MICROSAR Ethernet Advanced Course

Agenda VectorAcademy

Delivery Format:	This Course is offered in Classroom or Remote Format
Duration:	Classroom: 2 days Remote: 14 hours
Target Group:	ECU developers
Prerequisites:	Participation in the Training "AUTOSAR Classic Platform Basic Course" or a good knowledge about AUTOSAR Classic Platform
Goal:	At the end of the training, the trainee will be able to use the AUTOSAR Ethernet tool

Evaluation:
Validation of learning based on practical exercises with MICROSAR.

Pedagogical, technical and supervisory resources:
Course material is sent to each trainee. The training will be carried out in adapted rooms.
Competence of the trainer: experienced engineer on AUTOSAR

Method of follow-up of the trainee:
A sign-off sheet must be validated by the trainee. A first satisfaction questionnaire is planned at the end of the training.

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

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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

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

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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