



CompTIA Network+ Certification Exam Objectives

EXAM NUMBER: N10-008



About the Exam

Candidates are encouraged to use this document to help prepare for the CompTIA Network+ (N10-008) certification exam. The CompTIA Network+ certification exam will verify the successful candidate has the knowledge and skills required to:

- Establish network connectivity by deploying wired and wireless devices
- Understand and maintain network documentation
- Understand the purpose of network services
- Understand basic datacenter, cloud, and virtual networking concepts
- Monitor network activity, identifying performance and availability issues
- Implement network hardening techniques
- Manage, configure, and troubleshoot network infrastructure

This is equivalent to 9–12 months of hands-on experience working in a junior network administrator/network support technician job role. These content examples are meant to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

EXAM ACCREDITATION

The CompTIA Network+ (N10-008) exam is accredited by ANSI to show compliance with the ISO 17024 standard and, as such, undergoes regular reviews and updates to the exam objectives.

EXAM DEVELOPMENT

CompTIA exams result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional.

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PLEASE NOTE

The lists of examples provided in bulleted format are not exhaustive lists. Other examples of technologies, processes, or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document. CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current, and the security of the questions is protected. When necessary, we will publish updated exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

TEST DETAILS

Required exam	N10-008
Number of questions	
Types of questions	Multiple-choice and performance-based
Length of test	
Recommended experience	<ul style="list-style-type: none">• CompTIA A+ certified, or equivalent• Minimum of 9–12 months of hands-on experience working in a junior network administrator/network support technician job role
Passing score	

EXAM OBJECTIVES (DOMAINS)

The table below lists the domains measured by this examination and the extent to which they are represented.

DOMAIN	PERCENTAGE OF EXAMINATION
1.0 Networking Fundamentals	24%
2.0 Network Implementations	19%
3.0 Network Operations	16%
4.0 Network Security	19%
5.0 Network Troubleshooting	22%
Total	100%



1.0 Networking Fundamentals

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), subscriber 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 pluggable (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
 - Network address translation (NAT)
 - Port address translation (PAT)
- **IPv4 vs. IPv6**
 - Automatic Private IP Addressing (APIPA)
 - Extended unique identifier (EUI-64)
 - Multicast
 - Unicast
 - Anycast
 - Broadcast
 - Link local
 - Loopback
 - Default gateway
- **IPv4 subnetting**
 - Classless (variable-length subnet mask)
- Classful
 - A
 - B
 - C
 - D
 - E
- Classless Inter-Domain Routing (CIDR) notation
- **IPv6 concepts**
 - Tunneling
 - Dual stack
 - Shorthand notation
 - Router advertisement
 - Stateless address autoconfiguration (SLAAC)
- **Virtual IP (VIP)**
- **Subinterfaces**

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

Protocols	Ports
• File Transfer Protocol (FTP)	20/21
• Secure Shell (SSH)	22
• Secure File Transfer Protocol (SFTP)	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**



2.0 Network Implementations

2.1 Compare and contrast various devices, their features, and their appropriate placement on the network.

• Networking devices

- Layer 2 switch
- Layer 3 capable switch
- Router
- Hub
- Access point
- Bridge
- Wireless LAN controller
- Load balancer
- Proxy server
- Cable modem
- DSL modem
- Repeater

- Voice gateway
- Media converter
- Intrusion prevention system (IPS)/intrusion detection system (IDS) device
- Firewall
- VPN headend

• Networked devices

- Voice over Internet Protocol (VoIP) phone
- Printer
- Physical access control devices
- Cameras

- Heating, ventilation, and air conditioning (HVAC) sensors
- Internet of Things (IoT)
 - Refrigerator
 - Smart speakers
 - Smart thermostats
 - Smart doorbells
- Industrial control systems/supervisory control and data acquisition (SCADA)

2.2 Compare and contrast routing technologies and bandwidth management concepts.

• Routing

- Dynamic routing
 - Protocols [Routing Internet Protocol (RIP), Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), Border Gateway Protocol (BGP)]
 - Link state vs. distance vector vs. hybrid

- Static routing
- Default route
- Administrative distance
- Exterior vs. interior
- Time to live

• Bandwidth management

- Traffic shaping
- Quality of service (QoS)



2.3 Given a scenario, configure and deploy common Ethernet switching features.

- **Data virtual local area network (VLAN)**
- **Voice VLAN**
- **Port configurations**
 - Port tagging/802.1Q
 - Port aggregation
 - Link Aggregation Control Protocol (LACP)
 - Duplex
 - Speed
 - Flow control
 - Port mirroring
- Port security
- Jumbo frames
- Auto-medium-dependent interface crossover (MDI-X)
- **Media access control (MAC) address tables**
- **Power over Ethernet (PoE)/ Power over Ethernet plus (PoE+)**
- **Spanning Tree Protocol**
- **Carrier-sense multiple access with collision detection (CSMA/CD)**
- **Address Resolution Protocol (ARP)**
- **Neighbor Discovery Protocol**

2.4 Given a scenario, install and configure the appropriate wireless standards and technologies.

- **802.11 standards**
 - a
 - b
 - g
 - n (WiFi 4)
 - ac (WiFi 5)
 - ax (WiFi 6)
- **Frequencies and range**
 - 2.4GHz
 - 5GHz
- **Channels**
 - Regulatory impacts
- **Channel bonding**
- **Service set identifier (SSID)**
 - Basic service set
 - Extended service set
 - Independent basic service set (Ad-hoc)
 - Roaming
- **Antenna types**
 - Omni
 - Directional
- **Encryption standards**
 - WiFi Protected Access (WPA)/ WPA2 Personal [Advanced Encryption Standard (AES)/ Temporal Key Integrity Protocol (TKIP)]
 - WPA/WPA2 Enterprise (AES/TKIP)
- **Cellular technologies**
 - Code-division multiple access (CDMA)
 - Global System for Mobile Communications (GSM)
 - Long-Term Evolution (LTE)
 - 3G, 4G, 5G
- **Multiple input, multiple output (MIMO) and multi-user MIMO (MU-MIMO)**



3.0 Network Operations

3.1 Given a scenario, use the appropriate statistics and sensors to ensure network availability.

- **Performance metrics/sensors**
 - Device/chassis
 - Temperature
 - Central processing unit (CPU) usage
 - Memory
 - Network metrics
 - Bandwidth
 - Latency
 - Jitter
- **SNMP**
 - Traps
 - Object identifiers (OIDs)
 - Management information bases (MIBs)
- **Network device logs**
 - Log reviews
 - Traffic logs
 - Audit logs
 - Syslog
 - Logging levels/severity levels
- **Interface statistics/status**
 - Link state (up/down)
 - Speed/duplex
 - Send/receive traffic
 - Cyclic redundancy checks (CRCs)
 - Protocol packet and byte counts
- **Interface errors or alerts**
 - CRC errors
 - Giants
 - Runts
 - Encapsulation errors
- **Environmental factors and sensors**
 - Temperature
 - Humidity
 - Electrical
 - Flooding
- **Baselines**
- **NetFlow data**
- **Uptime/downtime**

3.2 Explain the purpose of organizational documents and policies.

- **Plans and procedures**
 - Change management
 - Incident response plan
 - Disaster recovery plan
 - Business continuity plan
 - System life cycle
 - Standard operating procedures
- **Hardening and security policies**
 - Password policy
 - Acceptable use policy
 - Bring your own device (BYOD) policy
 - Remote access policy
- Onboarding and offboarding policy
- Security policy
- Data loss prevention
- **Common documentation**
 - Physical network diagram
 - Floor plan
 - Rack diagram
 - Intermediate distribution frame (IDF)/main distribution frame (MDF) documentation
 - Logical network diagram
 - Wiring diagram
- Site survey report
- Audit and assessment report
- Baseline configurations
- **Common agreements**
 - Non-disclosure agreement (NDA)
 - Service-level agreement (SLA)
 - Memorandum of understanding (MOU)



3.3 Explain high availability and disaster recovery concepts and summarize which is the best solution.

- **Load balancing**
- **Multipathing**
- **Network interface card (NIC) teaming**
- **Redundant hardware/clusters**
 - Switches
 - Routers
 - Firewalls
- **Facilities and infrastructure support**
 - Uninterruptible power supply (UPS)
 - Power distribution units (PDUs)
 - Generator
 - HVAC
 - Fire suppression
- **Redundancy and high availability (HA) concepts**
 - Cold site
 - Warm site
 - Hot site
 - Cloud site
 - Active-active vs. active-passive
 - Multiple Internet service providers (ISPs)/diverse paths
 - Virtual Router Redundancy Protocol (VRRP)/First Hop Redundancy Protocol (FHRP)
 - Mean time to repair (MTTR)
 - Mean time between failure (MTBF)
 - Recovery time objective (RTO)
 - Recovery point objective (RPO)
- **Network device backup/restore**
 - State
 - Configuration



4.0 Network Security

4.1 Explain common security concepts.

- **Confidentiality, integrity, availability (CIA)**
- **Threats**
 - Internal
 - External
- **Vulnerabilities**
 - Common vulnerabilities and exposures (CVE)
 - Zero-day
- **Exploits**
- **Least privilege**
- **Role-based access**
- **Zero Trust**
- **Defense in depth**
- Network segmentation enforcement
- Screened subnet [previously known as demilitarized zone (DMZ)]
- Separation of duties
- Network access control
- Honeypot
- **Authentication methods**
 - Multifactor
 - Terminal Access Controller Access-Control System Plus (TACACS+)
 - Single sign-on (SSO)
 - Remote Authentication Dial-in User Service (RADIUS)
 - LDAP
- Kerberos
- Local authentication
- 802.1X
- Extensible Authentication Protocol (EAP)
- **Security assessments**
 - Vulnerability assessment
 - Penetration testing
 - Risk assessment
 - Posture assessment
- **Security information and event management (SIEM)**

4.2 Compare and contrast common types of attacks.

- **Technology-based**
 - Denial-of-service (DoS)/distributed denial-of-service (DDoS)
 - Botnet/command and control
 - On-path attack (previously known as man-in-the-middle attack)
 - DNS poisoning
 - VLAN hopping
 - ARP spoofing
 - Rogue DHCP
 - Rogue access point (AP)
 - Evil twin
 - Ransomware
 - Password attacks
 - Brute-force
 - Dictionary
 - MAC spoofing
 - IP spoofing
 - Deauthentication
 - Malware
- **Human and environmental**
 - Social engineering
 - Phishing
 - Tailgating
 - Piggybacking
 - Shoulder surfing

4.3 Given a scenario, apply network hardening techniques.

- **Best practices**
 - Secure SNMP
 - Router Advertisement (RA) Guard
 - Port security
 - Dynamic ARP inspection
 - Control plane policing
 - Private VLANs
 - Disable unneeded switchports
 - Disable unneeded network services
 - Change default passwords
 - Password complexity/length
 - Enable DHCP snooping
 - Change default VLAN
 - Patch and firmware management
 - Access control list
 - Role-based access
 - Firewall rules
 - Explicit deny
 - Implicit deny
 - **Wireless security**
 - MAC filtering
 - Antenna placement
 - Power levels
 - Wireless client isolation
 - Guest network isolation
 - Preshared keys (PSKs)
 - EAP
 - Geofencing
 - Captive portal
 - **IoT access considerations**
-

4.4 Compare and contrast remote access methods and security implications.

- **Site-to-site VPN**
 - **Client-to-site VPN**
 - Clientless VPN
 - Split tunnel vs. full tunnel
 - **Remote desktop connection**
 - **Remote desktop gateway**
 - **SSH**
 - **Virtual network computing (VNC)**
 - **Virtual desktop**
 - **Authentication and authorization considerations**
 - **In-band vs. out-of-band management**
-

4.5 Explain the importance of physical security.

- **Detection methods**
 - Camera
 - Motion detection
 - Asset tags
 - Tamper detection
- **Prevention methods**
 - Employee training
 - Access control hardware
 - Badge readers
 - Biometrics
 - Locking racks
- Locking cabinets
- Access control vestibule (previously known as a mantrap)
- Smart lockers
- **Asset disposal**
 - Factory reset/wipe configuration
 - Sanitize devices for disposal



5.0 Network Troubleshooting

5.1 Explain the network troubleshooting methodology.

- **Identify the problem**
 - Gather information
 - Question users
 - Identify symptoms
 - Determine if anything has changed
 - Duplicate the problem, if possible
 - Approach multiple problems individually
- **Establish a theory of probable cause**
 - Question the obvious
 - Consider multiple approaches
 - Top-to-bottom/ bottom-to-top OSI model
 - Divide and conquer
- **Test the theory to determine the cause**
 - If the theory is confirmed, determine the next steps to resolve the problem
 - If the theory is not confirmed, reestablish a new theory or escalate
- **Establish a plan of action to resolve the problem and identify potential effects**
- **Implement the solution or escalate as necessary**
- **Verify full system functionality and, if applicable, implement preventive measures**
- **Document findings, actions, outcomes, and lessons learned**

5.2 Given a scenario, troubleshoot common cable connectivity issues and select the appropriate tools.

- **Specifications and limitations**
 - Throughput
 - Speed
 - Distance
- **Cable considerations**
 - Shielded and unshielded
 - Plenum and riser-rated
- **Cable application**
 - Rollover cable/console cable
 - Crossover cable
 - Power over Ethernet
- **Common issues**
 - Attenuation
 - Interference
 - Decibel (dB) loss
- Incorrect pinout
- Bad ports
- Open/short
- Light-emitting diode (LED) status indicators
- Incorrect transceivers
- Duplexing issues
- Transmit and receive (TX/RX) reversed
- Dirty optical cables
- **Common tools**
 - Cable crimper
 - Punchdown tool
 - Tone generator
 - Loopback adapter
 - Optical time-domain reflectometer (OTDR)
 - Multimeter
 - Cable tester
 - Wire map
 - Tap
 - Fusion splicers
 - Spectrum analyzers
 - Snips/cutters
 - Cable stripper
 - Fiber light meter



5.3 Given a scenario, use the appropriate network software tools and commands.

- **Software tools**
 - WiFi analyzer
 - Protocol analyzer/packet capture
 - Bandwidth speed tester
 - Port scanner
 - iperf
 - NetFlow analyzers
 - Trivial File Transfer Protocol (TFTP) server
- Terminal emulator
- IP scanner
- **Command line tool**
 - ping
 - ipconfig/ifconfig/ip
 - nslookup/dig
 - traceroute/tracert
 - arp
 - netstat
- hostname
- route
- telnet
- tcpdump
- nmap
- **Basic network platform commands**
 - show interface
 - show config
 - show route

5.4 Given a scenario, troubleshoot common wireless connectivity issues.

- **Specifications and limitations**
 - Throughput
 - Speed
 - Distance
 - Received signal strength indication (RSSI) signal strength
 - Effective isotropic radiated power (EIRP)/power settings
- **Considerations**
 - Antennas
- Placement
- Type
- Polarization
- Channel utilization
- AP association time
- Site survey
- **Common issues**
 - Interference
 - Channel overlap
 - Antenna cable attenuation/signal loss
- RF attenuation/signal loss
- Wrong SSID
- Incorrect passphrase
- Encryption protocol mismatch
- Insufficient wireless coverage
- Captive portal issues
- Client disassociation issues

5.5 Given a scenario, troubleshoot general networking issues.

- **Considerations**
 - Device configuration review
 - Routing tables
 - Interface status
 - VLAN assignment
 - Network performance baselines
- **Common issues**
 - Collisions
 - Broadcast storm
 - Duplicate MAC address
 - Duplicate IP address
 - Multicast flooding
 - Asymmetrical routing
- Switching loops
- Routing loops
- Rogue DHCP server
- DHCP scope exhaustion
- IP setting issues
 - Incorrect gateway
 - Incorrect subnet mask
 - Incorrect IP address
 - Incorrect DNS
- Missing route
- Low optical link budget
- Certificate issues
- Hardware failure
- Host-based/network-based firewall settings
- Blocked services, ports, or addresses
- Incorrect VLAN
- DNS issues
- NTP issues
- BYOD challenges
- Licensed feature issues
- Network performance issues

Network+ (N10-008) Acronym List

The following is a list of acronyms that appear on the CompTIA Network+ exam. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as part of a comprehensive exam preparation program.

ACRONYM	SPELLED OUT	ACRONYM	SPELLED OUT
AAAA	Authentication, Authorization, Accounting, Auditing	FTP	File Transfer Protocol
AES	Advanced Encryption Standard	GRE	Generic Routing Encapsulation
AH	Authentication Header	GSM	Global System for Mobile Communications
AP	Access Point	HA	High Availability
APC	Angled Physical Contact	HTTP	Hypertext Transfer Protocol
APIPA	Automatic Private Internet Protocol Addressing	HTTPS	Hypertext Transfer Protocol Secure
ARP	Address Resolution Protocol	HVAC	Heating, Ventilation, and Air Conditioning
BGP	Border Gateway Protocol	IaaS	Infrastructure as a Service
BYOD	Bring Your Own Device	ICMP	Internet Control Message Protocol
CAN	Campus Area Network	IDF	Intermediate Distribution Frame
CDMA	Code Division Multiple Access	IDS	Intrusion Detection System
CIA	Confidentiality, Integrity, and Availability	IMAP	Internet Message Access Protocol
CIDR	Classless Inter-Domain Routing	IoT	Internet of Things
CNAME	Canonical Name	IPS	Intrusion Prevention System
CPU	Central Processing Unit	IPSec	Internet Protocol Security
CRC	Cyclic Redundancy Check	IPv4	Internet Protocol version 4
CSMA/CD	Carrier-Sense Multiple Access with Collision Detection	IPv6	Internet Protocol version 6
CVE	Common Vulnerabilities and Exposures	iSCSI	Internet Small Computer Systems Interface
CWDM	Coarse Wavelength Division Multiplexing	ISP	Internet Service Provider
DaaS	Desktop as a Service	LACP	Link Aggregation Control Protocol
dB	Decibel	LAN	Local Area Network
DDoS	Distributed Denial-of-Service	LC	Local Connector
DHCP	Dynamic Host Configuration Protocol	LDAP	Lightweight Directory Access Protocol
DNS	Domain Name System	LDAPS	Lightweight Directory Access Protocol (over SSL)
DoS	Denial-of-Service	LED	Light-Emitting Diode
DSL	Digital Subscriber Line	LTE	Long-Term Evolution
DWDM	Dense Wavelength Division Multiplexing	MAC	Media Access Control/Medium Access Control
EAP	Extensible Authentication Protocol	MDF	Main Distribution Frame
EIGRP	Enhanced Interior Gateway Routing Protocol	MDIX	Medium Dependent Interface Crossover
EIRP	Effective Isotropic Radiated Power	mGRE	Multipoint Generic Routing Encapsulation
ESP	Encapsulating Security Payload	MIB	Management Information Base
EUI	Extended Unique Identifier	MIMO	Multiple Input, Multiple Output
FCoE	Fibre Channel over Ethernet	MU-MIMO	Multiuser - Multiple Input, Multiple Output
FHRP	First Hop Redundancy Protocol	MOU	Memorandum of Understanding
		MPLS	Multiprotocol Label Switching
		MTBF	Mean Time Between Failure
		MT-RJ	Mechanical Transfer - Registered Jack

ACRONYM	SPELLED OUT
MTTR	Mean Time to Repair
MTU	Maximum Transmission Unit
MX	Mail Exchange
NAT	Network Address Translation
NDA	Non-Disclosure Agreement
NFV	Network Function Virtualization
NIC	Network Interface Card
NS	Name Server
NTP	Network Time Protocol
OID	Object Identifier
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
OTDR	Optical Time Domain Reflectometer
PaaS	Platform as a Service
PAN	Personal Area Network
PAT	Port Address Translation
PDU	Power Distribution Unit
PoE	Power over Ethernet
POP3	Post Office Protocol version 3
PSK	Pre-Shared Key
PTR	Pointer Record
QoS	Quality of Service
QSFP	Quad Small Form-factor Pluggable
RA	Router Advertisements
RADIUS	Remote Authentication Dial-In User Service
RDP	Remote Desktop Protocol
RF	Radio Frequency
RFC	Request for Comment
RG	Radio Guide
RIP	Routing Internet Protocol
RJ	Registered Jack
RPO	Recovery Point Objective
RSSI	Received Signal Strength Indication
RTO	Recovery Time Objective
SaaS	Software as a Service
SAN	Storage Area Network
SC	Standard Connector/Subscriber Connector
SCADA	Supervisory Control and Data Acquisition
SDN	Software-Defined Network
SDWAN	Software-Defined WAN
SFP	Small Form-factor Pluggable
SFTP	Secure File Transfer Protocol
SIEM	Security Information and Event Management
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SLAAC	Stateless Address Auto-Configuration
SMB	Server Message Block
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SOA	Start of Authority
SQL	Structured Query Language
SRV	Service Record

ACRONYM	SPELLED OUT
SSH	Secure Shell
SSID	Service Set Identifier
SSL	Secure Sockets Layer
SSO	Single Sign-On
ST	Straight Tip or Snap Twist
SYSLOG	System Log
TACACS+	Terminal Access Controller Access Control System Plus
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TKIP	Temporal Key Integrity Protocol
TLS	Transport Layer Security
TTL	Time to Live
TX/RX	Transmit and Receive
UDP	User Datagram Protocol
UPC	Ultra-Physical Contact
UPS	Uninterruptible Power Supply
VIP	Virtual IP
VLAN	Virtual Local Area Network
VNC	Virtual Network Computing
vNIC	virtual Network Interface Card
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol
WAN	Wide Area Network
WDM	Wavelength Division Multiplexing
WLAN	Wireless Local Area Network
WPA	WiFi Protected Access

Network+ Proposed Hardware and Software List

CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the Network+ exam. This list may also be helpful for training companies that wish to create a lab component for their training offering. The bulleted lists below each topic are sample lists and are not exhaustive.

EQUIPMENT

- Optical and copper patch panels
- Punchdown blocks
- Layer 2 switch
- Layer 3 switch
- PoE switch
- Router
- Firewall
- VPN headend
- Wireless access point
- Basic laptops that support virtualization
- Tablet/cell phone
- Media converters
- VoIP system (including a phone)

SPARE HARDWARE

- NICs
- Power supplies
- GBICs
- SFPs
- Managed switch
- Wireless access point
- UPS
- PoE injector

SPARE PARTS

- Patch cables
- RJ11 connectors
- RJ45 connectors, modular jacks
- Unshielded twisted pair cable spool
- Coaxial cable spool
- F connectors
- Fiber connectors
- Antennas
- Bluetooth/wireless adapters
- Console cables (RS-232 to USB serial adapter)

TOOLS

- Telco/network crimper
- Cable tester
- Punchdown tool
- Cable stripper
- Coaxial crimper
- Wire cutter
- Tone generator
- Fiber termination kit
- Optical power meter

SOFTWARE

- Protocol analyzer/packet capture
- Terminal emulation software
- Linux OS/Windows OS
- Software firewall
- Software IDS/IPS
- Network mapper
- Hypervisor software
- Virtual network environment
- WiFi analyzer
- Spectrum analyzer
- Network monitoring tools
- DHCP service
- DNS service
- NetFlow analyzer
- TFTP server
- Firmware backups for upgrades

OTHER

- Sample network documentation
- Sample logs
- Defective cables
- Cloud network diagrams