

## Junos Layer 3 VPNs

**Duration: 3 Days**    **Course Code: JL3V**    **Version: 16.a**    **Delivery Method: Virtual Learning**

### Overview:

This three-day course is designed to provide students with MPLS-based Layer 3 virtual private network (VPN) knowledge and configuration examples. The course includes an overview of MPLS Layer 3 VPN concepts, scaling Layer 3 VPNs, Internet access, Interprovider Layer 3 VPNs, and Multicast for Layer 3 VPNs. This course also covers Junos operating system-specific implementations of Layer 3 VPNs. These concepts are put into practice with a series of in-depth hands-on labs, which will allow participants to gain experience in configuring and monitoring Layer 3 VPNs on Junos OS devices. These hands-on labs utilize Juniper Networks vMX Series devices using the Junos OS Release 16.1R3.10, but are also applicable to other MX Series devices.

### Target Audience:

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

### Objectives:

- Describe the value of MPLS VPNs.
- Describe the differences between provider-provisioned VPNs and customer-provisioned VPNs.
- Describe the differences between Layer 2 VPNs and Layer 3 VPNs.
- List the provider-provisioned MPLS VPN features supported by the Junos OS software.
- Describe the roles of a CE device, PE router, and P router in a BGP Layer 3 VPN.
- Describe the format of the BGP routing information, including VPN-IPv4 addresses and route distinguishers.
- Describe the propagation of VPN routing information within an AS.
- List the BGP design constraints to enable Layer 3 VPNs within a provider network.
- Explain the operation of the Layer 3 VPN data plane within a provider network.
- Create a routing instance, assign interfaces to a routing instance, create routes in a routing instance, and import/export routes from a routing instance using route distinguishers/route targets.
- Describe the purpose of BGP extended communities, configure extended BGP extended communities, and use BGP extended communities.
- List the steps necessary for proper operation of a PE-CE dynamic routing protocol.
- List the troubleshooting and monitoring techniques for routing instances.
- Provision and troubleshoot hub-and-spoke Layer 3 VPNs.
- Describe the flow of control traffic and data traffic in a hub-and-spoke Layer 3 VPN.
- Describe QoS mechanisms available in L3VPNs.
- Configure L3VPN over GRE tunnels.
- Describe the RFC 4364 VPN options.
- Describe the carrier-of-carriers model.
- Configure the carrier-of-carriers and "Option C" configuration.
- Describe the flow of control and data traffic in a draft-rosen multicast VPN.
- Describe the configuration steps for establishing a draft-rosen multicast VPN.
- Monitor and verify the operation of draft-rosen multicast VPNs.
- Describe the flow of control traffic and data traffic in a next-generation multicast VPN.
- Describe the configuration steps for establishing a next-generation multicast VPN.
- Monitor and verify the operation of next-generation multicast VPNs.
- Describe the flow of control traffic and data traffic when using MPVPNs for Internet multicast.
- Describe the configuration steps for enabling internet multicast using MVPNs.
- Monitor and verify the operation of MVPN internet multicast.

- Explain the difference between the bgp.l3vpn table and the inet.0 table of a routing instance.
  - Monitor the operation of a CE-PE dynamic routing protocol.
  - Explain the operation of a PE multi-access interface in a Layer 3 VPN and list commands to modify that behavior.
  - Describe ways to support communication between sites attached to a common PE router.
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### Prerequisites:

- - JL2V - Junos Layer 2 VPNs
  - JMF - Junos MPLS Fundamentals
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### Follow-on-Courses:

- AJSPR - Advanced Junos Service Provider Routing
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## Content:

Day 1 :

1 .COURSE INTRODUCTION :

2. MPLS VPNs :

- MPLS VPNs
- Provider-Provisioned VPNs

3. Layer 3 VPNs :

- Layer 3 VPN Terminology
- VPN-IPv4 Address Structure
- Operational Characteristics

4. Basic Layer 3 VPN Configuration :

- Preliminary Steps
- PE Router Configuration
- LAB: Layer 3 VPN with Static and BGP Routing

5 .Layer 3 VPN Scaling and Internet Access :

- Scaling Layer 3 VPNs
- Public Internet Access Options
- LAB: LDP over RSVP Tunnels and Public Internet Access

Day 2:

6. Layer 3 VPNs – Advanced Topics :

- Exchanging Routes between Routing Instances
- Hub-and-Spoke Topologies
- Layer 3 VPN CoS Options
- Layer 3 VPN and GRE Tunneling Integration
- Layer 3 VPN and IPsec Integration
- Layer 3 VPN Egress Protection
- BGP Prefix-Independent Convergence (PIC)
- Edge for MPLS VPNs
- VRF Localization
- Provider Edge Link Protection
- Support for Configuring More Than 3 Million
- L3VPN Labels LAB: GRE Tunneling and Route Redistribution

7. Interprovider Backbones for Layer 3 VPNs :

- Hierarchical VPN Models
- Carrier-of-Carriers Model
- Option C Configuration LAB: Carrier-of-Carriers VPNs

8 .Troubleshooting Layer 3 VPNs :

- Working with Multiple Layers
- Troubleshooting Commands on a PE Device
- Multi-Access Interfaces in Layer 3 VPNs
- PE and CE-Based Traceroutes
- Layer 3 VPN Monitoring Commands
- LAB: Troubleshooting Layer 3 VPNs

Day 3 :

9. Draft Rosen Multicast VPNs :

- Multicast Overview
- Draft Rosen MVPN Overview
- Draft Rosen MVPN Operation Configuration
- Monitoring

10 .Next-Generation Multicast VPNs :

- Multicast VPN Overview
- Next-Generation MVPN Operation Configuration
- Monitoring
- Internet Multicast
- Ingress Replication
- Internet Multicast Signaling and Data Plane
- Configuring MVPN Internet Multicast
- Monitoring MVPN Internet Multicast'
- LAB: MVPNs

## 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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