

# Cisco Aggregation Services Router 9000 Series Essentials (ASR9KE) v6.1

## What you'll learn in this course

The **Cisco Aggregation Services Router 9000 Series Essentials (ASR9KE) v6.1** 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.

## Course duration

- Instructor-led training: 4 days in the classroom with hands-on lab practice
- Virtual instructor-led training: 5 days of web-based classes with hands-on lab practice
- E-learning: Equivalent of 4 days of video instruction with hands-on lab practice

## How you'll benefit

This course will help you:

- Understand the essential features and functions of the ASR 9000 Series routers running Cisco IOS XR 64-Bit software
- Practice Cisco IOS XR 64-Bit configurations on the ASR 9900 Series router in lab exercises
- Configure Cisco ASR 9900 configuration changes and restore older versions of the configuration
- Install the Cisco IOS XR 64-Bit Software operating system, Package Information Envelopes (PIEs), and Software Maintenance Updates (SMUs)
- Understand data flow through the Cisco ASR 9000 and ASR 9900 Series router

## Who should enroll

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

## How to enroll

### E-learning

- To buy a single e-learning license, visit the [Cisco Learning Network Store](#).
- For more than one license, or a learning library subscription, contact us at [learning-bdm@cisco.com](mailto:learning-bdm@cisco.com).

### Instructor-led training

- Find a class at the [Cisco Learning Locator](#).
- Arrange training at your location through [Cisco Private Group Training](#).

## Technology areas

- Routing and switching
- Service provider

## Course details

### Objectives

After taking this course, you should be able to:

- List and describe the major features and benefits of a Cisco ASR 9000 Series router
- List and describe the major features and benefits of the Cisco 64-Bit IOS XR operating system
- Understand data flow through the Cisco ASR 9000 Series router
- Configure Cisco ASR 9000, back out of configuration changes, and restore older versions of the configuration
- Install the Cisco IOS XR 64-Bit Software operating system, package information envelopes, and software maintenance updates
- Enable multicast routing on a Cisco ASR 9900 Series router
- Configure Layer 3 VPN services
- Configure Ethernet link bundles
- Configure local Ethernet Line (E-Line) Layer 2 VPN (L2VPN)
- Configure Ethernet over Multiprotocol Label Switching (EoMPLS) E-Line L2VPN
- Configure EoMPLS with pseudowire backup
- Configure local Ethernet LAN (E-LAN) L2VPN
- Describe Virtual Private LAN Service (VPLS) L2VPN
- Describe VPLS with Border Gateway Protocol (BGP) autodiscovery
- Configure service-based Connectivity Fault Management (CFM)
- Configure Layer 2 multicast features
- Describe basic QoS implementation
- Describe how to configure and verify network Virtualization (nV) on the ASR 9000 series

## 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

## Outline

- Cisco ASR 9000 Series Hardware
  - Examining the Cisco ASR 9000 Series Chassis
  - Examining the Cisco ASR 9000 Series Architecture
- 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
- Cisco IOS XR 64-Bit Software Installation
  - Examining Resource Allocations and Media Mappings
  - Migrating to Cisco IOS XR 64-Bit Software
- Cisco IOS XR 64-Bit Software Configuration Basics
  - Configuring Cisco IOS XR 64-Bit Basic Operations
  - Cisco IOS XR 64-Bit Initial Configuration
- Cisco IOS XR 64-Bit Software Routing Protocols
  - Exploring Intermediate System to Intermediate System (IS-IS)
  - Exploring OSPF

- 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
- Layer 3 VPNs
  - Examining L3VPNs
  - Exploring L3VPN Control and Data Flow
- Cisco ASR 9000 Layer 2 Architecture
  - Examining Carrier Ethernet and Flexible Ethernet Edge
  - Comparing Layer 2 and Layer 3 VPNs
- 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
- 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

## Lab outline

- ASR 9904 Hardware Discovery Lab
- Device Discovery and Initial Configuration
- Installing Cisco IOS XR 64-Bit Software
- Cisco IOS XR 64-Bit Software Operations
- Configuring IS-IS Routing
- Configuring OSPF Routing
- Configuring Internal BGP (iBGP) Routing
- IPv4 Multicast Configuration
- Configuring Multiprotocol Label Switching
- Configuring and Verifying IGP Segment Routing
- Configuring Layer 3 Virtual Private Network
- Local E-Line Service
- EoMPLS Service




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