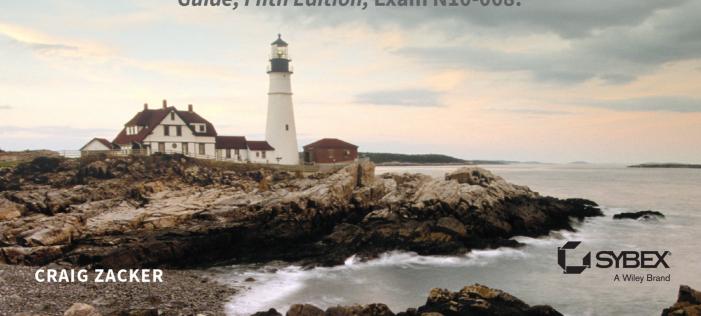# CompTIA®
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About the Author

Craig Zacker is the author or co-author of dozens of books, manuals, articles, and websites on computer and networking topics. He has also been an English professor, a technical and copy editor, a network administrator, a webmaster, a corporate trainer, a technical support engineer, a minicomputer operator, a literature and philosophy student, a library clerk, a photographic darkroom technician, a shipping clerk, and a newspaper boy.

About the Technical Editor

George "Buzz" Murphy, CISSP, SSCP, CASP, is a public speaker, corporate trainer, author, and cybersecurity evangelist who has instructed thousands of cybersecurity professionals around the world over the past 25 years with courses, seminars, and consulting presentations on a variety of technical and cybersecurity topics. A former Dell technology training executive, he has addressed audiences at Comdex, Networld, and the National Computer Conference as well as major corporations and educational institutions such as Princeton University. Buzz has earned more than 29 IT and cybersecurity certifications from such prestigious organizations as ISC², CompTIA, PMI, and Microsoft, and other industry certification organizations. He is an ISC² Authorized Instructor and recently served as technical editor for the ISC² *CCFP - Certified Cyber Forensics Professional Certification Guide* (McGraw-Hill, 2014). During the past year, he served as technical editor on five cybersecurity textbooks for both McGraw Hill Education as well as Sybex, an imprint of Wiley and Sons, which includes technical editor for the recent publication *CASP+: CompTIA Advanced Security Practitioner Study Guide* by Jeff T. Parker and Michael Gregg (Sybex, 2019).

Having held a top-secret security clearance in both U.S. and NATO intelligence, he has trained network and cybersecurity operators for the U.S. Army, various U.S. government security agencies, and foreign military personnel across CONUS and EMEA, and has been involved with facilitating such course subjects as Critical Site Nuclear EMP Hardening, International Cryptographic Methodology, and Computer Forensic Sciences, as well as cybersecurity topics. Buzz can be reached at `buzz@buzzmurphy.com`.

Contents at a Glance

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Introduction

Welcome to *CompTIA® Network+® Practice Tests: Exam N10-008*. This book gives you a focused, timesaving way to review your networking knowledge and prepare to pass the Computing Technology Industry Association (CompTIA) Network+ exam. The book combines realistic exam prep questions with detailed answers and two complete practice tests to help you become familiar with the types of questions that you will encounter on the Network+ exam. By reviewing the objectives and sample questions, you can focus on the specific skills that you need to improve before taking the exam.

How This Book Is Organized

The first five chapters of this book are based on the five objective domains published by CompTIA for the N10-008 Network+ exam. There are approximately 200 questions for each objective domain, covering each of the suggested topics. The next two chapters each contain a 100-question practice test covering all of the objective domains. Once you have prepared for each of the objective domains individually, you can take the practice tests to see how you will perform on the actual exam.

Objective Map

The following table gives you the extent, by percentage, that each domain is represented on the actual examination, and where you can find questions in this book that are related to each objective.

Objective	Percentage of Exam	Chapter
1.0 Networking Fundamentals	24%	1
2.0 Network Implementations	19%	2
3.0 Network Operations	16%	3
4.0 Network Security	19%	4
5.0 Network Troubleshooting	22%	5

Who Should Read This Book

CompTIA recommends, but does not require, that candidates for the Network+ exam meet the following prerequisites:

- CompTIA A+ certification or equivalent knowledge
- At least 9 to 12 months of work experience in IT networking

CompTIA's certification program relies on exams that measure your ability to perform a specific job function or set of tasks. CompTIA develops the exams by analyzing the tasks performed by people who are currently working in the field. Therefore, the specific knowledge, skills, and abilities relating to the job are reflected in the certification exam.

Because the certification exams are based on real-world tasks, you need to gain hands-on experience with the applicable technology in order to master the exam. In a sense, you might consider hands-on experience in an organizational environment to be a prerequisite for passing the Network+ exam. Many of the questions relate directly to specific network products or technologies, so use opportunities at your school or workplace to practice using the relevant tools. Candidates for the exam are also expected to have a basic understanding of enterprise technologies, including cloud and virtualization.

How To Use This Book

Although you can use this book in a number of ways, you might begin your studies by taking one of the practice exams as a pretest. After completing the exam, review your results for each Objective Domain and focus your studies first on the Objective Domains for which you received the lowest scores.

As this book contains only practice questions and answers, the best method to prepare for the Network+ exam is to use this book along with a companion book that provides more extensive explanations for the elements covered in each objective domain. Todd Lammle's *CompTIA® Network+® Study Guide: Exam N10-008* provides complete coverage of all the technology you need to know for the exam.

After you have taken your pretest, you can use the chapters for the objective domains in which you need work to test your detailed knowledge and learn more about the technologies involved. By reviewing why the answers are correct or incorrect, you can determine if you need to study the objective topics more.

What's Next

The next step is to review the objective domains for the Network+ N10-008 exam and think about which topics you need to work on most. Then, you can turn to the appropriate chapter and get started. Good luck on the exam.

Chapter

1

Networking Fundamentals

THE COMPTIA NETWORK+ EXAM N10-008 TOPICS COVERED IN THIS CHAPTER INCLUDE THE FOLLOWING:

✓ **1.1 Compare and contrast the Open Systems Interconnection (OSI) model layers and encapsulation concepts.**

- OSI model

  - Layer 1 – Physical

  - Layer 2 – Data link

  - Layer 3 – Network

  - Layer 4 – Transport

  - Layer 5 – Session

  - Layer 6 – Presentation

  - Layer 7 – Application

- Data encapsulation and decapsulation within the OSI model context

  - Ethernet header

  - Internet Protocol (IP) header

  - Transmission Control Protocol (TCP)/ User Datagram Protocol (UDP) headers

  - TCP flags

  - Payload

  - Maximum transmission unit (MTU)

✓ **1.2 Explain the characteristics of network topologies and network types.**

- Mesh

- Star/hub-and-spoke

- Bus

- Ring

- Hybrid
- Network types and characteristics
    - Peer-to-peer
    - Client-server
    - Local area network (LAN)
    - Metropolitan area network (MAN)
    - Wide area network (WAN)
    - Wireless local area network (WLAN)
    - Personal area network (PAN)
    - Campus area network (CAN)
    - Storage area network (SAN)
    - Software-defined wide area network (SDWAN)
    - Multiprotocol label switching (MPLS)
    - Multipoint generic routing encapsulation (mGRE)
- Service-related entry point
    - Demarcation point
    - Smartjack
- Virtual network concepts
    - vSwitch
    - Virtual network interface card (vNIC)
    - Network function virtualization (NFV)
    - Hypervisor
- Provider links
    - Satellite
    - Digital subscriber line (DSL)
    - Cable
    - Leased line
    - Metro-optical

✓ **1.3 Summarize the types of cables and connectors and explain which is the appropriate type for a solution.**

- Copper

- Twisted pair
  - Cat 5
  - Cat 5e
  - Cat 6
  - Cat 6a
  - Cat 7
  - Cat 8
- Coaxial/RG-6
- Twinaxial
- Termination standards
  - TIA/EIA-568A
  - TIA/EIA-568B
- Fiber
  - Single-mode
  - Multimode
- Connector types
  - Local connector (LC), straight tip (ST), sub-scriber connector (SC), mechanical transfer (MT), registered jack (RJ)
    - Angled physical contact (APC)
    - Ultra-physical contact (UPC)
  - RJ11
  - RJ45
  - F-type connector
  - Transceivers/media converters
  - Transceiver type
    - Small form-factor pluggable (SFP)
    - Enhanced form-factor pluggable (SFP+)
  - Quad small form-factor pluggable (QSFP)
  - Enhanced quad small form-factor plugga-ble (QSFP+)

- Cable management
  - Patch panel/patch bay
  - Fiber distribution panel
  - Punchdown block
    - 66
    - 110
    - Krone
    - Bix
- Ethernet standards
  - Copper
    - 10BASE-T
    - 100BASE-TX
    - 1000BASE-T
    - 10GBASE-T
    - 40GBASE-T
  - Fiber
    - 100BASE-FX
    - 100BASE-SX
    - 1000BASE-SX
    - 1000BASE-LX
    - 10GBASE-SR
    - 10GBASE-LR
    - Coarse wavelength division multiplexing (CWDM)
    - Dense wavelength division multiplexing (DWDM)
    - Bidirectional wavelength division multiplexing (WDM)

✓ **1.4 Given a scenario, configure a subnet and use appropriate IP addressing schemes.**

- Public vs. private
  - RFC1918

✓ 1.5 Explain common ports and protocols, their application, and encrypted alternatives.

Protocols	Ports
File Transfer Protocol (FTP)	20/21
Secure Shell (SS)	22
Secure File Transfer Protocol (SFT)	22
Telnet	23
Simple Mail Transfer Protocol (SMTP)	25
Domain Name System (DNS)	53
Dynamic Host Configuration Protocol (DHCP)	67/68
Trivial File Transfer Protocol (TFTP)	69
Hypertext Transfer Protocol (HTTP)	80
Post Office Protocol v3 (POP3)	110
Network Time Protocol (NTP)	123
Internet Message Access Protocol (IMAP)	143
Simple Network Management Protocol (SNMP)	161/162
Lightweight Directory Access Protocol (LDAP)	389
Hypertext Transfer Protocol Secure (HTTPS) [Secure Sockets Layer (SSL)]	443
HTTPS [Transport Layer Security (TLS)]	443
Server Message Block (SMB)	445
Syslog	514
SMTP TLS	587
Lightweight Directory Access Protocol (over SSL) (LDAPS)	636
IMAP over SSL	993
POP3 over SSL	995
Structured Query Language (SQL) Server	1433
SQLnet	1521
MySQL	3306
Remote Desktop Protocol (RDP)	3389
Session Initiation Protocol (SIP)	5060/5061

- IP protocol types

    - Internet Control Message Protocol (ICMP)

    - TCP

    - UDP

    - Generic Routing Encapsulation (GRE)

    - Internet Protocol Security (IPSec)

        - Authentication Header (AH)/Encapsulating Security Payload (ESP)

    - Connectionless vs. connection-oriented

✓ **1.6 Explain the use and purpose of network services.**

- DHCP

    - Scope

    - Exclusion ranges

    - Reservation

    - Dynamic assignment

    - Static assignment

    - Lease time

    - Scope options

    - Available leases

    - DHCP relay

    - IP helper/UDP forwarding

- DNS

    - Record types

        - Address (A)

        - Canonical name (CNAME)

        - Mail exchange (MX)

        - Authentication, authorization, accounting, auditing (AAAA)

    - Start of authority (SOA)

    - Pointer (PTR)

    - Text (TXT)

- Service (SRV)
- Name server (NS)
  - Global hierarchy
    - Root DNS servers
    - Internal vs. external
    - Zone transfers
    - Authoritative name servers
    - Time to live (TTL)
    - DNS caching
    - Reverse DNS/reverse lookup/forward lookup
    - Recursive lookup/iterative lookup
  - NTP
    - Stratum
    - Clients
    - Servers

✓ **1.7 Explain basic corporate and datacenter network architecture.**

  - Three-tiered
    - Core
    - Distribution/aggregation layer
    - Access/edge
  - Software-defined networking
    - Application layer
    - Control layer
    - Infrastructure layer
    - Management plane
  - Spine and leaf
    - Software-defined network
    - Top-of-rack switching
    - Backbone

- Traffic flows
    - North-South
    - East-West
- Branch office vs. on-premises datacenter vs. colocation
- Storage area networks
    - Connection types
        - Fibre Channel over Ethernet (FCoE)
        - Fibre Channel
        - Internet Small Computer Systems Interface (iSCSI)

✓ **1.8 Summarize cloud concepts and connectivity options.**

- Deployment models
    - Public
    - Private
    - Hybrid
    - Community
- Service models
    - Software as a service (SaaS)
    - Infrastructure as a service (IaaS)
    - Platform as a service (PaaS)
    - Desktop as a service (DaaS)
- Infrastructure as code
    - Automation/orchestration
- Connectivity options
    - Virtual private network (VPN)
    - Private-direct connection to cloud provider
- Multitenancy
- Elasticity
- Scalability
- Security implications

1. At which of the following layers of the Open Systems Interconnection (OSI) model do the protocols on a typical local area network (LAN) use media access control (MAC) addresses to identify other computers on the network?

    A. Physical

    B. Data link

    C. Network

    D. Transport

2. Which of the following organizations developed the Open Systems Interconnection (OSI) model?

    A. International Telecommunication Union (ITU-T)

    B. Comité Consultatif International Télégraphique et Téléphonique (CCITT)

    C. American National Standards Institute (ANSI)

    D. Institute of Electrical and Electronics Engineers (IEEE)

    E. International Organization for Standardization (ISO)

3. Which layer of the Open Systems Interconnection (OSI) model is responsible for the logical addressing of end systems and the routing of datagrams on a network?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

4. On a TCP/IP network, which layers of the Open Systems Interconnection (OSI) model contain protocols that are responsible for encapsulating the data generated by an application, creating the payload for a packet that will be transmitted over a network? (Choose all that apply.)

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

5. What layer of the Open Systems Interconnection (OSI) model is responsible for translating and formatting information?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

6. Which of the following devices typically operates at the network layer of the Open Systems Interconnection (OSI) model?

    A. Proxy server

    B. Hub

    C. Network interface adapter

    D. Router

7. Which layer of the Open Systems Interconnection (OSI) model provides an entrance point to the protocol stack for applications?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

8. Which layer of the Open Systems Interconnection (OSI) model is responsible for dialogue control between two communicating end systems?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

9. Some switches can perform functions associated with two layers of the Open Systems Interconnection (OSI) model. Which two of the following layers are often associated with network switching? (Choose all that apply.)

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

10. At which layer of the Open Systems Interconnection (OSI) model are there TCP/IP protocols than can provide either connectionless or connection-oriented services to applications?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

11. Which of the following layers of the Open Systems Interconnection (OSI) model typically have dedicated physical hardware devices associated with them? (Choose all that apply.)

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

12. At which layer of the Open Systems Interconnection (OSI) model is there a protocol that adds both a header and footer to the information that is passed down from an upper layer, thus creating a frame?

    A. Physical

    B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

13. Identify the layer of the Open Systems Interconnection (OSI) model that controls the addressing, transmission, and reception of Ethernet frames, and also identify the media access control method that Ethernet uses.

    A. Physical layer; Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

    B. Physical layer; Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)

    C. Data link layer; CSMA/CD

    D. Data link layer; CSMA/CA

14. At which layer of the OSI model do you find the protocol responsible for the delivery of data to its ultimate destination on an internetwork?

   A. Data link

   B. Network

   C. Session

   D. Application

15. Which of the following is *not* a protocol operating at the network layer of the OSI model?

   A. IP

   B. ICMP

   C. IGMP

   D. IMAP

16. Ed is a software developer who has been given the task of creating an application that requires guaranteed delivery of information between end systems. At which layer of the Open Systems Interconnection (OSI) model does the protocol that provides the guaranteed delivery run, and what type of protocol must Ed use?

   A. Data link layer; connectionless

   B. Network layer; connection-oriented

   C. Transport layer; connection-oriented

   D. Application layer; connectionless

17. Which of the following devices operates only at the physical layer of the Open Systems Interconnection (OSI) model?

   A. Hub

   B. Bridge

   C. Switch

   D. Router

18. Alice is a network administrator designing a new Local Area Network (LAN). She needs to determine the type of cabling and the network topology to implement. Which layers of the Open Systems Interconnection (OSI) model apply to cabling and topology elements?

   A. Physical and data link layers

   B. Data link and network layers

   C. Network and transport layers

   D. Transport and application layers

19. Which layers of the Open Systems Interconnection (OSI) model do not have protocols in the TCP/IP suite exclusively dedicated to them? (Choose all that apply.)

   A. Physical

   B. Data link

    C. Network

    D. Transport

    E. Session

    F. Presentation

    G. Application

20. The protocols at which layer of the Open Systems Interconnection (OSI) model use port numbers to identify the applications that are the source and the destination of the data in the packets?

    A. Application

    B. Presentation

    C. Transport

    D. Network

21. Which of the following is a correct listing of the Open Systems Interconnection (OSI) model layers, in order, from top to bottom?

    A. Physical, data link, transport, network, session presentation, application

    B. Application, session, presentation, transport, network, data link, physical

    C. Presentation, application, transport, session, network, physical, data link

    D. Session, application, presentation, transport, data link, network, physical

    E. Application, presentation, session, transport, network, data link, physical

22. At which of the Open Systems Interconnection (OSI) model layers do switches and bridges perform their basic functions?

    A. Physical

    B. Data link

    C. Network

    D. Transport

23. On a TCP/IP network, flow control is a function implemented in protocols operating at which layer of the Open Systems Interconnection (OSI) model?

    A. Presentation

    B. Session

    C. Transport

    D. Network

24. Which layer of the Open Systems Interconnection (OSI) model defines the medium, network interfaces, connecting hardware, and signaling methods used on a network?

    A. Physical

    B. Data link

    C. Network

    D. Transport

E.   Session

F.   Presentation

G.   Application

25. Which of the OSI model layers is responsible for syntax translation and compression or encryption?

A.   Data link

B.   Network

C.   Session

D.   Presentation

E.   Application

26. Which layer of the Open Systems Interconnection (OSI) model is responsible for transmitting signals over the network medium?

A.   Physical

B.   Data link

C.   Network

D.   Transport

E.   Session

F.   Presentation

G.   Application

27. Specify the layer of the Open Systems Interconnection (OSI) model at which the Internet Protocol (IP) operates and whether it is connection-oriented or connectionless.

A.   Network; connection-oriented

B.   Network; connectionless

C.   Transport; connection-oriented

D.   Transport; connectionless

28. An Ethernet network interface adapter provides functions that span which two layers of the Open Systems Interconnection (OSI) model?

A.   Physical and data link

B.   Data link and network

C.   Network and transport

D.   Transport and application

29. Which of the following protocols operate at the application layer of the Open Systems Interconnection (OSI) model? (Choose all that apply.)

A.   HTTP

B.   SNMP

   C. ICMP

   D. IGMP

   E. UDP

30. Which layer of the Open Systems Interconnection (OSI) model would be responsible for converting a text file encoded using EBCDIC on the sending system into ASCII code, when required by the receiving system?

   A. Application

   B. Presentation

   C. Session

   D. Physical

31. Which of the following protocols operates at the network layer of the OSI model, but does not encapsulate data generated by an upper layer protocol for transmission over the network?

   A. IP

   B. UDP

   C. ARP

   D. ICMP

   E. TCP

32. A client on a TCP/IP network is attempting to establish a session with a server. Which of the following correctly lists the order of the TCP flags raised in the Transmission Control Protocol (TCP) session establishment messages?

   A. SYN, ACK, SYN, ACK

   B. SYN, SYN, ACK, ACK

   C. SYN/ACK, SYN/ACK

   D. SYN, SYN/ACK, ACK

33. Which of the following is the Maximum Transmission Unit (MTU) size for an Ethernet frame?

   A. 512

   B. 1024

   C. 1500

   D. 1518

34. Which of the following Transmission Control Protocol (TCP) control bits is set to 1 to initiate the termination of a session?

   A. SYN

   B. URG

   C. FIN

   D. END

   E. PSH