

Junos Layer 3 VPNs (JL3V)

Engineering Simplicity

COURSE LEVEL

Advanced-level course

AUDIENCE

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

PREREQUISITES

- Intermediate-level networking knowledge and an understanding of OSPF, ISIS, BGP, and Junos policy
- Experience configuring MPLS label-switched paths using Junos
- Attend the *Introduction to the Junos Operating System (I JOS)*, *Junos Intermediate Routing (JIR)*, and *Junos MPLS Fundamentals (JMF)* courses prior to attending this class

ASSOCIATED CERTIFICATION

[JNCIP-SP](#)

RELEVANT JUNIPER PRODUCT

- Routing
- Junos OS
- M Series
- T Series
- MX Series
- PTX Series
- Service Provider Routing and Switching Track

RECOMMENDED NEXT COURSE

Advanced Junos Service Provider Routing (AJSPR)

Junos Layer 2 VPNs (JL2V)

Junos Multicast Routing (JMR)

JNCIE-SP Bootcamp

CONTACT INFORMATION

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COURSE 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 19.4R1.10, and are also applicable to other MX Series devices.

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.
- 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.
- 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.

COURSE CONTENT

Day 1

1	COURSE INTRODUCTION	4	Basic Layer 3 VPN Configuration
2	MPLS VPNs		<ul style="list-style-type: none"> Preliminary Steps PE Router Configuration
	<ul style="list-style-type: none"> MPLS VPNs Provider-Provisioned VPNs 		LAB: Layer 3 VPN with Static and BGP Routing
3	Layer 3 VPNs	5	Layer 3 VPN Scaling and Internet Access
	<ul style="list-style-type: none"> Layer 3 VPN Terminology VPN-IPv4 Address Structure Operational Characteristics 		<ul style="list-style-type: none"> 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	7	Interprovider Backbones for Layer 3 VPNs
	<ul style="list-style-type: none"> 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 		<ul style="list-style-type: none"> Hierarchical VPN Models Carrier-of-Carriers Model Option C Configuration
	LAB: GRE Tunneling and Route Redistribution		LAB: Carrier-of-Carriers VPNs
		8	Troubleshooting Layer 3 VPNs
			<ul style="list-style-type: none"> 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	10	Next-Generation Multicast VPNs
	<ul style="list-style-type: none"> Multicast Overview Draft Rosen MVPN Overview Draft Rosen MVPN Operation Configuration Monitoring 		<ul style="list-style-type: none"> 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

JL3V02192020