N10-003

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LEADING THE WAY IN IT
TESTING AND CERTIFICATION TOOLS!

Study Guide

CompTIA Network+

Demo Version 1

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LIST OF ABREVIATIONS AND ACCRONYMS

A	Address (DNS Resource Record)
ADSL	Asymmetrical Digital Subscriber Line
AFP	Apple File Protocol
AIX	Advanced Interactive Executive
ARB	All Rings Broadcast
ARP	Address Resolution Protocol
AS	Autonomous System
AUI	Attachment Unit Interface
BDC	Backup Domain Controller
BIOS	Basic Input/Output System
BNC	Bayonet-Neill-Concelman
BSD	Berkeley Software Distribution
CATV	Cable Television
CHAP	Challenge Handshake Authentication Protocol
CNAME	Canonical Name (DNS Resource Record)
CRC	Cyclical Redundancy Check
CSMA/CD	Carrier Sense Multiple Access With Collision Detection
CSU	Channel Service Unit
DAT	Digital Audio Tape
DFS	Distributed File System
DHCP	Dynamic Host Configuration Protocol
DLT	Digital Linear Tape
DMA	Direct Memory Access
DMP	Diagnostic And Monitoring Protocol
DNS	Domain Name Service
DQDB	Distributed Queue Dual Bus
DSL	Digital Subscriber Line
DSL	Digital Subscriber Line
DSU	Data Service Unit

EAP	Extensible Authentication Protocol
EGP	Exterior Gateway Protocol
FAT	File Allocation Table
FCS	Frame Check Sequence
FDDI	Fiber Distributed Data Interface
FOIRL	Fiber Optic Inter-Repeater Link
FTP	File Transfer Protocol
GGP	Gateway-To-Gateway Protocol
GUI	Graphical User Interface
HDSL	High-Bit-Rate Digital Subscriber Line
HTTP	Hypertext Transfer Protocol
HTTPS	Secure Hypertext Transfer Protocol
I/O	Input/Output
IANA	Internet Assigned Numbers Authority
ICMP	Internet Control Message Protocol
ICS	Internet Connection Sharing
IDC	IBM Data Connector
IDP	Internetwork Datagram Packet
IDSL	ISDN Digital Subscriber Line
IEEE	Institute Of Electrical And Electronic Engineers
IETF	Internet Engineering Task Force
IGMP	Internet Group Multicast Protocol
IGP	Interior Gateway Protocol
IHL	Internet Header Length
IIS	Internet Information Server
IMAP4	Internet Message Access Protocol version 4
IP	Internet Protocol
IPSec	Internet Protocol Security
IPX	Internetwork Packet Exchange
IPX/SPX	Internetwork Packet Exchange/Sequence Packet Exchange

IR	Infrared
IRQ	Interrupt Request
IS	Integrated Services
ISDN	Integrated Services Digital Network
ISN	Initial Sequence Number
ISP	Internet Service Provider
LAN	Local Area Networks
LCP	Link Control Protocol
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LL2TP	Layer 2 Tunneling Protocol
LLC	Logical Link Control
LPD	Line Printer Daemon
LPR	Line Printer Remote
LTO	Linear Tape-Open
MAC	Media Access Control
MAN	Metropolitan Area Network
MAU	Multistation Access Unit
MBR	Master Boot Record
MIB	Management Information Base
MMF	Multimode Fiber
MS-CHAP	Microsoft Challenge Handshake Authentication Protocol
MSDN	Microsoft Developers Network
MSS	Maximum Segment Size
MTU	Maximum Transfer Unit
MX	Mail Exchange (DNS Resource Record)
NAT	Network Address Translation
NBF	NetBEUI Frame
NCP	Netware Core Protocol
NCPB	Netware Core Packet Burst
NDIS	Network Driver Interface Specification
NDPS	Novell Distributed Print Services

NDS	Novell Directory Services
NetBEUI	NetBIOS Enhanced User Interface
NetBIOS	Network Basic Input/Output System
NFS	Network File System
NIC	Network Interface Card
NMP	Name Management Protocol
NNTP	Network News Transport Protocol
NS	Name Server (DNS Resource Record)
NSS	Novell Storage Services
NTP	Network Time Protocol
ODI	Open Data-Link Interface
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
OUI	Organizationally Unique Identifier
PAP	Password Authentication Protocol
PDA	Personal Data Assistant
PDC	Primary Domain Controller
PDU	Protocol Data Unit
POP3	Post Office Protocol version 3
POTS	Plain Old Telephone Service
PPP	Point-To-Point Protocol
PPPoE	Point-To-Point Protocol over Ethernet
PPTP	Point-To-Point Tunneling Protocol
PSTN	Public Switched Telephone Network
PTR	Pointer (DNS Resource Record)
QIC	Quarter-Inch Cartridge
RADIUS	Remote Authentication Dial-In User Service
RADSL	Rate-Adaptive Digital Subscriber Line
RAID	Redundant Array Of Independent Disks
RARP	Reverse Address Resolution Protocol
RAS	Remote Access Service

RD+	Positive Receive Data
RDP	Remote Desktop Protocol
RFC	Requests For Comments
RIP	Routing Information Protocol
RMON	Remote Monitoring Protocol
SAP	Service Access Point
SCSI	Small Computer Systems Interface
SDSL	Symmetrical Digital Subscriber Line
SFTP	Secure File Transfer Protocol
SLIP	Serial Line Internet Protocol
SMB	Server Message Block
SMF	Single Mode Fiber
SMTP	Simple Mail Transfer Protocol
SNAP	Subnetwork Access Protocol
SOA	Start Of Authority (DNS Resource Record)
SPA	Spanning Tree Algorithm
SSH	Secure Shell
SSL	Secure Sockets Layer
STP	Shielded Twisted Pair
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TD+	Positive Transmit Data
Telnet	Telecommunications Network Protocol
TFTP	Trivial File Transfer Protocol
TTL	Time To Live
UART	Universal Asynchronous Receiver-Transmitter
UDC	Universal Data Connector
UDP	User Datagram Protocol
URL	Uniform Resource Locator
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair

VDSL	Very-High-Bit-Rate Digital Subscriber Line
VFAT	Virtual File Allocation Table
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WAN	Wide Area Network
WAP	Wireless Access Point
WECA	Wireless Ethernet Compatibility Alliance
WEP	Wired Equivalent Privacy
WINS	Windows Internet Name Service
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access
WPAN	Wireless Personal Area Network
XNS	Xerox Networking Services
Zeroconf	Zero Configuration

CompTIA Network+

INTRODUCTION

The N10-003 Exam

Certifications

CompTIA Network+

Prerequisites

None

About This Study Guide

This Study Guide is based on the current pool of exam questions for the CompTIA N10-003 – Network+ exam. As such, it provides all the information required to pass the CompTIA N10-003 exam and is organized around the specific skills that are tested in that exam. This Study Guide also includes the information required to answer questions related to the CompTIA A+ exams that may be asked during the CompTIA N10-003 exam. Topics covered in this Study Guide include Recognizing Logical or Physical Network Topologies, including: the Star Topology, the Bus Topology, the Mesh Topology, and the Ring Topology; Understanding the Main Features of 802.2 (Logical Link Control), 802.3 (Ethernet), 802.5 (Token Ring), 802.11 (Wireless), and Fiber Distributed Data Interface (FDDI) Networking Technologies, including their Speed, Access Method, Topology, and Media; Understanding the Characteristics of the Various Cable Standards, including: 10BASE-T and 10BASE-FL, 100BASE-TX and 100BASE-FX, 1000BASE-T, 1000BASE-CX, 1000BASE-SX and 1000BASE-LX, 10 GBASE-SR, 10 GBASE-LR and 10 GBASE-ER; Recognizing the Various Media Connectors and their Uses, including: RJ-11, RJ-45, F-Type, ST (Straight Tip), SC (Subscriber Connector or Standard Connector), IEEE 1394 (FireWire), Fiber LC (Local Connector), MT-RJ (Mechanical Transfer Registered Jack), and Universal Serial Bus (USB); Recognizing and Describing the Uses of the Various Media Types, including: Category 3, Category 5, Category 5e, and Category 6, UTP (Unshielded Twisted Pair), STP (Shielded Twisted Pair), Coaxial Cable, SMF (Single Mode Fiber) Optic Cable, and MMF (Multimode Fiber) Optic Cable; Identifying the Purposes, Features and Functions of Various Network Components, including: Hubs, Switches, Bridges, Routers, Gateways, CSU / DSU (Channel Service Unit / Data Service Unit), Network Interface Card (NICs), Integrated Services Digital Network (ISDN) adapters, Wireless Access Points (WAPs), Modems, Transceivers (media converters), and Firewalls; Understanding the General Characteristics of Various Wireless Technologies, including: 802.11 (Frequency Hopping Spread Spectrum), 802.11x (Direct Sequence Spread Spectrum), Infrared, and Bluetooth; Identifying Factors that Affect the Range and Speed of Wireless Services; Identifying a Media Access Control (MAC) Address; Identifying the Layers of the Open Systems Interconnect (OSI) Model and their Functions; Understanding the Differences Between Various Network Protocols in terms of Routing, Addressing Schemes, Interoperability, and Naming Conventions, including:

IPX / SPX (Internetwork Packet Exchange / Sequence Packet Exchange), NetBEUI (Network Basic Input / Output System Extended User Interface), AppleTalk / AppleTalk over Internet Protocol (IP), and TCP / IP (Transmission Control Protocol / Internet Protocol); Identifying the Components and Structure of IPv4 and IPv6 Addresses; Identifying Classful IP Address Ranges and their Subnet Masks; Understanding Subnetting; Identifying the Differences Between Private and Public Network Addressing Schemes; Understanding the Purpose, Function and Use of the Various Protocols in the TCP / IP Suite, including: Transmission Control Protocol (TCP), User Datagram Protocol (UDP), File Transfer Protocol (FTP), Secure File Transfer Protocol (SFTP) and Trivial File Transfer Protocol (TFTP), Simple Mail Transfer Protocol (SMTP), Hypertext Transfer Protocol (HTTP) and Secure Hypertext Transfer Protocol (HTTPS), Post Office Protocol version 3 (POP3), Internet Message Access Protocol version 4 (IMAP4), Telnet, Secure Shell (SSH), Internet Control Message Protocol (ICMP), Address Resolution Protocol (ARP) and Reverse ARP (RARP), Network Time Protocol (NTP), Network News Transport Protocol (NNTP), Lightweight Directory Access Protocol (LDAP), Internet Group Multicast Protocol (IGMP), and Line Printer Remote (LPR); Understanding the Function of TCP / UDP Ports; Identifying the Well-known Ports Associated with FTP, TFTP, SSH, Telnet, SMTP, DNS (Domain Name Service), HTTP and HTTPS, POP3, NNTP, NTP, and IMAP4; Identifying the Purpose of Network Services and Protocols including DNS, Network Address Translation (NAT), Internet Connection Sharing (ICS), Windows Internet Name Service (WINS), Simple Network Management Protocol (SNMP), Network File System (NFS), Zeroconf (Zero Configuration), Server Message Block (SMB), Apple File Protocol (AFP), Line Printer Daemon (LPD) and Samba; Identifying the Basic Characteristics of the Various Wide Area Networks (WAN) Technologies, including Packet Switching, Circuit Switching, Integrated Services Digital Network (ISDN), FDDI, T1, T3, E1, E3, J1, J3, OCx (Optical Carrier), and X.25; 2.15 Identifying the Basic Characteristics of the Various Internet Access Technologies, including Digital Subscriber Line (xDSL), Broadband Cable, Public Switched Telephone Network (PSTN) or Plain Old Telephone Service (POTS), Satellite, and Wireless; Understanding the Function of the Various Remote Access Protocols and Services, including: Remote Access Service (RAS), Point-to-Point Protocol (PPP), Serial Line Internet Protocol (SLIP), Point-to-Point Protocol over Ethernet (PPPoE), Point-to-Point Tunneling Protocol (PPTP), Virtual Private Network (VPN), and Remote Desktop Protocol (RDP); Identifying and Understanding the Purpose and Function the Various Security Protocols, including: Internet Protocol Security (IPSec), Layer 2 Tunneling Protocol (L2TP), Secure Sockets Layer (SSL), Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA), and 802.1x; and Identifying the Various Authentication Protocols, including: Challenge Handshake Authentication Protocol (CHAP), Microsoft Challenge Handshake Authentication Protocol (MS-CHAP), Password Authentication Protocol (PAP), Remote Authentication Dial-In User Service (RADIUS), Kerberos and Extensible Authentication Protocol (EAP).

Intended Audience

This Study Guide is targeted specifically at people who wish to take the CompTIA N10-003 – Network+ exam. This information in this Study Guide is specific to the exam. It is not a complete reference work.

How To Use This Study Guide

To benefit from this Study Guide we recommend that you:

- Although there is a fair amount of overlap between this Study Guide, the 220-301 Study Guide and the 220-302 Study Guide, the relevant information from the 220-301 and 220-302 Study Guides are included in this Study Guide. This is thus the only Study Guide you will require to pass the N10-003 exam.

- Study each chapter carefully until you fully understand the information. This will require regular and disciplined work. Where possible, attempt to implement the information in a lab setup.
- Pay attention to the diagrams and illustrations included in this Study Guide and the differences between the illustrations as the exam includes questions that will ask you to identify illustrations and diagrams.
- Be sure that you have studied and understand the entire Study Guide before you take the exam.

Good luck!

1. Networking Basics

1.1 Network Communications

There are different kinds of data networks. They range from enterprise networks used by corporations to straightforward two-node local area networks (LAN). Many of the standards apply to all the networks, regardless of the size. A data network is created when two computers communicate. The utensils that connects the computers together, is copper cable, a fibre cable, or a wireless technology, which is all network equipment. Copper-based cables are the most common form of network medium.

This general language is called protocols, and systems use them during normal exchanges of network data. In order to communicate, the computers must have some protocols in general to exchange data.

A network protocol can be simple or complex. A protocol is simply a code. The idea is the same as that of Morse code, in which a pattern of dots and dashes represents a letter of the alphabet. Networking protocols can give a variety of services e.g.:

- **Packet acknowledgment -** it is a return message by the recipient that verifies the receipt of packets.
- **Segmentation -** This is the division of a long data stream into small segments for transmission over the network.
- **Flow control -** This is the generation of messages by a receiving system that instructs the sending system to speed up or slow down its transmissions.
- **Error detection -** This is the inclusion of special codes in a packet that the receiving system uses to verify that the content of the packet was not damaged in transit.
- **Error correction -** This is the generation of messages by a receiving system of messages that inform the sender that specific packets were damaged and must be retransmitted.
- **Data compression -** it reduces the amount of data transmitted over a network by eliminating redundant information.
- **Data encryption -** This is a mechanism for protecting the data transmitted over a network by encrypting it using a key known by the receiving system.

A self-governing committee developed the protocols, which are base on public standards. These public standards guarantee that diverse types of systems can use them without sustaining any responsibility to a business. Every computer on a network uses different protocols during the communications process. The functions presented by the various protocols are divided into the layers that make up the Open Systems Interconnection (OSI) reference model.

Protocols are implemented on a computer in different ways. Some take the form of hardware. Others are device drivers, such as the driver for a particular network interface adapter supplied by its manufacturer.

1.2.1 Protocol Interaction

The protocols working at the different OSI layers are known as a protocol stack. The protocols work together to offer the services needed by certain application. The services given by the protocols are not redundant. The one protocol in a layer will not do the same work as the next protocol in a different layer.

Protocols at adjacent layers in the stack give services to each other, depending on the route in which the data is following.

The system that receive the data, follow the same procedure as the computer that send it, but it will do the procedure the other way around. The data is passed; up through the layers to the receiving application, with each protocol giving the same service to the protocol on the layer above it.

1.3 Local Area Networks and Wide Area Networks

This is a group of computers in a small area, which is linked via a LAN. It cannot extend further than the restrictions of a single building. Computers on the LAN are called nodes. A LAN is known by three attributes: its topology, its medium, and its protocols. The topology is the pattern used to connect the computers together. With a **bus topology**, a network cable connects each computer to the next one, creating a chain. With a **star topology**, each computer is connected to a central nexus called a hub. A **ring topology** is a bus network with the two ends joined together.

The link between the systems, on the network is the network medium. The topology and the medium used on a certain networks are specified by the protocol functioning at the data-link layer, e.g. Ethernet or Token Ring. Ethernet supports a few topologies and media. Whatever grouping of topology and medium is used for a LAN should be used on all the other computers in the same LAN or building. There are hardware products that allow you to join computers to the same LAN with different media. You cannot hook up a bus Ethernet system to a star Ethernet system and the systems are part of the same LAN or building in which it is situated.

All of the systems on a LAN must share the same protocols. You cannot connect an Ethernet system to a Token Ring system on the same LAN.

1.3.1 Wide Area Network

When you are connected to the Internet, you are connected to the largest Wide Area Network (WAN) on earth. A WAN is a network that crosses metropolitan, regional, or national boundaries. The people usually think of the WAN as a network that uses routers and public network links. WANs differ from LANs in the following ways:

- WANs cover greater distances.
- WAN speeds are slower.
- WANs can be connected on demand or it can be connected permanent; LANs have permanent connections between stations.
- WANs can use public or private network transports.
- Use private network transports.

Etc.