Juniper Networks Certified Professional Advanced Service Provider
Routing and Switching VPN Bundle, JL2V & JL3V
(JNCIP-SP VPN Bundle)

Course Summary

Description

This bundle combines Junos Layer 2 VPNs (JL2V) and Junos Layer 3 VPNs (JL3V).

JL2V:
This two-day course is designed to provide students with MPLS-based Layer 2 virtual private network (VPN) knowledge and configuration examples. The course includes an overview of MPLS Layer 2 VPN concepts, such as BGP Layer 2 VPNs, LDP Layer 2 circuits, FEC 129 BGP autodiscovery, virtual private LAN service (VPLS), Ethernet VPN (EVPN), and Inter-AS Layer 2 VPNs. This course also covers Junos operating system-specific implementations of Layer 2 VPN instances, VPLS, and EVPNs. This course is based on the Junos OS Release 15.1R2.9. Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and in device operations.

JL3V:
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 L3VPNs, and Multicast for Layer 3 VPNs. This course also covers Junos operating system-specific implementations of Layer 3 VPNs. This course is based on the Junos OS Release 15.1R2.9. Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and in device operations.

Objectives

Junos Layer 2 VPNs (JL2V):
After successfully completing this course, you should be able to:

- Define the term virtual private network.
- Describe the business drivers for MPLS VPNs.
- Describe the differences between Layer 2 VPNs and Layer 3 VPNs.
- List advantages for the use of MPLS Layer 3 VPNs and Layer 2 VPNs.
- Describe the roles of a CE device, PE router, and P router in a BGP Layer 2 VPN.
- Explain the flow of control traffic and data traffic for a BGP Layer 2 VPN.
- Configure a BGP Layer 2 VPN and describe the benefits and requirements of over-provisioning.
- Monitor and troubleshoot a BGP Layer 2 VPN.
- Explain the BGP Layer 2 VPN scaling mechanisms and route reflection.
- Describe the Junos OS BGP Layer 2 VPN CoS support.
- Describe the flow of control and data traffic for an LDP Layer 2 circuit.
- Configure an LDP Layer 2 circuit.
- Monitor and troubleshoot an LDP Layer 2 circuit.
- Describe the operation of FEC 129 BGP autodiscovery for Layer 2 VPNs.
- Configure a FEC 129 BGP autodiscovery Layer 2 VPN.
- Monitor and troubleshoot a FEC 129 BGP autodiscovery for Layer 2 VPNs.
- Describe the difference between Layer 2 MPLS VPNs and VPLS.
- Explain the purpose of the PE device, the CE device, and the P device.
- Explain the provisioning of CE and PE routers.
- Describe the signaling process of VPLS.
- Describe the learning and forwarding process of VPLS.
- Describe the potential loops in a VPLS environment.
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Course Summary (cont’d)

- Configure BGP, LDP, and FEC 129 BGP autodiscovery VPLS.
- Troubleshoot VPLS.
- Describe the purpose and features of Ethernet VPN.
- Configure Ethernet VPN.
- Monitor and troubleshoot Ethernet VPN.
- Describe the Junos OS support for hierarchical VPN models.
- Describe the Junos OS support for Carrier-of-Carriers VPN Option C.
- Configure the interprovider VPN Option C.
- Describe the Junos OS support for multisegment pseudowire for FEC 129.
- Describe and configure circuit cross-connect (CCC).

Junos Layer 3 VPNs (JL3V):
After successfully completing this course, you should be able to:

- 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 bgpl3vpn 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.
- 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.
- Describe the configuration steps for establishing a next-generation multicast VPN.
- Monitor and verify the operation of next-generation multicast VPNs.

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Course Summary (cont’d)

- Describe the flow of control traffic and data traffic when using MPVNs for Internet multicast.
- Describe the configuration steps for enabling Internet multicast using MVPNs.
- Monitor and verify the operation of MVPN Internet multicast.

Topics

JUNOS LAYER 2 VPNS (JL2V):
- MPLS VPNs
- Provider-Provisioned VPNs
- Overview of Layer 2 Provider-Provisioned VPNs
- BGP Layer 2 VPN Operational Model: Control Plane
- BGP Layer 2 VPN Operational Model: Data Plane
- Preliminary BGP Layer 2 VPN Configuration
- BGP Layer 2 Configuration
- Monitoring and Troubleshooting BGP Layer 2 VPNs
- Review of VPN Scaling Mechanisms
- Layer 2 VPNs and CoS
- LDP Layer 2 Circuit Operation
- LDP Layer 2 Circuit Configuration
- LDP Layer 2 Circuit Monitoring and Troubleshooting
- FEC 129 BGP Autodiscovery Layer 2 Circuit Operation
- FEC 129 BGP Autodiscovery Layer 2 Circuit Configuration
- FEC 129 BGP Autodiscovery Monitoring and Troubleshooting
- Layer 2 MPLS VPNS Versus VPLS
- BGP VPLS Control Plane
- BGP VPLS Data Plane
- Learning and Forwarding Process
- Loops
- VPLS Configuration
- VPLS Troubleshooting
- EVVPN Overview
- EVVPN Control Plane
- EVVPN Operation
- EVVPN Configuration
- EVVPN Troubleshooting

JUNOS LAYER 3 VPNS (JL3V):
- Layer 3 VPN Terminology
- VPN-IPv4 Address Structure
- Operational Characteristics
- Preliminary Steps
- PE Router Configuration
- Scaling Layer 3 VPNs
- Public Internet Access Options
- 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
- Hierarchical VPN Models
- Carrier-of-Carriers Model
- Option C Configuration
- 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
- Multicast Overview
- Draft Rosen MVPN Overview
- Draft Rosen MVPN Operation
- Configuration
- Monitoring
- 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
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Course Summary (cont’d)

Audience

JL2V & JL3V:
This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

Prerequisites

JL2V:
Students should have intermediate-level networking knowledge and an understanding of OSPF, IS-IS, BGP, and Junos policy. Students should have experience configuring MPLS label-switched paths using Junos. Students should also attend Introduction to the Junos Operating System (IJOS), Junos Routing Essentials (JRE), Junos Service Provider Switching (JSPX), Junos Intermediate Routing (JIR) and Junos MPLS Fundamentals (JMF) courses prior to attending this class.

JL3V:
Students should have intermediate-level networking knowledge and an understanding of OSPF, ISIS, BGP, and Junos policy. Students should have experience configuring MPLS label-switched paths using Junos. Students should also attend the Introduction to the Junos Operating System (IJOS), Junos Routing Essentials (JRE), Junos Intermediate Routing (JIR) and the Junos MPLS Fundamentals (JMF) courses prior to attending this class.

Duration

Five days