



**Enterprise Computing Solutions - Education Services**

## **TRAINING OFFERING**

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**You can reach us at:**

Arrow ECS, Nidderdale House, Beckwith Knowle, Harrogate, HG3 1SA

Email: [educationteam.ecs.uk@arrow.com](mailto:educationteam.ecs.uk@arrow.com)  
Phone: 0870 251 1000

CODE:	LENGTH:	PRICE:
JUN_JL3V	24 Hours (3 days)	£2,550.00

## Description

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.

The Junos Layer 3 VPNs (JL3V) course is an advanced-level course. Relevant Juniper Product

• M Series • T Series • MX Series • PTX Series

## Objectives

- Describe the purpose and functions of MPLS VPNs.
- Describe the differences between Layer 2 VPNs (L2VPNs) and Layer 3 VPNs (L3VPNs).
- Describe the roles of a customer edge (CE) device, provider edge (PE) router, and provider (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 autonomous system (AS).
- List the BGP design constraints to enable L3VPNs within a provider network.
- Explain the operation of the L3VPN 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 BGP extended communities, and use BGP extended communities.
- List the steps necessary for the 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.
- Describe ways to support communication between sites attached to a common PE router.
- Provision and troubleshoot hub-and-spoke L3VPNs.
- Describe the flow of control traffic and data traffic in a hub-and-spoke L3VPN.
- Describe the quality of service (QoS) mechanisms available in L3VPNs. • Describe seamless MPLS fundamentals.
- Describe the carrier-of-carriers model. • Configure the carrier-of-carriers and "Option C" configuration.
- Describe the flow of control traffic and data traffic in BGP MVPN. • Describe the configuration steps for establishing a BGP MVPN.
- Monitor and verify the operations of BGP MVPNs.
- Describe the flow of control traffic and data traffic when using BGP MPVNs for Internet multicast.
- Describe the configuration steps for enabling Internet multicast using BGP MPVNs.
- Monitor and verify the operation of BGP MVPN Internet multicast

## Audience

Individuals responsible for configuring and monitoring devices running Junos OS

## Prerequisites

- Intermediate-level networking knowledge and an understanding of OSPF, IS-IS, BGP, and Junos policy
- Experience configuring MPLS label-switched paths using Junos

• Completion of the Introduction to the Junos Operating System, Junos Intermediate Routing, and the Junos MPLS Fundamentals courses

## Programme

Day 1 Course Introduction Refresher—VPNs and MPLS • Contrast the differences between IPsec VPNs and MPLS VPNs • Contrast the differences between L3VPNs and L2VPNs Layer 3 VPNs—Overview • Explain L3VPN terminology • Define the VPN-IPv4 address structure Layer 3 VPNs—Operational Characteristics • Explain how the L3VPN control plane advertises VPN-IPv4 prefixes across a service provider network • Explain how the L3VPN data plane transports traffic between sites, across a service provider's core Layer 3 VPN—Configuration • Describe the preliminary steps needed for configuring an L3VPN • Describe the L3VPN PE configuration

Lab 1: Layer 3 VPNs with Static and BGP Routing Layer 3 VPN—Verification • Describe how to verify L3VPN operations

Lab 2: Route Redistribution OSPF as the PE-to-CE Protocol

- Configure and verify a basic L3VPN deployment, with OSPF to the CE router
- Explain the purpose of the BGP route type community and the domain ID OSPF—Optimal Routing
- Explain and verify the use of the DN bit and the VPN route tag, which prevent control plane loops
- Configure and verify sham links to control routing decisions in networks with backdoor links Route Leaking
- Describe route leaking in an L3VPN environment Hub-and-Spoke Topologies • Describe hub-and-spoke L3VPN topologies

Day 2 Layer 3 VPN CoS • Describe how to configure and use CoS with L3VPNs Layer 3 VPN Protection Mechanisms • Explain how BGP PIC edge works • Define how provider edge link protection functions Layer 3 VPN Scaling • Describe different ways to improve L3VPN scaling • Define L3VPN scaling guidelines BGP Route Target Filtering • Describe the purpose of BGP route target filtering

Lab 3: Additional L3VPN Scalability Techniques

Layer 3 VPNs and Internet Access

- Explain the differences between the methods of providing Internet access within an L3VPN environment
- Demonstrate how to configure VRF Internet access with a single connection through a use case Inter-AS Layer 3 VPNs
- Describe the functionality of Interprovider Options A, B, and C • Configure and verify the Interprovider Option C method Carrier-of-Carriers VPNs • Describe and configure carrier-of-carriers VPNs

Lab 4: Carrier-of-Carriers VPNs

Day 3 Troubleshooting Layer 3 VPN—Overview • Explain basic L3VPN troubleshooting steps • Define PE-to-CE verification methods Additional Layer 3 VPN Troubleshooting • Explain how to troubleshoot MPLS-related problems in an L3VPN

- Explain how to troubleshoot BGP-related problems in an L3VPN
- Demonstrate how to troubleshoot forwarding plane related problems in an L3VPN
- Describe troubleshooting an L3VPN with a use case

Lab 5: Troubleshooting L3VPNs Multicast Overview

- Describe IP multicast traffic flow and multicast components • Describe multicast addressing
- Describe the need for RPF check in multicast networks • Describe multicast routing tables

Introduction to IGMP

- Explain the role of IGMP • Describe the different versions of IGMP Multicast Routing Protocols • Discuss multicast routing
- Describe the different PIM messages BGP MVPN Overview • Describe the overall functionality of BGP MVPNs
- Explain how BGP MVPNs operate Configuring BGP MVPNs • Explain the configuration steps of BGP MVPNs
- Describe how to verify that a BGP MVPN is correctly working

Lab 6: MVPNs

## Follow on courses

Recommended Next Course Advanced Junos Service Provider Routing (AJSPR) Junos Layer 2 VPNs (JL2V) Junos Multicast Routing (JMR) JNCIE-SP Bootcamp

## Test and Certification

Associated Certification JNCIP-SP Exams can be purchased and scheduled at an additional cost – please ask for details.

## Session Dates

Date	Location	Time Zone	Language	Type	Guaranteed	PRICE
22 May 2024	Virtual Training Class - TP	BST	English	Instructor Led Online		£2,550.00
26 Aug 2024	Virtual Training Class - TP	BST	English	Instructor Led Online		£2,550.00

## Additional Information

[This training is also available as onsite training. Please contact us to find out more.](#)