CCNA Cisco Certified Network Associate Study Guide

(EXAM 640-407)

CCNA

（英文版）

学习指南

Syngress Media 公司 著

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FOREWORD

From Global Knowledge Network

At Global Knowledge Network we strive to support the multiplicity of learning styles required by our students to achieve success as technical professionals. In this series of books, it is our intention to offer the reader a valuable tool for successful completion of the CCNA Certification Exam.

As the world's largest IT training company, Global Knowledge Network is uniquely positioned to offer these books. The expertise gained each year from providing instructor-led training to hundreds of thousands of students worldwide has been captured in book form to enhance your learning experience. We hope that the quality of these books demonstrates our commitment to your lifelong learning success. Whether you choose to learn through the written word, computer-based training, Web delivery, or instructor-led training, Global Knowledge Network is committed to providing you the very best in each of those categories. For those of you who know Global Knowledge Network, or those of you who have just found us for the first time, our goal is to be your lifelong competency partner.

Thank you for the opportunity to serve you. We look forward to serving your needs again in the future.

Warmest regards,

Duncan Anderson
Chief Operating Officer, Global Knowledge Network

ABOUT THE CONTRIBUTORS

Syngress Media creates books and software for Information Technology professionals seeking skill enhancement and career advancement. Its products are designed to comply with vendor and industry standard course curricula, and are optimized for certification exam preparation. You can contact Syngress via the web at www.syngress.com.

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Brian Mayo is a Microsoft Certified System's Engineer (MCSE), Microsoft Certified Professional + Internet, (MCP + Internet) and a Compaq Accredited Systems Engineer (ASE). He comes from a deployment and support background, and currently works as a systems engineer for CompuCom out of their Indianapolis branch.

John Pherson has more than 16 years of technical consulting and technical management experience in the computer industry, specializing in networking technologies and operating systems. He holds MCSE and MCT certifications, as well as Novell Master CNE and CNI designations, and a B.S. in business administration. John has been a member of several CompTIA (Computer Technology Industry Association) committees responsible for the growth and direction of the A + Certification, and has been a featured speaker at the computer industry's biannual System Support Expo. He is also a member of American Mensa, Ltd. He is currently employed as an instructional consultant with Global Knowledge Network in Dallas, and also provides independent consulting services to small and medium-sized businesses. His personal interests include spending time with his wife and four daughters, playing guitar and folk harp, biking, sailing, and photography.

Herbert Borovansky is a consultant with the Forté Consulting Group, based in Phoenix, Arizona. He gained his bachelor's degree in management information systems from the University of Arizona. He is currently leading the design and implementation of switched network infrastructures for two call centers for a large financial services company. His fields of expertise range from network operating systems to personal computer operating systems to internetworking using switching and routing.

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Irwin Overton has more than 14 years of experience in the complex computer information industry. Irwin has had extensive experience in system administration, minicomputers, and mainframes, and has worked with almost every type of network operating system and cabling topology available in the industry. He also has an extensive knowledge of Cisco products and software configuration. Irwin's technical expertise includes LAN, WAN, and MAN design, configuration and implementation, Cisco router design and configuration, system analysis and development, and network systems architecture. Irwin is a Certified Cisco Systems Instructor and is a partner at Niche Networks, LLC. He holds a B.S.E.E., and a J.D., and is a member of IEEE.

Prakash Ranade has more than ten years of experience in the application of state-of-the-art computer technologies to the solution of complex engineering problems. His expertise includes systems analysis and requirements definition, operation systems architecture, operations planning, software testing and conceptual modeling. Through his work at

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Technical Review

Richard D. Hornbaker is a consultant with the Forté Consulting Group, based in Phoenix, Arizona. He specializes in large-scale routing and switching projects for Fortune 500 companies. Recent projects include a 12,000-node campus network using a combination of routing, switching, and ATM. Richard is currently designing the network for a major corporate merger. Richard has more than ten years of internetworking experience and holds several certifications: CCIE, MCSE, and MCNE. His skills are diverse, ranging from operating systems and software, to telephony systems and data networks. Protocol analysis and troubleshooting are among his strong suits.

Technical Review and From the Classroom Sidebars

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Special Thanks to the People at
International Network Services

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This book's primary objective is to help you prepare for and pass the required CCNA exam so you can begin to reap the career benefits of certification. We believe that the only way to do this is to help you increase your knowledge and build your skills. After completing this book, you should feel confident that you have thoroughly reviewed all of the objectives that Cisco has established for the exam.

In This Book

This book is organized around the topics covered within the Cisco exam administered at Sylvan Testing Centers. Cisco has specific objectives for the CCNA exam: we've followed their list carefully, so you can be assured you're not missing anything.

In Every Chapter

We've created a set of chapter components that call your attention to important items, reinforce important points, and provide helpful exam-taking hints. Take a look at what you'll find in every chapter:

- Every chapter begins with the **Certification Objectives**—what you need to know in order to pass the section on the exam dealing with the chapter topic. The Certification Objective headings identify the objectives within the chapter, so you'll always know an objective when you see it!

- **Certification Exercises** are interspersed throughout the chapters. These are step-by-step exercises that mirror vendor-recommended labs. They help you master skills that are likely to be an area of focus on the exam. Don't just read through the exercises; they are hands-on practice that you should be comfortable completing. Learning by doing is an effective way to increase your competency with a product.

■ **From the Classroom** sidebars describe the issues that come up most often in the training classroom setting. These sidebars give you a valuable perspective into certification- and product-related topics. They point out common mistakes and address questions that have arisen from classroom discussions.

■ **Q & A** sections lay out problems and solutions in a quick-read format:

I entered a static route that I want to use as a last resort. We are using OSPF, but currently my route takes precedence over OSPF entries. How do I change the configuration?	Change the administrative distance for your static route to any number above 110, which is OSPF's default.
I am running RIP across a 64-kbps WAN link. The updates are taking up too much bandwidth. What should I do?	Change the update period to a slower amount than the default 30 seconds.

■ The **Certification Summary** is a succinct review of the chapter and a re-statement of salient points regarding the exam.

■ The **Two-Minute Drill** at the end of every chapter is a checklist of the main points of the chapter. It can be used for last-minute review.

■ **Tables** are liberally sprinkled throughout the chapters. You'll find that these provide an easy way to look up information and show material you may find worthy of memorization:

Protocol	Familiar Name	Port
Trivial File Transfer Protocol	TFTP	69
Domain Name Service	DNS	53
Time Service	-	37
NetBIOS Name Server	-	137

Protocol	Familiar Name	Port
NetBIOS Datagram Server		138
Boot Protocol (Client and Server)	BOOTP	67 and 68
TACACS	TACACS	49

■ The Self Test offers questions similar to those found on the certification exams, including multiple choice and true/false questions. The answers to these questions, as well as explanations of the answers, can be found in Appendix A. By taking the Self Test after completing each chapter, you'll reinforce what you've learned from that chapter, while becoming familiar with the structure of the exam questions.

Some Pointers

Once you've finished reading this book, set aside some time to do a thorough review. You might want to return to the book several times and make use of all the methods it offers for reviewing the material:

1. *Re-read all the Two-Minute Drills*, or have someone quiz you. You also can use the drills as a way to do a quick cram before the exam.

2. *Review all the Q & A scenarios* for quick problem solving.

3. *Re-take the Self Tests.* Taking the tests right after you've read the chapter is a good idea, because it helps reinforce what you've just learned. However, it's an even better idea to go back later and do all the questions in the book in one sitting. Pretend you're taking the exam. (For this reason, you should mark your answers on a separate piece of paper when you go through the questions the first time.)

4. *Complete the exercises.* Did you do the exercises when you read through each chapter? If not, do them! These exercises are designed to cover exam topics, and there's no better way to get to know this material than by practicing.

5. *Check out the web site.* Global Knowledge Network invites you to become an active member of the Access Global web site. This site is an online mall and an information repository that you'll find invaluable. You can access many types of products to assist you in your preparation for the exams, and you'll be able to participate in forums, on-line discussions, and threaded discussions. No other book brings you unlimited access to such a resource. You'll find more information about this site in Appendix C.

INTRODUCTION

How to Take a Cisco Certification Examination

by Richard D. Hornbaker (CCIE, CNX, MCSE, MCNE), Forté Consulting Group

Catch the Wave!

Congratulations on your pursuit of Cisco certification! In this fast-paced world of networking, few certifications compare to the value of Cisco's program.

The networking industry has virtually exploded in recent years, accelerated by non-stop innovation and the Internet's popularity. Cisco has stayed at the forefront of this tidal wave, maintaining a dominant role in the industry.

The rapid growth of the networking industry has created a vacuum of qualified people; there simply aren't enough skilled networking people to meet the demand. That's where Cisco certification programs come in.

Cisco started its certification program many years ago, offering only the designation of Cisco Certified Internetwork Expert, or CCIE. Through the CCIE program, Cisco provided a means to identify experts in the field. However, the CCIE tests are brutal, with a failure rate over 80 percent. (Fewer than 5 percent of candidates pass on their first attempt.) As you might imagine, very few people ever attain CCIE status.

In early 1998, Cisco recognized the need for intermediate certifications, and several new programs were created. Four intermediate certifications were added: CCNA (Cisco Certified Network Associate), CCNP (Cisco Certified Network Professional), CCDA (Cisco Certified Design Associate), and CCDP (Cisco Certified Design Professional). Two specialties were also added to the CCIE program for WAN Switching and ISP Dial-up.

Why Vendor Certification?

Over the years, vendors have created their own certification programs because of industry demand. This demand arises when the marketplace needs skilled professionals and an easy way to identify them. Vendors benefit because it promotes people skilled in their product. Professionals benefit because it boosts their career. Employers benefit because it helps them identify qualified people.

In the networking industry, things change too quickly to rely on traditional means of certification, such as universities and trade associations. Because of the investment and effort required to keep network certification programs current, vendors are the only organizations suited to keep pace with the changes. In general, such vendor certification programs are excellent, with most of them requiring a solid foundation in the essentials, as well as their particular product line.

Corporate America has come to appreciate these vendor certification programs and the value they provide. Employers recognize that certifications, like university degrees, do not guarantee a level of knowledge or performance; rather, they establish a baseline for comparison. By seeking to hire vendor-certified employees, a company can assure itself that, not only has it found a person skilled in networking, but it has also hired a person skilled in the specific products the company uses.

Technical professionals have also begun to realize the value of certification and the impact it can have on their careers. By completing a certification program, professionals gain an endorsement of their skills from a major industry source. This endorsement can boost their current position, and it makes finding the next job even easier. Often, a certification determines whether a first interview is even granted.

Today, a certification may place you ahead of the pack. Tomorrow, it will be a necessity to keep from being left in the dust.

Cisco's Certification Program

As mentioned previously, Cisco now has five certifications for the Routing and Switching career track. While Cisco recommends a series of courses for each of these certifications, they are not required. Ultimately, certification is

based on a candidate passing a series of exams. With the right experience and study materials, each of these exams can be passed without taking the associated class.

Figure I-1 shows Cisco's Routing and Switching track, with both the Network Design and Network Support paths. The CCNA is the foundation of the Routing and Switching track, after which candidates can pursue either the Network Design path to CCDA and CCDP, or the Network Support path to CCNP and CCIE.

Table I-1 shows a matrix of the exams required for each Cisco certification. Note that candidates have the choice of taking either the single Foundation R/S exam, or the set of three ACRC, CLSC, and CMTD exams—four exams are not required.

You may hear veterans refer to this CCIE R/S Qualifying Exam as the "Cisco Drake test." This is a carryover from the early days, when Sylvan Prometric's name was Drake Testing Centers and Cisco only had the one exam.

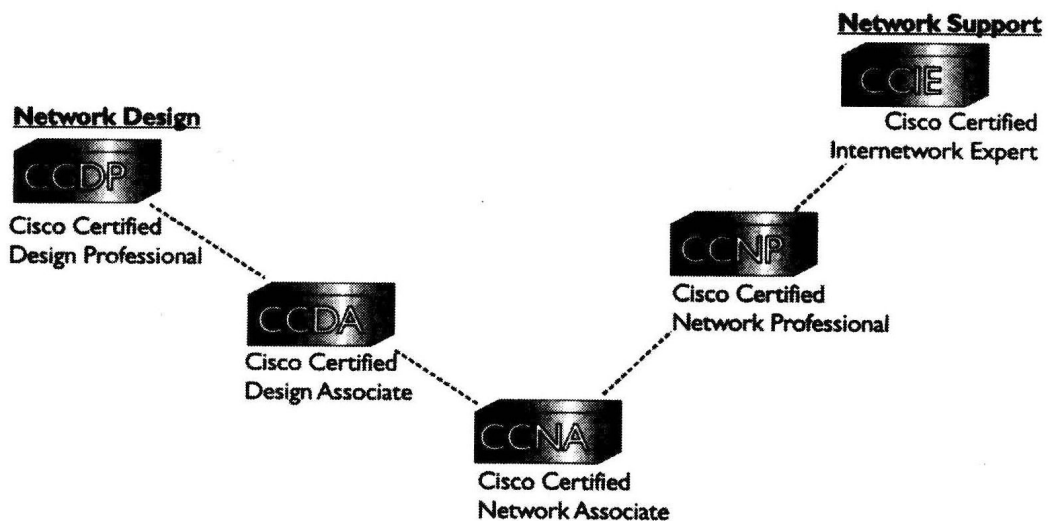| FIGURE I-I | Cisco's Routing and Switching certification track |

TABLE 1-1

Examinations Required for Cisco Certifications

Exam Name	CCNA	CCDA	CCNP	CCDP	CCIE
CCNA	x	x	x	x	
CDS		x		x	
Foundation R/S			x	x	
ACRC			x	x	
CLSC			x	x	
CMTD			x	x	
CIT			x		
CID				x	
CCIE R/S Qualifying					x
CCIE Lab					x

Computer-Based Testing

In a perfect world, you would be assessed for your true knowledge of a subject, not simply how you respond to a series of test questions. But life isn't perfect, and it just isn't practical to evaluate everyone's knowledge on a one-to-one basis. (Cisco actually does have a one-to-one evaluation, but it's reserved for the CCIE Laboratory exam, and the waiting list is quite long.)

For the majority of its certifications, Cisco evaluates candidates using a computer-based testing service operated by Sylvan Prometric. This service is quite popular in the industry, and it is used for a number of certification programs, including Novell's CNE and Microsoft's MCSE. Thanks to Sylvan's large number of facilities, exams can be administered worldwide, generally in the same town as a prospective candidate.

For the most part, Sylvan exams work similarly from vendor to vendor. However, there is an important fact to know about Cisco's exams: they use the traditional Sylvan test format, not the newer adaptive format. This gives