

Industrial Ethernet II

Industrial Protocols and advanced Functions

In this in-depth training course on Industrial Ethernet, special communication protocols in the field of control technology such as PTP, REP, PROFINET etc. are discussed in more detail and set up in a test network. Various auxiliary protocols such as QoS are used to guarantee real-time communication. Some troubleshooting exercises as well as the targeted installation and removal of systems during operation round off the exercises on industrial Ethernet.

Course Contents

- Switching, VLANs and basic security
- Working with macros
- Spanning tree and ring concepts in use
- Routing and rapid convergence
- NAT level 2
- Packet Filters on Layer 2 and 3
- Quality of service and real-time communication
- Time synchronization (NTP, PTP)
- Network management and monitoring (syslog, SNMP, SSH, debugging etc.)
- Alarm
- Protocols in IE (PROFINET, ModBUS, Ethernet/IP)
- Troubleshooting (Hardware, Disaster Recovery, Upgrades)
- Troubleshooting in switching and routing (configuration errors)

E-Book The detailed digital documentation package, consisting of an e-book and PDF, is included in the price of the course.

Target Group

Network planners and operators who want to implement and operate Industrial Ethernet in their networks are the target group for this training. In a test network with Cisco Industrial Switches of the 2000 and 3000 series, typical configurations are created, systems are replaced and upgraded and errors are eliminated as part of troubleshooting. The focus here is on general, manufacturer-independent aspects of Industrial Ethernet.

Prerequisites

Knowledge of LAN concepts and internetworking is a prerequisite for successful participation. Prior participation in the course Industrial Ethernet I - Design and Implementation is recommended.

This Course in the Web



You can find the up-to-date information and options for ordering under the following link:
www.experteach-training.com/go/IND2

Reservation

On our Website, you can reserve a course seat for 7 days free of charge and in a non-committal manner. This can also be done by phone under +49 6074/4868-0.

Guaranteed Course Dates

To ensure reliable planning, we are continuously offering a wide range of guaranteed course dates.

Your Tailor-Made Course!

We can precisely customize this course to your project and the corresponding requirements.

Training	Prices, excl. of V.A.T.	
Classes in Germany	2 Days	€ 1,595
Online Training	2 Days	€ 1,595
Dates upon request		

Status 05/07/2025



EXPERTeach



Table of Contents

Industrial Ethernet II – Industrial Protocols and advanced Functions

1 Industrielle Varianten des Ethernets	2.4.8 Macros für Quality of Service (QoS)
1.1 Feldbussysteme und Verbreitung	2.4.9 Routing in der IP-Welt
1.2 Protokolle im industriellen Ethernet	2.4.10 Statisches Routing
1.2.1 Modbus	2.4.11 Dynamisches Routing
1.2.2 Profibus	2.4.12 Virtual Router Redundancy Protocol (VRRP)
1.2.3 Profinet	2.5 IP Multicasting - Das Prinzip
1.2.4 Discovery and Configuration Protocol (DCP)	2.5.1 IPv4-Multicast-Adressen
1.2.5 EtherNet/IP	2.5.2 IGMP
1.2.6 Datenübertragung nach IEC 60870	2.5.3 IGMP Snooping
1.3 EtherCAT (Ethernet for Control Automation Technology)	2.5.4 Multicast Routing
1.3.1 Wireless ICS-Technologien	2.5.5 Shared Tree
1.3.2 OPC – Open Platform Communications	2.5.6 Source Based Tree (SBT)
1.3.3 OPC UA in der Industrie	2.5.7 Multicast Routing
1.4 Zeitsynchronisation mit NTP und PTP (IEEE 1588)	2.5.8 PIM-Sparse Mode
1.4.1 Uhren und Aufgaben	2.5.9 Konfiguration von PIM Sparse Mode
1.4.2 Korrektur des Offset	
1.4.3 Delay-Request-Response, Teil 1	3 Spezielle Konzepte im industriellen Ethernet
1.4.4 Delay-Request-Response, Teil 2	3.1 Alarme
1.4.5 Peer-Delay	3.2 Einfache Konfiguration durch Macros
1.4.6 Transparent Clock Peer-to-Peer	3.3 Externer Speicher (Flash)
1.4.7 Transparent Clock End-to-End	3.4 Hardware austauschen
1.4.8 PTP Best Master Clock Algorithm (BMCA)	3.4.1 Persistent DHCP
1.4.9 Netzwerkdesign für NTP und PTP	3.4.2 Externer Speicher (Flash)
1.5 Audio Video Bridging (AVB) und Time-Sensitive Networking (TSN)	3.4.3 Software Update
1.5.1 TSN in der Fabrikation	
1.5.2 Beispiel: Profinet over TSN	4 Troubleshooting im industriellen Ethernet
2 Industrial Ethernet Switching und Routing	4.1 Monitoring und Troubleshooting
2.1 Spezielle Redundanzmechanismen	4.1.1 Netzwerkdokumentation
2.1.1 Auswahlkriterien für Ring-Konzepte, Spanning Tree oder LAG	4.2 Die systematische Fehlereingrenzung
2.1.2 Auswahlkriterien für industrielle Switches	4.2.1 Troubleshooting-Modelle
2.2 Resilient Packet Ring (REP) von Cisco	4.3 Hardware-Troubleshooting
2.3 Quality of Service (QoS)	4.3.1 Boot-Probleme
2.4 Was ist Quality of Service?	4.3.2 Crashinfo
2.4.1 Bausteine für QoS	4.4 Monitoring und Debugging
2.4.2 Klassifizierung	4.5 Übergeordnetes NMS: Beispiel TIA Portal
2.4.3 Wer markiert die Frames?	4.6 Ethernet Troubleshooting
2.4.4 Queueing als Werkzeug	4.6.1 Duplex Mismatch
2.4.5 Konfiguration von QoS auf den Access-Catalyst-Systemen	4.6.2 Time Domain Reflectometry (TDR)
2.4.6 Show-Kommandos für QoS	4.6.3 Digital Optical Monitoring (DOM)
2.4.7 Auto-QoS	4.6.4 Error-Disable
	A Befehle

