

Leveraging Cisco IOS XR VPN Services

Duration: 180 Days **Course Code: XRVPNS** **Version: 1.0**

Overview:

The **Leveraging Cisco® IOS XR VPN Services (XRVPNS)** course teaches you 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. Cisco IOS XR is the foundational operating system of most service provider networks and operates Cisco's service provider portfolio of network devices. You will learn how to implement a label switched network infrastructure for the enablement of VPN services using Multiprotocol Label Switching (MPLS) or Segment Routing (SR). You will also learn how to implement and troubleshoot both IPv4 and IPv6 Layer 3 VPN services and Multicast VPN services using IOS XR. In addition, you will learn how to implement Ethernet VPN (EVPN) services including EVPN Integrated Routing and Bridging (EVPN IRB) and EVPN-SR data center fabric. Finally, you will learn how to implement EVPN advanced features.

This course is worth 24 Continuing Education (CE) Credits.

Target Audience:

Individuals looking to implement and troubleshoot Layer 2 and Layer 3 VPN services in a Service Provider Network utilising Cisco IOS XR Software.

Objectives:

- **After completing this course you should be able to:**
 - 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 Segment Routing Global Block (SRGB), and configure and verify Intermediate System to Intermediate System (IS-IS) and Open Shortest Path First (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 provider edge to provider edge (PE-PE) and provider edge to customer edge (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

Prerequisites:

Attendees should meet the following prerequisites:

- 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 Border Gateway Protocol (BGP) in a service provider network
- SPFNDU - Understanding Cisco Service Provider Network

Testing and Certification

Recommended as preparation for the following exams:

- No exam currently aligns to this course

Content:

Cisco IOS XR Software MPLS Operation and Implementation

- MPLS Architecture
- MPLS Applications
- LDP Introduction
- MPLS Forwarding Introduction
- MPLS Forwarding Operation
- MPLS Configuration
- MPLS Monitoring
- MPLS Troubleshooting

Segment Routing Fundamentals

- Segment Routing Overview
- Segment Identifiers
- Segment Routing Configuration and Verification Basics

Segment Routing IPv6

- Segment Routing over IPv6 Overview
- Configuring and Verifying SRv6

Layer 3 MPLS VPN Implementation with Cisco IOS XR Software

- Layer 3 VPN Overview
- Layer 3 VPN Models
- Layer 3 VPN Configuration and Verification

Layer 3 MPLS VPN Troubleshooting

- MPLS VPN Troubleshooting Methodologies

Layer 3 Multicast MPLS VPN Implementation

- Multicast VPN Fundamentals
- Implement Intranet MVPN
- Implement EXtranet MVPN
- Implement Multicast LDP for Layer 3 Multicast MPLS VPN

Layer 3 IPv6 MPLS VPNs Implementation

- Classical Solutions to Deploy IPv6 over IPv4 Environments
- Basic Solutions to Deploy IPv6 over MPLS VPN Environments
- Use 6PE to Deploy IPv6 Connectivity over MPL Environment
- Use 6VPE to Deploy IPv6 Connectivity over MPL Environment
- Use GRE for IPv6 Connectivity in MPLS VPN Environments
- Routing Requirements for IPv6 Connectivity over MPLS VPNs

Layer 3 IPv6 MPLS VPN Troubleshooting

- Troubleshoot PE-to-PE Connectivity
- Troubleshoot PE-to-CE Connectivity

Layer 2 VPNs and Ethernet Services Fundamentals

- 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

- EVPN Model for Ethernet Services Delivery
- Implement Ethernet VPNs (EVPN)

Cisco IOS XR Software EVPN IRB

- EVPN IRB Overview
- EVPN IRB Scenario
- Configure EVPN IRB
- Troubleshoot Common Issues for EVPN IRB Solutions

EVPN-SR Data Center Fabric

- EVPN-SR Data Center Fabric
- Data Center Fabric Provisioning
- Verification Commands

EVPN Advanced Features

- EVPN Operations and Maintenance
- EVPN Services
- EVPN Network Protection
- EVPN Protocol Enhancements

Labs:

- Discovery Lab 1: Configure and Verify MPLS
- Discovery Lab 2: Configure and Verify Segment Routing
- Discovery Lab 3: Configure and Verify SRv6
- Discovery Lab 4: Configure and Verify Layer 3 VPN
- Discovery Lab 5: Implement 6VPE
- Discovery Lab 6: Configure and Verify EVPN
- Discovery Lab 7: Configure and Verify EVPN VPWS

Further Information:

For More information, or to book your course, please call us on Head Office Tel.: +974 40316639

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