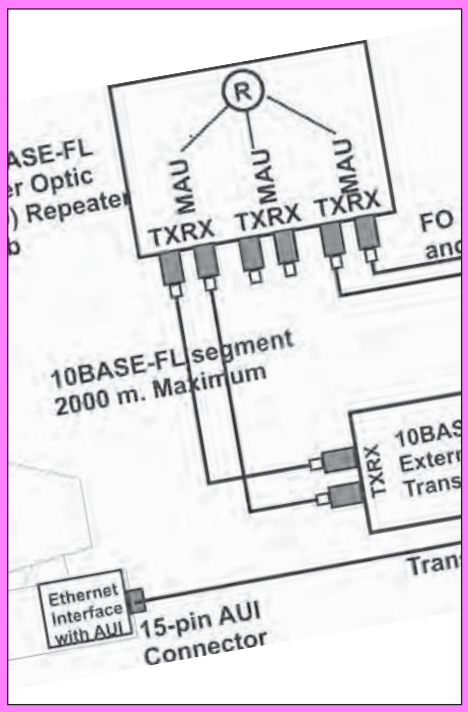
PRACTICAL TROUBLESHOOTING AND PROBLEM SOLVING OF ETHERNET NETWORKS



YOU WILL LEARN HOW TO:

- Install and configure a simple Ethernet network
- Install cabling, routers, switches and hubs effectively
- Troubleshoot Ethernet network problems
- Improve the performance of your Ethernet network
- Competently use a protocol analyser in fixing networks

WHO SHOULD ATTEND:

- Anyone involved in the installation, design and support of communications systems
- Instrumentation and Control System Engineers
- Process Control Designers and Systems Engineers
- Instrumentation Technologists and Engineers
- Systems Engineers
- IT Managers working with Networks
- Electrical Engineers
- Electrical and Instrumentation Technicians
- Project Engineers
- Maintenance Engineers and Supervisors
- Design Engineers

The Workshop

Ethernet is fast becoming the obvious choice for industrial control networking worldwide. While the basic structure of Ethernet has not changed much, the faster technologies such as Fast Ethernet and Gigabit Ethernet have increased the complexity and choices you have available in planning and designing these systems.

As Ethernet has become more complex, a number of misconceptions have arisen as to how Ethernet functions and how the system should be optimally configured. This workshop addresses these issues in a clear and practical manner, thus enabling you to apply the technology quickly and effectively in your next project.

The workshop commences with a brief outline of the fundamentals of Ethernet and its operation. The method of access is discussed in depth and topics such as full duplex and auto negotiation are explained. The best methods of designing and installing the cabling systems are then explored with the discussion ranging from 10Base-T over twisted pair to Gigabit Ethernet cabling. Methods of optimising Ethernet to obtain best performance are then defined.

Finally the all important topic of troubleshooting is examined with a summary of the typical problems you are likely to encounter from a two station network all the way up to a system comprising 30,000 PCs.

Pre-requisites

A fundamental knowledge of basic electrical concepts is expected with some knowledge of the basics of the Windows operating system.

Workshop Objectives

At the end of this workshop you will be able to:

- Specify how to install an Ethernet network
- Install and configure a simple Ethernet network
- Compare and know the strengths of the different types of Ethernet networks
- List and explain the main features of high speed (and Gigabyte) Ethernet
- Know when to use repeaters, bridges, switches and routers
- Install the cabling and hardware for a typical Ethernet network
- Learn the truth about deterministic operation of Ethernet networks
- Decide on the best cabling and connectors for your factory or office environment
- Apply the structured cabling system concepts to your next project
- Configure and show how TCP/IP is used with Ethernet
- Design and build a reliable Ethernet network
- Apply the principles of Ethernet security and redundancy
- Perform simple troubleshooting tasks on a network
- Use a protocol analyser to analyse Ethernet network activity
- Assess the performance characteristics of a typical network

The Program

I. INTRODUCTION TO ETHERNET BACKGROUND AND INTRODUCTION TO ETHERNET

- Background
- Network communications
- Open systems
- Network topologies

OPERATION OF ETHERNET SYSTEM

- Ethernet standards
- Logical link control frames
- Transmission media and access techniques
- Media access control protocol
- Full duplex Ethernet
- Auto negotiation

II. ETHERNET CABLING AND HARDWARE/PROTOCOLS - DIFFERENT CABLE TYPES

- Twisted pair Ethernet
- Fibre optic media
- Fast Ethernet twisted pair
- Fast Ethernet fibre optic cabling
- Gigabit Ethernet twisted pair
- Gigabit Ethernet fibre optic systems

LAN INTERCONNECTION COMPONENTS

- Repeaters
- Switches
- Bridges
- Routers
- Gateways
- Multi-segment configuration using repeaters
- Redundancy and reliability

PROTOCOLS THAT WORK WITH ETHERNET

- TCP/IP
- Modbus and TCP/IP
- Ethernet/IP
- IPX/SPX and NetBEUI
- IP addressing
- Routing on the networks
- Error and control messages
- User Datagram Protocol (UDP)
- Utilities with TCP/IP

III. CONSTRUCTION OF THE ETHERNET SYSTEM CABLING AND HARDWARE

- Structured cabling
- Twisted pair cables and connector
- Fiber optic cables and connectors
- Ethernet repeater hubs
- Ethernet switching hubs
- Industrial versus commercial networks

NETWORK DESIGN CONCEPTS

- System design
- Design simplicity
- Design documentation

IV. PERFORMANCE AND TROUBLESHOOTING TYPES OF PROBLEMS

- Hardware
- Protocols
- Software

TOOLS

- Basic utilities
- Protocol analyser
- Ethernet performance
- Troubleshooting of Ethernet

THERE ARE TEN PRACTICAL SESSIONS INCLUDING:

- Configuration of an Ethernet network
- Configuration of a simple network protocol
- Demonstration of typical failure points
- Diagnosis of network hardware problems
- Configuration of a network with a switch and hub
- Addition of the TCP/IP protocol
- Use of basic utilities for troubleshooting
- Troubleshooting with simple protocol analyser
- Identification of problems with utilities and protocol analyser
- Benchmarking performance of Ethernet

Practical Sessions

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

To gain full value from this workshop, please bring your laptop/notebook computer.