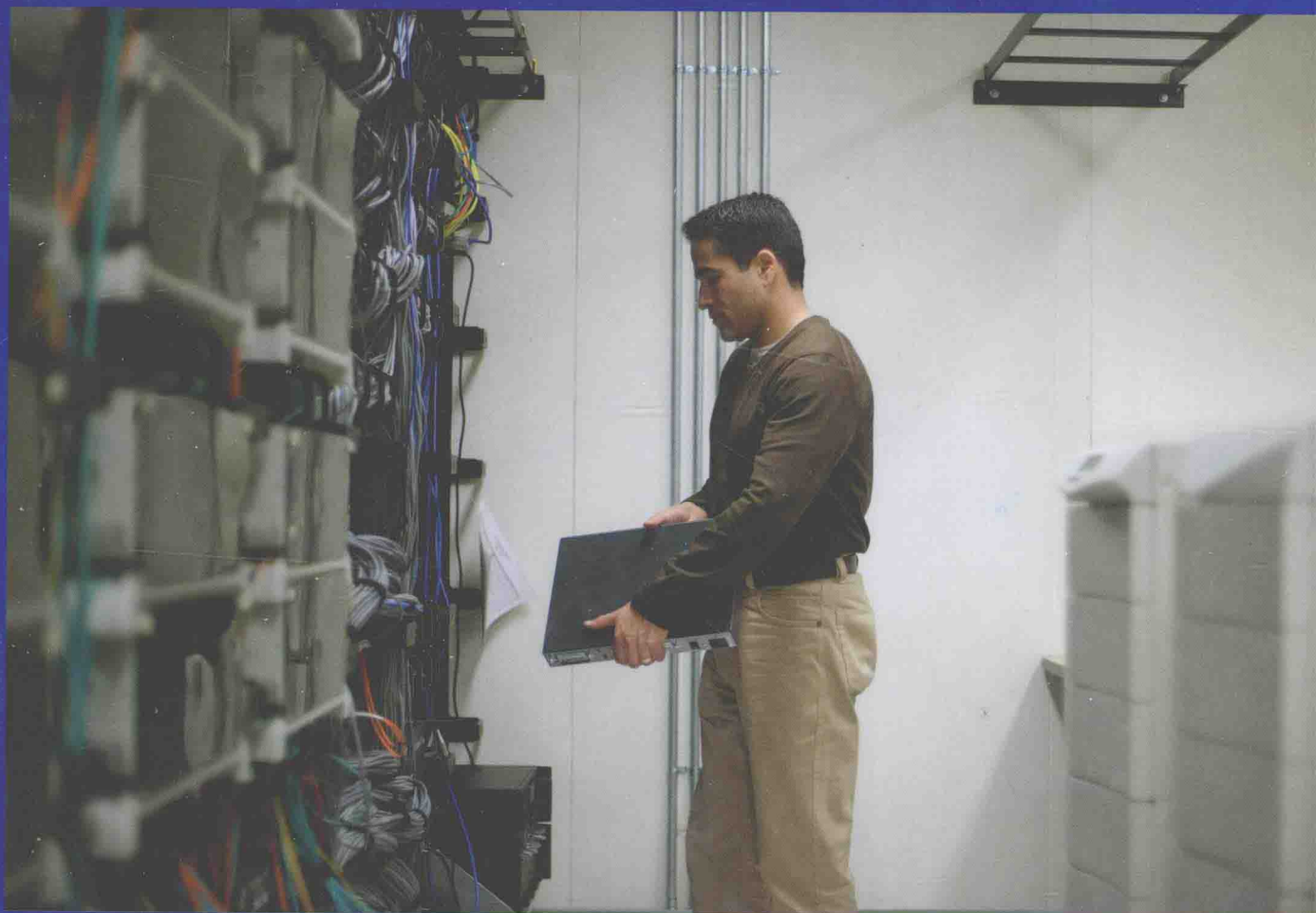




# Scaling Networks

Companion Guide



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## Companion Guide

**Cisco Networking Academy**

**Cisco Press**

800 East 96th Street

Indianapolis, Indiana 46240 USA

# Scaling Networks Companion Guide

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## About the Contributing 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 holds both an MBA and an M.Ed. in Occupational Training and Development. He is an information technology instructor at Del Mar College in Corpus Christi, Texas. In 2003, Allan began to commit much of his time and energy to the CCNA Instructional Support Team, providing services to Networking Academy instructors worldwide and creating training materials. He now works full-time for Cisco Networking Academy as a learning systems developer.

## Icons Used in This Book



## Syntax Conventions

The conventions used to present command syntax in this book are the same conventions used in the IOS Command Reference. The Command Reference describes these conventions as follows:

- **Boldface** indicates commands and keywords that are entered literally as shown. In actual configuration examples and output (not general command syntax), boldface indicates commands that are manually input by the user (such as a **show** command).
- *Italics* indicate arguments for which you supply actual values.
- Vertical bars (|) separate alternative, mutually exclusive elements.
- Square brackets ([ ]) indicate an optional element.
- Braces ({ }) indicate a required choice.
- Braces within brackets ([{ }]) indicate a required choice within an optional element.

## Introduction

*Scaling Networks Companion Guide* is the official supplemental textbook for the Cisco Networking Academy Scaling Networks course. Cisco Networking Academy is a comprehensive program that delivers information technology skills to students around the world. The curriculum emphasizes real-world practical application, while providing opportunities for you to gain the skills and hands-on experience needed to design, install, operate, and maintain networks in small- to medium-sized businesses, as well as enterprise and service provider environments.

As a textbook, this book provides a ready reference to explain the same networking concepts, technologies, protocols, and devices as the online curriculum. This book emphasizes key topics, terms, and activities and provides some alternate explanations and examples as compared with the course. You can use the online curriculum as directed by your instructor and then use this Companion Guide's study tools to help solidify your understanding of all the topics.

## Who Should Read This Book

This book is intended for students enrolled in the Cisco Networking Academy Scaling Networks course. The book, as well as the course, is designed as an introduction to data network technology for those pursuing careers as network professionals as well as those who need only an introduction to network technology for professional growth. Topics are presented concisely, starting with the most fundamental concepts and progressing to a comprehensive understanding of network communication. The content of this text provides the foundation for additional Cisco Networking Academy courses, and preparation for the CCNA Routing and Switching certification.

## Book Features

The educational features of this book focus on supporting topic coverage, readability, and practice of the course material to facilitate your full understanding of the course material.

## Topic Coverage

The following features give you a thorough overview of the topics covered in each chapter so that you can make constructive use of your study time:

- **Objectives:** Listed at the beginning of each chapter, the objectives reference the core concepts covered in the chapter. The objectives match the objectives stated in the corresponding chapters of the online curriculum. However, the question format in the Companion Guide encourages you to think about finding the answers as you read the chapter.
- **Notes:** These are short sidebars that point out interesting facts, timesaving methods, and important safety issues.
- **Chapter summaries:** At the end of each chapter is a summary of the chapter's key concepts. It provides a synopsis of the chapter and serves as a study aid.
- **Practice:** At the end of each chapter, there is a full list of all the Labs, Class Activities, and Packet Tracer Activities to refer back to for study time.

## Readability

The following features have been updated to assist your understanding of the networking vocabulary:

- **Key terms:** Each chapter begins with a list of key terms, along with a page-number reference from inside the chapter. The terms are listed in the order in which they are explained in the chapter. This handy reference allows you to find a term, flip to the page where the term appears, and see the term used in context. The Glossary defines all the key terms.
- **Glossary:** This book contains an all-new Glossary with almost 200 terms.

## Practice

Practice makes perfect. This new Companion Guide offers you ample opportunities to put what you learn into practice. You will find the following features valuable and effective in reinforcing the instruction that you receive:

- **Check Your Understanding questions and answer key:** Updated review questions are presented at the end of each chapter as a self-assessment tool. These questions match the style of questions that you see in the online course. Appendix A, "Answers to 'Check Your Understanding' Questions," provides an answer key to all the questions and includes an explanation of each answer.





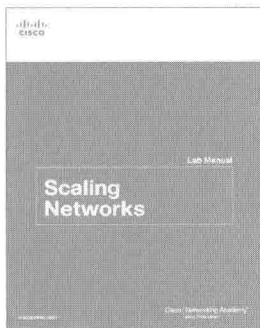
Packet Tracer  
Activity

Video

- **Labs and activities:** Throughout each chapter, you will be directed back to the online course to take advantage of the activities created to reinforce concepts. In addition, at the end of each chapter, there is a Practice section that collects a list of all the labs and activities to provide practice with the topics introduced in this chapter. The labs and class activities are available in the companion *Scaling Networks Lab Manual* (ISBN 978-1-58713-325-1). The Packet Tracer Activities PKA files are found in the online course.
- **Page references to online course:** After headings, you will see, for example, (1.1.2.3). This number refers to the page number in the online course so that you can easily jump to that spot online to view a video, practice an activity, perform a lab, or review a topic.

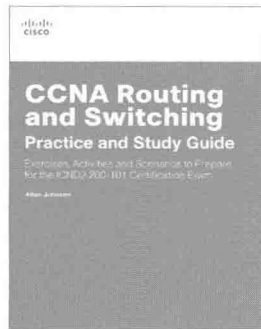
## Lab Manual

The supplementary book *Scaling Networks Lab Manual*, by Cisco Press (ISBN 978-1-58713-325-1), contains all the labs and class activities from the course.



## Practice and Study Guide

Additional Study Guide exercises, activities, and scenarios are available in the *CCNA Routing and Switching Practice and Study Guide* (ISBN 978-1-58713-344-2), by Allan Johnson. The Practice and Study Guide coordinates with the recommended curriculum sequence and follows the course outlines for *Scaling Networks and Connecting Networks*.



Packet Tracer  
Activity

## About Packet Tracer Software and Activities

Interspersed throughout the chapters you'll find many activities to work with the Cisco Packet Tracer tool. Packet Tracer allows you to create networks, visualize how packets flow in the network, and use basic testing tools to determine whether the network would work. When you see this icon, you can use Packet Tracer with the listed file to perform a task suggested in this book. The activity files are available in the course. Packet Tracer software is available only through the Cisco Networking Academy website. Ask your instructor for access to Packet Tracer.

## How This Book Is Organized

This book corresponds closely to the Cisco Networking Academy Scaling Networks course and is divided into nine chapters, one appendix, and a glossary of key terms:

- **Chapter 1, “Introduction to Scaling Networks”:** Introduces strategies that can be used to systematically design a highly functional network, such as the hierarchical network design model, the Cisco Enterprise Architecture, and appropriate device selections.
- **Chapter 2, “LAN Redundancy”:** Focuses on the protocols used to manage redundancy (STP and FHRP) as well as some of the potential redundancy problems and their symptoms.
- **Chapter 3, “LAN Aggregation”:** Describes EtherChannel, the methods used to create an EtherChannel, and the EtherChannel protocols PAgP and LACP. The configuration, verification, and troubleshooting of EtherChannel are discussed.
- **Chapter 4, “Wireless LANs”:** Covers WLAN technology, components, security, planning, implementation, and troubleshooting. The types of network attacks to which wireless networks are particularly susceptible are discussed.

- **Chapter 5, “Adjust and Troubleshoot Single-Area OSPF”:** Examines the methods for modifying the default operation of OSPF, including manipulating the DR/BDR election process, propagating default routes, fine-tuning the OSPFv2 and OSPFv3 interfaces, and enabling authentication. In addition, techniques for troubleshooting OSPFv2 and OSPFv3 are discussed.
- **Chapter 6, “Multiarea OSPF”:** Multiarea OSPF is introduced as the method to effectively partition a large single area into multiple areas. Discussion is focused on the LSAs exchanged between areas. In addition, activities for configuring OSPFv2 and OSPFv3 are provided. The chapter concludes with the **show** commands used to verify OSPF configurations.
- **Chapter 7, “EIGRP”:** Introduces EIGRP and provides basic configuration commands to enable it on a Cisco IOS router. It also explores the operation of the routing protocol and provides more detail on how EIGRP determines best path.
- **Chapter 8, “EIGRP Advanced Configurations and Troubleshooting”:** Discusses methods for modifying the EIGRP for IPv4 and EIGRP for IPv6 implementations, including propagating a default, fine-tuning timers, and configuring authentication between EIGRP neighbors. In addition, techniques for troubleshooting EIGRP are discussed.
- **Chapter 9, “IOS Images and Licensing”:** Explains the naming conventions and packaging of IOS Releases 12.4 and 15. Beginning with IOS Release 15, Cisco implemented a new packaging format and licensing process for IOS. This chapter discusses the process of obtaining, installing, and managing Cisco IOS Release 15 software licenses.
- **Appendix A, “Answers to ‘Check Your Understanding’ Questions”:** This appendix lists the answers to the “Check Your Understanding” review questions that are included at the end of each chapter.
- **Glossary:** The glossary provides you with definitions for all the key terms identified in each chapter.

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