



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

Duration: 5 Days

Method: Live Online Training

---

**Certification:** Cisco Certified Network Associate (CCNA®) — **Exam:** 200-301 CCNA

---

## Course Description

This course teaches participants a broad range of fundamental knowledge necessary for all IT careers. Through a combination of lecture, hands-on labs, and self-study, they 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 participants a foundation in network programmability, automation, and software-defined networking. This course helps participants prepare to take the certification exam.

## Target Audience

This course is intended for:

- Entry-level network engineer
- Network administrator
- Network support technician
- Help desk technician
- Individuals seeking the Cisco CCNA certification.

## Prerequisites

To attend this course, candidates must have:

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



## Course Objectives

Upon successful completion of this course, attendees will 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.
- 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 defence technologies.
- Implement a basic security configuration of the device management plane.
- Implement basic steps to harden network devices.



## Course Topics

### Module 1: Exploring the Functions of Networking

- Components of a Computer Network
- Basic Characteristics of a Computer Network
- What Is a Network?
- Examples of Networks
- Components of a Network
- Characteristics of a Network
- Physical vs. Logical Topologies
- Interpreting a Network Diagram
- Impact of User Applications on the Network

### Module 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

### Module 3: Operating Cisco IOS Software

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

### Module 4: Introducing LANs

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

### Module 5: Exploring the TCP/IP Link Layer

- Ethernet LAN Connection Media
- Ethernet Frame Structure
- Describe the Fields of an Ethernet Frame
- LAN Communication Types
- MAC Addresses
- Frame Switching
- Duplex Communication

### Module 6: Starting a Switch

- Switch Installation
- Connecting to a Console Port

- Switch LED Indicators
- Basic show Commands and Information

### Module 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: 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

### Module 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

### Module 9: Exploring the Functions of Routing

- Role of a Router
- Router Components
- Router Functions
- Routing Table
- Path Determination



## Course Topics *Continued*

### Module 10: 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

### Module 11: Exploring the Packet Delivery Process

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

### Module 12: Troubleshooting a Simple Network

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

### Module 13: Introducing Basic IPv6

- IPv4 Address Exhaustion Workarounds
- IPv6 Features
- IPv6 Addresses and Address Types
- Comparison of IPv4 and IPv6 Headers
- Internet Control Message Protocol V6
- Neighbor Discovery
- IPv6 Address Allocation
- Verification of End-To-End IPv6 Connectivity

### Module 14: Configuring Static Routing

- Routing Operation
- When to Use Static Routing

- IPv4 Static Route Configuration
- Default Routes
- Verifying Static and Default Route Configuration
- Configuring IPv6 Static Routes
- Implement IPv4 Static Routing
- Implement IPv6 Static Routing

### Module 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
- VLAN Design Consideration
- Troubleshoot VLANs and Trunk

### Module 16: Routing Between VLANs

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

### Module 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

### Routing for IPv6 Module 18: Building Redundant Switched Topologies

- Physical Redundancy in a LAN
- Issues in Redundant Topologies
- Spanning Tree Operation
- Types of Spanning Tree Protocols
- Rapid Spanning Tree Protocol
- PortFast and BPDU Guard



## Course Topics *Continued*

### Module 19: Improving Redundant Switched Topologies with EtherChannel

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

### Module 20: Exploring Layer 3 Redundancy

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

### Module 21: Introducing WAN Technologies

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

### Module 22: 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

### Module 23: Enabling Internet Connectivity

- Configure Internet Access using DHCP Clients
- Introducing Network Address Translation (NAT)
- Configure NAT on Cisco Routers
- 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

### Module 24: Introducing QoS

- Converged Networks
- Quality of Service Defined
- QoS Policy
- QoS Mechanisms
- QoS Models

### Deploying End-to-End QoS Module 25: Explaining Wireless Fundamentals

- Wireless Technologies
- WLAN Architectures
- WLAN Components
- WiFi Channels
- AP and WLC Management

### Module 26: Introducing Architectures and Virtualization

- Introduction to Network Design
- Enterprise Three-Tier Hierarchical Network Design

### Spine-Leaf Network Design

- Cisco Enterprise Architecture Model
- Cloud Computing Overview
- Device Architecture
- Virtualization Fundamentals

### Module 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
- Cisco SD-Access
- Introducing Cisco SD-WAN





## Course Topics *Continued*

### Module 28: Introducing System Monitoring

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

### Module 29: Managing Cisco Devices

- Cisco IOS Integrated File System and 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

### Module 30: Examining the Security Threat Landscape

- Security Threat Landscape Overview
- Malware
- Hacking Tools
- Denial of Service
- 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

### Module 31: Implementing Threat Defense Technologies

- Information Security Overview
- Firewalls
- Intrusion Prevention Systems
- Introduction to Cryptographic Technologies
- IPsec Security Services
- Secure Sockets Layer and Transport Layer Security
- Wireless Security Protocols
- Configure WPA2 PSK

### Module 32: 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

### Module 33: Implementing Device Hardening

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

## LABS INCLUDED

