CISCO CCENT Routing & Switching ICND1 Day ATLANTA SPECIAL

Length: 5 days
Format: Classroom
Time: Day

About This Course

As Enterprises migrate toward controller based architectures, the role and skills required of a core network engineer are evolving and more vital than ever. To prepare for this network transition, the CCNA Routing and Switching certification will not only prepare you with the knowledge of foundational technologies, but ensure you stay relevant with skill sets needed for the adoption of next generation technologies.

Required Exams

Interconnecting Cisco Networking Devices Part 1 (ICND1) exam 100-105

Audience Profile

The CCNA Routing and Switching certification is for IT professionals looking to expand upon and document their existing skills in CISCO technology. This course is intended for students seeking to earn their CCNA Routing and Switching certification and who need an expert instructor to guide them throughout the training and exam preparation process.

Course Objectives

The CCNA Routing and Switching boot camp helps you master the following topics:

* Networking fundamentals
* Implementing basic Ethernet LANs
* Ethernet LANs: design, VLANs, and troubleshooting
* IPv4 addressing and subnetting
* Implementing IPv4
* IPv4 design and troubleshooting
* IPv4 services: ACLs and NAT
* IPv6
* Network device management

Outline

Part I Networking Fundamentals

Chapter 1 Introduction to TCP/IP Networking

Perspectives on Networking

TCP/IP Networking Model

* History Leading to TCP/IP
* Overview of the TCP/IP Networking Model
* TCP/IP Application Layer
* TCP/IP Transport Layer
* TCP/IP Network Layer
* TCP/IP Link Layer (Data Link Plus Physical)
* TCP/IP Model and Terminology

OSI Networking Model

* Comparing OSI and TCP/IP * Describing Protocols by Referencing the OSI Layers * OSI Layers and Their Functions * OSI Layering Concepts and Benefits * OSI Encapsulation Terminology

Chapter 2 Fundamentals of Ethernet LANs

An Overview of LANs

* Typical SOHO LANs * Typical Enterprise LANs * The Variety of Ethernet Physical Layer Standards * Consistent Behavior over All Links Using the Ethernet Data Link Layer

Building Physical Ethernet Networks with UTP

* Transmitting Data Using Twisted Pairs
* Breaking Down a UTP Ethernet Link
* UTP Cabling Pinouts for 10BASE-T and 100BASE-T
* UTP Cabling Pinouts for 1000BASE-T

Sending Data in Ethernet Networks * Ethernet Data-Link Protocols
* Sending Ethernet Frames with Switches and Hubs

Chapter 3 Fundamentals of WANs

Leased-Line WANs

* Positioning Leased Lines with LANs and Routers
* Physical Details of Leased Lines
* Data-Link Details of Leased Lines

Ethernet as a WAN Technology

* Ethernet WANs that Create a Layer 2 Service
* How Routers Route IP Packets Using Ethernet Emulation

Accessing the Internet

* The Internet as a Large WAN
* Internet Access (WAN) Links
* Digital Subscriber Line
* Cable Internet

Chapter 4 Fundamentals of IPv4 Addressing and Routing

Overview of Network Layer Functions

* Network Layer Routing (Forwarding) Logic
* How Network Layer Routing Uses LANs and WANs
* IP Addressing and How Addressing Helps IP Routing
* Routing Protocols

IPv4 Addressing

* Rules for IP Addresses
* Rules for Grouping IP Addresses
* IP Subnetting

IPv4 Routing

* IPv4 Host Routing
* Router Forwarding Decisions and the IP Routing Table

IPv4 Routing Protocols

Other Network Layer Features

* Using Names and the Domain Name System
* The Address Resolution Protocol
* ICMP Echo and the ping Command

Chapter 5 Fundamentals of TCP/IP Transport and Applications

TCP/IP Layer 4 Protocols: TCP and UDP

* Transmission Control Protocol
* User Datagram Protocol

TCP/IP Applications

* Uniform Resource Identifiers
* Finding the Web Server Using DNS
* Transferring Files with HTTP
* How the Receiving Host Identifies the Correct Receiving Application

Part II Implementing Basic Ethernet LANs

Chapter 6 Using the Command-Line Interface

Accessing the Cisco Catalyst Switch CLI

* Cisco Catalyst Switches
* Accessing the Cisco IOS CLI
* CLI Help Features
* The debug and show Commands

Configuring Cisco IOS Software

* Configuration Submodes and Contexts
* Storing Switch Configuration Files
* Copying and Erasing Configuration Files

Chapter 7 Analyzing Ethernet LAN Switching

LAN Switching Concepts

* Overview of Switching Logic
* Forwarding Known Unicast Frames
* Learning MAC Addresses
* Flooding Unknown Unicast and Broadcast Frames
* Avoiding Loops Using Spanning Tree Protocol
* LAN Switching Summary

Verifying and Analyzing Ethernet Switching

* Demonstrating MAC Learning
* Switch Interfaces
* Finding Entries in the MAC Address Table
* Managing the MAC Address Table (Aging, Clearing)
* MAC Address Tables with Multiple Switches

Chapter 8 Configuring Basic Switch Management

Securing the Switch CLI

* Securing User Mode and Privileged Mode with Simple Passwords
* Securing User Mode Access with Local Usernames and Passwords
* Securing User Mode Access with External Authentication Servers
* Securing Remote Access with Secure Shell

Enabling IPv4 for Remote Access

* Host and Switch IP Settings
* Configuring IPv4 on a Switch
* Configuring a Switch to Learn Its IP Address with DHCP
* Verifying IPv4 on a Switch

Miscellaneous Settings Useful in Lab

* History Buffer Commands
* The logging synchronous, exec-timeout, and no ip domain-lookup Commands

Chapter 9 Configuring Switch Interfaces

Configuring Switch Interfaces

* Configuring Speed, Duplex, and Description
* Configuring Multiple Interfaces with the interface range Command
* Administratively Controlling Interface State with shutdown
* Removing Configuration with the no Command
* Autonegotiation

Port Security

* Configuring Port Security
* Verifying Port Security
* Port Security Violation Actions

* Port Security MAC Addresses as Static and Secure but Not Dynamic

Part III Ethernet LANs: Design, VLANs, and Troubleshooting

Chapter 10 Analyzing Ethernet LAN Designs

Analyzing Collision Domains and Broadcast Domains

* Ethernet Collision Domains
* Ethernet Broadcast Domains

Analyzing Campus LAN Topologies

* Two-Tier Campus Design (Collapsed Core)
* Three-Tier Campus Design (Core)
* Topology Design Terminology

Analyzing LAN Physical Standard Choices

* Ethernet Standards
* Choosing the Right Ethernet Standard for Each Link
* Wireless LANs Combined with Wired Ethernet

Chapter 11 Implementing Ethernet Virtual LANs

Virtual LAN Concepts

* Creating Multiswitch VLANs Using Trunking
* Forwarding Data Between VLANs

VLAN and VLAN Trunking Configuration and Verification

* Creating VLANs and Assigning Access VLANs to an Interface
* VLAN Trunking Protocol
* VLAN Trunking Configuration
* Implementing Interfaces Connected to Phones

Chapter 12 Troubleshooting Ethernet LANs

Perspectives on Applying Troubleshooting Methodologies

* Troubleshooting on the Exams
* A Deeper Look at Problem Isolation

* Troubleshooting as Covered in This Book

Analyzing Switch Interface Status and Statistics

* Interface Status Codes and Reasons for Nonworking States
* Interface Speed and Duplex Issues
* Common Layer 1 Problems on Working Interfaces

Predicting Where Switches Will Forward Frames

* Predicting the Contents of the MAC Address Table
* Analyzing the Forwarding Path

Analyzing Port Security Operations on an Interface

* Troubleshooting Shutdown Mode and Err-disabled Recovery
* Troubleshooting Restrict and Protect Modes

Analyzing VLANs and VLAN Trunks

* Ensuring That the Right Access Interfaces Are in the Right VLANs
* Access VLANs Not Being Defined
* Access VLANs Being Disabled
* Mismatched Trunking Operational States

Part IV IP Version 4 Addressing and Subnetting

Chapter 13 Perspectives on IPv4 Subnetting

Introduction to Subnetting

* Subnetting Defined Through a Simple Example
* Operational View Versus Design View of Subnetting

Analyze Subnetting and Addressing Needs

* Rules About Which Hosts Are in Which Subnet
* Determining the Number of Subnets
* Determining the Number of Hosts per Subnet
* One Size Subnet Fits All–Or Not

Make Design Choices

* Choose a Classful Network
* Choose the Mask
* Build a List of All Subnets

Plan the Implementation

* Assigning Subnets to Different Locations
* Choose Static and Dynamic Ranges per Subnet

Chapter 14 Analyzing Classful IPv4 Networks

Classful Network Concepts

* IPv4 Network Classes and Related Facts
* Number of Hosts per Network
* Deriving the Network ID and Related Numbers
* Unusual Network IDs and Network Broadcast Addresses

Practice with Classful Networks

* Practice Deriving Key Facts Based on an IP Address
* Practice Remembering the Details of Address Classes

Chapter 15 Analyzing Subnet Masks

Subnet Mask Conversion

* Three Mask Formats
* Converting Between Binary and Prefix Masks
* Converting Between Binary and DDN Masks
* Converting Between Prefix and DDN Masks
* Practice Converting Subnet Masks

Identifying Subnet Design Choices Using Masks

* Masks Divide the Subnet’s Addresses into Two Parts
* Masks and Class Divide Addresses into Three Parts
* Classless and Classful Addressing
* Calculations Based on the IPv4 Address Format
* Practice Analyzing Subnet Masks

Chapter 16 Analyzing Existing Subnets

Defining a Subnet

* An Example with Network 172.16.0.0 and Four Subnets
* Subnet ID Concepts
* Subnet Broadcast Address
* Range of Usable Addresses

Analyzing Existing Subnets: Binary

* Finding the Subnet ID: Binary
* Finding the Subnet Broadcast Address: Binary
* Binary Practice Problems
* Shortcut for the Binary Process
* Brief Note About Boolean Math
* Finding the Range of Addresses

Analyzing Existing Subnets: Decimal

* Analysis with Easy Masks
* Predictability in the Interesting Octet
* Finding the Subnet ID: Difficult Masks
* Finding the Subnet Broadcast Address: Difficult Masks

Practice Analyzing Existing Subnets

* A Choice: Memorize or Calculate

Part V Implementing IPv4

Chapter 17 Operating Cisco Routers

Installing Cisco Routers

* Installing Enterprise Routers
* Installing Internet Access Routers

Enabling IPv4 Support on Cisco Router Interfaces

* Accessing the Router CLI

Router Interfaces

* Interface Status Codes
* Router Interface IP Addresses
* Bandwidth and Clock Rate on Serial Interfaces

Router Auxiliary Port

Chapter 18 Configuring IPv4 Addresses and Static Routes

IP Routing

* IPv4 Routing Process Reference
* An Example of IP Routing

Configuring IP Addresses and Connected Routes

* Connected Routes and the ip address Command
* The ARP Table on a Cisco Router
* Routing Between Subnets on VLANs

Configuring Static Routes

* Static Route Configuration
* Static Host Routes
* Static Routes with No Competing Routes
* Static Routes with Competing Routes
* Static Default Routes
* Troubleshooting Static Routes

Chapter 19 Learning IPv4 Routes with RIPv2

RIP and Routing Protocol Concepts

* History of Interior Gateway Protocols
* Comparing IGPs
* Distance Vector Basics
* Summarizing RIPv2 Features

Core RIPv2 Configuration and Verification

* Configuring Core RIPv2 Features
* RIPv2 Verification

Optional RIPv2 Configuration and Verification

* Controlling RIP Updates with the passive-interface Command
* Supporting Multiple Equal-Cost Routes with Maximum Paths
* Understanding Autosummarization and Discontiguous Classful Networks
* Verifying Optional RIP Features
* RIPv2 Default Routes

Troubleshooting RIPv2

* Symptoms with Missing and Incorrect network Commands
* Issues Related to Passive Interfaces
* Issues Related to auto-summary
* RIP Issues Caused by Other Router Features
* Summary of RIP Troubleshooting Issues

Chapter 20 DHCP and IP Networking on Hosts

Implementing and Troubleshooting DHCP

* DHCP Concepts
* DHCP Server Configuration on Routers
* IOS DHCP Server Verification
* Troubleshooting DHCP Services

Verifying Host IPv4 Settings

* IP Address and Mask Configuration
* Name Resolution with DNS
* Default Routers

IPv4 Address Types

* Review of Unicast (Class A, B, and C) IP Addresses
* IP Broadcast Addresses
* IPv4 Multicast Addresses (Class D Addresses)
* Comparing and Contrasting IP Address Types

Part VI IPv4 Design and Troubleshooting

Chapter 21 Subnet Design

Choosing the Mask(s) to Meet Requirements

* Review: Choosing the Minimum Number of Subnet and Host Bits

* No Masks Meet Requirements
* One Mask Meets Requirements
* Multiple Masks Meet Requirements
* The Formal Process
* Practice Choosing Subnet Masks

Finding All Subnet IDs

* First Subnet ID: The Zero Subnet
* Finding the Pattern Using the Magic Number
* A Formal Process with Less Than 8 Subnet Bits
* Finding All Subnets with Exactly 8 Subnet Bits
* Finding All Subnets with More Than 8 Subnet Bits
* Practice Finding All Subnet IDs

Chapter 22 Variable-Length Subnet Masks

VLSM Concepts and Configuration

* Classless and Classful Routing Protocols
* VLSM Configuration and Verification

Finding VLSM Overlaps

* Designing Subnetting Plans with VLSM
* An Example of Finding a VLSM Overlap
* Practice Finding VLSM Overlaps

Adding a New Subnet to an Existing VLSM Design

* An Example of Adding a New VLSM Subnet

Chapter 23 IPv4 Troubleshooting Tools

Problem Isolation Using the ping Command

* Ping Command Basics
* Strategies and Results When Testing with the ping Command
* Using Ping with Names and with IP Addresses

Problem Isolation Using the traceroute Command

* traceroute Basics

* Using traceroute to Isolate the Problem to Two Routers

Telnet and SSH

* Common Reasons to Use the IOS Telnet and SSH Client
* IOS Telnet and SSH Examples

Chapter 24 Troubleshooting IPv4 Routing

Problems Between the Host and the Default Router

* Root Causes Based on a Host's IPv4 Settings
* Root Causes Based on the Default Router's Configuration

Problems with Routing Packets Between Routers

* IP Forwarding by Matching the Most Specific Route
* Routing Problems Caused by Incorrect Addressing Plans
* Pointers to Related Troubleshooting Topics

Part VII IPv4 Services: ACLs and NAT

Chapter 25 Basic IPv4 Access Control Lists

IPv4 Access Control List Basics

* ACL Location and Direction
* Matching Packets
* Taking Action When a Match Occurs
* Types of IP ACLs

Standard Numbered IPv4 ACLs

* List Logic with IP ACLs
* Matching Logic and Command Syntax
* Implementing Standard IP ACLs
* Troubleshooting and Verification Tips

Practice Applying Standard IP ACLs

* Practice Building access-list Commands
* Reverse Engineering from ACL to Address Range

Chapter 26 Advanced IPv4 Access Control Lists

Extended Numbered IP Access Control Lists

* Matching the Protocol, Source IP, and Destination IP
* Matching TCP and UDP Port Numbers
* Extended IP ACL Configuration
* Practice Building access-list Commands

Named ACLs and ACL Editing

* Named IP Access Lists
* Editing ACLs Using Sequence Numbers
* Numbered ACL Configuration Versus Named ACL Configuration
* ACL Implementation Considerations

Troubleshooting with IPv4 ACLs

* Analyzing ACL Behavior in a Network
* ACL Interactions with Router-Generated Packets

Chapter 27 Network Address Translation

Perspectives on IPv4 Address Scalability

* CIDR
* Private Addressing

Network Address Translation Concepts

* Static NAT
* Dynamic NAT
* Overloading NAT with Port Address Translation

NAT Configuration and Troubleshooting

* Static NAT Configuration
* Dynamic NAT Configuration
* Dynamic NAT Verification
* NAT Overload (PAT) Configuration
* NAT Troubleshooting

Part VIII IP Version 6

Chapter 28 Fundamentals of IP Version 6

* Introduction to IPv6
* IPv6 Addressing Formats and Conventions

Chapter 29 IPv6 Addressing and Subnetting

Global Unicast Addressing Concepts

* A Brief Review of Public and Private IPv4 Addresses
* The IPv6 Global Routing Prefix
* Address Ranges for Global Unicast Addresses
* IPv6 Subnetting Using Global Unicast Addresses
* Assigning Addresses to Hosts in a Subnet

Unique Local Unicast Addresses

* Subnetting with Unique Local IPv6 Addresses
* The Need for Globally Unique Local Addresses

Chapter 30 Implementing IPv6 Addressing on Routers

Implementing Unicast IPv6 Addresses on Routers

* Static Unicast Address Configuration
* Dynamic Unicast Address Configuration

Special Addresses Used by Routers

* Link-Local Addresses
* IPv6 Multicast Addresses
* Miscellaneous IPv6 Addresses
* IPv6 Addressing Configuration Summary

Chapter 31 Implementing IPv6 Addressing on Hosts

The Neighbor Discovery Protocol

* Discovering Routers with NDP RS and RA
* Discovering Addressing Info for SLAAC with NDP RS and RA
* Discovering Neighbor Link Addresses with NDP NS and NA
* Discovering Duplicate Addresses Using NDP NS and NA

* NDP Summary

Dynamic Configuration of Host IPv6 Settings

* Dynamic Configuration Using Stateful DHCP and NDP
* Using Stateless Address Auto Configuration

Troubleshooting IPv6 Addressing

* Verifying Host IPv6 Connectivity from Hosts
* Verifying Host Connectivity from Nearby Routers

Chapter 32 Implementing IPv6 Routing Connected and Local IPv6 Routes

* Rules for Connected and Local Routes
* Example of Connected IPv6 Routes
* Examples of Local IPv6 Routes

Static IPv6 Routes

* Static Routes Using the Outgoing Interface
* Static Routes Using Next-Hop IPv6 Address
* Static Default Routes
* Static IPv6 Host Routes
* Floating Static IPv6 Routes
* Default Routes with SLAAC on Router Interfaces
* Troubleshooting Static IPv6 Routes

Part IX Network Device Management Chapter 33 Device Management Protocols System Message Logging (Syslog)

* Sending Messages in Real Time to Current Users
* Storing Log Messages for Later Review
* Log Message Format
* Log Message Severity Levels
* Configuring and Verifying System Logging
* The debug Command and Log Messages

Network Time Protocol (NTP)

* Setting the Time and Timezone
* Implementing NTP Clients, Servers, and Client/Server Mode
* NTP Using a Loopback Interface for Better Availability

Analyzing Topology Using CDP and LLDP

* Examining Information Learned by CDP
* Configuring and Verifying CDP Itself
* Implementing Link Layer Discovery Protocol

Chapter 34 Device Security Features

Securing IOS Passwords

* Encrypting Older IOS Passwords with service password-encryption
* Encoding the Enable Passwords with Hashes
* Hiding the Passwords for Local Usernames

Cisco Device Hardening

* Configuring Login Banners
* Securing Unused Switch Interfaces
* Controlling Telnet and SSH Access with ACLs
* Firewalls

Chapter 35 Managing IOS Files

Managing Cisco IOS Images and Upgrades

* The IOS File System
* Upgrading IOS Images
* The Cisco IOS Software Boot Sequence

Password Recovery

* The General Ideas Behind Cisco Password Recovery/Reset
* A Specific Password Reset Example

Managing Configuration Files

* Copying and Erasing Configuration Files
* Initial Configuration (Setup Mode)

Chapter 36 IOS License Management

IOS Packaging

* IOS Images per Model, Series, and per Software Version/Release
  * Original Packaging: One IOS Image per Feature Set Combination
  * New IOS Packaging: One Universal Image with All Feature Sets

IOS Software Activation with Universal Images

* The Future: Cisco ONE Licensing

Managing Software Activation with Cisco License Manager

* Manually Activating Software Using Licenses
  * Example of Manually Activating a License
  * Right-to-Use Licenses