Cisco Implementing and Administering Cisco Solutions v1.0 (CCNA)

Summary

Length: 40 hours Level: Foundational

This course gives you a broad range of fundamental knowledge for all IT careers. You will learn how to install, operate, configure, and verify a basic IPv4 and IPv6 network. 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 to earn CCNA certification. This course consists of 5 days of instructor-led training with hands-on lab practice, plus the equivalent of 3 days of self-paced material. This course includes post class lab access- a total of 60 hours of labs over a 90 day period. This course eligible for registration with CLC's. This course may earn a Credly Badge.

Learning 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 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, addresses and configure and verify basic IPv6 connectivity
- Describe the operation, benefits, and limitations of static routing
- Describe, implement and verify 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 OSPF
- Explain how STP and 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 ACLs and their applications in the network
- Configure internet access using DHCP clients and explain and configure NAT on Cisco routers
- Describe the basic QoS concepts
- Describe the concepts of wireless networks, which types of wireless networks can be built and how to use WLC
- Describe network and device architectures and introduce virtualization
- Introduce the concept of network programmability and SDN and describe the smart network management solutions like Cisco DNA Center, SD-Access and 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

Course Outline

1. 1 - EXPLORING THE FUNCTIONS OF NETWORKING
   - What is a computer network?
   - Components of a network
   - Characteristics of a network
   - Physical vs. Logical Topologies
   - Interpreting a network diagram
   - Impact of user applications on the network
2. 2 - INTRODUCING THE HOST-TO-HOST COMMUNICATIONS MODEL
   - Host-to-host communications overview
   - ISO OSI reference model
   - TCP/IP protocol Suite
   - Peer-to-peer communications
   - Encapsulation and de-encapsulation
   - TCP/IP stack vs OSI reference model
3. 3 - OPERATING CISCO IOS SOFTWARE
   - Cisco IOS software features and functions
   - Cisco IOS software CLI functions
   - Cisco IOS software models
   - Discovery 1: Get started with Cisco CLI
4. 4 - INTRODUCING LANS
   - Local area networks
   - LAN components
   - Need for switches
   - Characteristics and features of switches
5. 5 - EXPLORING THE TCP/IP LINK LAYER
   - Ehernet LAN connection media
   - Ethernet frame structure
   - LAN communication types
   - MAC addresses
   - Frame switching
   - Discovery 2: Observe how a switch operate
   - Duplex communication

6. 6 - STARTING A SWITCH
   - Switch installation
   - Connecting to a console port
   - Switch LED indicators
   - Basic show commands and information
   - Discovery 3: Perform basic switch configuration
   - Implement the initial switch configuration
7. 7 - INTRODUCING THE TCP/IP INTERNET LAYER, IPV4 ADDRESSING, AND SUBNETS
   - Internet protocol
   - Decimal and binary number systems
   - Binary-to-decimal conversion
   - Decimal-to-binary conversion
   - IPv4 address representation
   - IPv4 header fields
   - IPv4 address classes
   - Subnet masks
   - Subnets
   - Implementing subnetting: Bowwing bits
   - Implementing subnetting: Determining the addressing scheme
   - Benefits of VLSM and Implementing VLSM
   - Private vs. Public IPv4 addresses
   - Reserved IPv4 addresses
   - Verifying IPv4 address of a host
8. 8 - EXPLAINING THE TCP/IP TRANSPORT LAYER AND APPLICATION LAYER
   - TCP/IP transport layer functions
   - Reliable vs. Best-effort transport
   - TCP characteristics
   - UDP characteristics
   - TCP/IP application layer
   - Introducing HTTP
   - Domain name system

Explaining DHCP for IPv4
Discovery 4: Inspect TCP/IP applications
9. 9 - EXPLORING THE FUNCTIONS OF ROUTING
Role of a router
Router components
Router functions
Routing table
Path determination
10. 10 - CONFIGURING A CISCO ROUTER
Initial router setup
Configuring router interfaces
Configuring IPv4 addresses on router interfaces
Checking interface configuration and status
Discovery 5: Configure an interface on a Cisco router
Exploring connected devices
Using Cisco Discovery Protocol
Configure and verify LLDP
Disconvery 6: Configure and verify layer 2 discovery protocols
Implement an initial router configuration
11. 11 - EXPLORING THE PACKET DELIVERY PROCESS
Layer 2 addressing
Layer 3 addressing
Default gateways
Address resolution protocol
Discovery 7: Configure default gateway
Host-to-host packet delivery
Discovery 8: Explore packet forwarding
12. 12 - TROUBLESHOOTING A SIMPLE NETWORK
Troubleshooting methods
Troubleshooting tools
Troubleshooting common switch media issues

Discovery 9: Troubleshoot switch media and port issues
Discovery 10: Troubleshoot port duplex issues
Troubleshooting common problems associated with IPv4 addressing
13. 13 - INTRODUCING BASIC IPV6
IPv4 address exhaustion workarounds
IPv6 features
IPv6 addresses and address types
Comparison of IPv4 and IPv6 header
Internet control message protocol version 6
Neighbor discovery
IPv6 address allocation
Discovery 11: Configure basic IPv6 connectivity
Verification of end-to-end IPv6 connectivity
14. 14 - CONFIGURING STATIC ROUTING
Routing Operation
Static and dynamic routing comparison
When to use static routing
IPv4 static route configuration
Default routes
Verifying static and default route configuration
Discovery 12: Configure and verify IPv4 static routes
Configuring IPv6 static routes
Discovery 13: Configure IPv6 static routes
Implement IPv4 static routing
Implement IPv6 static routing
15. 15 - IMPLEMENTING VLANS AND TRUNKS
VLAN Introduction
Creating a VLAN
Assigning a port to a VLAN
Trunking with 802.1Q
Configuring an 802.1Q trunk

Discovery 14: Configure VLAN and trunk
VLAN design considerations
Troubleshoot VLANs and trunk
16. 16 - ROUTING BETWEEN VLANS
Purpose of Inter-VLAN routing
Options for the Inter-VLAN routing
Discovery 15: Configure a router on a stick
Implement multiple VLANs and basic routing between the VLANs
17. 17 - INTRODUCING OSPF
Dynamic routing protocols
Path selection
Link-State routing protocol overview
Link-State routing protocol data structures
Introducing OSPF
Establishing OSPF neighbor adjacencies
OSPF neighbor states
SPF algorithm
Building a Link-State database
Discovery 16: Configure and verify single-area OSPF
Routing for IPv6
18. 18 - BUILDING REDUNDANT SWITCHED TOPOLOGIES (SELF-STUDY)
Physical redundancy in a LAN
Issues in redundant topologies
Spanning tree operation
Types of spanning tree protocols
PortFast and BPDU guard
Rapid spanning tree protocol
19. 19 - IMPROVING REDUNDANT SWITCHED TOPOLOGIES WITH ETHERCHANNEL
EtherChannel overview
EtherChannel configuration options
Configuring and verifying EtherChannel

Improve redundant switched topologies with EtherChannel

20. 20 - EXPLORING LAYER 3 REDUNDANCY (SELF-STUDY)

Need for default gateway redundancy

Understanding FHRP

Understanding HSRP

21. 21 - INTRODUCING WAN TECHNOLOGIES (SELF-STUDY)

Introduction to WAN technologies

WAN devices and demarcation point

WAN topology options

WAN connectivity options

Virtual private networks

Enterprise-manged VPNs

Provider-managed VPNs

22. 22 - EXPLAINING BASICS OF ACL

ACL overview

ACL operation

ACL wildcard masking

Wildcard mask abbreviations

Types of basic ACLs

Configuring standard IPv4 ACLs

Configuring extended IPv4 ACLs

Verifying and modifying IPv4 ACLs

Applying IPv4 ACLs to filter network traffic

Discovery 18: Configure and verify IPv4 ACLs

Implement numbered and named IPv4 ACLs

23. 23 - ENABLING INTERNET CONNECTIVITY

Discovery 19: Configure a provider-assigned IPv4 address

Introducing network address translation

NAT terminology and translation mechanisms

Benefits and drawbacks of NAT

Static NAT and port forwarding

Port address translation

Configuring and verifying inside IPv4 NAT

Discovery 20: Configure static NAT

Discovery 21: Configure dynamic NAT and PAT

Implement PAT

24. 24 - INTRODUCING QOS (SELF-STUDY)

Converged networks

Quality of service defined

QoS policy

QoS mechanisms

QoS models

Deploying end-to-end QoS

25. 25 - EXPLAINING WIRELESS FUNDAMENTALS (SELF-STUDY)

Wireless technologies

WLAN architechtures

WiFi channels

AP and WLC management

Discovery 22: Log into the WLC

Discovery 23: Monitor the WLC

Discovery 24: Configure a dynamic (VLAN) interface

Discovery 25: Configure a DHCP scope

Discovery 26: Configure a WLAN

Discovery 27: Define a RADIUS server

Discovery 28: Explore management options

26. 26 - INTRODUCING ARCHITECTURES AND VIRTUALIZATION (SELF-STUDY)

Introduction to network design

Enterprise three-tier hierarchical network design

Spine-leaf network design

Cisco enterprise architecture model

Cloud computing overview

Network device architecture

Virtualization fundamentals
27. 27 - EXPLAINING THE EVOLUTION OF INTELLIGENT NETWORKS
Overview of network programmability in enterprise networks
Software-defined networking
Common programmability protocols and methods
Configuration management tools
Introducing Cisco DNA center
Discovery 29: Explore the Cisco DNA center
Introducing Cisco SD-Access
Introducing Cisco SD-WAN
28. 28 - INTRODUCING SYSTEM MONITORING
Introducing Syslog
Syslog message format
SNMP overview
Enabling network time protocol
Discovery 30: Configure and verify NTP
Configure system message logging
29. 29 - MANAGING CISCO DEVICES
Cisco IOS intergrated file system adn devices
Stages of the router power-on boot sequence
Loading and managing system images files
Loading Cisco IOS configuration files
Validating Cisco IOS images using MD5
Managing Cisco IOS images and device configuration files
Discovery 31: Create the Cisco IOS impage backup
Discovery 32: Upgrade Cisco IOS image
30. 30 - EXAMINING THE SECURITY THREAT LANDSCAPE (SELF-STUDY)
Security threat landscape overview
Malware
Hacking tools
Denial of service and distributed denial of service

Reflection and amplification attacks

Social engineering

Evolution of Phishing

Password attacks

Reconnaissance attacks

Buffer overflow attacks

Man-in-the-middle attacks

Vectors of data loss and exfiltration

Other considerations

31. 31 - IMPLEMENTING THREAT DEFENSE TECHNOLOGIES (SELF-STUDY)

Information security overview

Firewalls

Intrusion prevention systems

Protection against data loss and phishing attacks

Defending against DoS and DDoS attacks

Introduction to cryptographic technologies

IPsec security services

Secure sockets Layer and transport layer security

Wireless security protocols

Discover 33: Configure WLAN using WPA2 PSK using the GUI

32. 32 - SECURING ADMINISTRATIVE ACCESS

Network device security overview

Securing access to privileged EXEC mode

Securing console access

Securing remote access

Discover 34: Secure console and remote access

Configuring the login banner

Limiting remote access with ACLs

Discovery 35: Enable and limit remote access connectivity

External authentication options

Secure device administrative access

33. 33 - IMPLEMENTING DEVICE HARDENING

- Securing unused ports
- Infrastructure ACL
- Disabling unused services
- Port security
- Discovery 36: Configure and verify port security
- Mitigating VLAN attacks
- DHCP snooping
- Dynamic ARP inspection
- Mitigation STP attacks
- Implement device hardening
- The self-study material can be done at your own pace after the instructor-led portion of the course

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

While there are no prerequisites for this course, please ensure you have the right level of experience to be successful in this training: - Basic computer literacy - Basic PC operating system navigation skills - Basic internet usage skills - Basic IP address knowledge