

---

# **CISCO CERTIFIED NETWORK ASSOCIATE (CCNA)**

## **COURSE CONTEXT AND OVERVIEW**

The Cisco CCNA® Exploration curriculum provides a comprehensive overview of networking; from fundamentals to advanced applications and services. It is based on a top-down approach to networking that is popular in advanced technical colleges and universities. This course emphasizes theoretical concepts and practical application, while providing opportunities for participants to gain the skills and hands-on experience needed to design, install, operate, and maintain networks.

CCNA Exploration offers in-depth theory, challenging labs, and a detailed overview of protocol operations. It is designed for students with advanced problem-solving and analytical skills, such as degree candidates in engineering, math, or science, or for working professionals who would like to advance their careers or gain certification. CCNA Exploration helps participants prepare for successful IT careers in small-to-medium businesses, as well as enterprise and service provider environments.

All CCNA Exploration courses include complex and challenging hands-on labs to help participants develop critical thinking, problem solving, and collaboration skills, as well as practical knowledge.

The CCNA Exploration curriculum prepares students for the Cisco CCNA® network associate certification exam (640-802). CCNA is the industry standard, foundational certification for networking careers. Participants need to complete all four courses of CCNA Exploration to fully prepare for the CCNA exam.

The CCNA Exploration curriculum is composed of four modules:

- 1) Network Fundamentals
- 2) Routing Protocols and Concepts
- 3) LAN Switching and Wireless
- 4) Accessing the WAN

## **TARGET AUDIENCE**

This CCNA course targets staff in telecom operators (fixed and mobile), service providers, and regulatory authorities, and any other organizations that have implemented, or are intending to implement enterprise level IP networking solutions.

In particular, it targets:

- Switching Technicians/ Engineers

- Transmission Technicians/Engineers
- Data communications Technicians / Engineers
- Systems and Network Administrators
- Telecommunications management personnel seeking basic IP knowledge

## **METHODOLOGY**

The course will be a mixture of lectures, assessment and practical exercises based on Cisco routers, switches and wireless access devices.

## **DURATION**

The course will be offered over a period of five months.

## **CCNA 1 – 4 MODULES / OUTLINE**

### **CCNA 1: Network Fundamentals**

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. It uses the OSI and TCP layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum.

As the first CCNA module, a mixture of equipment-based labs and simulations are used to allow participants to analyse real data without affecting production networks. Participants analyse protocol and network operation and build small networks in a simulated environment.

At the end of the course, participants build simple LAN topologies by applying basic principles of cabling; performing basic configurations of network devices, including routers and switches; and implementing IP addressing schemes.

### **Skills**

*Upon completion of the Network Fundamentals course, participants will be able to perform the following tasks:*

- Describe the importance and operation of data networks and the Internet in supporting communications
- Recognise the devices and services that are used to support communications across an Internetwork
- Use layered network protocol models to explain communication in data networks
- Describe the importance of addressing and naming schemes at various layers of data networks
- Describe the protocols and services provided by the Application layer in the OSI and TCP/IP models
- Analyse the operations and features of the protocols and services at the Transport, Network and Data Link layers

- Describe the fundamental concepts of routing
- Design, calculate, and apply subnet masks and addresses to fulfill given requirements
- Explain the role of Physical layer protocols and services in supporting communications across data networks
- Explain fundamental Ethernet concepts such as media, services, and operation
- Employ basic cabling and network designs to connect devices in accordance with stated objectives
- Build a simple Ethernet network using routers and switches
- Use Cisco Command Line Interface commands to perform basic router and switch configuration and verification
- Analyse the operations and features of common Application layer protocols such as HTTP, DNS, DHCP, SMTP, Telnet, and FTP.
- Utilise common network utilities to verify small network operations and analyse data traffic.

### **Prerequisites**

Skills which may be helpful for this course are: A+ Certification, Introductory electronics

### **CCNA 2: Routing Protocols and Concepts**

This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Participants analyse, configure, verify, and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP, and OSPF.

By the end of this course, delegates will be able to recognise and correct common routing issues and problems. Each chapter walks the student through a basic procedural lab, and then presents basic configuration, implementation, and troubleshooting labs.

### **Skills**

*Upon completion of the Routing Protocols and Concepts course, the participants will be able to perform the following tasks:*

- Describe the purpose, nature, and operations of a router
- Explain the critical role routers play in enabling communications across multiple networks
- Describe the purpose and nature of routing tables
- Describe how a router determines a path and switches packets and explain the route lookup process
- Configure and verify basic router operation for a newly installed router
- Configure and verify static and default routing.
- Describe the role of dynamic routing protocols and place these protocols in the context of modern network design
- Describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols
- Identify the characteristics of distance vector routing protocols using RIP
- Compare and contrast classful and classless IP addressing
- Design and implement a classless IP addressing scheme for a given network
- Describe the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP)
- Use advanced configuration commands with routers implementing EIGRP and OSPF

- Describe the basic features and concepts of link-state routing protocols
- Describe the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol
- Configure and verify basic RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network.
- Use router show and debug commands to troubleshoot common errors that occur in small routed networks.

### **Prerequisites**

Successful completion of the CCNA Exploration Network Fundamentals module is required before embarking on this module.

### **CCNA 3. LAN Switching and Wireless**

This module helps participants develop an in-depth understanding of how switches operate and are implemented in the LAN environment for small and large networks.

Beginning with a foundational overview of Ethernet, this course provides detailed explanations of LAN switch operation, VLAN implementation, Rapid Spanning Tree Protocol (RSTP), VLAN Trunking Protocol (VTP), Inter-VLAN routing, and wireless network operations.

Delegates analyse, configure, verify, and troubleshoot VLANs, RSTP, VTP, and wireless networks. Campus network design and Layer 3 switching concepts are introduced.

### **Skills**

*Upon completion of the LAN Switching and Wireless course, you will be able to perform the following tasks:*

- Identify and correct common network problems at layers 1,2,3 and 7 using a layered model approach
- Interpret network diagrams
- Select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts.
- Explain basic switching concepts and the operation of Cisco switches.
- Perform and verify initial switch configuration tasks including remote access management.
- Describe enhanced switching technologies (VTP, RSTP, VLAN, PVSTP, 802.1q)
- Describe, configure, verify, and troubleshoot VLANs, trunking and Inter-VLAN Routing
- Configure, verify, and troubleshoot RSTP operation
- Verify network status and switch operation using basic utilities (ping, traceroute, telnet, SSH, arp, ipconfig), SHOW & DEBUG commands.
- Identify, prescribe, and resolve common switched network media issues, configuration issues, autonegotiation, and switch hardware failures
- Manage Cisco IOS
- Describe standards associated with wireless media (IEEE Wi-Fi Alliance, ITU/FCC)
- Identify and describe the purpose of the components in a small wireless network. (SSID, BSS, ESS)

- Identify the basic parameters to configure on a wireless network to ensure that devices connect to the correct access point.
- Compare and contrast wireless security features and capabilities of WPA security (open, WEP, WPA-1/2)
- Identify common issues with implementing wireless networks. (interference, misconfiguration )

### **Prerequisites**

Successful completion of the CCNA Exploration Network Fundamentals module is required before registering on this module.

### **CCNA 4. Accessing the WAN**

This module explains the principles of traffic control and access control lists (ACLs) and provides an overview of the services and protocols at the data link layer for wide-area access.

Delegates learn about user access technologies and devices and discover how to implement and configure Point-to-Point Protocol (PPP), Point-to-Point Protocol over Ethernet (PPPoE), DSL, and Frame Relay. WAN security concepts, tunnelling, and VPN basics are introduced.

The course concludes with a discussion of the special network services required by converged applications and an introduction to quality of service (QoS).

### **Skills**

*Upon completion of the Accessing the WAN course, delegates will be able to perform the following tasks:*

- Describe the impact of applications (Voice Over IP and Video Over IP) on a network
- Describe the components required for network and Internet communications.
- Implement basic switch security (port security, trunk access, management VLAN)
- Explain the operation and benefits of using DHCP and DNS and configure, verify and troubleshoot DHCP and DNS operation on a router.
- Describe today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats
- Explain general methods to mitigate common security threats to network devices, hosts, and applications.
- Describe the functions of common security appliances and applications, and recommended practices including initial steps to secure network devices
- Describe the purpose and types of ACLs and Configure and apply ACLs based on network filtering requirements.(CLI/SDM)
- Verify, monitor and troubleshoot ACLs in a network environment.
- Explain the basic operation of NAT; configure NAT for given network requirements and troubleshoot NAT issues
- Describe different methods for connecting to a WAN
- Configure and verify a basic WAN serial connection.
- Configure and verify a PPP connection between Cisco routers
- Configure and verify Frame Relay on Cisco routers

- Troubleshoot WAN implementation issues.
- Describe VPN technology (importance, benefits, role, impact, components)

### **Prerequisites**

Successful completion of the CCNA Exploration Routing Protocols and Concepts module is required before registering on this module.

