Bill Ferguson

CompTIA Network+®

REVIEW GUIDE

Second Edition

+ Targeted Review for the CompTIA Network+ Exam
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EXAM N10-005

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Sybex was founded in 1976. More than 30 years later, we're still committed to producing consistently exceptional books. With each of our titles, we're working hard to set a new standard for the industry. From the paper we print on, to the authors we work with, our goal is to bring you the best books available.

I hope you see all that reflected in these pages. I'd be very interested to hear your comments and get your feedback on how we're doing. Feel free to let me know what you think about this or any other Sybex book by sending me an email at `nedde@wiley.com`. If you think you've found a technical error in this book, please visit `http://sybex.custhelp.com`. Customer feedback is critical to our efforts at Sybex.

Best regards,

Neil Edde
Vice President and Publisher
Sybex, an Imprint of Wiley

To my father, who in the 1980s told me to learn as much about computers as I could and to buy and hold Microsoft stock. Unfortunately, I took only part of his good advice. Seriously, his purchase of an IBM PC XT computer in 1983 has made all the difference in my life and in my IT career. Unfortunately, Dad passed away on March 6, 2011, at the tender age of 73. I still think about him every time I use a computer. Thanks, Dad, and may you rest in peace!

Acknowledgments

First I'd like to thank Jeff Kellum for giving me the opportunity to write this important book. Several people have assisted me in many ways, so I'd like to acknowledge their contributions and offer my sincere appreciation. Specifically, I'd like to thank Quentin Docter, Eric Charbonneau, and Pete Gaughan for technical and developmental editing and support and for keeping me on track throughout the process. My thanks also goes to Alexa Murphy for keeping me on track and helping me put all the final, professional touches on the book. To the many people involved in this effort with whom I never worked with one-on-one—thanks! It takes a great team to put together a great book.

Finally, I'd like to acknowledge the encouragement and prayers of my family and friends and the students in my technical classes and Sunday school classes. In Him, all things are possible!

About the Author

Bill Ferguson—MCT, MCSE, MCP+I, CCSI, CCNA, A+, Network+, Server+, Security+, VCP4, VCI4—has been in the computer industry for more than 20 years. Originally in technical sales and sales management with Sprint, Bill made his transition to Certified Technical Trainer in 1997 with ExecuTrain. Bill now runs his own company (Parallel Connections) as an independent contractor/author in Birmingham, Alabama, teaching classes for most of the national training companies and some regional training companies as well as international classes and virtual (online) classes. In addition, Bill writes and produces technical training videos for Quickcert, VTC, and Palaestra Training Company. He has written video titles including *A+, Network+, Windows 2000 Management, Windows XP Management, Windows MCDST*, and *Interconnecting Cisco Network Devices*. In addition, he wrote the *Microsoft Certified Desktop Support Technician (MCDST) Study Guide,* the previous *Network+ Review Guide,* and the *Network+ Fastpass* books for Sybex/Wiley Press. Bill says, "My job is to understand the material so well that I can make it easier for my students to learn than it was for me to learn."

Contents at a Glance

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Introduction

The Computer Technology Industry Association (CompTIA) developed the Network+ certification to provide an industry-wide means of certifying the competency of computer service technicians in the basics of computer networking. The Network+ certification is granted to those individuals who have attained a level of knowledge and networking skills that show a basic competency with the networking needs of both personal and corporate computing environments.

CompTIA's exam objectives are periodically updated to keep its exams applicable to the most recent technological developments. The foundational elements, however, remain constant even as higher-end technology advances. The Network+ objectives have recently been changed to a small degree to reflect the very latest changes in technology. At the time of this writing, this book is current for the 2011 (N10-005) objectives as stated by CompTIA (`www.comptia.org`).

What Is Network+ Certification?

The Network+ certification offers an introductory step into the complex world of IT networking. You need to pass only a single exam to become Network+ certified. This is often the first step toward true networking knowledge and experience. By obtaining Network+ certification, you will be able to obtain more networking experience and gain an interest in networks in order to pursue more complex and in-depth network knowledge and certifications.

For the latest pricing on the exam and updates to the registration procedures, go to either `www.vue.com` or `www.2test.com`. You can register online for the exam. If you have further questions about the scope of the exam or related CompTIA programs, refer to the CompTIA website at `www.comptia.org`.

Is This Book for You?

CompTIA Network+ Review Guide is designed to be a succinct, portable exam review guide that can be used either in conjunction with a more complete study program (such as Sybex's *CompTIA Network+ Study Guide*, computer-based training courseware, or a classroom/lab environment) or as an exam review for those who don't need more extensive test preparation. It isn't my goal to give the answers away but rather to identify those topics on which you can expect to be tested and to provide sufficient coverage of these topics.

Perhaps you've been working with information technologies for many years. The thought of paying lots of money for a specialized IT exam preparation course probably doesn't sound too appealing. What can they teach you that you don't already know, right? Be careful, though. Many experienced network administrators have walked confidently into the test center only to

walk sheepishly out of it after failing an IT exam. After you've finished reading this book, you should have a clear idea of how your understanding of networking technologies matches up with the expectations of the Network+ test makers.

Perhaps you're relatively new to the world of IT—drawn to it by the promise of challenging work at a higher salary? You've just waded through an 800-page study guide, or you've taken a class at a local training center. Lots of information to keep in your head, isn't it? Well, by organizing this book according to CompTIA's exam objectives and by breaking up the information into concise, manageable pieces, I've created what I think is the handiest exam review guide available. Throw it in your laptop bag and carry it to work with you or get a copy of it on Kindle. As you read the book, you'll be able to identify quickly those areas you know best and those that require a more in-depth review.

The goal of the Review Guide series is to help Network+ candidates brush up on the subjects on which they can expect to be tested on the Network+ exam. For complete in-depth coverage of the technologies and topics involved, we recommend *CompTIA Network+ Study Guide,* from Sybex.

How Is This Book Organized?

This book is organized according to the official objectives list prepared by CompTIA for the Network+ exam. The chapters correspond to the six major domains of objective and topic groupings. In fact, the exam is weighted across these six domains as follows:

- Domain 1.0 Network Technologies (21 percent)
- Domain 2.0 Network Installation and Configuration (23 percent)
- Domain 3.0 Network Media and Topologies (17 percent)
- Domain 4.0 Network Management (20 percent)
- Domain 5.0 Network Security (19 percent)

Within each chapter, the top-level exam objective from each domain is addressed in turn. This discussion of each objective also contains an "Exam Essentials" section. Here you are given a short list of topics that you should explore fully before taking the test. Included in the "Exam Essentials" areas are notations on key pieces of information you should have taken out of *CompTIA Network+ Study Guide*.

At the end of each chapter you'll find the "Review Questions" section. These questions are designed to help you gauge your mastery of the content in the chapter.

Additional Study Tools

We've included several additional study tools available from the book's companion site. These tools will help you retain vital exam content as well as prepare you to sit for the actual exams:

Readers can get the additional study tools by visiting www.sybex.com/go/netplusrg 2e. Here, you will get instructions on how to download the files to your hard drive.

Test engine Using this custom test engine, you can identify weak areas up front and then develop a solid studying strategy using each of these robust testing features. Our thorough readme file will walk you through the quick, easy installation process.

Electronic flashcards You'll find flashcards for on-the-go review. These are short questions and answers, just like the flashcards you probably used to study in school. You can answer them on your PC or download them onto a portable device for quick and convenient reviewing.

Glossary of Terms in PDF The Glossary of Terms in PDF (Adobe Acrobat) format can easily be read on any computer. If you have to travel and brush up on any key terms, you can do so with this useful resource.

Tips for Taking the Network+ Exam

Here are some general tips for taking your exams successfully:

- Bring two forms of ID with you. One must be a photo ID, such as a driver's license. The other can be a major credit card or a passport. Both forms must include a signature.
- Arrive early at the exam center so you can relax and review your study materials, particularly tables and lists of exam-related information.
- Read the questions carefully. Don't be tempted to jump to an early conclusion. Make sure you know exactly what the question is asking.
- Don't leave any unanswered questions. Unanswered questions give you no opportunity for guessing correctly and scoring more points.
- There will be questions with multiple correct responses. When there is more than one correct answer, a message on the screen will prompt you to either "Choose two" or "Choose all that apply." Be sure to read the messages displayed so you know how many correct answers you must choose.
- Questions needing only a single correct answer will use radio buttons to select an answer, while those needing two or more answers will use checkboxes.
- When answering multiple-choice questions you're not sure about, use a process of elimination to get rid of the obviously incorrect answers first. Doing so will improve your odds if you need to make an educated guess.
- On form-based tests (non-adaptive), because the hard questions will eat up the most time, save them for last. You can move forward and backward through the exam.
- For the latest pricing on the exams and updates to the registration procedures, visit CompTIA's website at www.comptia.org.

How to Contact the Publisher

Sybex welcomes feedback on all of its titles. Visit the Sybex website at `www.sybex.com` for book updates and additional certification information. You'll also find forms you can use to submit comments or suggestions regarding this or any other Sybex title.

The Exam Objectives

The following are the areas (referred to as *domains*, according to CompTIA) in which you must be proficient in order to pass the Network+ exam:

Domain 1.0 Network Technologies This domain illustrates the OSI model of communication and how all the network devices and network protocols are organized based on this model. I will discuss the functions of common network protocols, ports, addressing technologies, and addressing schemes. In addition, I will discuss routing and routing protocols used primarily with TCP/IP. Finally, I will discuss an emerging technology in regard to computers and switches: virtualization.

Domain 2.0 Network Installation and Configuration This domain includes the installation and configuration of routers and switches in a wired network. I will discuss the installation and configuration of wireless networks. I will also discuss troubleshooting wired and wireless networks. Finally, I will identify and discuss an emerging type of network, the SOHO network.

Domain 3.0 Network Media and Topologies This domain concerns the categorization of media types such as fiber and copper. It also touches on wireless standard and WAN technologies. In addition I will cover the basics of the logical and physical shapes of various networks and how the topology of the network affects the technologies used in the network. Finally, I will discuss common physical connectivity problems and their solutions.

Domain 4.0 Network Management In this domain, I will start by discussing the purpose and features of various network appliances. I will continue by discussing ways to troubleshoot connectivity issues in a network and the common hardware and software tools you can use. In addition, I will discuss methods used to monitor resources and analyze traffic. Finally, I will explain methods and rationales for network performance optimization.

Domain 5.0 Network Security This area includes recognizing and defending against common network threats. I will discuss the proper use of firewalls, IDS, VPN concentrators, and other network hardware and software that can help you combat network attacks. I will also discuss common authentication and encryption techniques used by network administrators for wired and wireless networks.

The Network+ Exam Objectives

At the beginning of each chapter, I have included a complete listing of the topics that will be covered in that chapter. These topic selections are developed straight from the test objectives listed on CompTIA's website. These are provided for easy reference and to assure you that you are on track with learning the objectives. Note that exam objectives are subject to change at any time without prior notice and at CompTIA's sole discretion. Please visit the Network+ Certification page of CompTIA's website (`http://certification.comptia.org/network/default.aspx`) for the most current listing of exam objectives.

Domain 1.0 Network Technologies

1.1 Compare the layers of the OSI Model and the TCP/IP models.

- OSI model:
  - Layer 1 – Physical
  - Layer 2 – Data Link
  - Layer 3 – Network
  - Layer 4 – Transport
  - Layer 5 – Session
  - Layer 6 – Presentation
  - Layer 7 – Application
- TCP/IP model:
  - Network Interface layer
  - Internet layer
  - Transport layer
  - Application layer

1.2 Classify how applications, devices, and protocols relate to the OSI model layers.

- MAC address
- IP address
- EUI-64
- Frames

- Packets
- Switch
- Router
- Multilayer switch
- Hub
- Encryption devices
- Cable
- NIC
- Bridge

1.3 Explain the purpose and properties of IP addressing.

- Classes of addresses:
  - A, B, C, and D
  - Public vs. private
- Classless (CIDR)
- IPv4 vs. IPv6 (formatting)
- MAC address format
- Subnetting
- Multicast vs. unicast vs. broadcast
- APIPA

1.4 Explain the purpose and properties of routing and switching.

- EIGRP
- OSPF
- RIP
- Link state vs. distance vector vs. hybrid
- Static vs. dynamic
- Routing metrics:
  - Hop counts
  - MTU, bandwidth
  - Costs
  - Latency
- Next hop
- Spanning-Tree Protocol
- VLAN (802.1q)

- Port mirroring
- Broadcast domain vs. collision domain
- IGP vs. EGP
- Routing tables
- Convergence (steady state)

1.5 Identify common TCP and UDP default ports.

- SMTP – 25
- HTTP – 80
- HTTPS – 443
- FTP – 20, 21
- TELNET – 23
- IMAP – 143
- RDP – 3389
- SSH – 22
- DNS – 53
- DHCP – 67, 68

1.6 Explain the function of common networking protocols.

- TCP
- FTP
- UDP
- TCP/IP suite
- DHCP
- TFTP
- DNS
- HTTPS
- HTTP
- ARP
- SIP (VoIP)
- RTP (VoIP)
- SSH
- POP3
- NTP
- IMAP4