

# ETH 640

## Deploying MPLS Networks

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Authorized Training Partner

The ETH 640 course is an in-depth study of deploying networks using MPLS. It focuses on features of Foundry Networks NetIron IMR-XMR Series of switches and routers including advanced technologies such VLL, VPLS, QoS, and Traffic Engineering. It covers network design, system configuration and troubleshooting using the Foundry IMR-XMR Series of switches and routers.

### Course Contents

MPLS Fundamentals  
Basics of Virtual Private Networks  
Layer 2 VPNs  
Layer 2 VRF Import and Export Features.  
MPLS Label Distribution  
Advanced Routing in the Provider Core.  
MPLS VPN Mechanisms  
MPLS Traffic Engineering  
Quality of Service (QoS) in MPLS

### Target Group

- Customers or Resellers who are experienced with Foundry Networks Products
- Network technicians with installation, configuration, and troubleshooting experience with Foundry Products
- Network Administrators responsible for implementing and managing small to large enterprise and ISP networks.
- Network support staff that will act as network device installers and first-line support for a local to global sized business environment.

### Knowledge Prerequisites

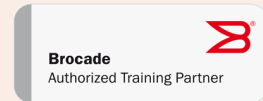
To fully benefit from this course you should attend the ETH 405 - Advanced Switching/Routing Configuration and Management. It is also recommended that you have previous exposure to switching and routing issues in a Foundry Networks environment. You should possess a working knowledge of the following technologies:

- Inter-domain routing protocols (RIP, RIPv2, OSPF, static routes)
- Exterior-domain routing protocols (BGPv4)
- FNCNE level knowledge or equivalent of Layer 2 switching and Layer 3 IP routing
- Foundry Networks command line interface (CLI)

### Course Objectives

After completing this course, the student will be able to:

- Implement advanced designs and configurations in MPLS Networks
- Implement advanced STP, OSPF and BGP features on Foundry Switches / Routers
- Implement Quality of Service in MPLS at both Layer 2 and Layer 3
- Design and configure and implement VPN networks
- Design and deploy Traffic Engineering in MPLS networks
- Interconnect Foundry Switches and Routers based on a MPLS network design
- Configure and troubleshoot design implementations using the CLI show commands



### Reservation and Registration

We will be glad to make a free and non-binding course reservation for you for the duration of two weeks. On [www.experteach-benelux.com](http://www.experteach-benelux.com) under *Registration*, you can conveniently make course reservations, registrations, and hotel reservations. Alternatively, call us under +31 (0)76 52 32 950.

For closed groups of participants, we can modify the course contents according to your requirements. Do not hesitate to contact us!



ETH 640

5 days €3,200 exclusive of V.A.T.

Course date (dd.mm.yy)/Location

Course dates available on request

Up-to-date information: [www.experteach-benelux.com](http://www.experteach-benelux.com)

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### MPLS Fundamentals

- Limitations of conventional IP routing
- Foundational MPLS concepts
- Benefits of MPLS Traffic Engineering
- Functional architecture of MPLS
- MPLS label structure
- Different types and functions of Label Switch Routers

### Basics of Virtual Private Networks

- Inter-connectivity of traditional router-based networks
- Virtual Private Networks (VPNs) operation in router-based networks
- Functions and operation of Layer -2 VPNs
- Functions and operation of Layer-3 VPNs
- Supported traffic types in each network type
- Scalability, deployment, service provisioning, and costs associated with these networks
- Maintenance and Management issues that impact these networks

### Layer 2 VPNs

- End-to-end L2 VPNs in a Provider network
- Customer traffic flow queuing and management
- Virtual Leased Line (VLL) and Virtual Private LAN Segment (VPLS) Packets forwarding over an MPLS network
- VLL packet encoding
- QoS services in a VLL network
- MPLS VLL network configuration
- MPLS VLL information displays
- Troubleshooting VLL networks

### Layer 2 VRF Import and Export Features.

- Advanced VRF features and their usage
- Command syntax required to configuring selective VRF imports
- Command syntax required to configuring selective VRF exports
- Reasons and methods for limiting the number of routes in a VRF table
- Reasons and methods for limiting the number of prefixes received from BGP Neighbors
- Reasons and methods for limiting VRF routes in the Provider Core

### MPLS Label Distribution

- Unicast IP Routing and how MPLS functions within Foundry Networks platforms
- Label Switch Paths
- LDP protocol details and events

- Label allocation in MPLS networks
- Label distribution in MPLS networks
- MPLS Forwarding Table construction and population
- Packet forwarding across MPLS networks
- MPLS Loop Detection
- Penultimate Hop Popping

### Advanced Routing in the Provider Core.

- OSPF protocol configuration and deployment within Provider MPLS core.
- Advanced OSPF (Constraint-based SPF) configuration and operation.
- BGP as a PE-CE routing protocol.
- MBGP distributing MPLS VPN labels with VPN routes between Provider edge routers

### MPLS VPN Mechanisms

- Virtual Routing and Forwarding (VRF) tables in MPLS VPN implementations
- Routing protocols in MPLS VPN implementations
- VRF-aware routing protocols
- Implementing VRFs in an MPLS VPN network
- Outbound interaction between PE-CE routing protocols, backbone MBGP, virtual routing and forwarding tables
- Inbound interaction between PE-CE routing protocols, backbone MBGP, virtual routing and forwarding tables

### MPLS Traffic Engineering

- Traffic Engineering basic concepts
- Customer concerns and justification for implementing Traffic Engineering
- Congestion avoidance and reduction using TE
- Traffic Engineering implementation using the Layer-2 Overlay Model
- Traffic Engineering implementation using the Layer-3 Model
- RSVP protocol for TE controls

### Quality of Service (QoS) in MPLS

- QoS in IP layer 3 QoS using MPLS devices, including VPNs
- End-to-end QoS provisioning in a Provider network using the MPLS Exp. Bits
- IP Precedence mapping for three, four, and five class Provider Traffic Profiles
- Customer traffic flows queuing and management by QoS



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