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Learning Style: On Demand

Technology: Cisco

Difficulty: Intermediate

Course Duration: 13 Hours

Implementing and Administering Cisco Solutions (200-301 CCNA) + Certification Exam Bundle



This course is for professionals preparing for the 200-301 CCNA certification exam. The course also includes the official exam voucher.

About this Course:

The Implementing and Administering Cisco Solutions (CCNA) v1.0 course gives you a broad range of fundamental knowledge for all IT careers. Through a

combination of lecture, hands-on labs, and self-study, you will learn how to install, operate, configure, and verify basic IPv4 and IPv6 networks. The course covers configuring network components such as switches, routers, and wireless LAN controllers; managing network devices; and identifying basic security threats. The course also gives you a foundation in network programmability, automation, and software-defined networking.

This course helps you prepare to take the 200-301 Cisco® Certified Network Associate (CCNA®) exam. By passing this one exam, you earn CCNA certification.

Course Objectives:

After taking this course, you should be able to:

- Identify the components of a computer network and describe their basic characteristics
- Understand the model of host-to-host communication
- Describe the features and functions of the Cisco Internetwork Operating System (IOS®) software
- Describe LANs and the role of switches within LANs
- Describe Ethernet as the network access layer of TCP/IP and describe the operation of switches
- Install a switch and perform the initial configuration
- Describe the TCP/IP Internet layer, IPv4, its addressing scheme, and subnetting
- Describe the TCP/IP Transport layer and Application layer
- Explore functions of routing
- Implement basic configuration on a Cisco router
- Explain host-to-host communications across switches and routers
- Identify and resolve common switched network issues and common problems associated with IPv4 addressing
- Describe IPv6 main features and addresses, and configure and verify basic IPv6 connectivity
- Describe the operation, benefits, and limitations of static routing
- Describe, implement, and verify Virtual Local Area Networks (VLANs) and trunks
- Describe the application and configuration of inter-VLAN routing
- Explain the basics of dynamic routing protocols and describe components and terms of Open Shortest Path First (OSPF)
- Explain how Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) work
- Configure link aggregation using EtherChannel
- Describe the purpose of Layer 3 redundancy protocols
- Describe basic WAN and VPN concepts
- Describe the operation of Access Control Lists (ACLs) and their applications in the network
- Configure Internet access using Dynamic Host Configuration Protocol (DHCP) clients and explain and configure Network Address Translation (NAT) on Cisco routers
- Describe basic Quality of Service (QoS) concepts

- Describe the concepts of wireless networks, which types of wireless networks can be built, and how to use Wireless LAN Controllers (WLCs)
- Describe network and device architectures and introduce virtualization
- Introduce the concept of network programmability and Software-Defined Networking (SDN) and describe smart network management solutions such as Cisco DNA Center™, Software-Defined Access (SD-Access),and Software-Defined Wide Area Network (SD-WAN)
- Configure basic IOS system monitoring tools
- Describe the management of Cisco devices
- Describe the current security threat landscape
- Describe threat defense technologies
- Implement a basic security configuration of the device management plane
- Implement basic steps to harden network devices

Audience:

This course is designed for anyone seeking CCNA certification. The course also provides foundational knowledge for all support technicians involved in the basic installation, operation, and verification of Cisco networks.

The job roles best suited to the material in this course are:

- Entry-level network engineer
- Network administrator
- Network support technician
- Help desk technician

Prerequisites:

Before taking this course, you should have:

- Basic computer literacy
- Basic PC operating system navigation skills
- Basic Internet usage skills
- Basic IP address knowledge
- There are no formal prerequisites for CCNA certification, but you should make sure to have a good understanding of the exam topics.

Course Outline:

Course Introduction

- Course Introduction

Chapter 01 - Networking Fundamentals

- Networking Fundamentals

Topic A: Introduction to TCP/IP Networking

- Computer Networking
- Networking Models
- History of Networking
- Networking Standards
- TCP/IP Protocol
- Layered Approach
- TCP/IP Layers
- Application Layer
- Client Request and Response
- Transport Layer
- Acknowledgements
- Layer Interaction
- Network Layer
- IP Addressing
- Addressing Basics
- Routing
- Link Layer
- Encapsulation
- De-encapsulation
- Link Layer Process
- Updated TCP/IP Model
- Sending Data via TCP/IP
- Comparing Network Models
- OSI/RM Layers

Topic B: Ethernet LAN

- Ethernet LAN Fundamentals
- Network Types
- Small Office / Home Office Network
- Small Office / Home Office Network
- Enterprise Networks
- Wiring Standards
- Wiring Standards
- Wiring Standards
- UTP
- Ports and Connectors
- How it Works
- Straight Through Cables
- Straight Through Cables
- Crossover Cables
- Comparing Cable Types
- Comparing Cable Types
- Data Link Standards
- Frame Components
- Physical Addresses
- MAC Address Types
- Frame Check Sequence
- Hubs vs. Switches
- Access Methods

Topic C: Wide Area Networks

- Wide Area Networks
- WAN Components
- Leased Line
- Leased Line Terms
- Customer Premises Equipment
- Customer Premises Equipment
- Additional Terms
- Data Link Basics
- Data Link Protocols
- HDLC
- WAN Packet Forwarding
- Point of Presence
- MPLS
- Other WAN Access Methods
- DSL
- Cable

Topic D: IPv4 Addressing and Routing Fundamentals

- Addressing and Routing
- Internet Protocol
- Routing Process
- ARP
- IPv4 Addressing
- Routing Requirements
- IPv4 Address Rules
- Demo - Binary to Decimal Conversion
- Rules for Grouping Addresses
- Address Space
- Classful Addressing
- Subnetting
- Subnetting a Network
- Router Logic
- Routing Goals
- Routing Tables
- DNS
- PING
- Topic E: TCP/IP Transport and Applications
- Understanding the Difference
- TCP vs. UDP
- Transport Layer Services
- Layer 4 PDUs
- Multiplexing
- Port Numbers
- Common Port Numbers
- Connection Establishment
- Connection Termination
- Understanding Connections

- TCP Acknowledgements
- Flow Control
- Web Examples
- Web Components

Chapter 1 Review

Chapter 2- Basic Ethernet LAN Implementation

- Basic Ethernet LAN Implementation

Topic A: Command Line Essentials

- Command Line Essentials
- Switch Types
- Naming Conventions
- IOS
- Connecting to the CLI
- Console Ports
- Serial Ports
- Switch Modes
- Console Passwords
- Configuring Passwords
- Getting Help
- Getting Help
- Demo
    - Getting Help
- Command History
- Showing Configurations
- Configuration Mode
- Configuration Mode
- Demo
    - Using Context Setting Commands
- Switch Memory
- Memory Types
- Configuration Files
- Demo
    - Examining Configuration Files

Topic B: Ethernet LAN Switching

- Switching Logic
- Switch Functions
- Frame Categories
- Switch Learning
- Flooding
- STP
- Catalyst Switches

- MAC Address Tables
- Dynamic MAC Addresses
- Demo
    - MAC Address Tables
- Switch Layouts
- Understanding Planes

Topic C: Managing Ethernet Switches

- Managing Ethernet Switches
- Using Passwords
- Securing Privileged Mode
- Demo
    - Configuring Login Security on the Switch
- Configuring Usernames and Passwords
- Configuration Checklist
- External Authentication
- Using SSH
- Using SSH
- Additional Security Considerations
- Configuring IP Addresses
- VLAN Interfaces
- Configuring IPv4
- Demo
    - Configuring IP Settings on the Switch
- Verifying Switch Status
- Topic D: Configuring Switch Interfaces
- Configuring Switch Interfaces
- Basic Interface Settings
- Demo
    - Configuring Basic Interface Settings
- Interface Status
- Port Security
- Security Options
- Enabling Port Security
- Demo
    - Configuring Port Security

Chapter 2 Review

Chapter 3 Designing Ethernet LANs

- Designing Ethernet LANs

Topic A: Understanding LAN Design Options

- Understanding LAN Design Options
- Design Factors
- Collision Domains
- Ethernet with Hubs

- Using Bridges
- Using Layer 2 Switches
- Additional Considerations
- Broadcast Domains
- Broadcast Domains
- Router and Switch Placement
- Campus LANs
- Two Tier Campus Design
- Topologies
- Connecting Multiple Buildings
- Three Tier Topology
- Physical Standards
- Ethernet Standard Evolution
- Physical Standard Factors
- Wireless Standards
- Wireless Access Points
- Wireless Controllers
- Wireless Controllers

Topic B: Implementing and Configuring Ethernet VLANs

- Implementing and Configuring Ethernet VLANs
- VLAN Advantages
- VLAN Features
- Multiple VLANs
- VLAN Trunking
- Trunk Ports
- Trunking Protocols
- Native VLANs
- VLAN Communications
- Forwarding Options
- VLAN Configuration
- VLAN Configuration
- Demo - Configuring VLAN Interfaces
- Trunking Configuration
- Configuring Trunking Ports

Topic C: Understanding Spanning Tree Protocol (STP)

- Introduction to Spanning Tree Protocol
- STP Functions
- Broadcast Storms
- Looping Frames
- Multiple Frame Transmission
- Port States
- STP Algorithm
- STP Bridge ID
- Understanding Spanning Tree Protocol
- STP Elections
- STP Elections (Cont.)

- Root Ports
- Designated Ports
- Handling Changes
- Modifying STP Port Costs
- Reacting to Changes
- STP States and Roles
- Rapid STP
- RSTP vs. STP
- RSTP vs. STP
- Alternate Ports
- Port State Comparison
- RSTP Messages
- Backup Ports
- Port Types Comparison
- Optional Features
- EtherChannel
- PortFast
- BPDU Guard

Topic D: Implementing STP

- Design Considerations
- Design Models
- Initial Configuration
- Spanning Tree Implementation
- Default Configuration
- Bridge I
- D
- Configuring Costs
- Spanning Tree Implementation
- Additional Features
- EtherChannel Configuration
- Manual Configuration
- Dynamic Configuration
- Protocol Options
- Migrating to RSTP
- Verifying Configuration

Chapter 3 Review

Chapter 4- Understanding IPv4

- Understanding IPv4

Topic A: IPv4 Subnetting

- IPv4 Implementation
- Subnetworks
- Required Subnets
- The Subnetting Process

- Discovery
- Planning
- Subnetting Rules
- Determining the Number of Subnets
- Number of Hosts
- Determining Subnet Mask Length
- One Size Fits All
- Demo
    - Subnetting 101
- Designing Subnets
- Classful Networks
- IPv4 Limitations
- Private Addresses
- Classful vs. Classless
- Classful Subnetting
- Understanding Classes
- Subnetwork ID
- Checking Requirements
- Test Case
- Demo
    - Go Over the Mathematics of the Test Case
- Building Subnets
- Demo
    - Finish the Test Scenario on Paper
- Finalizing the Design

Topic B: Analyzing Classful IPv4 Networks

- Analyzing Classful IPv4 Networks
- Understanding Classes
- Class Network Details
- The Keys to Classful IP
- Demo
    - Determining Network IDs
- Identifying other Characteristics
- Determining Addresses
- Demo
    - Determining Key Facts About Classful IP Addresses
- Keys to Remember
- Subnet Masks
- Subnet Masks
- Dotted Decimal Notation
- CIDR or Prefix Masks
- Converting between Subnet Mask Forms
- Demo
    - Practice Converting Between Formats
- IP Address Division

Topic C: Analyzing Subnet Masks

- Analyzing Subnet Masks
- Analyzing Subnet Masks
- Let's Do the Math
- Determining Hosts and Subnets
- Demo
    - Determining Hosts and Subnets

Topic D: Analyzing Existing Subnets

- Definition of a Subnet
- Analyzing Existing Subnets
- Subnet ID Facts
- Determining Ranges of Addresses
- Demo
    - Determining Subnet IDs

Chapter 4 Review

Chapter 5- Implementing IPv4

Implementing IPv4

Topic A: Working with Cisco Routers

- Working with Cisco Routers
- Physical Installation
- Connecting Routers
- Integrated Services Routers
- Physical Installation
- Installing SOHO Internet Access Routers
- Configuring Routers
- Router/Switch Similarities
- Router/Switch Differences
- Router Interfaces
- Displaying Interfaces
- Interface Addresses
- Demo
    - Configuring IP Addresses for Interfaces

Topic B: Configuring IPv4 Addresses and Static Routes

- Configuring IPv4 Addresses and Static Routes
- Routing Process
- Routing Process
- Methods for Adding IPv4 Routes
- Viewing Routing Tables
- Adding Static Routes
- Demo
    - Working with Static Routes
- Default Route

- Troubleshooting Routing
- VLAN Routing
- VLAN Routing
- Configuring 802.1Q Trunking
- Using a Layer 3 Switch
- Layer 3 Switch Configuration

Topic C: Using Dynamic Routing Protocols

- Using Dynamic Routing Protocols
- Types of Protocols
- Types of Protocols
- Older Protocols
- Dynamic Routing Considerations
- Distance Vector
- Distance Vector Features
- RIPv2 vs. RIPv1
- RIPv2 Configuration
- Displaying Configuration
- Additional Configuration Options
- Maximum Paths

Topic D: Configuring IPv4 Hosts

- DCHP
- Lease Generation
- Lease Renewal
- Configuration Options
- Scope Options
- Allocation Modes
- Configuring DHCP on a Cisco Router
- Verifying Configuration

Chapter 5 Review

Chapter 6- IPv4 Design and Troubleshooting

- IPV4 Design and Troubleshooting

Topic A: Designing IP Subnets

- Design Considerations
- Subnetting Process Review
- Demo
    - Practicing Subnet Examples

Topic B: Using VLSM

- Using VLSM
- Classless Routers

- Demo
    - Finding Overlaps using VLSM
- Creating Variable Length Subnets
- Demo
    - Developing a VSLM Strategy

Topic C: Troubleshooting IPv4

- Basic Troubleshooting
- Additional Options
- Demo
    - Using PING
- Traceroute

Chapter 6 Review

Chapter 7 IPv4 Services

- IPv4 Services

Topic A: Access Control Lists

- Access Control Lists
- ACL Features
- ACL Actions
- ACL Types
- First Match Logic
- Creating ACLs
- Creating ACLs
- Demo
    - Create a Standard ACL
- Examining Existing ACLs
- Extended ACLs
- Extended ACLs
- Matching Port Numbers
- ACL Considerations
- Demo
    - Creating Extended ACLs
- Additional Options
- Named ACLs
- Editing ACLs
- Editing ACLs
- Implementing ACLs

Topic B: Network Address Translation

- Network Address Translation
- NAT Functions
- NAT Types
- Terminology

- Dynamic NAT
- How Dynamic NAT Works
- Network Address Translation Overload
- Configuring PAT
- NAT Troubleshooting
- Common Issues
- ACLs vs. NAT

Chapter 7 Review

Chapter 8- Configuring IPv4 Routing Protocols

- Configuring IPv4 Routing Protocols

Topic A: Understanding OSPF

- Routing Protocols
- Types of Protocols
- Autonomous Systems
- Routing within Autonomous Systems
- Route Redistribution
- Administrative Distance
- Introduction to OSPF
- Link
- -state Database
- LSAs and LSDB
- OSPF Fundamentals
- Neighbor Establishment
- Neighbor Relationships
- Hello Process
- Hello Process
- Two
- -way State Requirements
- Exchange Process
- Additional Communication
- Designated Routers
- Additional Ethernet Terms
- Route Determination
- Network Size
- Understanding Areas
- Understanding Areas
- Area Terminology

Topic B: Implementing OSPF

- Implementing OSPF
- Configuration Process
- OSPF Configuration Key Points
- Single Area Configuration
- Matching Logic

- Demo
    - Single Area Configuration in OSPF and Verification
- Router ID Configuration
- Choosing the RID
- Enabling OSPF
- Multiarea Configuration
- Verifying the Configuration
- Displaying Configuration
- Determining Designated Routers
- Verifying Routing Table Entries
- Additional Configuration
- Default Routes
- Default Routes
- Defining Metrics
- Defining Metrics
- Key Points for Metrics
- Load Balancing
- OSPFv2

Chapter 8 Review

Chapter 9- Implementing IPv6

- Implementing IPv6

Topic A: IPv6 Fundamentals

- Introducing IPv6
- IPv6 Improvements
- Protocol Goals
- Other Updated Protocols
- IPv6 Packet
- IPv6 Routing
- Need to Know
- Address Space
- Hexadecimal Numbering
- Abbreviation of IPv6 Addresses
- Demo - Abbreviation
- Understanding Masks
- IPv6 Prefix
- Demo - Finding Prefixes

Topic B: IPv6 Addressing and Subnetting

- Types of Addresses
- IPv6 Addressing and Subnetting
- Global Unicast Addresses
- Global Unicast Addresses
- Subnetting
- Number of Subnets

- Address Rules
- Subnetting Process
- Demo - Listing Out Subnets Based on a Global Unicast Address
- Assigning Subnet IDs
- Local Unicast Addresses
- Local Unicast Address Rules

Topic C: Implementing IPv6

- Implementing IPv6
- Configuring Routers
- IPv6 Commands
- Configuring Interface IDs
- Static vs. Dynamic
- Additional Functions
- Link Local Routing
- Multicast Addresses
- Link Local Multicast
- Common Addresses
- Solicited-Node Multicast
- Solicited-Node Concepts
- Solicited-Node Concepts
- Anycast Addresses
- Miscellaneous Addresses
- Host Configuration
- Neighbor Discovery Protocol
- Router Discovery
- Neighbor Discovery
- Duplicate Address Detection
- Automatic Host Configuration
- DHCPv6
- Stateful DHCP
- Stateless Configuration
- SLAAC Process
- Host Configuration and Troubleshooting

Chapter 9 Review

Chapter 10 - Wireless LANs

Wireless LANs

Topic A: Wireless Network Fundamentals

- Wired vs. Wireless
- Wireless LAN Topologies
- Basic Service Set
- Distribution System
- Extended Service Set
- Other Topologies

- Wireless Bands and Channels
- Wireless Standards

Topic B: Cisco Wireless Architectures

- Autonomous AP Architecture
- Cloud-Based AP Architecture
- Split-MAC Architectures
- WLC Functions
- WLC Deployments
- Comparing Deployment Models
- Cisco AP Modes

Topic C: Securing Wireless Networks

- The Need for Security
- Authentication
- Message Privacy
- Message Integrity
- Authentication Methods
- Authentication Methods
- Privacy and Integrity Methods
- Wi-Fi Protected Access (WPA)

Topic D: Building a Wireless LAN

- Connecting a Cisco AP
- Accessing a Cisco WLC
- Connecting a Cisco WLC
- Using WLC Interfaces
- Configuring a WLAN
- Configuring a WLAN
- Configuring WLAN Security
- Configuring WLAN QoS
- Demo - Examining a Wireless Configuration

Chapter 10 Review

Course Closure

Credly Badge:

Display your Completion Badge And Get The Recognition You Deserve.

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