



# Best CompTIA Network+ Cheat Sheet

Updated for N10-009 Exam



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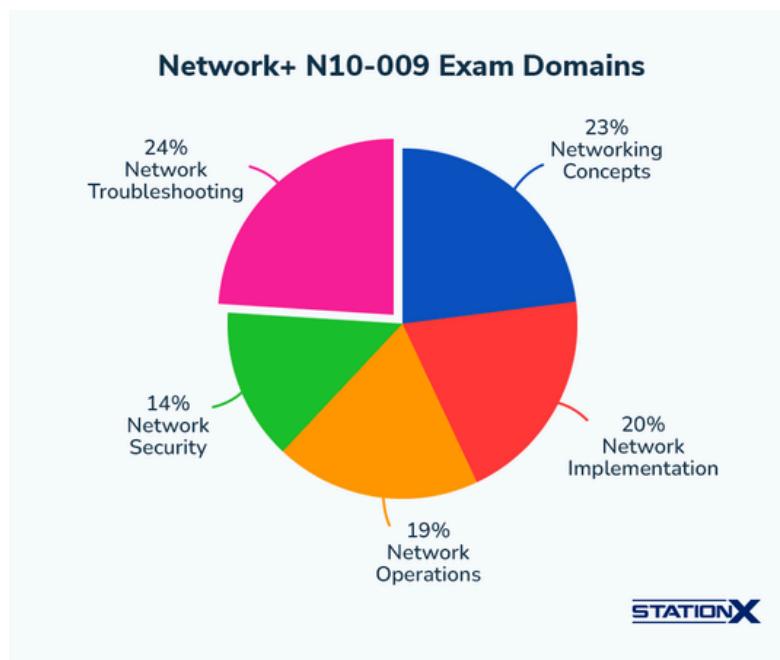
Updated for N10-009 Exam

Our CompTIA Network+ cheat sheet is handy as an overview or a refresher for this broad-based certification exam.

## Domains

Advancements in networking technologies and new threats to network security prompt updates to what constitutes a competent network administrator. Therefore, every three years, CompTIA updates the Network+ exam to highlight the most up-to-date industry needs in each focus area (Domain) of networking.

Here's the latest breakdown of Network+ Domains:



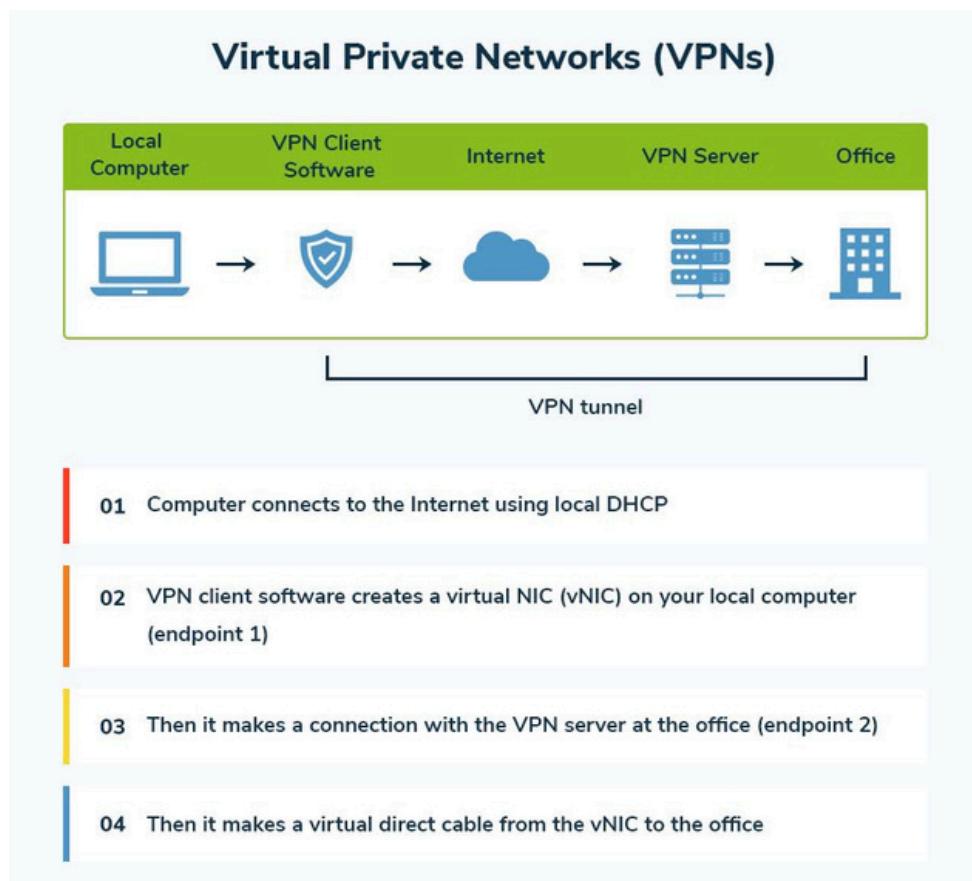
Domain	Exam Weighting (%)
Networking Concepts	23%
Network Troubleshooting	24%
Network Implementation	20%
Network Operations	19%
Network Security	14%

# Networking Concepts

The following items are essential networking knowledge.

Concept	Elaboration
<u>OSI model</u>	Open Systems Interconnection: 1. Physical 2. Data Link 3. Network 4. Transport 5. Session 6. Presentation 7. Application <ul style="list-style-type: none"> <li>• OSI model layer memory aid: Please Do Not Throw Sausage Pizza Away (<a href="#">alternatives</a>)</li> </ul>
LAN	Local Area Network
Subnet	Short for “subnetwork,” a logical or physical subdivision of a larger network
Router	Connects $\geq 2$ LANs to the Internet
Switch	Connect computers in LAN
Firewall	Safeguards computers and networks against unauthorized access
Proxy	Gateway between users and Internet
NAS	Network-attached storage
SAN	Storage area network
AP	Access point
IDS	Intrusion detection system
IPS	Intrusion prevention system
Load balancer	Distributes traffic across servers
CDN	Content Delivery Network
QoS	Quality of service
TTL	Time to live
Network security list	Set of security rules applied to all devices on a subnet

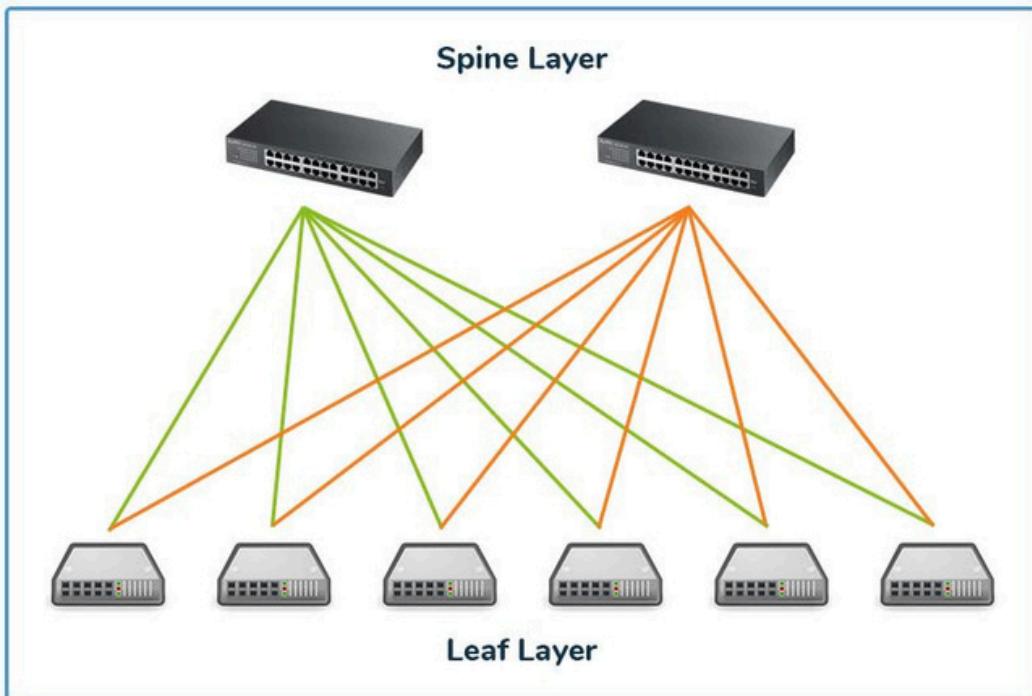
Concept	Elaboration
Network security group	Set of security rules applied to a group of network devices
Internet gateway	Allows inbound and outbound connections between private subnets and public networks
Network address translation (NAT) gateway	Allows outbound connections from a private subnet to public network services while shielding it from inbound connections from outside
Cloud	Considerations: <ul style="list-style-type: none"><li>• Scalability</li><li>• Elasticity</li><li>• Multitenancy</li></ul> Deployment models: <ul style="list-style-type: none"><li>• Public</li><li>• Private</li><li>Hybrid</li></ul>
VPN	Virtual Private Network



Concept	Elaboration
NFV	Network function virtualization
VPC	Virtual private cloud
SaaS	Software as a Service
IaaS	Infrastructure as a Service
PaaS	Platform as a Service
Direct Connect	Your on-premises infrastructure connects to a cloud provider's network, bypassing the public Internet
Internet Protocol (IP)	IPv4 and <u>IPv6</u>
Internet Control Message Protocol (ICMP)	Most commonly used for ping packets
Transmission Control Protocol (TCP)	Connection-oriented, SYN-ACK handshake
User Datagram Protocol (UDP)	Connectionless, best-effort
IPv4 address	32-bit number, consisting of four decimals from 0 to 255 separated by period (.), e.g., 192.168.1.1
IPv4 loopback/localhost	127.0.0.1
Automatic Private IP Addressing (APIPA)/link-local	169.254.x.x
Classless Inter-Domain Routing (CIDR)	CIDR IPv4 addresses have a prefix; e.g., "/24" in "10.150.23.58/24" denotes a 255.255.255.0 subnet mask.
<u>802.11</u> standards	For Wi-Fi communication
<u>802.3</u> standards	For wired Ethernet networks
Transceiver	Combined transmitter and receiver of signals
Form factor	Hardware specifications
TIA/EIA-568A	<ol style="list-style-type: none"> <li>1. White/green</li> <li>2. Green</li> <li>3. White/orange</li> <li>4. Blue</li> <li>5. White/blue</li> <li>6. Orange</li> <li>7. White/brown</li> <li>8. Brown</li> </ol>

Concept	Elaboration
TIA/EIA-568B	Swap “green” and “orange” in TIA/EIA-568A
Single-mode vs. multimode	(Optic fiber) Allowing one or multiple light modes to propagate
DAC	Direct attach copper
Coaxial	F-type, BNC
BNC	Bayonet Neill-Concelman
Twinaxial/twinax	Has two inner conductors instead of one as in coaxial
Twisted pair	RJ45, (RJ)11
(RJ)11	Registered jack
STP/UTP	Shielded/Unshielded twisted pair
Fiber optic	SC, ST, LC, FC, MT-RJ
SC	Subscriber connector
ST	Straight tip
LC	Local connector
FC	Fibre Channel
Plenum-rated	Fire-resistant cable; compare with riser-rated, non-plenum rated, and PVC
UTP category	Define speed and length of cables: <ul style="list-style-type: none"> <li>• Cat 3</li> <li>• Cat 5</li> <li>• Cat 5e</li> <li>• Cat 6/6a</li> <li>• Cat 7</li> <li>• Cat 8</li> </ul>
SFP	Small form-factor pluggable
QSFP	Quad small form-factor pluggable
MPO	Multi-fiber push on
Network topology	<ul style="list-style-type: none"> <li>• Mesh</li> <li>• Hybrid</li> <li>• Star/hub-and-spoke</li> <li>• Spine and leaf</li> <li>• Point to point</li> </ul>

## Spine-and-Leaf Architecture



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*Networking Concepts*

Concept	Elaboration
Three-tier hierarchical model	<ul style="list-style-type: none"> <li>• Core</li> <li>• Distribution</li> <li>• Access</li> </ul>
Collapsed core	Combine core and distribution layers
North-south	Traffic moving between a private network and the outside world
East-west	Traffic moving within an organization's internal network
<a href="#">RFC1918</a>	IP addresses set aside for private networks
VLSM	Variable Length Subnet Mask
Classless Inter-Domain Routing (CIDR)	CIDR IPv4 addresses have a prefix; e.g., "/24" in "10.150.23.58/24" denotes a 255.255.255.0 subnet mask.
IPv4 address classes	<ul style="list-style-type: none"> <li>• Class A: 0.0.0.0 – 127.255.255.255</li> <li>• Class B: 128.0.0.0 – 191.255.255.255</li> <li>• Class C: 192.0.0.0 – 223.255.255.255</li> <li>• Class D: 224.0.0.0 – 239.255.255.255</li> <li>• Class E: 240.0.0.0 – 255.255.255.255</li> </ul>
SD-WAN	Software-defined wide area network
SDN	Software-defined networking
SD-WAN	Software-defined wide area network
IaC	Infrastructure as Code
SASE	Secure Access Secure Edge
SSE	Security Service Edge
VXLAN	Virtual Extensible Local Area Network
ZTA	Zero trust architecture
DCI	Data center interconnect
GRE	Generic Routing Encapsulation
IPSec	Internet Protocol Security
AH	Authentication Header
ESP	Encapsulating Security Payload

Concept	Elaboration
IKE	Internet Key Exchange
Traffic types	<ul style="list-style-type: none"> <li>• Unicast</li> <li>• Multicast</li> <li>• Anycast</li> </ul>

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# Ports and Protocols

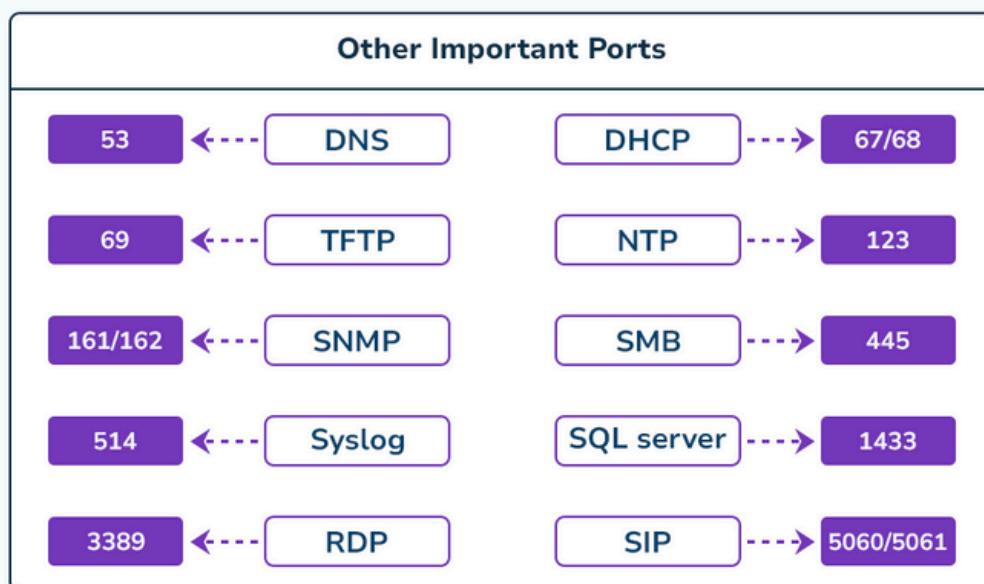
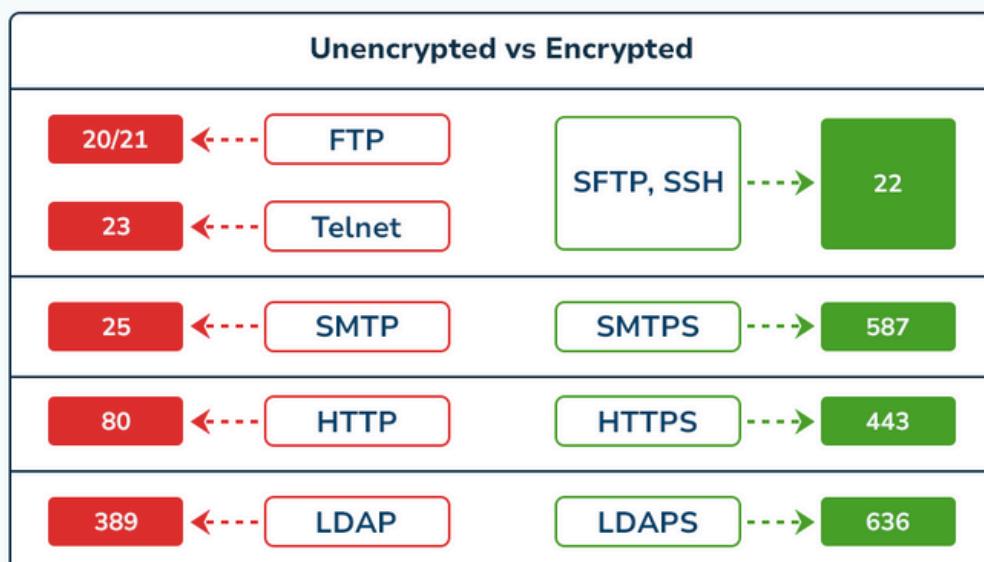
The following table lists the ports and protocols you must know to pass Network+.

Port number/s	Service name	Description
20/21	FTP	Open Systems
22	SSH, SFTP	Secure Shell, Secure File Transfer Protocol
23	Telnet	Telnet
25	SMTP	Simple Mail Transfer Protocol
53	DNS	Domain Name System
67/68	DHCP	Dynamic Host Configuration Protocol
69	TFTP	Trivial File Transfer Protocol
80	HTTP	Hypertext Transfer Protocol
123	NTP	Network Time Protocol
161/162	SNMP	Simple Network Management Protocol
389	LDAP	Lightweight Directory Access Protocol
443	HTTPS	Hypertext Transfer Protocol Secure
445	SMB	Server Message Block
514	Syslog	Syslog
587	SMTPS	Simple Mail Transfer Protocol Secure
636	LDAPS	Lightweight Directory Access Protocol over SSL
1433	SQL	Broadcast Structured Query Language (SQL) Server
3389	RDP	Remote Desktop Protocol
5060/5061	SIP	Session Initiation Protocol

## The 7-Layer OSI Model

No.	Layer	Function	Data unit	Hardware	Protocols
7	Application 	Human-computer interaction through applications that access network services	Message/data	Gateway	UPnP, DHCP, DNS, HTTP, HTTPS, NFS, NTP, POP3, SMTP, SNMP, FTP, Telnet, SSH, TFTP, IMAP
6	Presentation 	Data formatting and encryption/decryption	Message/data	Gateway redirector	TLS, SSL, AFP
5	Session 	Inter-host communication	Message/data	Gateway	NetBIOS, RPC, SMB, Socks
4	Transport 	Data transmission	TCP: segment; UDP: datagram	Gateway	TCP, UDP, SCTP
3	Network 	Path determination and logical addressing	Packet, datagram	Router, Brouter	ARP, IP, NAT, ICMP, IPsec, ICMP (ping)
2	Data Link 	Physical addressing	Frame, cell	Switch, bridge, NIC	ARP, Ethernet, L2TP, LLDP, MAC, NDP, PPP, PPTP, VTP, VLAN
1	Physical 	Binary signal transmission over physical media	Bit, frame	Cables, modem, hub, repeater, NIC, multiplexer	Ethernet, IEEE802.11, ISDN, USB, Bluetooth

## Common Ports and Protocols: Unencrypted vs Encrypted



The next Domain is about putting these basic concepts into practice.

# Network Implementation

This Domain is all about networking hardware: routers, switches, wireless, and installation considerations.

Concept	Elaboration
Static routing	Fix-value routing; no change at runtime unless manually edited
Dynamic routing	Routers automatically adjust the paths that data packets take based on network conditions
BGP	Border Gateway Protocol
EIGRP	Enhanced Interior Gateway Routing Protocol
OSPF	Open Shortest Path First
PAT	Port address translation
FHRP	First Hop Redundancy Protocol
VIP	Virtual IP
VLAN	Virtual Local Area Network
SVI	Switch Virtual Interface
MTU	Maximum transmission unit
SSID	Service set identifier
BSSID	Basic service set identifier
ESSID	Extended service set identifier
WPA2/WPA3	Wi-Fi Protected Access 2/3
Captive portal	A web page that appears upon connecting to a public Wi-Fi network, requiring action before granting full Internet access
Frequency options	<ul style="list-style-type: none"> <li>• 2.4GHz</li> <li>• 5GHz</li> <li>• 6GHz</li> </ul>
Band steering	Making Wi-Fi routers assign the optimal frequency band to a device based on its capabilities and network conditions

Concept	Elaboration
Network types	<ul style="list-style-type: none"> <li>• Mesh networks</li> <li>• Ad hoc</li> <li>• Point to point</li> <li>• Infrastructure</li> </ul>
PSK	Pre-shared key
IDF	Intermediate distribution frame
MDF	Main distribution frame
UPS	Uninterruptible power supply
PDU	Power distribution unit
Port-side intake	Cool air enters the switch through the side with the ports
Port-side exhaust	Hot air leaves the switch from the side with the ports
802.1Q tagging	A standard that enables VLANs on Ethernet networks
Link aggregation	Combining multiple physical network connections into a single logical link
Duplex switching	Able to transmit and receive data simultaneously or by taking turns doing so
STP	Spanning Tree Protocol
Jumbo frames	Ethernet frames with a payload larger than the standard 1500 bytes, typically 9000 bytes

The next big task after building a network is to maintain it—the scope of the next Domain.

# Network Operations

Everything related to the smooth running and maintenance of computer networks is the main focus of this Domain.

Concept	Elaboration
Asset inventory	A comprehensive list of all the assets belonging to or used by an organization, tangible and intangible
IPAM	IP address management
SLA	Service-level agreement
Wireless survey/heat map	Visualization for analyzing and mapping Wi-Fi signal coverage and strength in an area
OS	Operating system
EOL	End-of-life
EOS	End-of-support
MIB	Management information base
SIEM	Security information and event management
SNMP	Simple Network Management Protocol
High availability	Continued operational performance with minimal downtime
Active-active	Multiple active components share the workload and can handle failures by redistributing traffic
Active-passive	Relying on a primary, active component backed up by a secondary, standby component
Tabletop exercise	Discussion-based activity where participants simulate a disaster or emergency to test and improve plans, policies, and procedures
Validation test	“Does this product do what the user needs it to do?”
DR	Disaster recovery

Concept	Elaboration
RPO	Recovery point objective
RTO	Recovery time objective
MTTR	Mean time to repair
MTBF	Mean time between failures
BCP	Business Continuity Plan
Cold site	Power, networking capability, and cooling; no servers or storage
Warm site	Cold site plus storage hardware; still requires data transportation
Hot site	Fully functional backup site with important data mirrored to it
Dynamic addressing	Automatic assignment of IP addresses to devices on a network typically using DHCP
Name resolution	Conversion of human-readable domain names into the corresponding IP addresses using DNS
SLAAC	Stateless address autoconfiguration
DNSSEC	Domain Name Security Extensions
NTS	Network Time Security
PTP	Precision Time Protocol
DoH	DNS over HTTPS
DoT	DNS over TLS
Hosts file	Map hostnames to IP addresses using records such as A, AAAA, CNAME, etc.
A	IPv4 address
AAAA	IPv6 address
CNAME	Canonical name
MX	Mail exchange
TXT	Text

Concept	Elaboration
NS	Nameserver
PTR	Pointer
Clientless	Remote users can securely access enterprise resources without traditional client software
Split tunnel	Partial encryption of traffic
Full tunnel	Encryption of all traffic
Jump box/host	Secure intermediary server for accessing and managing devices in a separate network
In-band management	Same network infrastructure for data traffic and management
Out-of-band management	Using a separate, dedicated network for management
GUI	Graphical user interface

A network administrator doesn't cut the mustard if they only know how to keep a network running. The next Domain highlights the importance of keeping it secure as well.



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# Network Security

Maintaining the safety and security of computer networks is a vital component of being a competent professional in computer networking. This Domain doubles as an elementary introduction to cyber security.

Concept	Elaboration
Data at rest	On computer storage
Data in transit	Traveling along cables or broadcasting wirelessly
Risk	Potential for loss or damage
Vulnerability	A defect that creates an exploitable condition, making the system vulnerable to attacks
Exploit	Code that takes advantage of a vulnerability in a system or software to gain unauthorized access
Threat	Potential danger that can harm your systems, data, or operations
Least privilege	Only granting the minimum access necessary to perform actions
Honeypot/honeynet	Individual/connected devices inviting attacks to capture information
IAM	Identity and access management
MFA	Multifactor authentication
SSO	Single sign-on
PKI	Public Key Infrastructure
SAML	Security Assertion Markup Language
<u>CIA</u>	Confidentiality, Integrity, and Availability
RADIUS	For authentication, authorization, and accounting
TACACS+	Terminal Access Controller Access Control System Plus
ICS	Industrial Control System
BYOD	Bring Your Own Device

Concept	Elaboration
SCADA	Supervisory control and data acquisition
OT	Operational technology
GDPR	General Data Protection Regulation
PCI DSS	Payment Card Industry Data Security Standard
IoT	Internet of Things
IIoT	Industrial Internet of Things
VLAN hopping	Attacker can move from one VLAN to another
Media Access Control (MAC) flooding	Displacing legitimate MAC entries, forcing data into broadcast mode
Address Resolution Protocol (ARP) poisoning/spoofing	Forged ARP messages to redirect traffic from the victim
DoS	Denial-of-service
DDoS	Distributed denial-of-service
DNS poisoning	Exploit known DNS vulnerabilities
DNS spoofing	Forged DNS data to redirect traffic to hacker
Evil twin	Fake Wi-Fi access point to trick people into choosing it over the genuine one
On-path attack/Man-in-the-middle (MITM) attack	Intercept a two-party conversation for one's advantage  Tools: <ul style="list-style-type: none"><li>• Ettercap</li><li>• <a href="#">Wireshark</a></li><li>• <a href="#">tcpdump</a></li></ul>
Phishing	Attack by email; single target
Dumpster diving	Recover information from trash
Shoulder surfing	Look over someone's shoulder, often with a recording device
Tailgating	Unauthorized entity follows authorized party into secured premises

Concept	Elaboration
Device hardening	Reducing the attack surface to secure a device
802.1X	For port-based network access control (PNAC)
MAC filtering	Control network access by device MAC
NAC	Network access control
ACL	Access control list
Uniform Resource Locator (URL) filtering	Allow/block website access by URL
Screened subnet (demilitarized zone, DMZ)	<p>Five components:</p> <ul style="list-style-type: none"> <li>• External network</li> <li>• External router</li> <li>• Perimeter network</li> <li>• Internal router</li> <li>• Internal network</li> </ul>

# Network Troubleshooting

Apply the six technical troubleshooting steps (same as A+) to networking problems. Familiarize yourself with common networking issues.

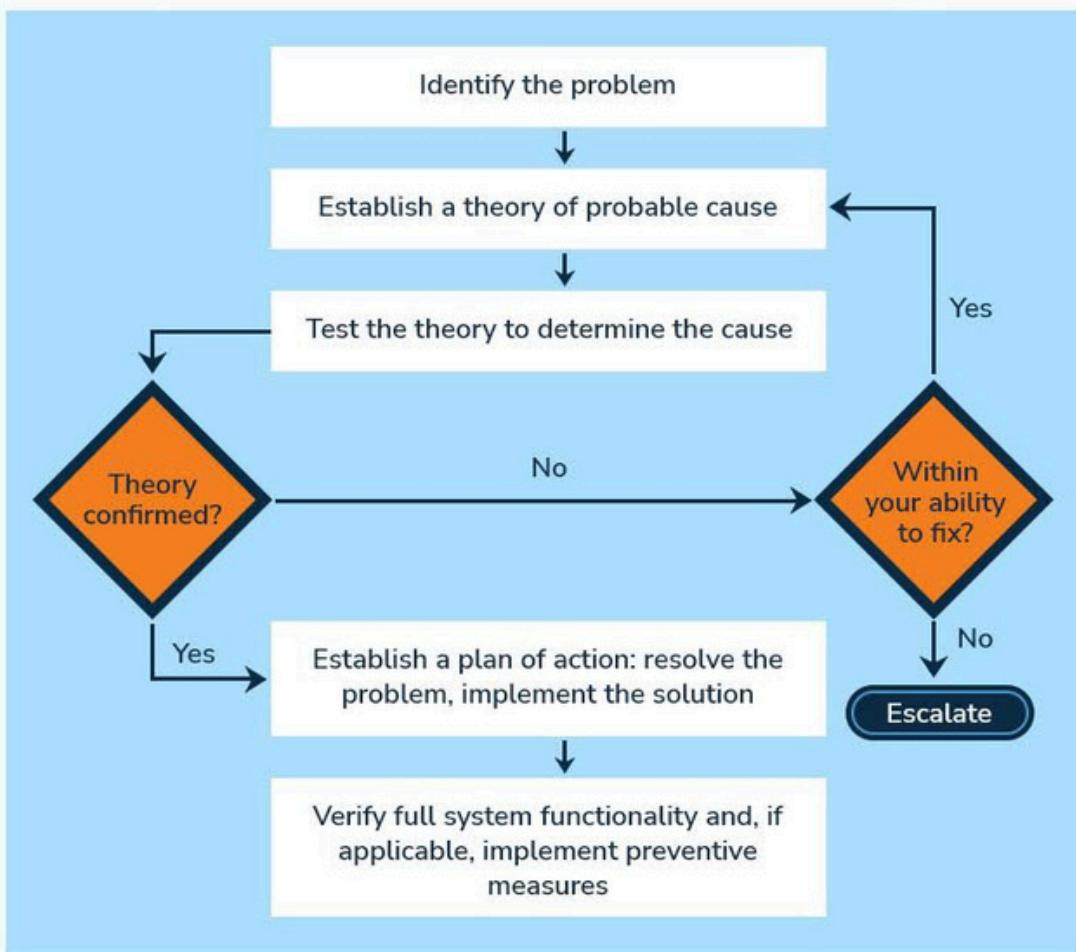
Concept	Elaboration
On the “establish theory” step in technical troubleshooting	<ul style="list-style-type: none"> <li>• Top-to-bottom/bottom-to-top</li> <li>• OSI model</li> <li>• Divide and conquer</li> </ul>
On establishing a plan of action	Identify the potential effects of the resolution
On documentation	Document also the lessons learned throughout the troubleshooting process
LLDP	Link Layer Discovery Protocol
CDP	Cisco Discovery Protocol

Concept	Elaboration
Troubleshooting tools/protocols	<p>Software tools:</p> <ul style="list-style-type: none"><li>• Protocol analyzer</li><li>• Command line</li><li>• Speed tester</li><li>• ping</li><li>• traceroute/tracert</li><li>• nslookup</li><li>• tcpdump</li><li>• dig</li><li>• netstat</li><li>• ip/ifconfig/ipconfig</li><li>• arp</li><li>• nmap</li></ul> <p>Hardware tools:</p> <ul style="list-style-type: none"><li>• Toner</li><li>• Cable tester</li><li>• Taps</li><li>• Wi-Fi analyzer</li><li>• Visual fault locator</li></ul> <p>Basic networking device commands</p> <ul style="list-style-type: none"><li>• show mac-address-table</li><li>• show route</li><li>• show interface</li><li>• show config</li><li>• show arp</li><li>• show vlan</li><li>• show power</li></ul>

## Technical Troubleshooting Best Practice Methodology



Always consider **corporate policies, procedures, and impacts** before implementing changes.



Document findings, actions, outcomes

# CompTIA Network+ Cheat Sheet Conclusion

To maximize your knowledge and exam preparation, take a look at our complete [CompTIA Network+ Training Bundle \(N10-009\)](#). For a one-time purchase, get access to 19 hours of video training, three full practice exams, over 300 flashcards, and more.

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# Frequently Asked Questions

## Is the CompTIA Network+ exam hard?

This certification in networking fundamentals can be challenging. However, sufficient practice and hands-on experience can flatten the learning curve.

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## Is CCNA harder than Network+?

Yes. As a vendor-specific certification focused on Cisco technologies, CCNA requires a greater depth of knowledge in networking than Network+. Read [our article "Network+ vs CCNA" comparing both](#).

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## How many times can you fail the CompTIA Network+ exam?

Countless times. If you fail the first time, you can re-register for the Network+ exam immediately, but you must [wait 14 days between subsequent attempts](#).

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## Is Network+ or Security+ harder?

Security+ is more challenging because it covers a broader range of topics, building upon Network+.

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## Can I skip A+ and do Network+?

Yes, you can. Network+ has no formal prerequisites, although CompTIA recommends that Network+ candidates acquire nine to 12 months of practical IT networking experience.

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## How long is Network+ valid for?

The Network+ certification is valid for three years. Here's [how to renew](#) yours on the CompTIA website.

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## Can you use notes on Network+ exam?

No, Network+ is a closed-book exam. If you do so, you'll lose your existing CompTIA certifications and disqualify yourself from future CompTIA exams. [Read more about CompTIA's policy on cheating here](#).



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