# Networking Concepts

**CompTIA Network+ certification exam, N10-009**

23% of the exam · 8 exam objectives · N10-009

Domain 1 is the foundation of the exam, 23% of it. It covers the seven OSI layers and what works at each, the appliances and functions of a network (routers, switches, firewalls, IDS and IPS, load balancers, proxies, storage, wireless, VPN, QoS, TTL), cloud networking (NFV, VPCs, security groups and lists, gateways, deployment and service models), the ports, protocols and traffic types in S1's table, transmission media and transceivers, topologies and data centre architectures, IPv4 addressing and subnetting, and evolving uses such as SDN, SD-WAN, VXLAN, zero trust, SASE, infrastructure as code and IPv6.

**You should be able to:** Are 10.1.70.9/21 and 10.1.73.20/21 in the same subnet, and at which OSI layer does IP addressing work?

## Every exam objective: the key point and the trap

**1.1 Explain concepts related to the Open Systems Interconnection (OSI) reference model.**

The OSI reference model splits network communication into seven layers, from 1 (Physical) at the bottom to 7 (Application) at the top. Each layer serves the one above it, and when data is sent each layer adds its own header (encapsulation).

**Trap:** Mixing up the units and devices of layers 2 and 3: a switch forwards frames by MAC address at layer 2, while a router forwards packets by IP address at layer 3.

**1.2 Compare and contrast networking appliances, applications, and functions.**

Appliances can be physical boxes or virtual appliances running as software. Routers connect networks and forward by IP address; switches connect devices within a network and forward by MAC address.

**Trap:** Choosing an IDS when the question asks for traffic to be blocked. An IDS detects and alerts; only an inline IPS prevents.

**1.3 Summarize cloud concepts and connectivity options.**

Network functions virtualization (NFV) runs network functions such as routers, firewalls and load balancers as software on standard hardware instead of dedicated boxes.

**Trap:** Calling automatic growing and shrinking scalability. Scalability is the capacity to grow; elasticity is the automatic adjustment up and down with demand.

**1.4 Explain common networking ports, protocols, services, and traffic types.**

Ports to know: FTP 20/21, SFTP 22, SSH 22, Telnet 23, SMTP 25, DNS 53, DHCP 67/68, TFTP 69, HTTP 80, NTP 123, SNMP 161/162.

**Trap:** Assuming every IPSec tunnel is encrypted. AH authenticates and protects integrity but does not encrypt; confidentiality needs ESP.

**1.5 Compare and contrast transmission media and transceivers.**

Wireless media: 802.11 standards (b and g at 2.4 GHz, a and ac at 5 GHz, n and ax at both, with 6E adding 6 GHz), cellular for mobile coverage, and satellite for remote sites at the cost of higher latency.

**Trap:** Calling multimode the long-distance fiber because it sounds bigger. Single-mode, with the smaller core, goes farther.

**1.6 Compare and contrast network topologies, architectures, and types.**

Mesh: every node links to many (partial) or all (full) others. A full mesh of n nodes needs n(n-1)/2 links: most redundant, most costly.

**Trap:** Confusing the layers: end devices connect at the access layer, not the distribution layer, and a collapsed core is a design, not a fourth layer.

**1.7 Given a scenario, use appropriate IPv4 network addressing.**

Private ranges (RFC1918) are 10.0.0.0/8, 172.16.0.0/12 (172.16 to 172.31) and 192.168.0.0/16; they are not routed on the internet. Most other unicast addresses are public.

**Trap:** Counting 2^h as usable hosts. The network and broadcast addresses are not usable, so a /27 holds 30 hosts, not 32.

**1.8 Summarize evolving use cases for modern network environments.**

SDN separates the control plane from the data plane so the network is managed centrally in software. SD-WAN applies this to the WAN: application aware, transport agnostic (any link: broadband, cellular, MPLS), zero-touch provisioning and central policy management.

**Trap:** Mixing SASE and SSE. SASE includes the SD-WAN networking; SSE is only the security services.

## Key terms

**OSI:** Open Systems Interconnection

**NFV:** Network Functions Virtualization

**ICMP:** Internet Control Message Protocol

**DAC:** Direct Attach Copper

**SFP:** Small Form-factor Pluggable

**APIPA:** Automatic Private Internet Protocol Addressing

**CIDR:** Classless Inter-domain Routing

**VLSM:** Variable Length Subnet Mask

**VXLAN:** Virtual Extensible LAN

**SASE:** Secure Access Service Edge

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