

## Leveraging Cisco IOS XR VPN Services

**Duration: 180 Days**    **Course Code: XRVPNS**    **Version: 1.0**    **Delivery Method: Elearning**  
**(Self-paced)**

### 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

### 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    | Layer 3 Multicast MPLS VPN Implementation                       | Cisco IOS XR Software EVPN IRB                          |
| ■ MPLS Architecture                                        | ■ Multicast VPN Fundamentals                                    | ■ EVPN IRB Overview                                     |
| ■ MPLS Applications                                        | ■ Implement Intranet MVPN                                       | ■ EVPN IRB Scenario                                     |
| ■ LDP Introduction                                         | ■ Implement EXtranet MVPN                                       | ■ Configure EVPN IRB                                    |
| ■ MPLS Forwarding Introduction                             | ■ Implement Multicast LDP for Layer 3 Multicast MPLS VPN        | ■ Troubleshoot Common Issues for EVPN IRB Solutions     |
| ■ MPLS Forwarding Operation                                | Layer 3 IPv6 MPLS VPNs Implementation                           | ■ EVPN-SR Data Center Fabric                            |
| ■ MPLS Configuration                                       | ■ Classical Solutions to Deploy IPv6 over IPv4 Environments     | ■ EVPN-SR Data Center Fabric                            |
| ■ MPLS Monitoring                                          | ■ Basic Solutions to Deploy IPv6 over MPLS VPN Environments     | ■ Data Center Fabric Provisioning                       |
| ■ MPLS Troubleshooting                                     | ■ Use 6PE to Deploy IPv6 Connectivity over MPL Environment      | ■ Verification Commands                                 |
| Segment Routing Fundamentals                               | ■ Use 6VPE to Deploy IPv6 Connectivity over MPL Environment     | ■ EVPN Advanced Features                                |
| ■ Segment Routing Overview                                 | ■ Use GRE for IPv6 Connectivity in MPLS VPN Environments        | ■ EVPN Operations and Maintenance                       |
| ■ Segment Identifiers                                      | ■ Routing Requirements for IPv6 Connectivity over MPLS VPNs     | ■ EVPN Services                                         |
| ■ Segment Routing Configuration and Verification Basics    | Layer 3 IPv6 MPLS VPN Troubleshooting                           | ■ EVPN Network Protection                               |
| Segment Routing IPv6                                       | ■ Troubleshoot PE-to-PE Connectivity                            | ■ EVPN Protocol Enhancements                            |
| ■ Segment Routing over IPv6 Overview                       | ■ Troubleshoot PE-to-CE Connectivity                            | Labs:                                                   |
| ■ Configuring and Verifying SRv6                           | Layer 2 VPNs and Ethernet Services Fundamentals                 | ■ Discovery Lab 1: Configure and Verify MPLS            |
| Layer 3 MPLS VPN Implementation with Cisco IOS XR Software | ■ Layer 2 Service Architecture and Carrier Ethernet Services    | ■ Discovery Lab 2: Configure and Verify Segment Routing |
| ■ Layer 3 VPN Overview                                     | ■ Refresh on Traditional E-LAN, E-Line and E-Tree Solutions     | ■ Discovery Lab 3: Configure and Verify SRv6            |
| ■ Layer 3 VPN Models                                       | ■ Implement Ethernet Operations, Administration and Maintenance | ■ Discovery Lab 4; Configure and Verify Layer 3 VPN     |
| ■ Layer 3 VPN Configuration and Verification               | Cisco IOS XR Software EVPN Operation and Implementation         | ■ Discovery Lab 5: Implement 6VPE                       |
| Layer 3 MPLS VPN Troubleshooting                           | ■ EVPN Model for Ethernet Services Delivery                     | ■ Discovery Lab 6: Configure and Verify EVPN            |
| ■ MPLS VPN Troubleshooting Methodologies                   | ■ Implement Ethernet VPNs (EVPN)                                | ■ Discovery Lab 7: Configure and Verify EVPN VPWS       |

## Further Information:

For More information, or to book your course, please call us on 00 20 (0) 2 2269 1982 or 16142

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