

SP8KE (CISCO 8000 SERIES ROUTERS ESSENTIALS) 1.0

Objetivo

• Describe the various Cisco 8000 Series hardware components. • Explain the system architecture of the Cisco 8000 Series systems. • Describe the packet flows through the Cisco 8000 Series Router and CLI commands for verifying packet flows through various Cisco 8000 Series Router components. • Describe how the QoS features are implemented within the Cisco 8000 Series router, how to examine the VOQ QoS architecture, and describe how to implement modular Virtual Output Queueing (VOQ), including congestion avoidance, priority flow control, and congestion management. • Describe the Software for Open Networking in the Cloud (SONiC) Operating System. • Describe Cisco IOS XR Software architecture. • Explain how to install Cisco IOS XR software packages. • Describe how to provision network devices by using zero touch provisioning. • Implement and configure Multiprotocol Label Switching (MPLS) and describe MPLS label propagation in service provider networks. • Describe the main factors leading to the development and deployment of segment routing, describe the various types of segments that are used in segment routing, describe the SRGB, and configure and verify IS-IS and OSPF segment routing operation. • Describe how to implement and verify TI-LFA in a segment routing environment, the benefits of SR-TE, and briefly describe the tools required for enabling it. • Describe the fundamentals of EVPN, how to configure and verify EVPN Native, and how to configure and verify EVPN VPWS. • Describe the operation and data flow of the Layer 3 VPN control plane, describe different Layer 3 MPLS VPNs models, and describe how to configure and verify a basic Layer 3 VPN by using Cisco IOS XR 64-bit software. • Implement and configure advanced SR-TE features. • Implement and configure Segment Routing IPv6. • Implement and configure model-driven telemetry. • Describe programmable features of Cisco IOS XR software. • Describe the application hosting architecture and how to deploy a third-party application on a Cisco 105 XR router.

Público Alvo

This course is designed for technical professionals who need to know how to deploy Cisco 8000 Series routers in their network environment.

Pré-Requisitos

The knowledge and skills that students are expected to have before attending this course are: • Basic knowledge of router installation and some experience with installation tools. • Routing protocol configuration experience with BGP, Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF). • Knowledge of Layer 2 IEEE switching and related protocols. • Strong knowledge of MPLS configuration experience. • Experience troubleshooting Cisco routers in a large network environment.

Carga Horária

40 horas (5 dias).

Conteúdo Programático

Course Introduction

- Overview
- Course Goal and Objectives
- Course Flow
- Your Training Curriculum
- Learner Introductions

Cisco 8000 Series Hardware Fundamentals

- Describe the Cisco 8000 Series architecture, list the features and functions of the new Cisco 8000 Series chassis and describe the FRUs and components
- Cisco 8000 Series Router Overview
- Overview of the Cisco 8100 and 8200 fixed routers
- Describe the Cisco 8800 Series Modular Systems
- Describe the Cisco 8800 Series line cards
- Describe the Cisco 8000 Series Optics

Cisco 8000 System Architecture

- Describe the Cisco Silicon One routing silicon architecture and the various Cisco 8000 Series ASICs
- Describe the architecture of the 8800, 8200, and 8100 Series chassis
- Describe the switch fabric architecture and the fabric cards
- Describe the Route Processor and its features and explain how to replace a Route Processor
- Describe the Cisco 8800 line card architecture and list the available Cisco 8800 line cards
- Describe the power architecture of the Cisco 8100 fixed routers, Cisco 8200 fixed routers, and Cisco 8800 Modular Chassis
- Describe Cisco 8000 System Baseboard Management Controller (BMC)

Packet Flow Through the Cisco 8000 Series Router

- Describe the packet flows through the Cisco 8000 Series Router and CLI commands for verifying packet flows through various Cisco 8000 Series Router components
- Describe the various packet flows within the Cisco 8000 Series system
- Use CLI command to trace and verify the flow of packets through the line cards
- Describe the CLI commands for tracing a packet flow through the Cisco 8000 Series route processor
- Describe the CLI commands for tracing packet flow through the Cisco 8000 Series system switch fabric

Traffic Management and QoS on Cisco 8000 Routers

- Describe how the QoS features are implemented within the Cisco 8000 Series router, how to examine the VOQ QoS architecture, and describe how to implement modular Virtual Output Queueing (VOQ), including congestion avoidance, priority flow control, and congestion management
- Describe QoS features within the Cisco 8000 Series router and how to examine the VOQ QoS architecture
- Describe MQC framework used for QoS provisioning within the Cisco 8000 Series router

SONiC Basics

- Describe the SONiC operating system
- Describe the SONiC architecture and various components of the operating system
- Describe a SONiC installation process for Cisco 8000 Series routers

Cisco IOS XR Software Architecture

- Describe Cisco IOS XR Software architecture
- Cisco IOS XR7 Software Fundamentals
- Describe the evolution of Cisco IOS XR software and lists the operational enhancements of the Cisco IOS XR7 software

Cisco IOS XR Software Installation

- Explain how to install Cisco IOS XR software packages
- Software Package Basics
- Identify the Cisco IOS XR software package types
- Describe the Cisco IOS XR systems installation workflows
- Describe how to create a Golden ISO image
- Describe how bug fixes are implemented by using RPMs
- FPD Upgrades
- Describe how card firmware can be updated

Automatic Provisioning

- Describe how to provision network devices by using zero touch provisioning
- Automatic Provisioning Overview

Cisco IOS XR MPLS

- Implement and configure MPLS and describe MPLS label propagation in service provider networks
- Describe MPLS architecture, control, and data planes
- List MPLS applications in service provider environments
- Describe LDP process and operation in a service provider network
- Describe how label allocation and distribution function in an MPLS network
- Describe MPLS forwarding operation
- Configure MPLS in service provider environments
- List tools and commands for monitoring MPLS operation
- Describe MPLS list troubleshooting methods and commands

Introducing Segment Routing

- Describe the main factors leading to the development and deployment of segment routing, describe the various types of segments that are used in segment routing, describe the SRGB, and configure and verify IS-IS and OSPF segment routing operation
- Segment Routing Overview
- Describe the main factors leading to the development and deployment of segment routing
- Introduce the various types of segments used in segment routing and shows how to examine the SRGB & SIDs
- Segment Routing Configuration and Verification Basics
- Configure and verify IS-IS and OSPF segment routing operations

Segment Routing TI-LFA and Traffic Engineering

- Describe how to implement and verify TI-LFA in a segment routing environment, the benefits of SR-TE, and briefly describe the tools required for enabling it
- Topology-Independent Loop-Free Alternate
- Implement and verify TI-LFA in a segment routing environment
- Describe the benefits of SR-TE and briefly describes the tools required for enabling it

EVPN Layer 2 Basics

- Describe how to configure and verify EVPN Native and EVPN VPWS
- Describe the fundamentals of EVPN
- Describe how to configure and verify EVPN Native
- Describe how to configure and verify EVPN VPWS

Layer 3 VPNs

- Describe MPLS Layer 3 VPNs, different Layer 3 VPN models, and explain how to configure and verify the basic MPLS Layer VPN implementation
- Layer 3 VPN Overview
- Describe the operation and data flow of the Layer 3 VPN control plane
- Layer 3 VPN Models
- Describe different Layer 3 MPLS VPNs models
- Layer 3 VPN Configuration and Verification
- Describe how to configure and verify a basic Layer 3 VPN by using Cisco IOS XR 64-bit software

Advanced SR-TE Features

- Implement and configure advanced SR-TE features
- Segment Routing Performance Measurement
- Implement Segment Routing Performance Measurement
- Implement On-Demand Next Hop
- Implement Segment Routing Flexible Algorithm

Segment Routing IPv6

- Implement and configure Segment Routing IPv6
- Segment Routing over IPv6 Overview
- Describe basic Segment Routing over IPv6 concepts
- Describe how to configure and verify SRv6

Telemetry

- Implement and configure model-driven telemetry
- Examining Telemetry Fundamentals
- Examine the basics and features of Telemetry on the Cisco IOS XR Software
- Describe the Model-Driven Telemetry on the Cisco IOS XR Software
- Describe the telemetry encoding and transport methods
- Describe the gRPC fundamentals
- Configure Dial-Out and Dial-In Telemetry with TCP, UDP, and GRPC
- Telemetry Collectors
- Describe the available commercial and freely accessible collectors for telemetry data

Cisco IOS XR Programmability

- Describe programmable features of Cisco IOS XR software
- Model-Driven Programmability Basics
- Describe Cisco IOS XR support for Model-Driven Programmability
- Describe foundational principles of NETCONF
- Describe the foundational principles of gRPC
- Cisco IOS XR Service Layer
- Describe the basics of the Cisco IOS XR services layer and the service layer API architecture
- On-Box Automation Scripts

- Describe the on-box automation scripts that you can use to automate network operations
- Describe YANG development Kit

Application Hosting Overview

Describe the application hosting architecture and how to deploy a third-party application on a Cisco IOS XR router

Application Hosting Basics

Describe application hosting basics

Labs

Discovery 1: Investigate and Monitor Cisco 8000 Series Hardware

- Verify software version, the status of hardware modules, environmental and power management, processor, and memory utilization on Cisco 8000 Series router, and configure and verify interface in breakout mode
- Task 1: Verify Software Version on Cisco 8000 Series Router
- Task 2: Verify Status of Hardware Modules on Cisco 8000 Series Router
- Task 3: Verify Environmental and Power Management on Cisco 8000 Series Router
- Task 4: Verify Processor and Memory Utilization on Cisco 8000 Series Router
- Task 5: Configure and Verify Interface in Breakout Mode

Discovery 2: Troubleshoot Traffic through the Cisco 8000 Router

- Verify packet flows in the system, through line cards, through the route processor, and through the switch fabric
- Task 1: Verify Packet Flows in the System
- Task 2: Verify Packet Flows Through Line Cards
- Task 3: Verify Packet Flows Through Route Processor
- Task 4: Verify Packet Flows Through Switch Fabric

Discovery 3: Cisco IOS XR Software Installation

- Create and configure local repository, install a Cisco IOS XR software package, and remove a Cisco IOS XR software package
- Task 1: Package Upgrade from a Remote Repository
- Task 2: Create and Configure a Local Repository
- Task 3: Install RPM with Optional Feature
- Task 4: Remove RPM with Optional Feature

Discovery 4: Configure and Verify ZTP

- Configure autoprovisioning by using a static configuration and by using script
- Task 1: Configure Autoprovisioning by Using a Static Configuration
- Task 2: Configure Autoprovisioning by Using a Script

Discovery 5: Configure and Verify Multiprotocol Label Switching

- Configure and verify MPLS LDP and verify the MPLS operation
- Task 1: Verify the IS-IS Routing
- Task 2: Configure and Verify MPLS
- Task 3: Verify MPLS Operation

Discovery 6: Configure and Verify Segment Routing

- Configure and verify IGP segment routing
- Task 1: Verify Lab Connectivity

- Task 2: Verify the Existing LDP Environment
- Task 3: Configure Segment Routing Support
- Task 4: Configure the Segment Routing Prefix SID
- Task 5: Configure and Verify the Segment Routing Prefer
- Task 6: Configure Segment Routing with OSPF

Discovery 7: Configure and Verify SR TI-LFA Using IS-IS

- Configure and verify SR TI-LFA using IS-IS
- Task 1: Verify Segment Routing Environment and Forwarding
- Task 2: Configure TI-LFA
- Task 3: Zero-Segment Protection
- Task 4: Single-Segment Protection
- Task 5: Double-Segment Protection

Discovery 8: Configure and Verify SR TI-LFA Using OSPF

- Configure and verify SR TI-LFA using OSPF
- Task 1: Verify Segment Routing Environment and Forwarding
- Task 2: Configure TI-LFA
- Task 3: Zero-Segment Protection
- Task 4: Single-Segment Protection
- Task 5: Double-Segment Protection

Discovery 9: Configure and Verify SR-TE Using IS-IS

- Configure and verify SR-TE using IS-IS
- Task 1: Verify Network Topology
- Task 2: Create Segment Routing Policy Using Dynamic Path
- Task 3: Create Segment Routing Policy Using Explicit Path

Discovery 10: Configure and Verify SR-TE Using OSPF

- Configure and verify SR-TE using OSPF
- Task 1: Verify Network Topology
- Task 2: Create Segment Routing Policy Using Dynamic Path
- Task 3: Create Segment Routing Policy Using Explicit Path

Discovery 11: Configure and Verify Basic EVPN

- Configure BGP sessions between the route reflector and BGP route reflector clients, configure and verify EVPN VPWS
- Task 1: Configure BGP Route Reflector
- Task 2: Configure and Verify EVPN VPWS

Discovery 12: Configure and Verify Layer 3 VPN

- Configure and verify Layer 3 VPN, BGP to Support VPNv4 address family, and BGP as PE-CE routing protocol
- Task 1: Configure and Verify BGP to Support VPNv4 Address Family
- Task 2: Configure BGP as PE-CE Routing Protocol

Discovery 13: Configure and Verify ODN and Flexible Algorithm

- Configure and verify SR-TE for high-bandwidth traffic, SR-TE for low-latency traffic, SR-TE for high- bandwidth and low latency traffic, using ODN, and network slicing, using a Flexible Algorithm

- Task 1: Configure SR-TE for High-Bandwidth Traffic
- Task 2: Configure SR-TE for Low-Latency Traffic
- Task 3: Configure SR-TE for High-Bandwidth and Low-Latency Traffic by Using ODN
- Task 4: Configure and Verify Network Slicing by Using the Flexible Algorithm

Discovery 14: Configure and Verify SRv6

- Configure and verify IS-IS for IPv6 routing, the SRv6 extension, MP-BGP, flexible algorithm, and VRF using latency metric
- Task 1: Configure and Verify IS-IS for IPv6
- Task 2: Configure and Verify SRv6 Extension
- Task 3: Configure and Verify MP-BGP
- Task 4: Configure BGP Between PE and CE Routers
- Task 5: Configure and Verify Flexible Algorithm
- Task 6: Configuring and Verifying VRF Using Latency Metric

Discovery 15: Configure and Verify Model-Driven Telemetry

- Configure and verify Model-Driven Telemetry, and verify the streamed data on the Telemetry Collector Stack
- Task 1: Configure and Verify the MDT Destination Group
- Task 2: Configure and Verify the MDT Sensor Groups for Dial-Out
- Task 3: Configure and Verify the MDT Subscription for Dial-Out
- Task 4: Verify the Streamed Data on the Grafana

Discovery 16: Configure and Verify Devices by Using Model-Driven Programmability

- Retrieve and edit device configuration by using model-driven programmability
- Task 1: Configure NETCONF YANG Agent
- Task 2: Retrieve a Complete Running Configuration by Using Model-Driven Programmability
- Task 3: Retrieve Partial Configurations by Using Subtree Filtering
- Task 4: Edit Device Configuration by Using Model-Driven Programmability
- Task 5: Configure and Verify On-the-Box Automation

Discovery 17: Configure and Verify Application Hosting Within a Docker Container

- Run the iPerfS in a Docker container and verify the application hosted in the Docker container
- Task 1: Deploy iPerfS in a Docker Container
- Task 2: Verify the Application Hosted in the Docker Container