

Routers and Routing Basics

CCNA 2 Labs and Study Guide

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Introduction

Routers and Routing Basics CCNA 2 Lab Study Guide is a supplement to your classroom and laboratory experience with the Cisco Networking Academy Program. Specifically, this book covers the second of four courses. To be successful on the exam and achieve your CCNA certification, you should do everything possible to arm yourself with a variety of tools and training materials to support your learning efforts. This Lab Study Guide is just such a collection of tools. Used to its fullest extent, it can help you gain the knowledge as well as practice the skills associated with the content area of v3.1.1 of the CCNA 2 Routers and Routing Basics course. Specifically, this book can help you work on these main areas of CCNA 2:

- Configuring a router
- Managing the Cisco IOS
- Selecting a routing protocol
- Verifying and troubleshooting a network
- Implementing basic security with access control lists

Goals and Methods

The most important goal of this book is to help you prepare for either the CCNA exam (640-801) or the INTRO exam (640-821). Whether you are studying for the full exam or the first part of your CCNA, passing either of these exams means that you not only have the required knowledge of the technologies covered by the exam, but that you can also plan, design, implement, operate, and troubleshoot these technologies. In other words, these exams are rigorously application based. In fact, if you view the main objectives for the CCNA exam at <http://www.cisco.com/go/certifications>, you can see the following four categories of objectives:

- Planning & Design
- Implementation & Operation
- Troubleshooting
- Technology

Although Technology is listed last, a CCNA student cannot possibly plan, design, implement, operate, and troubleshoot networks without first fully grasping the technology. So you must devote large amounts of time and effort in the Study Guide section of each chapter, learning the concepts and theories before applying them in the Lab Exercises.

The Study Guide section offers exercises that help you learn the concepts and configurations that are crucial to your success as a CCNA exam candidate. Each chapter is slightly different and includes some or all of the following types of exercises:

- Vocabulary Matching and Completion
- Skill-Building Activities and Scenarios
- Configuration Scenarios
- Concept Questions
- Journal Entries
- Internet Research

The Lab Exercise sections include a Command Reference table, all the online Curriculum Labs, and brand new Comprehensive Labs and Challenge Labs. The Curriculum Labs typically walk you through the configuration tasks step by step. The Comprehensive Labs include many, if not all, of the configuration tasks of the Curriculum Labs without actually providing you with the commands. The Challenge Labs take this a step further, often only giving you a general requirement that you must implement fully without the details of each small step. In other words, you must use the knowledge and skills you gained in the Curriculum Labs to successfully complete the Comprehensive and Challenge Labs. In fact, you should not attempt the Comprehensive or Challenge labs until you have worked through all the Study Guide activities and the Curriculum Labs. Avoid the temptation to work through the Comprehensive and Challenge Labs by flipping back through the Curriculum Labs when you are not sure of a command. Do not try to short-circuit your CCNA training. You need a deep understanding of CCNA knowledge and skills to ultimately be successful on the CCNA exam.

How This Book Is Organized

Because the content of *Routers and Routing Basics CCNA 2 Companion Guide* and the online course is sequential, you should work through this *Labs and Study Guide* in order, beginning with Chapter 1.

Chapters 1 through 11 cover the following topics:

Chapter 1, "WANs and Routers"—After presenting a few vocabulary exercises covering the topic of WANs, this chapter delves into the internal and external components of routers. Understanding how a router works and how you connect to a router are important concepts and skills you need throughout the rest of your CCNA studies. The three Curriculum Labs focus your attention on connecting LANs and WANs using routers. An additional Challenge Lab helps you review the skills learned in the Curriculum labs.

Chapter 2, "Introduction to Routers"—This chapter discusses the basics of using the command-line interface (CLI). Several exercises help you solidify your skills with using the CLI. In addition, you work through exercises that focus on understanding the router boot sequence and interpreting output from the show version command. The three Curriculum Labs focus your attention on the configuration tasks covered in the chapter.

Two additional labs, a Comprehensive Lab and Challenge Lab, help you review the commands and skills learned in the Curriculum labs.

Chapter 3, "Configuring a Router"—This chapter first focuses on basic router configuration, including learning the commands that every router uses as well as activating interfaces and setting up basic routing. Then your attention turns to file-management issues: backing up the configuration and the IOS. The ten Curriculum Labs focus your attention on the router configuration and file-management tasks covered in the chapter. Two additional labs, a Comprehensive Lab and Challenge Lab, help you review the commands and skills learned in the Curriculum Labs.

Chapter 4, "Learning About Other Devices"—The Cisco IOS software offers a powerful tool for gathering information about other directly connected devices through its Cisco Discovery Protocol (CDP). This chapter's exercises center your attention on the benefits of using CDP as a network engineer. Other commands, including telnet and traceroute, are also part of your tool kit for learning about other network devices. So you spend some time on these, as well. The eight Curriculum Labs focus your attention on the configuration tasks covered in the chapter. Two additional Comprehensive Labs help you review the commands and skills learned in the Curriculum labs.

Chapter 5, "Managing Cisco IOS Software"—This chapter examines in detail how a router boots and loads the IOS. Knowing the default boot sequence as well as how to change the sequence is an important part of your network engineer's skill set. Exercises focus on the boot sequence, the boot system commands, the configuration register, the IOS naming convention, and methods for uploading and downloading an IOS. The six Curriculum Labs focus your attention on the configuration tasks covered in the chapter. An additional Challenge Lab helps you review the commands and skills learned in the Curriculum Labs.

Chapter 6, "Routing and Routing Protocols"—This chapter covers a crucial topic for any CCNA candidate: routing. Exercises focus on reading a routing table output from the show ip route command, using static routing, choosing a routing protocol, understanding dynamic routing, and learning basic Routing Information Protocol (RIP) configuration. The one Curriculum Lab focuses your attention on configuring static routes. Two additional labs, a Comprehensive Lab and Challenge Lab, help you review the commands and skills learned in the chapter.

Chapter 7, "Distance Vector Routing Protocols"—This chapter covers how distance vector routing avoids loops. In addition, you extend your skills in configuring RIP and you learn some valuable troubleshooting tools. The seven Curriculum Labs focus your attention on the configuration tasks covered in the chapter. Two additional labs, a Comprehensive Lab and Challenge Lab, help you review the commands and skills learned in the chapter.

Chapter 8, "TCP/IP Suite Error and Control Messages"—This chapter takes a brief look at the Internet Control Message Protocol (ICMP). A basic understanding of the IP packet header and the most important ICMP messages are covered. There are no labs in this chapter.

Chapter 9, "Basic Router Troubleshooting"—This chapter focuses exclusively on your troubleshooting skills. As a major part of the CCNA exam, you must be proficient at troubleshooting a simple internetwork. Exercises include dissecting a routing table entry, knowing troubleshooting steps, matching a problem to the correct layer, and reviewing the most powerful show and debug commands. The seven Curriculum Labs focus your attention on the configuration tasks covered in the chapter. An additional Challenge Lab helps you review the commands and skills learned in the Curriculum Labs.

Chapter 10, "Intermediate TCP/IP"—This chapter is mostly a review of material covered in your CCNA 1 studies. Exercises include learning vocabulary, reviewing TCP and User Datagram Protocol (UDP) segments, understanding port numbers, and comparing Layers 2, 3 and 4. The two Curriculum Labs focus your attention on how port numbers work to allow multiple sessions for the same host or application.

Chapter 11, "Access Control Lists (ACLs)"—This chapter covers the fundamentals of access control lists. Having a basic understanding of ACLs and knowing how to implement them are crucial to your success on the CCNA exam and in the networking field. Therefore, the exercises in this chapter are extensive. First, you work through some exercises that help you understand what ACLs are and how they operate. Then you work through eight ACL configuration exercises and scenarios that focus on CCNA-level security implementations. The eight Curriculum Labs focus your attention on the configuration tasks covered in the chapter. An additional Challenge Lab helps you review the commands and skills learned in the Curriculum Labs.

Appendix A, "CCNA 2 Skills-Based Assessment Practice"—This appendix contains a practice lab for the Skills-Based Assessment in which you are required to demonstrate all the skills covered in the CCNA 2 course.

Appendix B, "Router Interface Summary"—This appendix provides a chart to correctly reference the router interface identifiers that you need for the curriculum-based labs in each chapter.

Appendix C, "Erasing and Reloading the Router"—This appendix guides you through the procedure for clearing out previous configurations and starting with an unconfigured router for use in the curriculum-based labs in each chapter.

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About the Author

Allan Johnson entered the academic world in 1999 after ten years as a business owner/operator to dedicate his efforts to his passion for teaching. He has an M.B.A. and a M.Ed. in occupational training and development. Allan is currently pursuing an M.S. in information security. He is an information technology instructor at Mary Carroll High School and Del Mar College in Corpus Christi, TX. Since 2003, Allan has committed much of his time and energy to the CCNA Instructional Support Team, providing services for instructors worldwide and creating training materials. He is a familiar voice on the Cisco Networking Academy Community forum "Ask the Experts" series. He currently holds CCNA and CCAI certifications.

NOTE: Separate Instructor Edition with Answer Key available.

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