

XRVPNS (LEVERAGING IOS XR VPN SERVICES) 1.0

Objetivo

Implement and configure MPLS and describe MPLS label propagation in service provider networks. Describe the main factors leading to the development and deployment of segment routing, describe the various types of segments that are used in segment routing, describe the SRGB, and configure and verify IS-IS and OSPF segment routing operation. Implement and configure Segment Routing IPv6. Describe the components and functionality of Layer 3 MPLS VPNs implementation in Cisco IOS XR Software deployments. Identify the routing protocol and LDP information necessary for Layer 3 MPLS VPN troubleshooting. Discuss Multicast LDP (MLDP) implementation and troubleshooting method for Layer 3 multicast MPLS VPN. Implement MPLS VPN solutions for IPv6 environments. Describe common issues and fixes for PE-PE and PE-CE connectivity in an IPv6 MPLS VPN environment. Implement Layer 2 VPN operations in a service provider environment. Explain how EVPN gets around the problems that regular Layer 2 VPNs have, what the model for EVPN delivery is, and how to implement and troubleshoot EVPN solutions. Explain the advantages of EVPN IRB, how it is implemented, and how to troubleshoot problems when building EVPN IRB solutions. Demonstrate how to configure EVPN-SR data center fabric solutions. Explain advanced EVPN features to support network engineers in designing, implementing, and troubleshooting complex EVPN networks.

Público Alvo

The primary goal of this course is professionals wants how to implement and troubleshoot Layer 2 and Layer 3 Virtual Private Network services in a service provider network operating on Cisco IOS XR software.

Pré-Requisitos

The knowledge and skills that students are expected to have before attending this course are: Familiarity with service provider network operation Familiarity with Cisco IOS XR software configuration and operation Ability to implement and troubleshoot routing protocol including OSPF, IS-IS and BGP in a service provider network.

Carga Horária

24 horas (3 dias).

Conteúdo Programático

Course Introduction

- Overview
- Course Goal and Objectives
- Course Flow
- Your Training Curriculum
- Learner Introductions

Cisco IOS XR Software MPLS Operation and Implementation

- Implement and configure MPLS and describe MPLS label propagation in service provider networks
- Describe MPLS architecture, control, and data planes.
- List MPLS applications in service provider environments.
- Describe LDP process and operation in a service provider network.
- Describe how label allocation and distribution function in an MPLS network.
- Describe MPLS forwarding operation.
- Configure MPLS in service provider environments.
- Using tools and commands for monitoring MPLS operation.
- Describe MPLS list troubleshooting methods and commands.

Segment Routing Fundamentals

- Describe the main factors leading to the development and deployment of segment routing.
- Introduce the various types of segments used in segment routing and shows how to examine the SRGB.
- Segment Routing Configuration and Verification Basics
- Configure and verify IS-IS and OSPF segment routing operations.

Segment Routing IPv6

- Implement and configure Segment Routing IPv6
- Segment Routing over IPv6 Overview
- Configuring and Verifying SRv6

Layer 3 MPLS VPN Implementation with Cisco IOS XR Software

- Describe the components and functionality of Layer 3 MPLS VPNs implementation in Cisco IOS XR Software deployments
- Describe the operation and data flow of the Layer 3 VPN control plane.
- Describe various Layer 3 MPLS VPNs models.
- Layer 3 VPN Configuration and Verification

Layer 3 MPLS VPN Troubleshooting

- Identify the routing protocol and LDP information necessary for Layer 3 MPLS VPN troubleshooting.
- MPLS VPN Troubleshooting Methodologies

Layer 3 Multicast MPLS VPN Implementation

- Discuss Multicast LDP (MLDP) implementation and troubleshooting method for Layer 3 multicast MPLS VPN.
- Describe the fundamentals of the MVPN feature.
- Explain the process for implementing an intranet MVPN.
- Describe the process for implementing an extranet MVPN.
- Implement Multicast LDP for Layer 3 Multicast MPLS VPN

Layer 3 IPv6 MPLS VPNs Implementation

- Implement MPLS VPN solutions for IPv6 environments.
- Classical Solutions to Deploy IPv6 over IPv4 Environments
- Basic Solutions to Deploy IPv6 over MPLS VPN Environments
- Use 6VPE to Deploy IPv6 Connectivity over MPLS Environment
- Use GRE for IPv6 Connectivity in MPLS VPN Environments
- Routing Requirements for IPv6 Connectivity over MPLS VPNs

Layer 3 IPv6 MPLS VPN Troubleshooting

- Describe common issues and fixes for PE-PE and PE-CE connectivity in an IPv6 MPLS VPN environment.
- Troubleshoot PE-to-CE Connectivity
- Describe common issues and fixes for PE-CE connectivity in an IPv6 MPLS VPN environment.

Layer 2 VPNs and Ethernet Services Fundamentals

- Implement Layer 2 VPN operations in a service provider environment.
- Layer 2 Service Architecture and Carrier Ethernet Services
- Refresh on Traditional E-LAN, E-Line, and E-Tree Solutions
- Implement Ethernet Operations, Administration, and Maintenance

Cisco IOS XR Software EVPN Operation and Implementation

- Explain how EVPN gets around the problems that regular Layer 2 VPNs have, what the model for EVPN delivery is, and how to implement and troubleshoot EVPN solutions.
- EVPN Model for Ethernet Services Delivery
- Implement Ethernet VPNs (EVPN)

Cisco IOS XR Software EVPN IRB

- Explain the advantages of EVPN IRB, how it is implemented, and how to troubleshoot problems when building EVPN IRB solutions.
- Describe the benefits of EVPN IRB and demonstrate how to implement it.
- EVPN IRB Scenario
- Demonstrate how to configure EVPN IRB solutions.
- Troubleshoot Common Issues for EVPN IRB Solutions

EVPN-SR Data Center Fabric

- Demonstrate how to configure EVPN-SR data center fabric solutions
- EVPN-SR Data Center Fabric
- Data Center Fabric Provisioning
- Describe the various types of data center fabrics and their characteristics, such as spine-leaf architecture, VXLAN, EVPN, and segment routing.
- Explain how to use EVPN-SR data center fabric verification commands to validate the network.

EVPN Advanced Features

- Explain advanced EVPN features to support network engineers in designing, implementing, and troubleshooting complex EVPN networks.
- EVPN Operations and Maintenance
- Describe Ethernet EVPN support for VPLS, Layer 2 and Layer 3 VPN, and DCI service use cases.
- Explain how EVPN network protection offers convergence and isolation strategies for EVPN networks
- Discuss various EVPN protocol modifications, their features, and their benefits for enhancing the performance and dependability of an EVPN network.

Labs

Discovery 1: Configure and Verify MPLS

- Configure and verify MPLS LDP and verify the MPLS operation.
- Task 1: Verify the IS-IS Routing
- Task 2: Configure and Verify MPLS

- Task 3: Verify MPLS Operation

Discovery 2: Configure and Verify Segment Routing

- Configure and verify IGP segment routing.
- Task 1: Verify Lab Connectivity
- Task 2: Verify the Existing LDP Environment
- Task 3: Configure Segment Routing Support
- Task 4: Configure the Segment Routing Prefix SID
- Task 5: Configure and Verify the Segment Routing Prefer
- Task 6: Configure Segment Routing with OSPF

Discovery 3: Configure and Verify SRv6

- Configure and verify IS-IS for IPv6 routing, the SRv6 extension, MP-BGP, flexible algorithm, and VRF using latency metric.
- Task 1: Configure and Verify IS-IS for IPv6
- Task 2: Configure and Verify SRv6 Extension
- Task 3: Configure and Verify MP-BGP
- Task 4: Configure BGP Between PE and CE Routers
- Task 5: Configure and Verify Flexible Algorithm
- Task 6: Configuring and Verifying VRF Using Latency Metric

Discovery 4: Configure and Verify Layer 3 VPN

- Configure and verify Layer 3 VPN, BGP to Support VPNv4 address family, and BGP as PE-CE routing protocol
- Task 1: Configure and Verify BGP to Support VPNv4 Address Family
- Task 2: Configure BGP as PE-CE Routing Protocol

Discovery 5: Implement 6VPE

- Interconnect IPv6 networks over a Layer 3 MPLS VPN architecture using 6VPE approach.
- Task 1: Validate IPv6 Addressing and Test IPv6 Connectivity on PE-to-CE Interfaces
- Task 2: Enable MP-BGP for VPNv6 Address Family
- Task 3: Configure VPN Routing with OSPFv3 as the PE-CE Routing Protocol for Customer B
- Task 4: Configure VPN Routing with MP-BGP as the PE-CE Routing Protocol for Customer A

Discovery 6: Configure and Verify EVPN

- Configure BGP sessions between the route reflector and BGP route reflector clients, configure and verify EVPN VPWS.
- Task 1: Configure BGP Route Reflector
- Task 2: Configure and Verify EVPN

Discovery 7: Configure and Verify EVPN VPWS

- Configure BGP sessions between the route reflector and BGP route reflector clients, configure and verify EVPN VPWS.
- Task 1: Configure BGP Route Reflector
- Task 2: Configure and Verify EVPN VPWS