Achievable

CCNA DUMP SHEET

Network fundamentals

The exam

- **Exam:** 200-301 CCNA, version 1.1 (testing ends Feb 2, 2027)
- **Length:** 120 minutes, may be 60-90 questions, varying by candidate (unofficial)
- **Question types:** multiple choice, drag-and-drop, simulation
- **Passing score:** not published by Cisco

Network Fundamentals	Network Access	IP Connectivity	IP Services	Security Fundamentals	Automation and Programmability
20%	20%	25%	10%	15%	10%

Network components

Router	Layer 3. Routes packets between networks	**Firewall**	Blocks unauthorized traffic from untrusted networks
Layer 2 switch	Forwards frames inside a LAN by MAC address	**NGFW**	Firewall plus IPS, application control, URL filtering
Layer 3 switch	Multi-layer: also routes between IP networks	**IPS**	Blocks malicious traffic in real time; IDS only alerts
Access point	Layer 2. Joins wireless endpoints to the wired LAN	**Endpoint**	Host at the network edge: PC, phone, printer, IoT
WLC	Wireless LAN controller: manages APs centrally	**Server**	Endpoint providing services and data to other hosts
SDN controller	Manages network logic and policy centrally	**PoE**	Power and data over one Ethernet cable

Layers and encapsulation

TCP/IP layer	No.	Unit	Address
Application	7	Data	None
Transport	4	Segment, UDP datagram	Port
Network	3	Packet	IP (logical)
Data Link	2	Frame	MAC (physical)
Physical	1	Bits	None

- **OSI:** 7 layers. **TCP/IP:** 5; Application spans OSI Session (5), Presentation (6), Application (7)
- **Sender moves down:** data → segment → packet → frame → bits. **Receiver** moves up
- **At each router:** IP addresses stay end to end, both MAC addresses are rewritten
- **Devices:** routers at Layer 3, switches and APs at Layer 2
- **IEEE standards:** 802.3 is Ethernet, 802.11 is Wi-Fi
- **IP address:** static or DHCP. **MAC address:** tied to the adapter
- **Troubleshooting:** start at Physical and work up

TCP vs. UDP

	TCP	UDP
Connection	Connection-oriented	Connectionless
Setup	Session first	No session
Delivery	Reliable, with ACKs	Unreliable, no ACKs
Lost data	Retransmitted	Not retransmitted
Order	Sequence numbers	No sequence numbers
Flow control	Yes	No
Errors	Checksum, retransmits	Checksum, detects only
Overhead	More, adds latency	Less, low latency
Used by	Web, email, file transfer	Voice, video, TFTP, NTP

- **3-way handshake:** client SYN, server SYN-ACK, client ACK
- **SYN** carries the initial sequence number
- **Flow control:** the receiver tells the sender to slow down
- **Out of order:** TCP detects it by sequence number, UDP cannot
- **Why UDP:** voice and video want low latency, accept some loss

Port numbers

Port	Transport	Application	Port	Transport	Application	Port	Transport	Application
20, 21	TCP	FTP	53	TCP, UDP	DNS	123	UDP	NTP
22	TCP	SSH	67, 68	UDP	DHCP	161, 162	UDP	SNMP
23	TCP	Telnet	69	UDP	TFTP	443	TCP	HTTPS
25	TCP	SMTP	80	TCP	HTTP	514	UDP	Syslog

- **Range:** 0-65535. **Well-known:** 0-1023, where servers listen
- **Registered:** 1024-49151. **Ephemeral:** 49152-65535, for clients
- **Source, destination:** from the sender's side; they swap on the reply
- **Socket:** IP address and port together, as in 192.168.1.100:80