

12 Days

# Cisco CCIE Routing and Switching

The CCIE Routing and Switching (Cisco Certified Internetwork Expert) training certifies a network engineer with a proven ability to plan, operate and Troubleshooting complex, converged network infrastructure.

The Cisco CCIE Routing and Switching written exam validates the potential of a participant to configure, validate, and troubleshoot complex enterprise network infrastructures, and understand the interoperations of infrastructure components.

## **Course Details**

## **Course Outline**

#### **1.0 Network Principles**

#### 1.1 Network theory

- Describing basic software architecture differences between IOS and IOS XE
- Identifying Cisco express forwarding concepts
- Explaining general network challenges
- Explaining IP operations
- Explaining TCP operations
- Explaining UDP operations

#### **1.2 Network Implementation and operation**

• Evaluating proposed changes to a network

#### **1.3 Network Troubleshooting**

- Use IOS Troubleshooting tools
- Applying Troubleshooting methodologies
- Interpreting packet capture

#### 2.0 Layer 2 Technologies

2.1 LAN switching technologies

- Implementing and Troubleshooting switch administration
- Implementing and Troubleshooting layer 2 protocols
- Implementing and Troubleshooting VLAN
- Implementing and Troubleshooting trunking
- Implementing and Troubleshooting EtherChannel
- Implementing and Troubleshooting spanning?tree
- Implementing and Troubleshooting other LAN switching technologies
- Describing chassis virtualization and aggregation technologies
- Describing spanning?tree concepts

#### 2.2 Layer 2 multicast

- Implementing and Troubleshooting IGMP
- Explaining MLD
- Explaining PIM snooping

#### 2.3 Layer 2 WAN circuit technologies

- Implementing and Troubleshooting HDLC
- Implementing and Troubleshooting PPP
- Describing WAN rate?based Ethernet circuits

#### 3.0 Layer 3 Technologies

#### 3.1 Addressing technologies

- Identifying, Implementing and Troubleshooting IPv4 addressing and subnetting
- Identifying, Implementing and Troubleshooting IPv6 addressing and subnetting

#### 3.2 Layer 3 multicast

- Troubleshooting reverse path forwarding
- Implementing and Troubleshooting IPv4 protocol independent multicast
- Implementing and Troubleshooting multicast source discovery protocol
- Describing IPv6 multicast 3.2.d (i) IPv6 multicast

#### 3.3 Fundamental routing concepts

- Implementing and Troubleshooting static routing
- Implementing and Troubleshooting default routing
- Comparing routing protocol types
- Implementing, Optimizing and Troubleshooting administrative distance
- Implementing and Troubleshooting passive interface
- Implementing and Troubleshooting VRF lite
- Implementing, Optimizing and Troubleshooting filtering with any routing protocol
- Implementing, Optimizing and Troubleshooting redistribution between any routing protocol

- Implementing, Optimizing and Troubleshooting manual and auto summarization with any routing protocol
- Implementing, Optimizing and Troubleshooting policy?based routing
- · Identifying and Troubleshooting sub?optimal routing
- Implementing and Troubleshooting bidirectional forwarding detection
- Implementing and Troubleshooting loop prevention mechanisms
- Implementing and Troubleshooting routing protocol authentication

#### 3.4 RIP (v2 and v6)

- Implementing and Troubleshooting RIPv2
- Describing RIPv6 (RIPng)

#### 3.5 EIGRP (for IPv4 and IPv6)

- Describing packet types
- Implementing and Troubleshooting neighbor relationship
- Implementing and Troubleshooting loop free path selection
- Implementing and Troubleshooting operations, EIGRP stub & load?balancing
- Implementing EIGRP (multi?address) named mode
- · Implementing, Troubleshooting and Optimizing EIGRP convergence and scalability

#### 3.6 OSPF (v2 and v3)

- Describing packet types
- Implementing and Troubleshooting neighbor relationship
- Implementing and Troubleshooting OSPFv3 address?family support
- · Implementing and Troubleshooting network types, area types and router types, path preference & operations
- · Implementing, Troubleshooting and Optimizing OSPF convergence and scalability

#### 3.7 BGP

- Describing, Implementing and Troubleshooting peer relationships
- Implementing and Troubleshooting IBGP and EBGP
- Explaining attributes and best?path selection
- Implementing, Optimizing and Troubleshooting routing policies
- · Implementing and Troubleshooting scalability
- Implementing and Troubleshooting multiprotocol BGP
- Implementing and Troubleshooting AS path manipulations

#### 3.8 ISIS (for IPv4 and IPv6)

- Describing basic ISIS network
- Describing neighbor relationship
- · Describing network types, levels and router types
- Describing operations

Describing optimization features

#### 4.0 VPN Technologies

#### 4.1 Tunneling

- Implementing and Troubleshooting MPLS operations
- Implementing and Troubleshooting basic MPLS L3VPN+
- Implementing and Troubleshooting encapsulation
- Implementing and Troubleshooting DMVPN (single hub)
- Describing IPv6 tunneling techniques
- Describing basic layer 2 VPN —wireline
- Describing basic L2VPN LAN services

#### 4.2 Encryption

- Implementing and Troubleshooting IPsec with preshared key
- Describing GET VPN

#### 5.0 Infrastructure Security

#### 5.1 Device security

- Implementing and Troubleshooting IOS AAA using local database
- Implementing and Troubleshooting device access control
- Implementing and Troubleshooting control plane policing
- Describing device security using IOS AAA with TACACS+ and RADIUS

#### 5.2 Network security

- · Implementing and Troubleshooting switch security features
- Implementing and Troubleshooting router security features
- Implementing and Troubleshooting IPv6 first hop security
- Describing 802.1x

#### 6.0 Infrastructure Services

#### 6.1 System management

- Implementing and Troubleshooting device management
- Implementing and Troubleshooting SNMP
- Implementing and Troubleshooting logging

#### 6.2 Quality of service

- Implementing and Troubleshooting end?to?end QoS
- Implementing, Optimizing and Troubleshooting QoS using MQC
- Describing layer 2 QoS

#### 6.3 Network services

- Implementing and Troubleshooting first?hop redundancy protocols
- Implementing and Troubleshooting network time protocol
- Implementing and Troubleshooting IPv4 and IPv6 DHCP
- Implementing and Troubleshooting IPv4 network address translation
- Describing IPv6 network address translation

#### 6.4 Network optimization

- Implementing and Troubleshooting IP SLA
- Implementing and Troubleshooting tracking object
- Implementing and Troubleshooting netflow
- Implementing and Troubleshooting embedded event manager
- Identifying performance routing (PfR)

#### 7.0 Evolving Technologies

#### 7.1 Cloud

- · Comparing and contrasting Cloud deployment models
- Describing Cloud Implementations and operations

#### 7.2 Network Programmability (SDN)

- Describing functional elements of network programmability (SDN) and how they interact
- · Describing aspects ofx virtualization and automation in network environments

#### 7.3 Internet of Things (IoT)

· Describe architectural framework and deployment considerations for Internet of Things

### Pre Requisite

- There are no specific prerequisites for CCIE certification.
- Instead, candidates must first pass a written exam and then the corresponding hands-on lab exam.
- Also, a candidate is expected to possess a thorough understanding of the exam topics and strongly encouraged to have three to five years of job experience before attempting certification

### **Exams**

CCIE Routing and Switching Written Exam [400-101]

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