Formation Network - Ethernet and switching: This course covers both 802.3 (10, 100, 1000 Mbps) and 802.1P/802.1Q

N1 - Ethernet and switching

This course covers both 802.3 (10, 100, 1000 Mbps) and 802.1P/802.1Q

Objectives

- The course explains the IEEE802.3 specification, and especially the evolution between Ethernet 10Mbps, 100Mbps, 1000Mbps and 10 Gbps.
- An architectural view of an Ethernet network is provided, highlighting the differences between repeaters, switches and routers.
- The MAC layer is studied through various Freescale implementation examples.
- The course explains how the spanning tree algorithm works.
- Quality of Service through the VLAN tag is explained.
- Switch related protocols are detailed, especially IGMP snooping.
- The course details the operation of the PHY-to-MAC bus.
- The course describes the transmission protocol according to the medium.
- An introduction to TCP-UDP/IP allows to understand how upper layer data are encapsulated into Ethernet frames.

- This course has been delivered several times to companies implementing Ethernet in embedded systems, such as missiles, railway equipments and avionics systems

A more detailed course description is available on request at info@ac6-formation.com

Plan

INTRODUCTION TO ETHERNET

- Protocol layers
- Topology, equipments : hub, switch and router
- Collisions, backoff algorithm
- Highlighting how software and hardware interact
- Full duplex Ethernet
- Flow control mechanisms

MAC LAYER

- Frame format
- Addressing : nodecast, multicast, broadcast
- Buffer management by Freescale FCC
- Transmit and receive errors detected by the MAC layers
- Data coherency when buffers are shared by PowerPC and SDMAs
- Wake on LAN

MANAGEMENT LAYER

- RMON registers
- MIB organization
- Simple Network Management Protocol

10 Mbps NETWORKS

- Differential mode transmission
- Interface to the PHY, AUI and GPSI
- AUI operation, differential Manchester coding
- 10Base-T
- Repeater
- System considerations

100 Mbps NETWORKS

- Media Independent Interface
- 100Base-X physical sublayers PCS and PMA
- 4b/5b coding
- Far-end fault
- Scrambling
- 100Base-TX, MLT-3 modulation
- Auto-negotiation

1000 Mbps NETWORKS

- Medium types
- Gigabit Media Independent Interface
- MAC implementation examples

1000BASE-T

- PCS layer
- Scrambling
- Convolutional encoder
- Trellis, Viterbi decoder
- 4D-PAM5, constellations
- PMA layer, PAM-5 modulation
- Auto-negotiation, master vs slave selection

1000BASE-X

- PCS layer, codage 8b10b
- PMA layer
- Auto-negotiation, utilization of specific control symbols
- Detail of 1000BASE-CX MDI

10 Gbps NETWORKS

- Full duplex only operation
- MDIO interface, management frame structure, electrical interface
- XGMII Extender Sublayer XGXS and 10 Gbps Attachment Unit Interface XAUI
- Physical Coding Sublayer and Physical Medium Attachement Sublayer 10GBASE-X285
- Physical coding layer for 64b/66b, type 10GBASE-R317
- WAN interface sublayer, type 10GBASE-W

- Physical Media Attachment Sublayer, type serial
- Physical Medium Dependent Sublayer and baseband medium, type 10GBASE-S, 10GBASE-L, 10GBASE-E
- Physical Medium Dependent Sublayer and baseband medium, type 10GBASE-LX4

SWITCH OPERATION - 802.1D

- Switch architecture
- Filtering services
- Quality of service
- Rapid Spanning Tree Protocol
- Management protocol
- GARP [Generic Attribute Registration Protocol]
- GMRP [GARP Multicast Registration Protocol]

SWITCH OPERATION - 802.1Q

- Multiple Spanning Tree Protocol
- Frame tagging
- Quality of Service
- GMRP usage in VLANs
- VLAN switch operation
- GVRP [GARP VLAN Registration Protocol]
- IGMP snooping

INTRODUCTION TO TCP/IP

- The TCP/IP protocol stack
- IP [Internet Protocol]
- ARP [Address Resolution Protocol]
- RARP [Reverse Address Resolution Protocol]
- ICMP [Internet Control Message Protocol]
- Transport layer overview
- UDP [User Datagram Protocol]
- TCP [Transport Control Protocol]
- DOS/UNIX TCP/IP commands

POWER OVER ETHERNET

- Objectives
- Operation
- Protocol
- Software aspects

LINK AGGREGATION

- Handled on request

Renseignements pratiques

Duration : 4 days
Cost : 1950 € HT