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* (IJOS), *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

Contact Juniper Education Services

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 MPVNs for Internet multicast.
- Describe the configuration steps for enabling internet multicast using MVPNs.
- Monitor and verify the operation of MVPN internet multicast.

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

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