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 AVB Use Case**
   - 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
   - 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

12. **Exercise: PDU Multiplexing**
    - Setup of an embedded software PDU multiplexing using the SOAD
    - Container PDU
    - Triggered UDP packets