

MICROSAR Ethernet Advanced Course

Agenda VectorAcademy

Delivery Format:	This Course is offered in Classroom or Remote Format
Duration:	Classroom: 2 days Remote: 13 hours
Target Group:	ECU developers
Prerequisites:	Participation in the Training "AUTOSAR Classic Platform Basic Course" or a good knowledge about AUTOSAR Classic Platform
Goal:	Obtain an overview on the usage of Ethernet in an AUTOSAR based ECU and acquire practical skills to configure a MICROSAR.ETH stack

1. Overview and introduction

- > Motivation for Ethernet in vehicles
- > Difference to traditional vehicle networks
- > Protocols and History of Ethernet in AUTOSAR
- > Vector's MICROSAR solution

2. Basics of Ethernet and TCP/IP

- > PHY: MDI/MII, most commonly used PHY layers and ECU Hardware setup
- > MAC/VLAN Data Link Layer addressing and Switches
- > Internet Protocol IPv4/IPv6 Network Layer addressing and routers
- > ARP, NDP, ICMP
- > Transport Protocols (UDP, TCP), Transport Layer addressing
- > Dynamic Host Configuration Protocol (DHCP)

3. Ethernet in the AUTOSAR Software Architecture

- > Socket based communication using TCP/IP vs. PDU and signal based communication in traditional vehicle networks
- > approach in AUTOSAR (SOAD + PDU Container)
- > AUTOSAR Software Architecture

4. Overview of Automotive Protocols and use cases

- > Requirements emerging from modern E/E architecture and distributed system approach
- > Summary of protocols SOME/IP(-SD), DoIP, TSN, AVB, XCP, NM

5. Diagnostics Over IP (DoIP)

- > AUTOSAR Software Architecture with DoIP
- > The DoIP Protocol
- > DoIP use cases DoIP Node vs. DoIP Gateway
- > Illustration of configuration principle in SOAD, DoIP and PDUR

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6. SOME/IP and Service Discovery (SD)

- > Service Oriented communication with SOME/IP, Sd and SoAd
- > Control Flow (SD) and Data Flow (SOME/IP)
- > Illustration of configuration principle in SoAd, Sd, LdCom

7. UDP Network Management (UdpNm)

- > Network Management
- > MICROSAR configuration elements and principles

8. Universal Calibration Protocol (XCP)

- > Integration into the ETH stack
- > Illustration of configuration principle in SOAD, XCP

9. Time-Sensitive Networking (TSN) and Audio-Video-Bridging (AVB)

- > Demarcation of TSN vs AVB
- > Time Synchronization Cluster in AUTOSAR
- > TSYN
- > STBM
- > Time Synchronization on CAN, FR, ETH
- > Synchronization message sequences on CAN, FR, ETH
- > Time Stamping and Time Bases on CAN, FR, ETH
- > Service Module STBM
- > Use Case: AVB

10. Exercise: Diagnostics over IP (DoIP)

- > Setup of an embedded Software DoIP use case
- > DCM

11. Exercise: SOME/IP – Service Discovery (SD)

- > Setup of an embedded Software SOME/IP-SD use case
- > Service Discovery
- > Events
- > Remote Procedure Calls using Methods
- > Setup of an embedded software PDU multiplexing using the SOAD
- > Container PDU
- > Triggered UDP packets