


Of course. Here are some common computer network questions and answers for interview preparation, categorized by topic.

Fundamental Concepts

1. What is the OSI Model? Explain its 7 layers.

The **OSI (Open Systems Interconnection) model** is a conceptual framework that standardizes the functions of a telecommunication or computing system into seven abstract layers. Each layer serves a specific function and communicates with the layers directly above and below it. 

The seven layers are:

1. **Physical Layer:** Transmits raw bits over a physical medium (e.g., cables, radio waves).
2. **Data Link Layer:** Manages node-to-node data transfer (e.g., MAC addresses) and detects/corrects errors from the Physical Layer.
3. **Network Layer:** Handles packet forwarding, including routing through different routers (e.g., IP addresses).
4. **Transport Layer:** Provides reliable end-to-end communication and flow control (e.g., TCP, UDP).
5. **Session Layer:** Establishes, manages, and terminates connections between applications.
6. **Presentation Layer:** Translates, encrypts, and compresses data.
7. **Application Layer:** Provides network services directly to the end-user's applications (e.g., HTTP, FTP, SMTP).

2. What's the difference between the OSI and TCP/IP models?

The main difference is that **OSI is a conceptual model**, while **TCP/IP is a practical model** used for the internet. TCP/IP is simpler and combines several OSI layers into one.

OSI Model	TCP/IP Model
7 Layers	4 Layers
Theoretical framework	Practical implementation
Layers: Physical, Data Link, Network, Transport, Session, Presentation,	Layers: Network Access, Internet, Transport, Application

Application	
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3. Differentiate between LAN, MAN, and WAN.

These terms describe the geographic scope of a network.

- **LAN (Local Area Network):** Covers a small area like a single building or campus. (e.g., home Wi-Fi).
- **MAN (Metropolitan Area Network):** Spans a larger area like a city. It connects multiple LANs.
- **WAN (Wide Area Network):** Covers a very large geographical area, like a country or the entire globe. The **internet** is the largest WAN.

Networking Protocols

4. What's the difference between TCP and UDP?

TCP (Transmission Control Protocol) and **UDP (User Datagram Protocol)** are core protocols at the Transport Layer.

Feature	TCP (Transmission Control Protocol)	UDP (User Datagram Protocol)
Connection	Connection-oriented (establishes a connection before sending data)	Connectionless (sends data without establishing a connection)
Reliability	Reliable. Guarantees delivery, order, and error-checking.	Unreliable. No guarantee of delivery or order.
Speed	Slower due to overhead (acknowledgements, handshakes).	Faster, with less overhead.
Use Cases	Web browsing (HTTP/S), email (SMTP), file transfer (FTP).	Video streaming, online gaming, DNS, VoIP.

5. How does DNS work?

DNS (Domain Name System) acts as the phonebook of the internet. It translates human-readable domain names (like www.google.com) into machine-readable IP addresses (like 172.217.167.78). 🌐

The process generally involves these steps:

1. Your computer checks its local cache.
2. If not found, it queries a **Recursive DNS server** (usually from your ISP).
3. The recursive server queries a **Root DNS server**.
4. The root server directs it to a **Top-Level Domain (TLD) server** (e.g., for .com).
5. The TLD server directs it to the **Authoritative DNS server** for the specific domain, which holds the actual IP address record.
6. The IP address is sent back to your computer.

6. Explain the DHCP process (DORA).

DHCP (Dynamic Host Configuration Protocol) automatically assigns IP addresses and other network configuration parameters to devices on a network. The process is known as **DORA**:

1. **Discover:** The client device broadcasts a "DHCP Discover" message to find a DHCP server.
 2. **Offer:** The DHCP server receives the message and replies with a "DHCP Offer" message, containing a proposed IP address.
 3. **Request:** The client broadcasts a "DHCP Request" message, accepting the offered IP address.
 4. **Acknowledge:** The server sends a "DHCP Acknowledge" message to confirm the lease, completing the process.
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Network Architecture & Hardware

7. What's the difference between a hub, a switch, and a router?

- **Hub:** A basic networking device that operates at the **Physical Layer (Layer 1)**. It broadcasts all incoming data to every port. It's inefficient and can cause network congestion.
- **Switch:** An intelligent device that operates at the **Data Link Layer (Layer 2)**. It learns the MAC addresses of connected devices and forwards data only to the intended destination port.
- **Router:** A device that operates at the **Network Layer (Layer 3)**. It connects different

networks together (e.g., your home network to the internet) and uses IP addresses to forward packets to their destination across those networks.

8. What is subnetting? Why is it used?

Subnetting is the practice of dividing a single, large IP network into smaller, more manageable sub-networks or "subnets".

It is used for:

- **Improved Security:** Isolate network segments so a breach in one doesn't easily spread.
- **Better Performance:** Reduces network broadcast traffic, leading to less congestion.
- **Simplified Administration:** Makes managing a large network easier.

9. What are private and public IP addresses?

- **Public IP Address:** An IP address that is unique across the entire internet. It's assigned by your ISP and is used for communicating with other devices online.
 - **Private IP Address:** An IP address used within a private network (like your home or office). These are not routable on the internet and are used for local communication. Common private ranges include 192.168.x.x, 10.x.x.x, and 172.16.x.x - 172.31.x.x. **NAT (Network Address Translation)** is used by routers to allow devices with private IPs to access the internet via a single public IP.
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Network Security

10. What is a firewall and how does it work?

A **firewall** is a network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules. It acts as a barrier between a trusted internal network and an untrusted external network (like the internet). 🔥

11. What is a VPN?

A **VPN (Virtual Private Network)** creates a secure, encrypted connection over a less secure network, such as the public internet. It essentially creates a private "tunnel" for your data, protecting it from eavesdropping and allowing you to access resources on a private network remotely.

12. What is the three-way handshake in TCP?

The **TCP three-way handshake** is the process used to establish a connection between a

client and a server. It ensures both sides are ready to communicate.

1. **SYN (Synchronize):** The client sends a SYN packet to the server to initiate the connection.
 2. **SYN-ACK (Synchronize-Acknowledge):** The server responds with a SYN-ACK packet, acknowledging the client's request and sending its own sync request.
 3. **ACK (Acknowledge):** The client sends an ACK packet back to the server, confirming the connection is established.
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Troubleshooting & Commands

13. What is the use of the ping command?

The ping command is a basic utility used to test the reachability of a host on an IP network. It sends an ICMP (Internet Control Message Protocol) echo request packet to the target and measures the round-trip time for the reply. It's used to check for network connectivity and latency.

Example: ping 8.8.8.8

14. What are some common networking commands in Windows/Linux?

- **ipconfig / ifconfig:** Displays the IP address, subnet mask, and default gateway for all network adapters.
- **ping:** Tests connectivity to another host.
- **tracert / traceroute:** Traces the route (path of routers) that packets take to a destination host.
- **nslookup:** Queries DNS servers to find IP addresses for domain names and vice-versa.
- **netstat:** Displays active network connections, routing tables, and network interface statistics.