

Implementing and Administering Cisco Solutions

Duration: 180 Days Course Code: CCNA Version: 2.2 Delivery Method: Elearning (Self-paced)

Overview:

The Implementing and Administering Cisco Solutions course provides a broad range of fundamental knowledge for all IT careers. Through a combination of lecture and hands-on labs, 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. Network programmability, automation, and software-defined networking are also covered at a foundational level.

This course helps you prepare to take the **200-301Cisco Certified Network Associate (CCNA)** exam.

This course is worth 30 CE credits towards recertification

Target Audience:

Anyone looking to start a career in networking or wishing to achieve the Cisco CCNA Certification.

Objectives:

- After completing 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
 - 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
 - Explain Software-Defined Networks
 - 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

- 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)
- Implement basic steps to harden network devices
- Discuss the need of network programmability in Enterprise Networks, common programmability protocols, and configuration management tools.
- Introducing AI and ML in Network Operations

Prerequisites:

Attendees should meet the following prerequisites:

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

Testing and Certification

Recommended as preparation for the following exams:

- **200-301** - Cisco Certified Network Associate Exam (CCNA)

Follow-on-Courses:

This course covers network fundamentals, network access, IP connectivity, IP Services, security fundamentals and verification of Cisco Networks and is a great starting point for those starting their Cisco career certification journey. The following courses are recommended for further study.

- **CLFNDU** - Understanding Cisco Collaboration Foundations
- **DCFNDU** - Understanding Cisco Data Center Foundations
- **ENFNDU** - Understanding Cisco Enterprise Foundations
- **SPFNDU** - Understanding Cisco Service Provider Network Foundations
- **WLFNDU** - Understanding Cisco Wireless Foundations

Alternatively should you wish to progress to the professional level then you may wish to review

- **CLCOR** - Implementing and Operating Cisco Collaboration Core Technologies
- **DCCOR** - Implementing and Operating Cisco Data Center Core Technologies
- **ENCOR** - Implementing and Operating Cisco Enterprise Network Core Technologies.
- **SCOR** - Implementing and Operating Cisco Security Core Technologies
- **SPCOR** - Implementing and Operating Cisco Service Provider Network Core Technologies

Content:

Exploring the Functions of Networking

- What is a Computer Network?
- Common Usage of 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

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

Operating Cisco IOS Software

- Cisco IOS Software Features and Functions
- Cisco IOS Software CLI Functions
- Cisco IOS Software Modes

Introducing LANs

- Local Area Networks
- LAN Components
- Need for Switches
- Characteristics and Features of Switches

Exploring the TCP/IP Link Layer

- Ethernet LAN Connection Media
- Ethernet Frame Structure
- LAN Communication Types
- MAC Addresses
- Frame Switching
- Duplex Communication

Starting a Switch

- Switch Installation
- Connecting to a Console Port
- Switch Components
- Switch LED Indicators
- Basic show Commands and Information
- Implement the Initial Switch Configuration

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

Introducing Basic IPv6

- IPv4 Address Exhaustion Workarounds
- IPv6 Features
- IPv6 Addresses and Address Types
- Comparison of IPv4 and IPv6 Headers
- Internet Control Message Protocol Version 6
- Neighbor Discovery
- IPv6 Address Allocation
- Verification of End-To-End IPv6 Connectivity

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
- IPv6 Static Route Configuration
- Implement IPv4 Static Routing
- Implement IPv6 Static Routing

Implementing VLANs and Trunks

- VLAN Introduction
- Creating a VLAN
- Assigning a Port to a VLAN
- Trunking with 802.1Q
- Configuring an 802.1Q Trunk
- VLAN Design Considerations
- Troubleshoot VLANs and Trunks

Routing Between VLANs

- Purpose of Inter-VLAN Routing
- Options for Inter-VLAN Routing
- Implement Multiple VLANs and Basic Routing Between the VLANs

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
- Routing for IPv6

Building Redundant Switched Topologies

- Physical Redundancy in a LAN
- Issues in Redundant Topologies
- Spanning Tree Operation
- Types of Spanning Tree Protocols

Securing Administrative Access

- Network Device Security Overview
- Securing Access to Privileged EXEC Mode
- Securing Console Access
- Securing Remote Access
- Configuring the Login Banner
- Limiting Remote Access with ACLs
- External Authentication Options
- Secure Device Administrative Access

Implementing Device Hardening

- Securing Unused Ports
- Infrastructure ACL
- Disabling Unused Services
- Port Security
- Mitigating VLAN Attacks
- Dynamic ARP Inspection
- Mitigating STP Attacks
- Implement Device Hardening

Exploring Layer 3 Redundancy (Self-Study)

- Need for Default Gateway Redundancy
- Understanding FHRP
- Understanding HSRP

Introducing WAN Technologies (Self-Study)

- Introduction to WAN Technologies
- WAN Devices and Demarcation Point
- WAN Topology Options
- WAN Connectivity Options
- Virtual Private Networks
- Enterprise-Managed VPNs

Introducing QoS (Self-Study)

- Converged Networks
- QoS Defined
- QoS Policy
- QoS Mechanisms
- QoS Models
- Deploying End-to-End QoS

Explaining Wireless Fundamentals (Self-Study)

- Wireless Technologies
- Wireless Radio Communication
- WLAN Architectures
- Wi-Fi Channels
- AP and WLC Management

Introducing Architectures and Virtualization (Self-Study)

- Introduction to Network Design
- Enterprise Three-Tier Hierarchical Network Design
- Spine - Leaf Network Design
- Cisco Enterprise Architecture Model

- Implementing Subnetting: Borrowing 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

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

Exploring the Functions of Routing

- Role of a Router
- Router Components
- Router Functions
- Routing Table
- Path Determination
- Cisco Router Models
- Routing Hierarchy on Internet

Configuring a Cisco Router

- Initial Router Setup
- Configuring Router Interfaces
- Configuring IPv4 Addresses on Router Interfaces
- Checking Interface Configuration and Status
- Exploring Connected Devices
- Using Cisco Discovery Protocol
- Configure and Verify LLDP
- Implement an Initial Router Configuration

Exploring the Packet Delivery Process

- Layer 2 Addressing
- Layer 3 Addressing
- Default Gateways
- Address Resolution Protocol
- Host-To-Host Packet Delivery

Troubleshooting a Simple Network

- Troubleshooting Methods
- Troubleshooting Tools
- Troubleshooting Common Switch Media Issues
- Troubleshooting Common Switch Port Issues
- Troubleshooting Common Problems Associated with IPv4 Addressing

- PortFast, BPDU Guard and BPDU Filter
- Rapid Spanning Tree Protocol
- STP Loop Guard
- STP Root Guard

Improving Redundant Switched Topologies with EtherChannel

- EtherChannel Overview
- EtherChannel Configuration Options
- Configuring and Verifying EtherChannel
- Improve Redundant Switched Topologies with EtherChannel

Explaining the 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
- Implement Numbered and Named IPv4 ACLs

Enabling Internet Connectivity

- 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
- Implement PAT

Introducing AI and ML in Network Operations

- Basics of AI and ML
- Advanced AI Concepts
- Retrieval-Augmented Generation
- Role of AI and ML in Network Operations

Introducing System Monitoring

- Introducing Syslog
- Syslog Message Format
- SNMP Overview
- Enabling Network Time Protocol
- Configure System Message Logging

Managing Cisco Devices

- Cisco IOS Integrated File System and Devices
- Stages of the Router Power-On Boot Sequence
- Loading and Managing System Images Files

- Underlay and Overlay Network Concepts
- Cloud Computing Overview
- Network Device Architecture
- Virtualization Fundamentals

Explaining Software-Defined Networking (Self-Study)

- Software-Defined Networking
- Traditional versus Software-Defined Networks
- Software-Defined Network Layers
- Introducing Cisco Catalyst Center
- Cisco Catalyst Center Dashboard and Tools
- Introducing Cisco SD-Access
- Introducing Cisco Catalyst SD-WAN
- Introducing Cisco Meraki

Introducing Network Programmability (Self-Study)

- Traditional Network Management
- Network Automation and Programmability
- Network Automation Use Cases
- Model-Driven Programmability
- Data Encoding Formats
- JavaScript Object Notation
- Extensible Markup Language
- YAML Data Serialisation Standard
- Network Management Protocols
- Configuration Management Tools Overview
- Ansible
- Terraform

Examining the Security Threat Landscape (Self-Study)

- Security Threat Landscape Overview
- Malware
- Hacking Tools
- DoS and DDoS
- 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

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

- Loading Cisco IOS Configuration Files
- Validating Cisco IOS Images Using MD5/SHA512
- Managing Cisco IOS Images and Device Configuration Files
- Cisco IOS WebUI

- Secure Sockets Layer and Transport Layer Security
- Wireless Security Protocols

Labs:

- Discovery 1: Get Started with Cisco Command-Line Interface (CLI)
- Discovery 2: Observe How a Switch Operates
- Discovery 3: Perform Basic Switch Configuration
- FAST Lab 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
- FAST Lab 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
- FAST Lab 3: Implement IPv4 Static Routing
- FAST Lab 4: Implement IPv6 Static Routing
- Discovery 14: Configure VLANs and Trunk
- FAST Lab 5: Troubleshoot VLANs and Trunk
- Discovery 15: Configure Inter-VLAN Routing
- FAST Lab 6: Implement Multiple VLANs and Basic Routing Between the VLANs
- Discovery 16: Configure and Verify Single-Area OSPF
- Discovery 17: Configure and Verify EtherChannel
- FAST Lab 7: Improve Redundant Switched Topologies with EtherChannel
- Discovery 18: Configure and Verify IPv4 ACLs
- FAST Lab 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 Port Address Translation (PAT)
- FAST Lab 9: Implement PAT
- Discovery 22: Configure and Verify NTP
- FAST Lab 10: Configure System Message Logging
- Discovery 23: Create the Cisco IOS Image Backup

- Discovery 24: Upgrade Cisco IOS Image
- Discovery 25: Secure Console and Remote Access
- Discovery 26: Enable and Limit Remote Access Connectivity
- FAST Lab 11: Secure Device Administrative Access
- Discovery 27: Configure and Verify Port Security
- FAST Lab 12: Implement Device Hardening
- Discovery 28: Log into and Monitor the WLC
- Discovery 29: Configure an Open Wireless Network
- Discovery 30: Define a RADIUS Server and Enable SNMP and Syslog
- Discovery 31: Configure a WLAN to Use WPA2 PSK

Further Information:

For More information, or to book your course, please call us on Head Office 01189 123456 / Northern Office 0113 242 5931

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