP/IP and Ethernet networks
- Learn how to troubleshoot TCP/IP networks
- Identify network problems and fix them
- Fault find at the Ethernet/TCP/IP and application levels
- Learn the essentials of network management
- Learn how to track hackers and network problems

## 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

## The Workshop

This workshop is a practical workshop devoted to two days of hands-on faultfinding and troubleshooting.

The workshop has been structured to cover key issues in troubleshooting TCP/IP and Ethernet in detail, while going through the practical implementation of TCP/IP in office and industrial networks and the 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. 15 practical mini-sessions expose you to typical problems that could occur with industrial Ethernet and TCP/IP networks and shows you how to fix them. Most of each day comprises practical sessions with a modicum of discussion to explain the key points. There will be a minimum of two people to a PC so that the practical component will be emphasised.

At the end of this workshop you will walk away with a solid knowledge on troubleshooting industrial Ethernet and TCP/IP networks. A comprehensive 400 page manual will ensure that you have an excellent reference book for your future work in this challenging and yet rewarding area of engineering.

### Pre-requisites

A basic working knowledge of industrial communications and applications is useful.

## Practical Sessions

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

## The Program

### BACKGROUND AND INTRODUCTION TO ETHERNET

- Network communications
- Open systems
- Network topologies

### OPERATION OF ETHERNET SYSTEMS

- Ethernet standards (10Mbits/s to 10Gigabits/s)
- Full duplex Ethernet

### TROUBLESHOOTING THE DIFFERENT ETHERNET CABLE TYPES

- Twisted pair
- Fibre optic
- Fast Ethernet twisted pair
- Fast Ethernet fibre optic
- Gigabit Ethernet twisted pair
- Gigabit Ethernet fibre optic
- Structured cabling
- Industrial versus commercial networks

### TCP/IP

- Quick review of essentials of TCP/IP
- Internet Layer Protocols (IP)
- Host-to-Host Layer protocols (incl. TCP/UDP)
- Application Layer protocols (incl. DHCP, FTP, SNMP, DNS)

### TOOLS FOR TROUBLESHOOTING

- Basic utilities
- Protocol analyser
- Ethernet performance
- Troubleshooting of Ethernet and TCP/IP rules

### TROUBLESHOOTING THE NETWORK INTERFACE CONNECTION

- NIC hardware errors
- Frame collisions and how they impact on performance
- Incompatibilities with 802.3 and Ethernet V.2 Frames

### TROUBLESHOOTING THE INTERNETWORK CONNECTION (IP PROTOCOL)

- DNS configuration errors
- DHCP configuration problems
- Fragmenting and reassembly of long messages
- ARP related problems
- Duplicate IP Addresses
- Incorrect Sub-Net mask
- Using ICMP Echo Messages (Ping)
- Misdirected datagrams
- Incorrectly configured routers

### TROUBLESHOOTING THE HOST-TO-HOST CONNECTION (TCP PROTOCOL)

- Using BOOTP with UDPTransport
- Clock synchronisation with UDP
- Establishing and terminating TCP connections
- TCP data transfers
- Repeated Host Acknowledgments
- Using the Finger User Information Protocol
- Optimising TCP Window Size
- Problems with high delay links (e.g. satellite)

### TROUBLESHOOTING THE PROCESS/APPLICATION CONNECTION

- Using FTP and TFTP
- Hacking passwords and security problems
- Telnet problems
- NetBIOS and TCP interactions
- Implementing Multi Protocol stacks

### TROUBLESHOOTING ROUTERS AND SWITCHES

- Ethernet repeater hubs
- Ethernet switching hubs
- Routers

### NETWORK MANAGEMENT

- Simple Network Management Protocol (SNMP) client/server session

### WRAP UP AND CONCLUSION

- Revision of key concepts
- Summary of the basic rules