



1.0 Networking Concepts

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

- Layer 1 - Physical
- Layer 2 - Data link
- Layer 3 - Network
- Layer 4 - Transport
- Layer 5 - Session
- Layer 6 - Presentation
- Layer 7 - Application

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

- **Physical and virtual appliances**
 - Router
 - Switch
 - Firewall
 - Intrusion detection system (IDS)/intrusion prevention system (IPS)
 - Load balancer
 - Proxy
 - Network-attached storage (NAS)
- Storage area network (SAN)
- Wireless
 - Access point (AP)
 - Controller
- **Applications**
 - Content delivery network (CDN)
- **Functions**
 - Virtual private network (VPN)
 - Quality of service (QoS)
 - Time to live (TTL)

1.3 Summarize cloud concepts and connectivity options.

- **Network functions virtualization (NFV)**
- **Virtual private cloud (VPC)**
- **Network security groups**
- **Network security lists**
- **Cloud gateways**
 - Internet gateway
 - Network address translation (NAT) gateway
- **Cloud connectivity options**
 - VPN
 - Direct Connect
- **Deployment models**
 - Public
 - Private
 - Hybrid
- **Service models**
 - Software as a service (SaaS)
 - Infrastructure as a service (IaaS)
 - Platform as a service (PaaS)
- **Scalability**
- **Elasticity**
- **Multitenancy**



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

Protocols

Protocols	Ports
File Transfer Protocol (FTP)	20/21
Secure File Transfer Protocol (SFTP)	22
Secure Shell (SSH)	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
Network Time Protocol (NTP)	123
Simple Network Management Protocol (SNMP)	161/162
Lightweight Directory Access Protocol (LDAP)	389
Hypertext Transfer Protocol Secure (HTTPS)	443
Server Message Block (SMB)	445
Syslog	514
Simple Mail Transfer Protocol Secure (SMTPS)	587
Lightweight Directory Access Protocol over SSL (LDAPS)	636
Structured Query Language (SQL) Server	1433
Remote Desktop Protocol (RDP)	3389
Session Initiation Protocol (SIP)	5060/5061

• Internet Protocol (IP) types

- Internet Control Message Protocol (ICMP)
- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)
- Generic Routing Encapsulation (GRE)
- Internet Protocol Security (IPSec)
 - Authentication Header (AH)
 - Encapsulating Security Payload (ESP)
 - Internet Key Exchange (IKE)

• Traffic types

- Unicast
- Multicast
- Anycast
- Broadcast



1.5 Compare and contrast transmission media and transceivers.

- **Wireless**
 - 802.11 standards
 - Cellular
 - Satellite
- **Wired**
 - 802.3 standards
 - Single-mode vs. multimode fiber
 - Direct attach copper (DAC) cable
 - Twinaxial cable
 - Coaxial cable
 - Cable speeds
 - Plenum vs. non-plenum cable
- **Transceivers**
 - Protocol
 - Ethernet
 - Fibre Channel (FC)
 - Form factors
 - Small form-factor pluggable (SFP)
 - Quad small form-factor pluggable (QSFP)
- Bayonet Neill-Concelman (BNC)
- **Connector types**
 - Subscriber connector (SC)
 - Local connector (LC)
 - Straight tip (ST)
 - Multi-fiber push on (MPO)
 - Registered jack (RJ)11
 - RJ45
 - F-type

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

- **Mesh**
 - Distribution
- **Hybrid**
 - Access
- **Star/hub and spoke**
- **Spine and leaf**
- **Point to point**
- **Three-tier hierarchical model**
 - Core
- **Collapsed core**
- **Traffic flows**
 - North-south
 - East-west

1.7 Given a scenario, use appropriate IPv4 network addressing.

- **Public vs. private**
 - Automatic Private IP Addressing (APIPA)
 - RFC1918
 - Loopback/localhost
- **Subnetting**
 - Variable Length Subnet Mask (VLSM)
 - Classless Inter-domain Routing (CIDR)
- **IPv4 address classes**
 - Class A
 - Class B
 - Class C
 - Class D
 - Class E



1.8 Summarize evolving use cases for modern network environments.

- **Software-defined network (SDN) and software-defined wide area network (SD-WAN)**
 - Application aware
 - Zero-touch provisioning
 - Transport agnostic
 - Central policy management
- **Virtual Extensible Local Area Network (VXLAN)**
 - Data center interconnect (DCI)
 - Layer 2 encapsulation
- **Zero trust architecture (ZTA)**
 - Policy-based authentication
 - Authorization
 - Least privilege access
- **Secure Access Secure Edge (SASE)/Security Service Edge (SSE)**
- **Infrastructure as code (IaC)**
 - Automation
 - Playbooks/templates/reusable tasks
 - Configuration drift/compliance
 - Upgrades
 - Dynamic inventories
 - Source control
 - Version control
 - Central repository
 - Conflict identification
 - Branching
- **IPv6 addressing**
 - Mitigating address exhaustion
 - Compatibility requirements
 - Tunneling
 - Dual stack
 - NAT64