



## Cisco Aggregation Services Router 9000 Series Essentials (ASR9KE)

### COURSE OVERVIEW

The Cisco Aggregation Services Router 9000 Series Essentials (ASR9KE) v6.0 course introduces you to the features and functions of the Cisco® Aggregation Services Router (ASR) 9000 Series platforms. Through a combination of lecture and hands-on labs, you will gain an understanding of all major aspects of the platform, including hardware, Layer 2 and Layer 3 services, routing protocols including Segment Routing, Layer 2 and Layer 3 multicast, quality of service (QoS) features, and network virtualization. The course investigates Cisco Internetworking Operating System (IOS) XR 64-Bit Linux-based feature parity in the environment, as well as how to install Cisco IOS® XR 64-Bit software packages.

### WHO WILL BENEFIT FROM THIS COURSE?

This course is designed for technical professionals who need to know how to deploy Cisco ASR 9000 Series routers in their network environment. The primary audience for this course includes:

- System engineers
- Technical support personnel
- Channel partners, resellers

### PREREQUISITES

Before attending this course, you should have the following knowledge and skills:

- Basic IOS XR 64-Bit Software configuration commands
- 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 or multicast configuration experience
- Experience troubleshooting Cisco routers in a large network environment

### COURSE OBJECTIVES

- Major features and benefits of a Cisco ASR 9000 Series router
- Major features and benefits of the Cisco IOS XR Software operating system
- Data flow through the Cisco ASR 9000 Series router
- Configure the Cisco ASR 9000, back out of configuration changes, and restore older versions of the configuration
- Install the Cisco IOS XR operating system, package information envelopes (PIEs), and software maintenance updates (SMUs)
- Enable multicast routing on a Cisco ASR 9000 Series router
- Configure Multiprotocol Label Switch-Traffic Engineering (MPLS-TE) on a Cisco ASR 9000 Series router
- Configure Layer 3 VPN services



- Configure Ethernet link bundles
- Configure local E-Line L2VPN
- Configure Ethernet over MPLS E-Line L2VPN
- Configure EoMPLS with pseudowire backup
- Configure local E-LAN L2VPN
- Configure link-based Ethernet operations, administration, and maintenance (E-OAM)
- Configure virtual private LAN service (VPLS) L2VPN
- Configure VPLS with Border Gateway Protocol (BGP) autodiscovery
- Configure service-based connectivity fault management (CFM)
- Multiple Spanning Tree-Access Gateway (MST-AG)
- Configure Layer 2 multicast features
- Basic QoS implementation
- How to configure and verify network virtualization (nV) on the ASR 9000 series

## **COURSE OUTLINE**

### Cisco ASR 9000 Series Hardware

- Examining the Cisco ASR 9000 Series Chassis
- Examining the Cisco ASR 9000 Series Architecture
- Examining the Route Switch Processor/ Route Processor (RSP/RP) Functions and Fabric Architecture
- Examining the Cisco ASR 9000 Series Line Card
- Examining the Cisco ASR 9000 Power Subsystems

### Cisco IOS XR 64-Bit Software Architecture and Linux Fundamentals

- Cisco IOS XR 64-Bit Software Fundamentals
- Cisco ASR 9000 IOS XR 64-Bit vs. 32-Bit
- Exploring Linux Fundamentals

### Cisco IOS XR 64-Bit Software Installation

- Examining Resource Allocations and Media Mappings
- Migrating to Cisco IOS XR 64-Bit Software
- Performing Disaster Recovery
- Installing Software Packages

### Cisco IOS XR 64-Bit Software Configuration Basics

- Configuring Cisco IOS XR 64-Bit Basic Operations
- Cisco IOS XR 64-Bit Initial Configuration
- Reviewing the Configuration

### Cisco IOS XR 64-Bit Software Routing Protocols

- Exploring Intermediate System to Intermediate System (IS-IS)
- Exploring OSPF
- Exploring BGP
- Exploring Routing Protocol for LLN



## Multicast Routing

- Exploring Multicast Routing
- Exploring Protocol Independent Multicast (PIM)

## Cisco Multiprotocol Label Switching

- Examining the MPLS Forwarding Infrastructure
- Implementing the MPLS Label Distribution Protocol (LDP)

## Cisco IOS XR 64-Bit Segment Routing

- Segment Routing Concepts
- Interior Gateway Protocol Segment Routing (IGP SR) Control Plane Overview
- Prefix and Adjacency Segment IDs (SIDs)
- SR IS-IS Multi-Level and OSPF Multi-Area
- IS-IS SR Configuration and Verification
- OSPF SR Configuration and Verification

## Layer 3 VPNs

- Examining L3VPNs
- Exploring L3VPN Control and Data Flow
- Configuring L3VPNs
- Verifying the L3VPN Operation

## Cisco ASR 9000 Layer 2 Architecture

- Examining Carrier Ethernet and Flexible Ethernet Edge
- Comparing Layer 2 and Layer 3 VPNs
- Examining the ASR 9000 Layer 2 Infrastructure and Ethernet Flow Points (EFPs)
- Layers 2 and 3 Coexistence and VLAN Tag Manipulation
- Exploring the Layer 2 Network Infrastructure

## Point-to-Point Layer 2 Services

- Point-to-Point Alternating Current-Alternating Current (AC-AC) and Attachment Circuit Redundancy
- Point-to-Point AC-Pseudowire (PW) Cross-Connect
- Examining Pseudowire Redundancy and Resiliency

## Layer 2 Multicast

- Examining the Cisco ASR 9000 Series Multicast
- Implementing Multicast

## Quality of Service

- QoS Basics and the Modular QoS CLI (MQC) Mode
- Layer 2 QoS Example

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