Introduction

Cisco's professional certifications—CCNP (Routing and Switching), CCDP (Design), CCIP (Service Provider), CCSP (Network Security), and CCVP (Voice)—are very popular and meaningful measurements of progress in your career. Successfully completing any of these tracks demonstrates exposure and familiarity with a range of important concepts and a deep commitment to your career. Details about all Cisco certifications may be found online at www.cisco.com/go/certification.

The BSCI exam is a requirement for CCNP, CCDP, and CCIP, and generally shows that you have the theoretical understanding and implementation know-how to build and support large, complex IP networks. The BSCI exam is not an easy exam. Cisco wants to ensure that everyone who passes the test thoroughly understands the subject matter both at a conceptual level and at an implementation level.

Although this is a difficult exam, networking professionals can expect to pass if they meet the prerequisites and spend the proper amount of time on training, on-the-job experience, and study. As with most certification exams, you might not pass the first time. Taking the exam a second time, however, is likely to be easier because you will have a better idea of what to expect.

There are many questions on the BSCI exam that you might already know through your professional background and experiences, if you meet the prerequisites. This book offers you the opportunity to solidify that knowledge as you make your final preparations to take the BSCI exam.

Exam Overview

The BSCI exam is a computer-based exam. You can take the exam at any Prometric or Pearson VUE testing center. See the Cisco Training and Events page (http://www.cisco.com/web/learning/index.html) for more information about registering for your exam.

Your testing center can tell you the exact length of the exam. Be aware that when you register for the exam, you might be told to allow a certain amount of time to take the exam that is longer than the testing time indicated by the testing software when you begin. This is to allow time to get settled and take the tutorial about the testing engine.

The exam is difficult in subject matter and also in format. Questions may be multiple-choice/single answer, multiple choice/multiple answer, fill-in-the-blank, drag-and-drop, or simulations. Expect questions that require you to pick the correct answer based on output screens and configuration output. Also be prepared to configure a router or organize a diagram to demonstrate your understanding of the practical application of routing. Visit Cisco.com for a certification exam tutorial: http://www.cisco.com/web/learning/le3/learning_certification_exam_tutorial.html.

Another difficult aspect of the exam format is that you are not allowed to go back and change an answer. Candidates who are unsure about an answer will be forced to guess rather than have an extra 15 minutes to think about it at the end of the exam.

NOTE   One of the prerequisites for professional-level certification is CCNA. If you have completed the CCNA then you are already familiar with the formats and techniques used in Cisco tests and the BSCI test will not surprise you in that regard.

Goals and Methods

The goal of this book is to help you efficiently study for and ultimately pass the Cisco BSCI exam (642-901). You cannot pass the BSCI exam through rote memorization. The goal of this book is to ensure that you understand and retain the topics. A happy side effect is that you will also be prepared to apply these concepts on the job.

The first step in efficient study is to recognize your own strengths and weaknesses and to delegate study time accordingly. The methodology used in this book helps you assess your current understanding of the topics and then review those topics, quizzing yourself at the end to ensure you've retained what you've learned. By "dipping into" the sections that you need, you can quickly access and review the information you need.

Who Should Read This Book?

This book is intended for anyone interested in passing the Cisco BSCI exam or interested in learning the material that is included on that exam. BSCI is attractive both as a step toward certification and as a way to prepare for important job roles.

This book is intended as a final-stage preparation tool. Before reading this book and taking the exam, you should have either taken the Building Scalable Cisco Internetworks (BSCI) v3.0 CCNP course; read through *Building Scalable Cisco Internetworks (BSCI)*, Third Edition (Authorized Self-Study Guide); have a couple of years of LAN switching experience; or have some combination of these prerequisites.

In addition, this book assumes that you have achieved the CCNA certification and understand the following concepts:

■   Common networking terms

■   Binary, hexadecimal, and decimal numbering and translation

■   OSI reference model

■   TCP/IP protocols

- IP addressing and subnetting, including complex variable-length subnetting.
- Routing protocol theory and configuration of simple networks using
    — Static routes and default routes
    — EIGRP (Enhanced Internet Gateway Routing Protocol)
    — Single-area OSPF (Open Shortest Path First)
- Standard and extended access-lists
- Point-to-point WAN links using HDLC or PPP
- Frame Relay WAN links, including point-to-point and multipoint subinterfaces

How This Book Is Organized

Although you can read this book cover-to-cover, it is designed to be flexible and allow you to easily move between chapters and sections of chapters to cover just the material that you need more work with. Each chapter covers a subset of topics on the BSCI exam. This book is divided into five parts.

Part I: Introduction to Scalable Networks

- Chapter 1, "Network Design," describes how scalability and multiplexing simplify network design; compares the enterprise composite model to the older hierarchical model; describes Services-Oriented Network Architecture (SONA) and Intelligent Information Network (IIN); and introduces the routing protocols covered in detail in later chapters.
- Chapter 2, "IP Address Planning and Summarization," acts as a bridge between CCNA and CCNP topics by reviewing IP addressing fundamentals and explaining summarization.

Part II: EIGRP

- Chapter 3, "EIGRP Principles," describes the key features and advantages of EIGRP; explains EIGRP neighbor, topology, and routing tables; and describes factors that impact EIGRP network scalability.
- Chapter 4, "Scalable EIGRP," describes EIGRP configuration, authentication, and troubleshooting.

Part III: OSPF

- Chapter 5, "Understanding Simple Single Area OSPF," reviews OSPF fundamentals and describes configuring and troubleshooting OSPF in a single area.
- Chapter 6, "OSPF Network Topologies," describes OSPF network topology options and how to configure different types of OSPF networks.

- Chapter 7, "Using OSPF Across Multiple Areas," describes the features and operation of an OSPF multi-area network and explains how to configure, verify, and troubleshoot multi-area OSPF.

- Chapter 8, "OSPF Advanced Topics," describes how OSPF design uses stub, totally stubby, and not-so-stubby areas to optimize resource utilization, and explains OSPF authentication.

Part IV: IS-IS

- Chapter 9, "Fundamentals of the Integrated IS-IS Protocol," introduces Integrated IS-IS, including the ISO addressing structure, adjacencies, and design considerations.

- Chapter 10, "Using IS-IS with IP," covers basic IS-IS configuration, optional IS-IS commands, and commands for verifying and troubleshooting the IS-IS operation.

Part V: Cisco IOS Routing Features

- Chapter 11, "Implementing Redistribution and Controlling Routing Updates," introduces redistribution fundamentals and describes controlling routing updates, important configuration commands, and when to use **traceroute** and **ping.**

- Chapter 12, "Controlling Redistribution with Route Maps," describes configuring and monitoring route maps.

- Chapter 13, "Dynamic Host Control Protocol," describes the process of allocating IP addresses with DHCP; defines the server, relay, and client used by DHCP; and outlines the process for troubleshooting DHCP

Part VI: BGP

- Chapter 14, "BGP Concepts," introduces fundamental concepts such basic BGP operation, multihoming, load sharing, synchronization, and BGP states.

- Chapter 15, "BGP Neighbors," describes basic BGP configuration commands, commands for managing and verifying the BGP configuration, and methods for resetting neighbors.

- Chapter 16, "Controlling BGP Route Selection," describes BGP attributes, path selection, and commands that you can use to display output related to BGP attributes.

Part VII: Multicasting

- Chapter 17, "What Is Multicasting?," explains styles of IP addresses, the process to convert a multicast IP address to a multicast MAC address, and some of the problems that limit the use of multicasting.

- Chapter 18, "IGMP and Multicast Routing Protocols," describes data link layer support for multicast, introduces the features of IGMP, and describes enabling IGMP groups and configuring IGMP snooping.

- Chapter 19, "Configuring Multicast," describes multicast routing protocols and the commands necessary to implement multicasting.

Part VIII: IPv6

- Chapter 20, "Introduction to IPv6 and IPv6 Addressing," describes the need for IPv6, the IPv6 packet header, IPv6 addressing and address assignments, and IPv6 mobility.

- Chapter 21, "IPv6 Routing Protocols, Configuration, and Transitioning from IPv4," describes the various routing protocols that support IPv6, provides the commands to configure and verify IPv6 and OSPFv3, and discusses the transition from IPv4 to IPv6.

Each chapter in the book uses several features to help you make the best use of your time in that chapter. The features are as follows:

- **Assessment**—Each chapter begins with a "Do I Know This Already?" quiz that helps you determine the amount of time you need to spend studying that chapter. If you intend to read the entire chapter, you can save the quiz for later use. Questions are all multiple-choice to give a quick assessment of your knowledge.

  A more lengthy "Q&A" section appears near the end of each chapter. The Q&A section presents many open-ended review questions to test your retention and comprehension of the subject matter presented in the chapter.

  Appendix A, "Answers to Chapter 'Do I Know This Already?' Quizzes and Q&A Sections," list the answers to both quizzes.

- **Foundation Topics**—This is the core section of each chapter that explains the protocols, concepts, and configuration for the topics in the chapter.

- **Foundation Summary**—At the end of each chapter, a Foundation Summary collects key concepts, methodologies, and commands into an easy-to-review format.

- **Scenarios**—Where appropriate, some chapters conclude with a Scenarios section that provides an in-depth examination of a network implementation. Instead of posing a simple question asking for a single fact, the scenarios let you design, configure, and troubleshoot networks (at least on paper) without the clues inherent in a multiple-choice quiz format.

- **CD-based practice exam**—The companion CD-ROM contains two separate test banks—one composed of the questions from the book and an entirely new test bank of questions to reinforce your understanding of the book's concepts. In addition to the multiple-choice questions, you encounter some configuration simulation questions for which you actually perform configurations. This is the best tool for helping you prepare for the actual test-taking process.

BSCI Exam Topics

The exact questions that appear on the BSCI exam are a very closely guarded secret. Only those who write the questions for Cisco and who have access to the entire question database truly know what is on the exam. Cisco reveals only general details about the contents and objectives of the BSCI exam. Because Cisco maintains the right to change this information without notice, it is important that you check the web site for the most current information. You can find a list of Cisco exams and the general outline that accompanies each exam at http://www.cisco.com/go/certification.

Table I-1 lists the BSCI 642-901 exam topics posted on the Cisco website at the publication time of this book. The table reflects the part of the book in which each topic is discussed.

Table I-1 *Cisco Exam Topics*

Exam Topic	Part of This Book That Covers the Exam Topic
Explain the functions and operations of EIGRP (e.g., DUAL).	Part II*
Configure EIGRP routing (e.g., Stub Routing, authentication, etc.).	Part II
Verify or troubleshoot EIGRP routing configurations.	Part II
Explain the functions and operations of multiarea OSPF.	Part III
Configure multiarea OSPF routing (e.g., Stub, NSSA, authentication, etc.).	Part III
Verify or troubleshoot multiarea OSPF routing configurations.	Part III
Describe the features and benefits of integrated IS-IS.	Part IV
Configure and verify integrated IS-IS.	Part IV
Describe, configure, or verify route redistribution between IP routing IGPs (e.g., route-maps, default routes, etc.).	Part V
Describe, configure, or verify route filtering (i.e., distribute-lists and passive interfaces).	Part V
Describe and configure DHCP services (e.g., Server, Client, IP helper address, etc.).	Part V
Describe the functions and operations of BGP.	Part VI
Configure or verify BGP operation in a non-transit AS (e.g., authentication).	Part VI
Configure BGP path selection (i.e., Local Preference, AS Path, Weight, or MED attributes).	Part VI
Describe IP Multicast (e.g., Layer-3 to Layer-2 mapping, IGMP, etc.).	Part VII
Describe, configure, or verify IP multicast routing (i.e., PIM Sparse-Dense Mode).	Part VII
Describe IPv6 addressing operations.	Part VIII
Describe IPv6 interoperation with IPv4.	Part VIII
Describe, configure, or verify OSPF routing with IPv6 addressing.	Part VIII

* Part I, "Introduction to Scalable Networks," provides an overview of network design. Although not directly tied to official exam topics, understanding concepts described in Part I is essential for passing the exam.

For More Information

Cisco might make changes that affect the CCNP certification from time to time. You should always check cisco.com for the latest details. Also, you can look to this book's website http://www.ciscopress.com/title/158720147x for information pertinent to how you might use this book differently in light of Cisco's future changes.

The *CCNP BSCI Official Exam Certification Guide* is designed to help you attain CCNP, CCDP, or CCIP certification. It is a certification book from the only Cisco-authorized publisher. We at Cisco Press believe that this book will help you achieve certification, but the real work is up to you. We hope you find your time well-spent with this book. Good luck!