

# CCNA Routing and Switching Scope and Sequence

Last updated November 28, 2016

## Target Audience

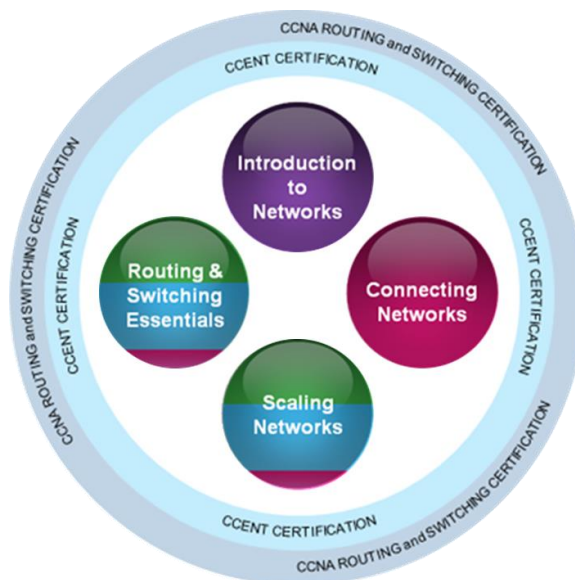
The Cisco CCNA® Routing and Switching curriculum is designed for Cisco Networking Academy® students who are seeking entry-level jobs in the ICT industry or hope to fulfill prerequisites to pursue more specialized ICT skills. CCNA Routing and Switching provides an integrated and comprehensive coverage of networking topics, from fundamentals to advanced applications and services, while providing opportunities for hands-on practical experience and career skills development.

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

## Curriculum Overview

The CCNA Routing and Switching curriculum consists of four courses that make up the recommended learning path. Students will be prepared to take the Cisco CCENT® certification exam after completing a set of two courses and the CCNA Routing and Switching certification exam after completing a set of four courses. The curriculum also helps students develop workforce readiness skills and builds a foundation for success in networking-related careers and degree programs. Figure 1 shows the different courses included in the CCNA Routing and Switching curriculum.

**Figure 1.** CCNA Routing and Switching Courses



In each course, Networking Academy™ students will learn technology concepts with the support of interactive media and apply and practice this knowledge through a series of hands-on and simulated activities that reinforce their learning.

CCNA Routing and Switching teaches comprehensive networking concepts and skills, from network applications to the protocols and services provided to those applications by the lower layers of the network. Students will progress from basic networking to more complex enterprise and theoretical networking models later in the curriculum.

CCNA Routing and Switching includes the following features:

- Students learn the basics of routing, switching, and advanced technologies to prepare for the Cisco CCENT and CCNA certification exams, 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.
- Courses emphasize critical thinking, problem solving, collaboration, and the practical application of skills.
- 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.

### **Course Structure and Sequences**

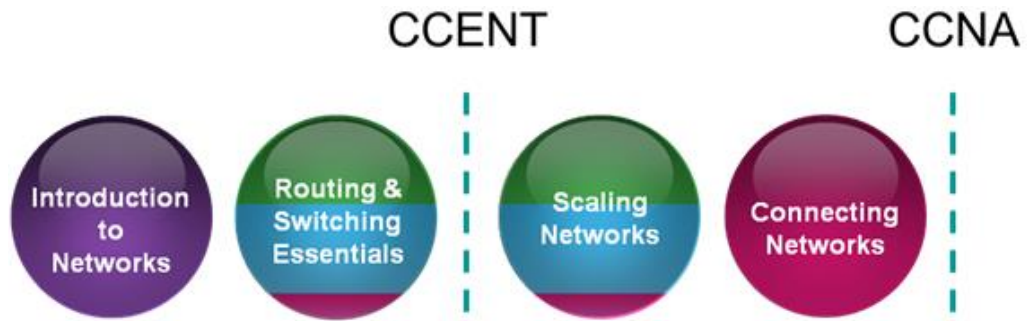
Market research and global employers have consistently indicated that the skills gap for general networking skills is shrinking, while the skills gap for essential networking technologies such as security, voice, and wireless, and for emerging technologies, such as data center, cloud, and video, is growing. As a global leader in technology and networking, Cisco developed the new CCENT and CCNA Routing and Switching certifications and curriculum to remain aligned with the rapidly changing global job market and trends.

As a result of the changes to the certification exams, students can choose to pursue Cisco advanced technology certifications after achieving the prerequisite CCENT certification. The recommended CCNA Routing and Switching course flow supports student flexibility by helping students prepare for the CCENT certification exam after the first two courses, and helps them prepare for the CCNA certification exam after completing all four courses.

Figure 2 shows the four courses that make up the recommended CCNA Routing and Switching course sequence: **Introduction to Networks**, **Routing and Switching Essentials**, **Scaling Networks**, and **Connecting Networks**.

Networking Academy strongly encourages all academies to teach this recommended course sequence, since these courses may significantly enhance employment opportunities by enabling students to acquire skills they can immediately use in their jobs, and may accelerate their ability to pursue advanced technology certifications.

**Figure 2.** Recommended CCNA Routing and Switching Course Flow



### Lab Equipment Requirements

Detailed equipment information, including descriptions and part numbers, is available in the CCNA Equipment List, which is located on the Cisco NetAcad [Equipment Information](#) site. Please refer to that document for the latest information, which includes specifications for the following minimum equipment required:

- 3 CISCO1941/K9 Integrated Services Routers Generation 2 (ISR-G2)
- 3 HWIC-2T Serial WAN Interface Cards
- 3 WS-C2960-24TC-L Cisco Catalyst switches
- Assorted Ethernet and Serial cables

### Routing & Switching Essentials Course Outline

**Table 1.** Routing & Switching Essentials Course Outlines

Chapter	Introduction to Networks
1	Routing Concepts
2	Static Routing
3	Dynamic Routing
4	Switched Networks
5	Switch Configuration
6	VLANs
7	Access Control Lists
8	DHCP
9	NAT for IPv4
10	Device Discovery, Management, and Maintenance

### Routing and Switching Essentials

This course describes the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with virtual LANs and inter-VLAN routing in both IPv4 and IPv6 networks.

Students who complete the Routing and Switching Essentials course will be able to perform the following functions:

- Implement DHCP on a router.
- Implement network address translation (NAT).
- Implement access control lists (ACLs) to filter traffic.
- Determine how a router will forward traffic based on the contents of a routing table.
- Implement static routing.
- Explain how switching operates in a small to medium-sized business network.
- Configure Ethernet switch ports.
- Implement VLANs.
- Use monitoring tools and network management protocols to troubleshoot data networks.
- Configure monitoring tools available for small to medium-sized business networks.
- Configure initial settings on a network device.

## Routing & Switching Essentials Detailed Course Outline

**Table 2.** Routing & Switching Essentials Course Outline

Ch.	Routing & Switching Essentials		Objectives
<b>1</b>	<b>Routing Concepts</b>		
	1.1	Router Initial Configuration	Configure a router to route between multiple directly-connected networks.
	1.2	Routing Decisions	Explain how routers use information in data packets to make forwarding decisions in a small to medium-sized business network.
	1.3	Router Operation	Explain how a router learns about remote networks when operating in a small to medium-sized business network.
<b>2</b>	<b>Static Routing</b>		
	2.1	Implement Static Routes	Explain how static routes are implemented in a small to medium-sized business network.
	2.2	Configure Static and Default Routes	Configure static routes to enable connectivity in a small to medium-sized business network.
	2.3	Troubleshoot Static and Default Routes	Troubleshoot static and default route configurations.
<b>3</b>	<b>Dynamic Routing</b>		
	3.1	Dynamic Routing Protocols	Explain the function of dynamic routing protocols.
	3.2	RIPv2	Implement RIPv2.
	3.3	The Routing Table	Determine the route source, administrative distance, and metric for a given route.
<b>4</b>	<b>Switched Networks</b>		
	4.1	LAN Design	Explain how switched networks support small to medium-sized businesses.
	4.2	The Switched Environment	Explain how Layer 2 switches forward data in a small to medium-sized LAN.
<b>5</b>	<b>Switch Configuration</b>		

Ch.	Routing & Switching Essentials		Objectives
	5.1	Basic Switch Configuration	Configure basic switch settings to meet network requirements.
	5.2	Switch Security	Configure a switch using security best practices in a small to medium-sized business network.
<b>6</b>	<b>VLANs</b>		
	6.1	VLAN Segmentation	Explain how VLANs segment broadcast domains in a small to medium-sized business network.
	6.2	VLAN Implementations	Implement VLANs to segment a small to medium-sized business network.
	6.3	Inter-VLAN Routing Using Routers	Configure routing between VLANs in a small to medium-sized business network.
<b>7</b>	<b>Access Control Lists</b>		
	7.1	ACL Operation	Explain the purpose and operation of ACLs in small to medium-sized business networks.
	7.2	Standard IPv4 ACLs	Configure standard IPv4 ACLs to filter traffic in a small to medium-sized business network.
	7.3	Troubleshoot ACLs	Troubleshoot IPv4 ACL issues.
<b>8</b>	<b>DHCP</b>		
	8.1	DHCPv4	Implement DHCPv4 to operate across multiple LANs in a small to medium-sized business network.
	8.2	DHCPv6	Implement DHCPv6 to operate across multiple LANs in a small to medium-sized business network.
<b>9</b>	<b>NAT for IPv4</b>		
	9.1	NAT Operation	Explain how NAT provides IPv4 address scalability in a small to medium-sized business network.
	9.2	Configure NAT	Configure NAT services on the edge router to provide IPv4 address scalability in a small to medium-sized business network.
	9.3	Troubleshoot NAT	Troubleshoot NAT issues in a small to medium-sized business network.
<b>10</b>	<b>Device Discovery, Management, and Maintenance</b>		
	10.1	Device Discovery	Use discovery protocols to map a network topology.
	10.2	Device Management	Configure NTP and Syslog in a small to medium-sized business network
	10.3	Device Maintenance	Maintain router and switch configuration and IOS files.