

## Advanced Services' Advanced Implementing and Troubleshooting MPLS VPN Networks (AMPLS) v4



Advanced Implementing and Troubleshooting MPLS VPNs is a comprehensive five-day hands-on course that enables you to develop the skills to successfully deploy a complex Multiprotocol Label Switching Virtual Private Network (MPLS VPN) installation and various service overlays. You explore the intricacies of the benefits of an MPLS VPN solution, including intranet, extranet and inter-autonomous system (inter-AS) MPLS VPNs, Multicast VPNs, Quality of Service (QoS) within an MPLS VPN, and Multi-VRF and the best practices for implementing them. In-depth hands-on labs help ensure that you learn the practical skills as well as the theory.

AMPLS is offered in a traditional classroom or as an interactive online training delivered over Cisco WebEx™ conferencing. Both versions are led by the same knowledgeable instructors. The course materials are the same (although minor changes are made to accommodate the online environment), and both versions have the same hands-on labs. AMPLS Online offers the same learning experience as the traditional version with the added benefit of remote access.

### Duration

- Instructor-led offering: Five days, eight hours a day
- Virtual classroom offering: Five days, six hours a day

The virtual classroom offering allows you to attend the live instruction, along with getting access to our lab equipment, without leaving your office. Go to [www.cisco.com/go/ase](http://www.cisco.com/go/ase) for more information about the virtual classroom delivery format.

### Target Audience

This course is intended for network professionals, including designers, implementers, and support staff, who are involved with deploying large-scale networks for large enterprises or the design and deployment of high-end networks requiring MPLS VPNs.

### Course Objectives

Upon completion of this course, you should be able to:

- Identify the components of the MPLS control and forwarding planes
- Troubleshoot an MPLS network using MPLS Operations, Administration and Maintenance (MPLS OAM) tools and features
- Implement and verify advanced Label Distribution Protocol (LDP) control plane features
- Implement and verify intranet and extranet MPLS VPNs to extend a customer network to multiple sites
- Troubleshoot an MPLS VPN
- Scale MPLS VPNs to allow for additional capacity within an MPLS VPN network
- Implement inter-AS VPNs to extend a customer VPN across multiple service providers
- Implement QoS within an MPLS VPN network
- Implement multicast service within an MPLS VPN
- Implement Multi-VRF (vrf-lite) to extend an MPLS VPN to a customer site
- Implement Internet access within an MPLS VPN

### Course Prerequisites

Following are the prerequisites for this course.

- Ability to efficiently use Cisco IOS® Software to perform Cisco® router configuration
- Considerable knowledge in routed networks, including network protocols and IP subnets
- Ability to configure and troubleshoot Open Shortest Path First (OSPF) or Intermediate System-to-Intermediate System (IS-IS) routing protocols in a large-scale network
- Ability to configure and troubleshoot Border Gateway Protocol (BGP) routing
- Ability to configure and verify basic MPLS functionality
- Ability to configure QoS policies using Modular QoS (MQC)
- Ability to configure and verify basic IP multicast routing

To locate Cisco courses that cover the listed prerequisites, go to the Cisco Training & Events web page at [www.cisco.com/web/learning/index.html](http://www.cisco.com/web/learning/index.html).

### Course Outline

The course outline is as follows:

- Introduction
  - Course and Lab Introduction
- Implementing and Troubleshooting MPLS Control and Forwarding Planes
  - Reviewing MPLS Control Plane and Forwarding Plane Functionality
  - Troubleshooting MPLS Control and Forwarding Planes
  - Configuring and Verifying Advanced LDP Functionality
- Implementing and Verifying MPLS VPNs
  - Implementing and Verifying Intranet and Extranet MPLS VPNs
  - Troubleshooting MPLS VPNs
  - Scaling and Convergence in MPLS VPNs
  - Implementing and Verifying Inter-AS MPLS VPNs
- Implementing and Verifying MPLS VPN Service Overlays

- Implementing and Verifying Quality of Service in MPLS VPN Networks
- Implementing and Verifying Multicast in MPLS VPN Networks
- Implementing and Verifying Advanced MPLS VPN Features
  - Implementing and Verifying Multi-VRF (vrf-lite)
  - Implementing Internet Access in an MPLS VPN

### Lab Outline

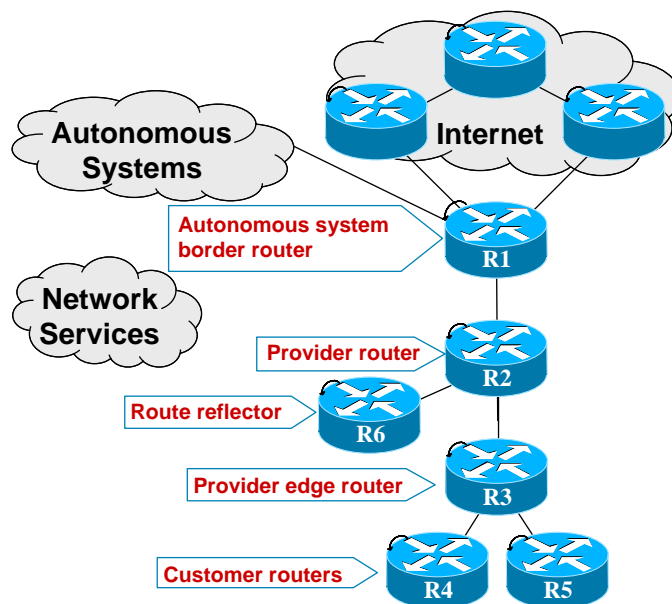
The lab outline is as follows:

- Lab Familiarization
  - Use Cisco IOS Software commands to discover the lab topology.
- Configure, Verify, and Use MPLS OAM to Troubleshoot MPLS
  - Identify and resolve MPLS lab implementation issues using MPLS OAM.
- Configure Advanced LDP Features
  - Configure and verify label allocation and filtering and LDP session protection.
- Configure and Verify MPLS VPNs
  - Implement intranet and extranet MPLS VPNs into an existing network.
    - Configure and verify intranet MPLS VPNs.
    - Configure and verify an extranet MPLS VPN.
- Implement and Verify VPNv4 Route Reflectors
  - Configure and verify BGP route reflectors for VPNv4 routes.
- Configure and Verify Inter-AS MPLS VPNs
  - Implement inter-AS MPLS VPNs using two different methods
    - Configure and verify an inter-AS MPLS VPN using MP-eBGP for VPNv4.
    - Configure and verify an inter-AS MPLS VPN using BGP+Label with route reflector.
    - Configure and verify inter-AS MPLS VPNs using both MP-eBGP for VPNv4 and BGP+Label with route reflector options.
- Implement MPLS QoS Within an MPLS VPN
  - Implement and verify MPLS QoS operation within an MPLS VPN.
- Implement Multicast Within an MPLS VPN
  - Implement and verify multicast functionality within an MPLS VPN.
- Implement Multi-VRF to Extend a VPN to a customer edge device
  - Implement and verify Multi-VRF using OSPF and BGP between the provider edge device and the customer edge device to extend a VPN to the customer edge device
- Internet Access Within an MPLS VPN
  - Implement and verify Internet access within an MPLS VPN.
    - Implement and verify Internet access using static default routing.
    - Implement and verify Internet access using a separate BGP session.

### Lab Topology

Figure 1 shows the lab topology that is used in this course.

**Figure 1.** Lab Topology of Advanced Implementing and Troubleshooting MPLS VPN Networks



### Registration Information

For more information about schedules and registration for this course, contact [aeskt\\_registration@cisco.com](mailto:aeskt_registration@cisco.com).

### For More Information

For more information about Advanced Services Education course offerings, including custom training options, as well as Advanced Services Curriculum Planning Services and the Advanced Services Technical Knowledge Library (TKL), refer to the Advanced Services Education Website at [www.cisco.com/go/ase](http://www.cisco.com/go/ase).



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