

# CCNA Routing and Switching Scope and Sequence

Last updated November 2, 2016

## Target Audience

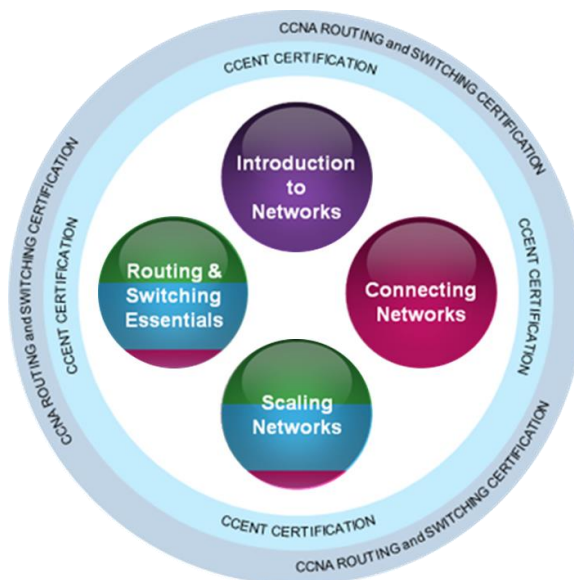
The Cisco CCNA® Routing and Switching curriculum is designed for Cisco Networking Academy® students who are seeking entry-level jobs in the ICT industry or hope to fulfill prerequisites to pursue more specialized ICT skills. CCNA Routing and Switching provides an integrated and comprehensive coverage 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**

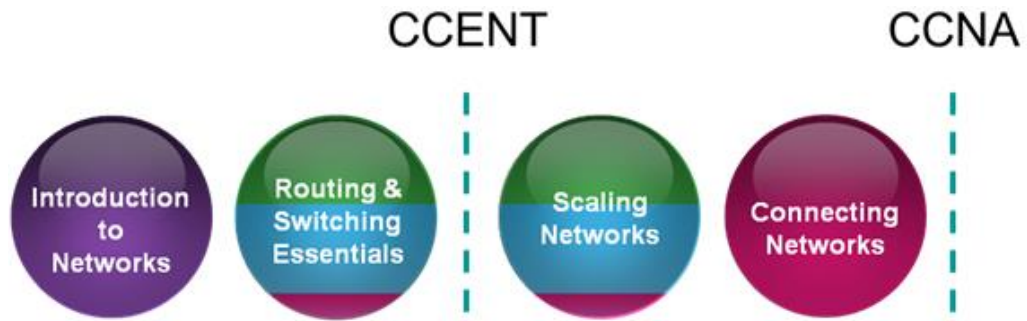
Market research and global employers have consistently indicated that the skills gap for general networking skills is shrinking, while the skills gap for essential networking technologies such as security, voice, and wireless, and for emerging technologies, such as data center, cloud, and video, is growing. 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

### Introduction to Networks Course Outline

**Table 1.** Introduction to Networks Course Outlines

Chapter	Introduction to Networks
1	Explore the Network
2	Configure a Network Operating System
3	Network Protocols and Communications
4	Network Access
5	Ethernet
6	Network Layer
7	IP Addressing
8	Subnetting IP Networks
9	Transport Layer
10	Application Layer
11	Build a Small Network

### Introduction to Networks

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. 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. By the end of the course, students

will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

Students who complete Introduction to Networks will be able to perform the following functions:

- Explain network technologies.
- Explain how devices access local and remote network resources.
- Implement basic network connectivity between devices.
- Design an IP addressing scheme to provide network connectivity for a small to medium-sized business network.
- Describe router hardware.
- Explain how switching operates in a small to medium-sized business network.
- Configure monitoring tools available for small to medium-sized business networks.
- Configure initial settings on a network device.

## Introduction to Networks Detailed Course Outline

**Table 2.** Introduction to Networks Course Outline

Ch.	Introduction to Networks		Objectives
<b>1</b>	<b>Explore the Network</b>		
	1.1	Globally Connected	Explain how multiple networks are used in everyday life.
	1.2	LANs, WANs, and the Internet	Explain how topologies and devices are connected in a small to medium-sized business network.
	1.3	The Network as a Platform	Explain the basic characteristics of a network that supports communication in a small to medium-sized business.
	1.4	The Changing Network Environment	Explain trends in networking that will affect the use of networks in small to medium-sized businesses.
<b>2</b>	<b>Configure a Network Operating System</b>		
	2.1	IOS Bootcamp	Explain the features and functions of the Cisco IOS Software.
	2.2	Basic Device Configuration	Configure initial settings on a network device using the Cisco IOS Software.
	2.3	Address Schemes	Given an IP addressing scheme, configure IP address parameters on devices to provide end-to-end connectivity in a small to medium-sized business network.
<b>3</b>	<b>Network Protocols and Communications</b>		
	3.1	Rules of Communication	Explain how rules facilitate communication.
	3.2	Network Protocols and Standards	Explain the role of protocols and standards organizations in facilitating interoperability in network communications.
	3.3	Data Transfer in the Network	Explain how devices on a LAN access resources in a small to medium-sized business network.
<b>4</b>	<b>Network Access</b>		
	4.1	Physical Layer Protocols	Explain how physical layer protocols and services support communications across data networks.

Ch.	Introduction to Networks		Objectives
	4.2	Network Media	Build a simple network using the appropriate media.
	4.3	Data Link Layer Protocols	Explain the role of the data link layer in supporting communications across data networks.
	4.4	Media Access Control	Compare media access control techniques and logical topologies used in networks.
<b>5</b>	Ethernet		
	5.1	Ethernet Protocol	Explain the operation of Ethernet.
	5.2	LAN Switches	Explain how a switch operates.
	5.3	Address Resolution Protocol	Explain how the address resolution protocol enables communication on a network.
<b>6</b>	Network Layer		
	6.1	Network Layer Protocols	Explain how network layer protocols and services support communications across data networks.
	6.2	Routing	Explain how routers enable end-to-end connectivity in a small to medium-sized business network
	6.3	Routers	Explain how devices route traffic in a small to medium-sized business network.
	6.4	Configuring a Cisco Router	Configure a router with basic configurations.
<b>7</b>	IP Addressing		
	7.1	IPv4 Network Addresses	Explain the use of IPv4 addresses to provide connectivity in small to medium-sized business networks.
	7.2	IPv6 Network Addresses	Configure IPv6 addresses to provide connectivity in small to medium-sized business networks.
	7.3	Connectivity Verification	Use common testing utilities to verify and test network connectivity.
<b>8</b>	Subnetting IP Networks		
	8.1	Subnetting an IPv4 Network	Implement an IPv4 addressing scheme to enable end-to-end connectivity in a small to medium-sized business network
	8.2	Addressing Schemes	Given a set of requirements, implement a VLSM addressing scheme to provide connectivity to end users in a small to medium-sized network.
	8.3	Design Considerations for IPv6	Explain design considerations for implementing IPv6 in a business network.
<b>9</b>	Transport Layer		
	9.1	Transport Layer Protocols	Explain how transport layer protocols and services support communications across data networks.
	9.2	TCP and UDP	Compare the operations of transport layer protocols in supporting end-to-end communication.
<b>10</b>	Application Layer		
	10.1	Application Layer Protocols	Explain the operation of the application layer in providing support to end-user applications.
	10.2	Well-Known Application Layer Protocols and Services	Explain how well-known TCP/IP application layer protocols operate.
<b>11</b>	Build a Small Network		

Ch.	Introduction to Networks	Objectives
11.1	Network Design	Explain how a small network of directly connected segments is created, configured and verified.
11.2	Network Security	Configure switches and routers with device hardening features to enhance security.
11.3	Basic Network Performance	Use common show commands and utilities to establish a relative performance baseline for the network.
11.4	Network Troubleshooting	Troubleshoot a network.



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