

# CCNAv7

## Switching, Routing and Wireless Essentials (SRWE), Scope and Sequence

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### Target Audience

The Cisco Networking Academy® CCNAv7 curriculum is designed for participants who are seeking entry-level jobs in the ICT industry or hope to fulfill prerequisites to pursue more specialized ICT skills. The CCNAv7 curriculum is presented in three courses: Introduction to Networks (ITN), Switching, Routing and Wireless Essentials (SRWE), and Enterprise Networking, Security, and Automation (ENSA). These three courses provide integrated and comprehensive coverage of networking topics including: IP routing and switching fundamentals, network security and services, and network programmability and automation, while providing learners extensive opportunities for hands-on practical experience and career skills development.

The curriculum is appropriate for learners at many education levels and types of institutions, including high schools, secondary schools, universities, colleges, career and technical schools, and community centers.

### Prerequisites

Students are required to have successfully completed the Introduction to Networks (ITN) course prior to beginning the Switching, Routing and Wireless Essentials (SRWE) course. Learners are also expected to have the following skills:

- High school reading level.
- Basic computer literacy
- Basic PC operating system navigation skills
- Basic internet usage skills

### CCNAv7 Curriculum Description

In this curriculum, Cisco Networking Academy™ participants develop workforce readiness skills and build a foundation for success in networking-related careers and degree programs. With the support of video and rich interactive media, participants learn, apply and practice CCNA knowledge and skills through a series of in-depth hands-on experiences and simulated activities that reinforce their learning. Upon completion of all three course offerings, learners will be prepared to take the Cisco CCNA Unified certification exam.

CCNAv7 teaches comprehensive networking concepts and skills, from network applications to the protocols and services provided to those applications. Learners will progress from basic networking to more complex enterprise and theoretical networking models later in the curriculum.

CCNAv7 includes the following features:

- There are three offerings that make up the CCNAv7 curriculum.
- The three offerings align to and cover the competencies outlined for the CCNA Certification Exam.
- Each offering is comprised of multiple modules. Each module is comprised of topics.
- Modules emphasize critical thinking, problem solving, collaboration, and the practical application of skills.

- Each topic contains a Check Your Understanding interactive quiz, or some other way to assess understanding, such as a lab or a Packet Tracer. These topic-level assessments are designed to tell learners if they have a good grasp of the topic content, or if they need to review before continuing. Learners can ensure their level of understanding well before taking a graded quiz or exam. Check Your Understanding quizzes do not affect the learner's overall grade.
- Students learn the basics of routing, switching, and advanced technologies to prepare for the Cisco CCNA exam, networking-related degree programs, and entry-level networking careers.
- The language used to describe networking concepts is designed to be easily understood by learners at all levels and embedded interactive activities help reinforce comprehension.
- Assessments and practice activities are focused on specific competencies to increase retention and provide flexibility in the learning path.
- Multimedia learning tools, including videos, games, and quizzes, address a variety of learning styles and help stimulate learning and promote increased knowledge retention.
- Hands-on labs and Cisco® Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem-solving skills.
- Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.
- Cisco Packet Tracer activities are designed for use with the latest version of Packet Tracer.

## Lab Equipment Requirements

Current designs for lab topologies leverage equipment used in previous CCNAv6 and include options to utilize a 2 router + 2 switch + 1 wireless router physical equipment bundle described below. Labs with more complex topologies will rely on PT as a complementary environment to be used in addition to the physical labs. Detailed equipment information, including descriptions and part numbers for the equipment used in previous CCNAv6 is available in the CCNA Equipment List, which is located on the Cisco NetAcad [Equipment Information](https://www.netacad.com/portal/resources/equipment-information) site (<https://www.netacad.com/portal/resources/equipment-information>).

### Baseline Equipment Bundle:

- 2 x ISR4221/K9 Routers
- 2 x WS-C2960+24TC-L Catalyst switches
- 1 wireless router (generic brand) with WPA2 support
- Ethernet patch cables
- PCs - minimum system requirements
  - CPU: Intel Pentium 4, 2.53 GHz or equivalent •
  - OS: Microsoft Windows 7, Microsoft Windows 8.1, Microsoft Windows 10, Ubuntu 14.04 LTS, macOS High Sierra and Mojave •
  - RAM: 4 GB
  - Storage: 500 MB of free disk space
  - Display resolution: 1024 x 768
  - Language fonts supporting Unicode encoding (if viewing in languages other than English)
  - Latest video card drivers and operating system updates
- Internet connection for lab and study PCs
- Optional equipment for connecting to a WLAN
  - 1 printer or integrated printer/scanner/copier for the class to share
  - Smartphones and tablets are desirable for use with the labs

### Software:

- Cisco IOS versions:
  - Routers: Version 15.0 or higher, IP Base feature set.
  - Switches: Version 15.0 or higher, lanbaseK9 feature set.
- Packet Tracer v7.3
- Open-source server software:

- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
- Tera Term source SSH client software for lab PCs.
- Oracle VirtualBox, most recent version.
- Wireshark version 2.5 or higher.

## CCNAv7: Switching, Routing and Wireless Essentials (SRWE) Outline

The second course in the CCNA curriculum focuses on switching technologies and router operations that support small-to-medium business networks and includes wireless local area networks (WLANs) and security concepts. Students learn key switching and routing concepts. They can perform basic network configuration and troubleshooting, identify and mitigate LAN security threats, and configure and secure a basic WLAN.

Listed below are the current set of modules and their associated competencies outlined for this course. Each module is an integrated unit of learning that consists of content, activities and assessments that target a specific set of competencies. The size of the module will depend on the depth of knowledge and skill needed to master the competency. Some modules are considered foundational, in that the artifacts presented, while not assessed, enable learning of concepts that are covered on the CCNA certification exam.

### CCNAv7: Switching, Routing and Wireless Essentials (SRWE) Outline

CCNAv7: SRWE		
Module	Topic	Objective
Basic Device Configuration		Configure devices by using security best practices.
	Configure a Switch with Initial Settings	Configure initial settings on a Cisco switch.
	Configure Switch Ports	Configure switch ports to meet network requirements
	Secure Remote Access	Configure secure management access on a switch.
	Basic Router Configuration	Configure basic settings on a router, using CLI, to route between two directly-connected networks.
	Verify Directly Connected Networks	Verify connectivity between two networks that are directly connected to a router.
Module	Topic	Objective
Switching Concepts		Explain how Layer 2 switches forward data.
	Frame Forwarding	Explain how frames are forwarded in a switched network.
	Switching Domains	Compare a collision domain to a broadcast domain.
Module	Topic	Objective
VLANs		Implement VLANs and trunking in a switched network.
	Overview of VLANs	Explain the purpose of VLANs in a switched network.
	VLANs in a Multi-Switched Environment	Explain how a switch forwards frames based on VLAN configuration in a multi-switch environment.
	VLAN Configuration	Configure a switch port to be assigned to a VLAN based on requirements.

	VLAN Trunks	Configure a trunk port on a LAN switch.
	Dynamic Trunking Protocol	Configure Dynamic Trunking Protocol (DTP).
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
Inter-VLAN Routing		Troubleshoot inter-VLAN routing on Layer 3 devices.
	Inter-VLAN Routing Operation	Describe options for configuring inter-VLAN routing.
	Router-on-a-Stick Inter-VLAN Routing	Configure router-on-a-stick inter-VLAN routing.
	Inter-VLAN Routing using Layer 3 Switches	Configure inter-VLAN routing using Layer 3 switching.
	Troubleshoot Inter-VLAN Routing	Troubleshoot common inter-VLAN configuration issues
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
STP		Explain how STP enables redundancy in a Layer 2 network.
	Purpose of STP	Explain common problems in a redundant, L2 switched network.
	STP Operations	Explain how STP operates in a simple, switched network.
	Evolution of STP	Explain how Rapid PVST+ operates.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
EtherChannel		Troubleshoot EtherChannel on switched links.
	EtherChannel Operation	Describe EtherChannel technology.
	Configure EtherChannel	Configure EtherChannel.
	Verify and Troubleshoot EtherChannel	Troubleshoot EtherChannel.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
DHCPv4		Implement DHCPv4 to operate across multiple LANs.
	DHCPv4 Concepts	Explain how DHCPv4 operates across multiple LANs.
	Configure DHCPv4 Server	Configure a router as a DHCPv4 server.
	Configure DHCPv4 Client	Configure a router as a DHCPv4 client.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
SLAAC and DHCPv6 Concepts		Configure dynamic address allocation in IPv6 networks.
	IPv6 Global Unicast Address Assignment	Explain how an IPv6 host can acquire its IPv6 configuration.
	SLAAC	Explain the operation of SLAAC.

	DHCPv6	Explain the operation of DHCPv6.
	Configure DHCPv6 Server	Configure a stateful and stateless DHCPv6 server.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
FHRP Concepts		Explain how FHRPs provide default gateway services in a redundant network.
	First Hop Redundancy Protocol	Explain the purpose and operation of first hop redundancy protocols.
	HSRP	Explain how HSRP operates.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
LAN Security Concepts		Explain how vulnerabilities compromise LAN security.
	Endpoint Security	Explain how to use endpoint security to mitigate attacks.
	Access Control	Explain how AAA and 802.1x are used to authenticate LAN endpoints and devices.
	Layer 2 Security Threats	Identify Layer 2 vulnerabilities.
	MAC Address Table Attack	Explain how a MAC address table attack compromises LAN security.
	LAN Attacks	Explain how LAN attacks compromise LAN security.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
Switch Security Configuration		Implement switch security to mitigate LAN attacks.
	Implement Port Security	Implement port security to mitigate MAC address table attacks.
	Mitigate VLAN Attacks	Explain how to configure DTP and native VLAN to mitigate VLAN attacks.
	Mitigate DHCP Attacks	Explain how to configure DHCP snooping to mitigate DHCP attacks.
	Mitigate ARP Attacks	Explain how to configure ARP inspection to mitigate ARP attacks.
	Mitigate STP Attacks	Explain how to configure Portfast and BPDU Guard to mitigate STP attacks.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
WLAN Concepts		Explain how WLANs enable network connectivity.
	Introduction to Wireless	Describe WLAN technology and standards.
	Components of WLANs	Describe the components of a WLAN infrastructure.

	WLAN Operation	Explain how wireless technology enables WLAN operation.
	CAPWAP Operation	Explain how a WLC uses CAPWAP to manage multiple APs.
	Channel Management	Describe channel management in a WLAN.
	WLAN Threats	Describe threats to WLANs.
	Secure WLANs	Describe WLAN security mechanisms.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
WLAN Configuration		Implement a WLAN using a wireless router and WLC.
	Remote Site WLAN Configuration	Configure a WLAN to support a remote site.
	Configure a Basic WLC on the WLC	Configure a WLC WLAN to use the management interface and WPA2 PSK authentication.
	Configure a WPA2 Enterprise WLAN on the WLC	Configure a WLC WLAN to use a VLAN interface, a DHCP server, and WPA2 Enterprise authentication.
	Troubleshoot WLAN Issues	Troubleshoot common wireless configuration issues.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
Routing Concepts		Explain how routers use information in packets to make forwarding decisions.
	Path determination	Explain how routers determine the best path.
	Packet Forwarding	Explain how routers forward packets to the destination.
	Basic Router Configuration review	Configure basic settings on a Cisco IOS router.
	IP Routing Table	Describe the structure of a routing table.
	Static and Dynamic Routing	Compare static and dynamic routing concepts.
<b>Module</b>	<b>Topic</b>	<b>Objective</b>
IP Static Routing		Configure IPv4 and IPv6 static routes.
	Static Routes	Describe the command syntax for static routes.
	Configure IP Static Routes	Configure IPv4 and IPv6 static routes.
	Configure IP Default Static Routes	Configure IPv4 and IPv6 default static routes.
	Configure Floating Static Routes	Configure a floating static route to provide a backup connection.
	Configure Static Host Routes	Configure IPv4 and IPv6 static host routes that direct traffic to a specific host.

Module	Topic	Objective
Troubleshoot Static and Default Routes		Troubleshoot static and default route configurations.
	Packet Processing with Static Routes	Explain how a router processes packets when a static route is configured.
	Troubleshoot IPv4 Static and Default Route Configuration	Troubleshoot common static and default route configuration issues.