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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