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

Overview

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.

Prerequisite Comments

Before taking this course, you should have:

Basic computer literacy
Basic PC operating system navigation skills
Basic internet usage skills
Basic IP address knowledge

Target 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

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 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 - 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 - 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 - 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 - Introducing LANs

Local area networks
LAN components
Need for switches
Characteristics and features of switches

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 - 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 - 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 - 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 - Exploring the Functions of Routing

Role of a router
Router components
Router functions
Routing table
Path determination

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 - Exploring the Packet Delivery Process

Layer 2 addressing
Layer 3 addressing
Default gateways
Address resolution protocol
Discover 7: Configure default gateway
Host-to-host packet delivery
Discovery 8: Explore packet forwarding

12 - Troubleshooting a Simple Network

Troubleshooting methods
Troubleshooting tools
Troubleshooting common switch media issues
Troubleshooting common switch port issues
Discovery 9: Troubleshoot switch media and port issues
Discovery 10: Troubleshoot port duplex issues
Troubleshooting common problems associated with IPv4 addressing

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 conncetivity
Verification of end-to-end IPv6 connectivity

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 - 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 - 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 - 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 - 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 - Improving Redundant Switched Topologies with EtherChannel

EtherChannel overview
EtherChannel configuration options
Configuring and verifying EtherChannel
Discovery 17: Configure and verify EtherChannel
Improve redundant switched topologies with EtherChannel

20 - Exploring Layer 3 Redundancy (Self-study)

Need for default gateway redundancy
Understanding FHRP
Understanding HSRP

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 - 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 - 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
Dynamic NAT
Port address translation
Configuring and verifying inside IPv4 NAT
Discovery 20: Configure static NAT
Discovery 21: Configure dynamic NAT and PAT
Implement PAT

24 - Introducing QoS (Self-study)

Converged networks
Quality of service defined
QoS policy
QoS mechanisms
QoS models
Deploying end-to-end QoS

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 - 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 - 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 - 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 - 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 - Examining the Security Threat Landscape (Self-study)

Security threat landscape overview
Malware
Hacking tools
Denial of service and distributed denial of service
Spoofing
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 - 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
Seccure sockets Layer and transport layer securiy
Wireless security protocols
Discover 33: Configure WLAN using WPA2 PSK using the GUI

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 - 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.