



# Implementing Cisco MPLS (MPLS)

## COURSE OVERVIEW

Multiprotocol Label Switching integrates the performance and traffic-management capabilities of data link Layer 2 with the scalability and flexibility of network Layer 3 routing. So, when used in conjunction with other standard technologies, MPLS gives the ability to support value-added features and service offerings.

Implementing Cisco MPLS (MPLS) v3.0 is a 5-day instructor-led class providing students with in-depth knowledge of MPLS and MPLS VPNs design, implementation and configuration skills for new features and functions in an existing routed environment. This class uses IOS (15.2)

## WHO WILL BENEFIT FROM THIS COURSE?

Primary target audience:

- This course is intended primarily for network administrators, network engineers, network managers and systems engineers who would like to implement MPLS and MPLS Traffic Engineering.

Secondary target audience:

- This course is intended for network designers and project managers. The course is also recommended to all individuals preparing for MPLS exam.

## PREREQUISITES

To fully benefit from this course, students should have the following prerequisite skills and knowledge:

- Intermediate to advanced knowledge of Cisco IOS Software configuration
- Configuring and troubleshooting EIGRP, OSPF, IS-IS and BGP

Skills and knowledge equivalent to those learned in:

- Interconnecting Cisco Networking Devices v2.0, Part 1 (ICND1) v2.0 and Part 2 (ICND2) v2.0, or
- Interconnecting Cisco Networking Devices: Accelerated Version 2.0 (CCNAX) v2.0
- Implementing Cisco IP Routing (ROUTE) v2.0
- Configuring BGP on Cisco Routers (BGP) v4.0
- Building Cisco Service Provider Next-Generation Networks Part 1 (SPNGN1) v1.2
- Building Cisco Service Provider Next-Generation Networks Part 2 (SPNGN2) v1.2
- Deploying Cisco Service Provider Network Routing (SPROUTE) v1.2
- Deploying Cisco Service Provider Advanced Network Routing (SPADVROUTE) v1.2



## COURSE OBJECTIVES

After completion of this course, students will be able to...

- Describe the features of MPLS
- Describe how MPLS labels are assigned and distributed
- Configure and troubleshoot frame-mode MPLS on Cisco IOS platforms
- Describe the MPLS peer-to-peer architecture and explain the routing and packet forwarding model in this architecture
- Configure, monitor, and troubleshoot VPN operations
- Describe how the MPLS VPN model can be used to implement managed services and Internet access
- Describe the various Internet access implementations that are available and the benefits and drawbacks of each model
- Describe the tasks and commands that are necessary to implement MPLS TE

## COURSE OUTLINE

Module 1: MPLS Concepts

- Lesson 1: Introducing Basic MPLS Concepts
- Lesson 2: Introducing MPLS Labels and Label Stack
- Lesson 3: Identifying MPLS Applications
- Lesson 4: Module Summary
- Lesson 5: Module Self-Check

Module 2: Label Assignment and Distribution

- Lesson 1: Discovering LDP Neighbors Label-Distributing Protocols
- Lesson 2: Introducing Typical Label Distribution in Frame-Mode MPLS
- Lesson 3: Introducing Convergence in Frame-Mode MPLS
- Lesson 4: Module Summary
- Lesson 5: Module Self-Check

Module 3: Frame-Mode MPLS Implementation on Cisco IOS Platforms

- Lesson 1: Introducing CEF Switching
- Lesson 2: Configuring Frame-Mode MPLS on Cisco IOS Platforms
- Lesson 3: Monitoring Frame-Mode MPLS on Cisco IOS Platforms
- Lesson 4: Troubleshooting Frame-Mode MPLS on Cisco IOS Platforms
- Lesson 5: Module Summary
- Lesson 6: Module Self-Check

Module 4: MPLS Virtual Private Network Technology

- Lesson 1: Introducing Virtual Private Networks
- Lesson 2: Introducing MPLS VPN Architecture
- Lesson 3: Introducing the MPLS VPN Routing Model
- Lesson 4: Forwarding MPLS VPN Packets
- Lesson 5: Module Summary
- Lesson 6: Module Self-Check



#### Module 5: MPLS VPN Implementation

- Lesson 1: Using MPLS VPN Mechanisms of Cisco IOS Platforms
- Lesson 2: Configuring an MP-BGP Session Between PE Routers
- Lesson 3: Configuring VRF Tables
- Lesson 4: Configuring Small-Scale Routing Protocols Between PE and CE Routers
- Lesson 5: Monitoring MPLS VPN Operations
- Lesson 6: Configuring OSPF as the Routing Protocol Between PE and CE Routers
- Lesson 7: Configuring BGP as the Routing Protocol Between PE and CE Routers
- Lesson 8: Troubleshooting MPLS VPNs
- Lesson 9: Module Summary
- Lesson 10: Module Self-Check

#### Module 6: Complex MPLS VPNs

- Lesson 1: Introducing Overlapping VPNs
- Lesson 2: Introducing Central Services VPNs
- Lesson 3: Introducing the Managed CE Routers Service
- Lesson 4: Module Summary
- Lesson 5: Module Self-Check

#### Module 7: Internet Access and MPLS VPNs

- Lesson 1: Combining Internet Access with MPLS VPNs
- Lesson 2: Implementing Internet Access in the MPLS VPN Environment
- Lesson 3: Module Summary
- Lesson 4: Module Self-Check

#### Module 8: MPLS Traffic Engineering Overview

- Lesson 1: Introducing MPLS Traffic Engineering Components
- Lesson 2: MPLS Traffic Engineering Operations
- Lesson 3: Configuring MPLS Traffic Engineering on Cisco IOS Platforms
- Lesson 4: Monitoring Basic MPLS TE on Cisco IOS Platforms
- Lesson 5: Module Summary
- Lesson 6: Module Self-Check

#### LABS:

- Discovery 1: Verifying CEF Switching
- Discovery 2: Enabling MPLS
- Discovery 3: Change IP TTL Propagation
- Discovery 4: Configure MP-IBGP
- Discovery 5: Configure the VRF Instances
- Discovery 6: Configure RIP as a PE-CE Routing Protocol
- Discovery 7: Configure EIGRP as a PE-CE Routing Protocol
- Discovery 8: Configure OSPF as a PE-CE Routing Protocol
- Discovery 9: Configure BGP as a PE-CE Routing Protocol
- Discovery 10: Configure a Central Services VPN
- Discovery 11: Configure MPLS Traffic Engineering



- Challenge 1: Implement the Service Provider's and Customer's IP Addressing and IGP Routing
- Challenge 2: Implement the Core MPLS Environment in the Service Provider Network
- Challenge 3: Implement EIGRP Based VPNs
- Challenge 4: Implement OSPF Based MPLS VPNs
- Challenge 5: Implement BGP Based MPLS VPNs
- Challenge 6: Implement MPLS Traffic Engineering

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