Implementing and Administering Cisco Solutions

Duration: 5 Days **Course Code: CCNA** **Version: 2.1** **Delivery Method: Virtual Learning**

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.

Please note that this course is a combination of Instructor-Led and Self-Paced Study - 5 days in the classroom and approx 3 days of self study. The self-study content will be provided as part of the digital courseware that you recieve at the beginning of the course and should be part of your preparation for the exam. Lab access is provided for both the class and the self- study sections, lab access is valid for 60 hours or 90 days whichever is the shorter, so please ensure you exit the lab exercises when not in use.

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
- 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

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)
- Describe threat defense technologies
- Implement a basic security configuration of the device management plane
- 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 Date 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 Contorl 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 Toplogies
- Spanning Tree Operation
- Types of Spanning Tree Protocols

Securing Administrative Access

- Network Device Security Overview
- Securing Access to Priviliged 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 Toplogies 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 AL 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 Catayst 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 Preventions 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 00 971 4 446 4987

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