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## Junos Layer 3 VPNs

**Duration: 3 Days**    **Course Code: JL3V**    **Version: 16.a**

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### 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.

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### Target Audience:

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

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### 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.
- Explain the difference between the `bgp.l3vpn` table and the `inet.0` table of a routing instance.
- 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 MVPNs for Internet multicast.
- Describe the configuration steps for enabling internet multicast using MVPNs.
- Monitor and verify the operation of MVPN internet multicast.

- 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.

## Prerequisites:

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## Content:

<ul style="list-style-type: none"> <li>■ MPLS VPNs</li> <li>■ Provider-Provisioned VPNs</li> </ul> <ul style="list-style-type: none"> <li>■ Layer 3 VPN Terminology</li> <li>■ VPN-IPv4 Address Structure</li> <li>■ Operational Characteristics</li> </ul> <ul style="list-style-type: none"> <li>■ Preliminary Steps</li> <li>■ PE Router Configuration</li> <li>■ LAB: Layer 3 VPN with Static and BGP Routing</li> </ul>	<ul style="list-style-type: none"> <li>■ Scaling Layer 3 VPNs</li> <li>■ Public Internet Access Options</li> <li>■ LAB: LDP over RSVP Tunnels and Public Internet Access</li> </ul> <p>Day 2:</p> <ul style="list-style-type: none"> <li>■ Exchanging Routes between Routing Instances</li> <li>■ Hub-and-Spoke Topologies</li> <li>■ Layer 3 VPN CoS Options</li> <li>■ Layer 3 VPN and GRE Tunneling Integration</li> <li>■ Layer 3 VPN and IPsec Integration</li> <li>■ Layer 3 VPN Egress Protection</li> <li>■ BGP Prefix-Independent Convergence (PIC)</li> <li>■ Edge for MPLS VPNs</li> <li>■ VRF Localization</li> <li>■ Provider Edge Link Protection</li> <li>■ Support for Configuring More Than 3 Million</li> <li>■ L3VPN Labels LAB: GRE Tunneling and Route Redistribution</li> </ul> <p>7. Interprovider Backbones for Layer 3 VPNs</p> <ul style="list-style-type: none"> <li>■ Hierarchical VPN Models</li> <li>■ Carrier-of-Carriers Model</li> <li>■ Option C Configuration LAB: Carrier-of-Carriers VPNs</li> </ul> <ul style="list-style-type: none"> <li>■ Working with Multiple Layers</li> <li>■ Troubleshooting Commands on a PE Device</li> <li>■ Multi-Access Interfaces in Layer 3 VPNs</li> <li>■ PE and CE-Based Traceroutes</li> <li>■ Layer 3 VPN Monitoring Commands</li> <li>■ LAB: Troubleshooting Layer 3 VPNs</li> </ul>	<p>Day 3 :</p> <ul style="list-style-type: none"> <li>■ Multicast Overview</li> <li>■ Draft Rosen MVPN Overview</li> <li>■ Draft Rosen MVPN Operation</li> <li>■ Configuration</li> <li>■ Monitoring</li> </ul> <ul style="list-style-type: none"> <li>■ Multicast VPN Overview</li> <li>■ Next-Generation MVPN Operation</li> <li>■ Configuration</li> <li>■ Monitoring</li> <li>■ Internet Multicast</li> <li>■ Ingress Replication</li> <li>■ Internet Multicast Signaling and Data Plane</li> <li>■ Configuring MVPN Internet Multicast</li> <li>■ Monitoring MVPN Internet Multicast'</li> <li>■ LAB: MVPNs</li> </ul>
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## Further Information:

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

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