
IMPLEMENTING AND ADMINISTERING CISCO SOLUTIONS

DURATION: 5 DAYS

COURSE CODE: CCNA

FORMAT: LECTURE/LAB

COURSE DESCRIPTION

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.

This course will help you:

- Learn the knowledge and skills to install, configure, and operate a small- to medium-sized network
- Gain a foundation in the essentials of networking, security, and automation
- Prepare for the 200-301 CCNA exam, which earns CCNA certification

WHO SHOULD ATTEND

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

PREREQUISITES

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.

ABOUT THE EXAM

The 200-301 CCNA exam certifies your knowledge and skills related to network fundamentals, network access, IP connectivity, IP services, security fundamentals, and automation and programmability.

After you pass 200-301 CCNA, you earn CCNA certification.

LEARNING OBJECTIVES

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

COURSE OUTLINE

1. Exploring the Functions of Networking

What Is a Computer Network?

- Identify the components of a computer network and describe their basic characteristics
- Define a network and describe examples of networks
- 2019 Cisco Systems, Inc. Course Administration Guide 12
- Components of a Network
- Identify common network components by function
- Characteristics of a Network
- List the characteristics of a network
- Physical vs. Logical Topologies
- Compare and contrast logical and physical topologies
- Interpreting a Network Diagram
- Interpret network diagrams
- Impact of User Applications on the Network
- Describe the impact of user applications on the network
- Summary Challenge

2. Introducing the Host-To-Host Communications Model

Host-To-Host Communications Overview

- Understand the model of host-to-host communication
- Identify the requirements of a host-to-host communication model
- ISO OSI Reference Model
- Describe the ISO OSI reference model
- TCP/IP Protocol Suite
- Describe the functions and purposes of the TCP/IP layers
- Peer-To-Peer Communications
- Describe how peer-to-peer communication works
- Encapsulation and De-Encapsulation
- Describe the process of encapsulation and de-encapsulation
- TCP/IP Stack vs OSI Reference Model
- Compare the TCP/IP suite with OSI Reference model
- Summary Challenge

3. Operating Cisco IOS Software

Cisco IOS Software Features and Functions

- Describe the features and functions of the Cisco IOS Software
- List the features and functions of Cisco IOS Software
- Cisco IOS Software CLI Functions
- List the functions and usage of Cisco CLI
- Cisco IOS Software Modes
- Identify IOS Software modes on Cisco devices
- Discovery 1: Get Started with Cisco CLI
- Navigate Cisco CLI
- Topology

Job Aids

- Task 1: Navigate Between EXEC Modes
- Task 2: Explore CLI Help
- Task 3: Manage Cisco IOS Configuration
- Task 4: Improve User Experience in the CLI
- Summary Challenge

4. Introducing LANs

Local Area Networks

- Describe LANs and the role of switches within LANs
- Define a LAN
- LAN Components
- Identify the components of a LAN
- Need for Switches
- Identify the need for the switches in a LAN
- Characteristics and Features of Switches
- List the characteristics and features of switches
- Summary Challenge

5. Exploring the TCP/IP Link Layer

Ethernet LAN Connection Media

- Describe Ethernet as the network access layer of TCP/IP and describe the operation of switches
- Describe the types of Ethernet LAN connection media
- Ethernet Frame Structure
- Describe the fields of an Ethernet frame
- LAN Communication Types
- Describe different LAN Communication Types
- MAC Addresses
- Define the structure and function of MAC addresses
- Frame Switching
- Explain the basic concept of switching
- Discovery 2: Observe How a Switch Operates
- Describe how switches operate and build MAC table
- Topology
- Job Aids
- Task 1: Observe How a Switch Operates
- Duplex Communication
- Compare half-duplex and full-duplex operation and also configure it on an interface
- Summary Challenge

6. Starting a Switch

Switch Installation

- Install a switch and perform the initial configuration
- Identify physical installation requirements
- Connecting to a Console Port
- Connect to a switch console port

COURSE OUTLINE

Switch LED Indicators

Identify the conditions that are reflected by the LEDs on switches

Basic show Commands and Information

List fundamental show commands

Discovery 3: Perform Basic Switch Configuration

Configure switch from command line and verify the configuration

Topology

Job Aids

Task 1: Configure a Switch from the Command Line

Task 2: Verify the Switch Initial Startup Status

Implement the Initial Switch Configuration

FASTLab 1: Implement the Initial Switch Configuration

Topology

Job Aid

Configuration Tips

Answer Key

Summary Challenge

7. Introducing the TCP/IP Internet Layer, IPv4 Addressing, and Subnets

Internet Protocol

Describe the TCP/IP Internet Layer, IPv4, its addressing scheme, and subnetting

List the characteristics of IP

Decimal and Binary Number Systems

Describe the decimal and binary number systems

Binary-to-Decimal Conversion

Convert a binary number to a decimal number

Decimal-to-Binary Conversion

Convert a decimal number to a binary number

IPv4 Address Representation

Describe the components of an IPv4 address

IPv4 Header Fields

Identify the fields within the IPv4 header

IPv4 Address Classes

List the classes of IPv4 addresses

Subnet Masks

Explain the role of a subnet mask

Subnets

Describe the purposes and functions of subnets and their addressing schemes

Implementing Subnetting: Borrowing Bits

Describe how subnetting is implemented

Implementing Subnetting: Determining the Addressing Scheme

Describe implementing subnetting by determining the

Addressing Scheme

Benefits of VLSM and Implementing VLSM

Describe the role of VLSM and also how to implement it

Private vs. Public IPv4 Addresses

Describe and differentiate between public and private addresses

Reserved IPv4 Addresses

Describe reserved IPv4 addresses

Verifying IPv4 Address of a Host

Verify the IPv4 address of a host

Summary Challenge

8. Explaining the TCP/IP Transport Layer and Application Layer

TCP/IP Transport Layer Functions

Describe the TCP/IP transport layer and Application layer

Explain the purpose and major functions of the TCP/IP transport layer

Reliable vs. Best-Effort Transport

2019 Cisco Systems, Inc. Course Administration Guide 18

Contrast connection-oriented transport with connectionless transport

TCP Characteristics

Explain the characteristics of TCP in brief

UDP Characteristics

Describe the characteristics of UDP in brief

TCP/IP Application Layer

List the common applications that are provided by TCP/IP

Introducing HTTP

Define the function of HTTP

Domain Name System

Define the function of DNS

Explaining DHCP for IPv4

Describe DHCP operation

Discovery 4: Inspect TCP/IP Applications

Explore how TCP and UDP servers listen on particular ports that are made available on particular interfaces

Topology

Job Aids

Task 1: Inspect TCP/IP Applications

Summary Challenge

9. Explaining the TCP/IP Transport Layer and Application Layer

Role of a Router

Explore functions of routing

Describe the role of a router in the IP packet delivery process

Router Components

Describe the physical characteristics of a router

COURSE OUTLINE

Router Functions

Describe the functions of a router

Routing Table

Describe the components of a routing table

Path Determination

Describe router path determination and describe how router selects the best path

Summary Challenge

10. Configuring a Cisco Router

Initial Router Setup

Implement basic configuration on a Cisco router

Describe router startup

Configuring Router Interfaces

Describe how to configuring router interfaces

Configuring IPv4 Addresses on Router Interfaces

Explain how to configure IP address on an interface and why

Checking Interface Configuration and Status

Explain how to check interface configuration

Discovery 5: Configure an Interface on a Cisco Router

Perform basic Cisco Router configuration

Topology

Job Aid

Task 1: Configure an IPv4 Address on the Router Interfaces

Task 2: Verify Interface Configuration and Status

Exploring Connected Devices

Describe the need for a network discovery protocol

Using Cisco Discovery Protocol

Explain how Cisco Discovery Protocol operates

Configure and Verify LLDP

Describe LLDP configuration and verification

Discovery 6: Configure and Verify Layer 2 Discovery Protocols

Configure and verify CDP

Topology

Job Aid

Task 1: Discover Neighbors Using Cisco Discovery Protocol

Task 2: Discover Neighbors Using Link Layer Discovery Protocol

Implement an Initial Router Configuration

FASTLab 2: Implement an Initial Router Configuration

Topology

Job Aid

Configuration Tips

Answer Key

Summary Challenge

11. Exploring the Packet Delivery Process

Layer 2 Addressing

Explain host-to-host communications across switches and routers

Describe Layer 2 addressing

Layer 3 Addressing

Describe Layer 3 addressing

Default Gateways

Explain what a default gateway is and why it is used

Address Resolution Protocol

Explain the role of ARP

Discovery 7: Configure Default Gateway

Describe how end systems use subnet masks and default gateways

Topology

Job Aids

Task 1: Configure Default Gateway

Host-To-Host Packet Delivery

Describe the host-to-host packet delivery

Discovery 8: Explore Packet Forwarding

Observe packet forwarding by using show commands and debugs

Topology

Job Aids

Task 1: Explore Packet Forwarding

Summary Challenge

12. Troubleshooting a Simple Network

Troubleshooting Methods

Identify and resolve common switched network issues and common problems associated with IPv4 addressing

Describe the Troubleshooting methods

Troubleshooting Tools

Describe common Troubleshooting Tools

Troubleshooting Common Switch Media Issues

Identify common switched network media issues

Troubleshooting Common Switch Port Issues

Identify common access port issues

Discovery 9: Troubleshoot Switch Media and Port Issues

Troubleshoot Switch Media and Port Issues

Topology

Job Aids

Task 1: Troubleshoot Port Issues

Discovery 10: Troubleshoot Port Duplex Issues

Troubleshoot port duplex issues

Topology

COURSE OUTLINE

Job Aids

Task 1: Troubleshoot Port Duplex Issues

Troubleshooting Common Problems Associated with IPv4 Addressing

Describe the common troubleshooting tools

Summary Challenge

13. Introducing Basic IPv6

IPv4 Address Exhaustion Workarounds

Describe IPv6 main features, addresses and configure and verify basic IPv6

Connectivity

Identify issues in IPv4

IPv6 Features

Identify the main IPv6 features

IPv6 Addresses and Address Types

Describe IPv6 addresses and address types

Comparison of IPv4 and IPv6 Headers

Compare the IPv4 and IPv6 header

Internet Control Message Protocol Version 6

Describe ICMPv6

Neighbor Discovery

Describe the neighbor discovery process and mapping from IPv6 addresses to

Layer 2 addresses

IPv6 Address Allocation

Describe manual address assignment, stateless auto-configuration, and DHCPv6

Discovery 11: Configure Basic IPv6 Connectivity

Master basic IPv6 commands

Topology

Job Aid

Task 1: Configure IPv6 Addresses

Task 2: Configure IPv6 Stateless Auto-configuration

Verification of End-To-End IPv6 Connectivity

Verify IPv6 end-to-end connectivity

Summary Challenge

14. Configuring Static Routing

Routing Operation

Describe the operation, benefits, and limitations of static routing

Describe the basic characteristics of routing operations

Static and Dynamic Routing Comparison

Describe the function of dynamic routing protocols. Explain the differences between static and dynamic routing

When to Use Static Routing

Explain when to use static routing

IPv4 Static Route Configuration

Describe how to configure static routes

Default Routes

Describe how to configure default routes

Verifying Static and Default Route Configuration

Describe how to verify static and default route configuration

Discovery 12: Configure and Verify IPv4 Static Routes

Configure static routes

Topology

Job Aid

Task 1: Verify Device Reachability

Task 2: Configure and Verify Static Routes

Task 3: Demonstrate Static Route Drawbacks

Task 4: Configure and Verify the Backup Static Route

Task 5: Configure and Verify the Default Route

Configuring IPv6 Static Routes

Describe how to configure and verify IPv6 static routes

Discovery 13: Configure IPv6 Static Routes

Configure and verify IPv6 static routes.

Topology

Job Aids

Task 1: Configure IPv6 Static Routes

Implement IPv4 Static Routing

FASTLab 3: Implement IPv4 Static Routing

Topology

Job Aid

Configuration Tips

Answer Key

Implement IPv6 Static Routing

FASTLab 4: Implement IPv6 Static Routing

Topology

Job Aid

Configuration Tips

Answer Key

Summary Challenge

15. Implementing VLANs and Trunks

VLAN Introduction

Describe, implement and verify VLANs and trunks

Describe the purpose and functions of VLANs

Creating a VLAN

Explain how to create a VLAN

Assigning a Port to a VLAN

Describe how to assign a port to a VLAN

Trunking with 802.1Q

COURSE OUTLINE

- Define the purpose and function of trunking
- Configuring an 802.1Q Trunk
- Describe how to configure an 802.1Q trunk
- Discovery 14: Configure VLAN and Trunk
- Configure and verify VLANs and trunks
- Topology
- Job Aid
- Task 1: Configure VLAN and Trunk
- VLAN Design Consideration
- Describe VLAN design and creation guidelines
- Troubleshoot VLANs and Trunk
- FASTLab 5: Troubleshoot VLANs and Trunk
- Topology
- Job Aid
- Configuration Tips
- Answer Key
- Summary Challenge

16. Routing Between VLANs

- Purpose of Inter-VLAN Routing
 - Describe the application and configuration of inter-VLAN routing
 - Describe the need for inter-VLAN routing
- Options for Inter-VLAN Routing
- Describe the options for inter-VLAN routing
- Discovery 15: Configure a Router on a Stick
- Configure Router on a Stick
- Topology
- Job Aids
- Task 1: Include a Router Interface in a VLAN
- Task 2: Configure a Router with a Trunk Link
- Implement Multiple VLANs and Basic Routing Between the VLANs
- FASTLab 6: Implement Multiple VLANs and Basic Routing Between the VLANs
- Topology
- Job Aids
- Configuration Tips
- Answer Key
- Summary Challenge

17. Introducing OSPF

- Dynamic Routing Protocols
 - Explain the basics of dynamic routing protocols and describe components and terms of OSPF
 - Describe the idea behind dynamic routing protocols
- Path Selection
- Describe the purpose of administrative distance

- Link-State Routing Protocol Overview
- Explain the basic idea behind link-state protocols
- Link-State Routing Protocol Data Structures
- Describe the data structures that are used by link-state routing protocols
- Introducing OSPF
- Describe the features of OSPF
- Establishing OSPF Neighbor Adjacencies
- Describe how OSPF neighbor adjacencies are established
- OSPF Neighbor States
- Explain OSPF neighbor states
- SPF Algorithm
- Explain how OSPF decides what is the best path through the network
- Building a Link-State Database
- Describe how routers build and synchronize the link-state database
- Discovery 16: Configure and Verify Single-Area OSPF
- Configure and verify OSPF configuration
- Topology
- Job Aids
- Task 1: Configure and Verify Single-Area OSPF
- Routing for IPv6
- Describe routing types for IPv6
- Summary Challenge

18. Building Redundant Switched Topologies

- Physical Redundancy in a LAN
 - Explain how STP and RSTP work
 - Describe physical redundancy in LAN
- Issues in Redundant Topologies
- Describe problems that may arise in redundant switched topologies
- Spanning Tree Operation
- Describe STP operation in the sample topology
- Types of Spanning Tree Protocols
- Describe variants of STP and the differences between them
- Rapid Spanning Tree Protocol
- Describe the Rapid Spanning Tree Protocol
- PortFast and BPDU Guard
- Demonstrate why PortFast and BPDU guard are important technologies
- Summary Challenge

19. Improving Redundant Switched Topologies with EtherChannel

- EtherChannel Overview

COURSE OUTLINE

Configure link aggregation using EtherChannel
Describe the idea behind EtherChannel technology
EtherChannel Configuration Options
Identify the two EtherChannel protocols and their modes
Configuring and Verifying EtherChannel
Explain the EtherChannel configuration and verification using Cisco IOS Software commands for Layer 2 and Layer 3 EtherChannel links.
Discovery 17: Configure and Verify EtherChannel
Configure and verify EtherChannel configuration
Topology
Job Aids
Task 1: Configure and Verify EtherChannel
Improve Redundant Switched Topologies with EtherChannel
FASTLab 7: Improve Redundant Switched Topologies with EtherChannel
Topology
Job Aid
Configuration Tips
Answer Key
Summary Challenge

20. Exploring Layer 3 Redundancy

Need for Default Gateway Redundancy
Describe the purpose of Layer 3 redundancy protocols
Describe routing issues in connection to redundancy
Understanding FHRP
Describe the router redundancy process and what happens when a failover occurs
Understanding HSRP
Describe the concept of HSRP
Summary Challenge
Section 21: Introducing WAN Technologies
Describe basic WAN and VPN concepts
This lesson includes these topics:
Introduction to WAN Technologies
Explain WAN technologies
WAN Devices and Demarcation Point
Describe the WAN devices and their functions in a WAN environment
WAN Topology Options
Describe the WAN topology options
WAN Connectivity Options
Describe the major WAN communication link options
Virtual Private Networks
Explain tVPNs
Enterprise-Managed VPNs

Describe the characteristics of enterprise-managed VPNs
Provider-Managed VPNs
Describe the characteristics of provider-managed VPNs
Summary Challenge

21. Introducing WAN Technologies

Introduction to WAN Technologies
Describe basic WAN and VPN concepts
Explain WAN technologies
WAN Devices and Demarcation Point
Describe the WAN devices and their functions in a WAN environment
WAN Topology Options
Describe the WAN topology options
WAN Connectivity Options
Describe the major WAN communication link options
Virtual Private Networks
Explain tVPNs
Enterprise-Managed VPNs
Describe the characteristics of enterprise-managed VPNs
Provider-Managed VPNs
Describe the characteristics of provider-managed VPNs
Summary Challenge

22. Explaining Basics of ACL

ACL Overview
Describe the operation of ACLs and their applications in the network
Describe what ACLs are
ACL Operation
Explain how ACLs operate
ACL Wildcard Masking
Describe ACL wildcard masking
Wildcard Mask Abbreviations
Describe ACL wildcard bit mask abbreviations
Types of Basic ACLs
Describe the types of ACLs
Configuring Standard IPv4 ACLs
Explain numbered IPv4 ACLs
Configuring Extended IPv4 ACLs
Configure and edit named IPv4 ACLs
Verifying and Modifying IPv4 ACLs
Describe traffic filtering with ACLs
Applying IPv4 ACLs to Filter Network Traffic
Apply an ACL to an interface and describe how to test an IP packet against a numbered standard access list
Discovery 18: Configure and Verify IPv4 ACLs
Topology

COURSE OUTLINE

Job Aids

Task 1: Configure, Apply, and Modify Standard IPv4 ACLs

Task 2: Configure, Apply, and Verify Extended IPv4 Access Lists

Implement Numbered and Named IPv4 ACLs

FASTLab 8: Implement Numbered and Named IPv4 ACLs

Topology

Job Aid

Configuration Tips

Answer Key

Summary Challenge

23. Enabling Internet Connectivity

Internet Connectivity

Configure Internet access using DHCP clients and explain and configure NAT on Cisco routers

Discovery 19: Configure a Provider-Assigned IPv4 Address

Configure a Static Provider Assigned IP address and Configuring DHCP Client Topology

Job Aids

Task 1: Configure a Provider-Assigned IPv4 Address

Introducing Network Address Translation

Describe the features and benefits of NAT

NAT Terminology and Translation Mechanisms

Describe types of NAT addresses

Benefits and Drawbacks of NAT

Describe types of NAT

Static NAT and Port Forwarding

Explain static NAT

Dynamic NAT

Explain dynamic NAT

Port Address Translation

Explain how to configure and verify static NAT

Configuring and Verifying Inside IPv4 NAT

Explain how to configure dynamic NAT

Discovery 20: Configure Static NAT

Configure static NAT and explain its operation

Topology

Job Aids

Task 1: Configure Static NAT

Discovery 21: Configure Dynamic NAT and PAT

Configure dynamic NAT and explain its operation

Topology

Job Aids

Task 1: Configure Dynamic NAT

Task 2: Configure Inside IPv4 PAT

Implement PAT

FASTLab 9: Implement PAT

Topology

Job Aid

Answer Key

Summary Challenge

24. Introducing QoS

Converged Networks

Describe the basic QoS concepts

Describe quality impact of running different types of traffic over a single network Quality of Service Defined

Define the goal of QoS

QoS Policy

Describe a QoS policy and explain its importance in the deployment of QoS and explain the three major steps that are involved in implementing a QoS policy on a network QoS Mechanisms

Identify and explain basic groups of QoS mechanisms

QoS Models

High-level summary of the three QoS models to be discussed: Best Effort, IntServ, and

DiffServ; with emphasis on DiffServ

Deploying End-to-End QoS

List and describe the steps for optimally deploying QoS policy within an enterprise and explain the best-practice QoS implementations and configurations within the campus

Summary Challenge

25. Explaining Wireless Fundamentals

Wireless Technologies

Describe the concepts of wireless networks, which types of wireless networks can be built and how to use WLC

Discuss the various types of wireless topologies

WLAN Architectures

Discuss the various types of wireless architectures

WLAN Components

Discuss the wireless components

WiFi Channels

Discuss the WiFi channels and the principle of non-overlapping WiFi channels

AP and WLC Management

Describe AP and WLC management access connections

Discovery 22: Log into the WLC

Log into the WLC

Topology

Task 1: Log into the WLC

COURSE OUTLINE

Discovery 23: Monitor the WLC

Monitor the WLC

Topology

Task 1: Monitor the WLC

Discovery 24: Configure a Dynamic (VLAN) Interface

Configure a VLAN (dynamic) interface

Topology

Task 1: Configure a VLAN (Dynamic) Interface

Discovery 25: Configure a DHCP Scope

Configure a DHCP scope

Topology

Task 1: Configure a DHCP Scope

Discovery 26: Configure a WLAN

Configure a WLAN

Topology

Task 1: Configure a WLAN

Discovery 27: Define a RADIUS Server

Define a RADIUS server.

Topology

Task 1: Define a RADIUS Server

Discovery 28: Explore Management Options

Configure the SNMP location for the WLC

Topology

Task 1: Explore Management Options

Summary Challenge

26. Introducing Architectures and Virtualization

Introduction to Network Design

Describe network and device architectures and introduce virtualization

Describe the issues in poorly designed LANs

Enterprise Three-Tier Hierarchical Network Design

Describe the enterprise network design

Spine-Leaf Network Design

Describe characteristics of spine and leaf architectures

Cisco Enterprise Architecture Model

Describe the enterprise architecture model

Cloud Computing Overview

Describe the effect of cloud computing on enterprise network

Device Architecture

Describe the device architecture

Virtualization Fundamentals

Explain the need for virtualization, the concept of a virtual machine, and its components

Summary Challenge

27. Explaining the Evolution of Intelligent Networks

Overview of Network Programmability in Enterprise Networks

Introduce the concept of network programmability and SDN and describe the smart network management solutions like Cisco DNA Center, SD-Access and SD-WAN

Explain the need for programmability, and automation and provide a high level Network

Programmability options in Enterprise Networks

Software-Defined Networking

Describe the basics of SDN and its role in enterprise network

Common Programmability Protocols and Methods

Describe the Common Programmability Protocols and Methods in the Model-driven Programmability Stack

Configuration Management Tools

Describe the Configuration Management Tools and compare and contrast agent-based and agentless configuration management solutions

Introducing Cisco DNA Center

Describe Cisco DNA Center

Discovery 29: Explore the Cisco DNA Center

Describe example analysis using Cisco DNA Center

Topology

Task 1: Explore Cisco DNA Center GUI

Cisco SD-Access

Explore Cisco SD Access and introduce concept of overlay networks

Introducing Cisco SD-WAN

Describe Cisco SD-WAN

Summary Challenge

28. Introducing System Monitoring

Introducing Syslog

Configure basic IOS system monitoring tools

Explain why syslog is used

Syslog Message Format

Describe the format and severity levels of syslog messages

SNMP Overview

Explain why SNMP is used and how it works and its versions

Enabling Network Time Protocol

Describe how to enable NTP

Discovery 30: Configure and Verify NTP

Configure and verify NTP in Client Server mode

Topology

Job Aids

Task 1: Configure and Verify NTP

Configure System Message Logging

COURSE OUTLINE

FASTLab 10: Configure System Message Logging

Topology

Job Aids

Configuration Tips

Answer Key

Summary Challenge

29. Managing Cisco Devices

Cisco IOS Integrated File System and Devices

Describe the management of Cisco devices

Describe the file systems that are used by a Cisco router

Stages of the Router Power-On Boot Sequence

Describe the sequence of events that occurs during a router boot Loading and Managing System Images Files

Describe how to load and manage system images files

Loading Cisco IOS Configuration Files

Describe the process of loading Cisco IOS configuration files

Validating Cisco IOS Images Using MD5

Describe how to validate IOS images using MD5

Managing Cisco IOS Images and Device Configuration Files

Describe how to manage Cisco IOS images and device configuration files Discovery 31: Create the Cisco IOS Image Backup

Create the IOS image backup

Topology

Job Aids

Task 1: Create the Cisco IOS Image Backup

Discovery 32: Upgrade Cisco IOS Image

Upgrade IOS image

Topology

Job Aid

Task 1: Upgrade Cisco IOS Image

Summary Challenge

30. Examining the Security Threat Landscape

Security Threat Landscape Overview

Describe the current security threat landscape

Describe the current threat landscape or threatscape

Malware

Describe malware

Hacking Tools

Describe hacking tools

Denial of Service and Distributed Denial of Service

Describe DoS and DDoS attacks

Spoofing

Describe spoofing

Reflection and Amplification Attacks

Describe reflection and amplification attacks

Social Engineering

Explain social engineering

Evolution of Phishing

Describe the evolution of phishing

Password Attacks

Examine password attacks

Reconnaissance Attacks

Examine reconnaissance attacks

Buffer Overflow Attacks

Explain buffer overflow attacks

Man-in-the-Middle Attacks

Explain man-in-the-middle attacks

31. Implementing Threat Defense Technologies

Information Security Overview

Describe threat defense technologies

Describe information security

Firewalls

Describe firewalls

Intrusion Prevention Systems

Describe intrusion prevention systems

Introduction to Cryptographic Technologies

Describe cryptographic technologies

IPsec Security Services

Describe IPsec security services

Secure Sockets Layer and Transport Layer Security

Describe SSL and TLS protocols

Wireless Security Protocols

Describe wireless security protocols

Discovery 33: Configure WLAN Using WPA2 PSK Using the GUI

Configure WPA2 PSK

Task 1: Configure WLAN Using WPA2 PSK Using the GUI

Summary Challenge

32. Securing Administrative Access

Network Device Security Overview

Implement a basic security configuration of the device management plane

List the actions that are required to secure a network device

Securing Access to Privileged EXEC Mode

Secure access to privileged EXEC mode

Securing Console Access

Secure console access to a network device

Securing Remote Access

COURSE OUTLINE

Secure remote access to a network device
Discovery 34: Secure Console and Remote Access
Secure initial configuration
Topology
Job Aids
Task 1: Secure Access to Privileged EXEC Mode
Task 2: Secure Console and Remote Access
Task 3: Enable SSH
Configuring the Login Banner
Configure the login banner
Limiting Remote Access with ACLs
Limit remote access with an ACL
Discovery 35: Enable and Limit Remote Access Connectivity
Enable and secure remote access connectivity
Topology
Job Aids
Task 1: Limit Remote Access with ACLs
Task 2: Configure the Login and EXEC Banners
External Authentication Options
Describe TACACS+ and RADIUS for external authentication
Secure Device Administrative Access
FASTLab 11: Secure Device Administrative Access
Topology
Job Aids
Answer Key
Summary Challenge

33. Implementing Device Hardening

Securing Unused Ports
Implement basic steps to harden network devices
Securing Unused Ports
Secure unused ports
Infrastructure ACL
Infrastructure ACL
Disabling Unused Services
Disable unused services
Port Security Overview
Describe port security
Discovery 36: Configure and Verify Port Security
Configure port security
Topology
Job Aids
Task 1: Configure and Verify Port Security with Static Learning and Default Violation Mode on SW1

Task 2: Configure and Verify Port Security with Sticky Learning and Default Violation Mode on SW1
Task 3: Configure Error-Disabled Port Automatic Recovery on SW1
Task 4: Configure and Verify Port Security with Dynamic Learning and Protect Violation Mode on SW2
Task 5: Configure and Verify Port Security with Dynamic Learning and Restrict Violation Mode on SW2
Mitigating VLAN Attacks
Describe VLAN attacks
DHCP Snooping
Describe DHCP attacks
Dynamic ARP Inspection
Explain ARP cache poisoning attack
Implement Device Hardening
FASTLab 12: Implement Device Hardening
Topology
Job Aids
Configuration Tips
Answer Key
Summary Challenge

LABS

- Discovery 1: [Get started with Cisco CLI](#)
- Discovery 2: [Observe How a Switch Operates](#)
- Discovery 3: [Perform Basic Switch Configuration](#)
- FASTLab 1: [Implement the Initial Switch Configuration](#)
- Discovery 4: [Inspect TCP/IP Applications](#)
- Discovery 5: [Configure an Interface on a Cisco Router](#)
- Discovery 6: [Configure and Verify Layer 2 Discovery Protocols](#)
- FASTLab 2: [Implement an Initial Router Configuration](#)
- Discovery 7: [Configure Default Gateway](#)
- Discovery 8: [Explore Packet Forwarding](#)
- Discovery 9: [Troubleshoot Switch Media and Port Issues](#)
- Discovery 10: [Troubleshoot Port Duplex Issues](#)
- Discovery 11: [Configure Basic IPv6 Connectivity](#)
- Discovery 12: [Configure and Verify IPv4 Static Routes](#)
- Discovery 13: [Configure IPv6 Static Routes](#)
- FASTLab 3: [Implement IPv4 Static Routing](#)
- FASTLab 4: [Implement IPv6 Static Routing](#)
- Discovery 14: [Configure VLAN and Trunk](#)
- FASTLab 5: [Troubleshoot VLANs and Trunk](#)
- Discovery 15: [Configure a Router on a Stick](#)
- FASTLab 6: [Implement Multiple VLANs and Basic Routing Between the VLANs](#)
- Discovery 16: [Configure and Verify Single-Area OSPF](#)
- Discovery 17: [Configure and Verify EtherChannel](#)
- FASTLab 7: [Improve Redundant Switched Topologies with EtherChannel](#)
- Discovery 18: [Configure and Verify IPv4 ACLs](#)
- FASTLab 8: [Implement Numbered and Named IPv4 ACLs](#)
- Discovery 19: [Configure a Provider-Assigned IPv4 Address](#)
- Discovery 20: [Configure Static NAT](#)
- Discovery 21: [Configure Dynamic NAT and PAT](#)
- FASTLab 9: [Implement PAT](#)
- 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](#)
- Discovery 29: [Explore the Cisco DNA Center](#)
- Discovery 30: [Configure and Verify NTP](#)
- FASTLab 10: [Configure System Message Logging](#)
- Discovery 31: [Create the Cisco IOS Image Backup](#)
- Discovery 32: [Upgrade Cisco IOS Image](#)
- Discovery 33: [Configure WLAN Using WPA2 PSK Using the GUI](#)
- Discovery 34: [Secure Console and Remote Access](#)
- Discovery 35: [Enable and Limit Remote Access Connectivity](#)
- FASTLab 11: [Secure Device Administrative Access](#)
- Discovery 36: [Configure and Verify Port Security](#)
- FASTLab 12: [Implement Device Hardening](#)