

CANoe/CANalyzer for Ethernet

Agenda VectorAcademy

Delivery Format:	This Course is offered in Classroom Format
Duration:	4 days
Target Group:	Users of Ethernet and IP in motor vehicles
Prerequisites:	Basic knowledge of serial communication principles
Goal:	Knowledge about the ISO OSI layer modell, Ethernet, IP, TCP and UDP as well as automotive application protocols DoIP, SOME/IP, TSN, AUTOSAR I-PDU in vehicles, introduction for initiation of an Ethernet network with CANoe/CANalyzer, measurement and analysis in the Ethernet context, CANoe/CANalyzer as a DoIP tester and CANoe as a simulation tool for Ethernet ECUs

1. Introduction

- > Motivation for the usage of Ethernet in vehicles
- > Protocols and their user areas

2. Physical Layers

- > OSI layer model
- > Physical network architectures and topologies
- > Automotive Ethernet: IEEE 100BASE-T1 and IEEE 1000BASE-T1
- > Traditional office Ethernet: IEEE 100BASE-TX and IEEE 1000BASE-T

3. Ethernet Fundamentals

- > Introduction into the Ethernet protocol
- > Addressing with MAC addresses and VLAN tag
- > Basic MAC frame and tagged MAC frame
- > Local Area Network (LAN) and Virtual Local Area Network (VLAN)
- > Switch as the coupling element

4. Internet Protocol (IP) Fundamentals

- > Introduction into IPv4 und IPv6
- > IP addresses and subnet masks
- > IP packet
- > Auxiliary protocols DHCP, ICMP, ARP, NDP and AutoIP

5. UDP and TCP Fundamentals

- > Overview UDP and TCP
- > Connection-oriented and connectionless communication
- > Addressing with ports
- > TCP segment and UDP packet
- > TCP und UDP Sockets

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6. Introduction in Automotive Application Protocols

- > Motivation
- > Protocol overview and application areas

7. Diagnostics over IP (DoIP)

- > Introduction into DoIP
- > Roles: tester, gateway and ECU
- > Phases of the DoIP communication
- > DoIP packet and transmission of a diagnostic (UDS) service

8. Overview Functions for Ethernet in AUTOSAR

- > Traditional transmission of signals over Ethernet
- > AUTOSAR I-PDUs and container PDUs (Protocol Data Unit)
- > AUTOSAR I-PDUs and SOME/IP-SD

9. SOA and SOME/IP

- > Introduction service-oriented architectures (SOA)
- > Effects of SOA to vehicle architectures
- > Introduction SOME/IP and SOME/IP-SD
- > Types of services: Methods, Events, Fields
- > Typical use cases for SOME/IP and SOME/IP-SD

10. Time Sensitive Networking (TSN)

- > Introduction in AVB/TSN protocol family
- > Used protocols in the automotive area
- > Time synchronization in vehicle
- > Available transport protocols
- > Stream reservation and traffic shaping

11. Introduction into CANoe/CANalyzer for Ethernet

- > Overview CANoe/CANalyzer for Ethernet
- > Available hardware for Ethernet and IP
- > License model

12. Initiation of an Ethernet Network

- > Creation of a CANoe/CANalyzer configuration for Ethernet
- > Configuration of the used hardware

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13. Measurement and analysis with CANoe/CANalyzer for Ethernet

- > Measurement and analysis windows for Ethernet and IP networks
- > Evaluation of application related protocol information:
- > DoIP, SOME/IP, AVB/TSN, AUTOSAR IPDU und AUTOSAR NM
- > Logging and offline analysis
- > Sending of Ethernet frames, IP packets and TCP/UDP packets

14. Diagnostics over IP (DoIP) with CANoe/CANalyzer for Ethernet

- > Analyzing the DoIP communication phases
- > CANoe/CANalyzer for Ethernet as a DoIP tester

15. Introduction into CANoe as a development tool

- > CANoe within the development process
- > Signal Server concept for signals and Service-Signals
- > CANoe Communication Concept for SOA and SOME/IP
- > Interaction Layer for AUTOSAR PDUs and SOME/IP

16. Simulating with Interaction Layers

- > Creation of a CANoe configuration for Interaction Layers
- > Adding the needed libraries
- > Model Generation Wizard
- > System panel, node and network panels as well as signal generators
- > Creating panels with the Panel Designer
- > CAPL for signals and service signals
- > Controlling Interaction Layers with CAPL
- > CAPL for Ethernet

17. Simulation with CANoe Communication Concept (optional – outlook)

- > Overview of CANoe Communication Concept
- > Creating a configuration for CANoe Communication Concept
- > CAPL and vCDL for CANoe Communication Concept