Name Abhishek Kumar

**Module -7: Network fundamental –**

1- Which of the following messages in the DHCP process are broadcasted? (Choose two)

A. Request

B. Offer

C. Discover

D. Acknowledge 3

**Ans: -** A. Request

C. Discover

**Reason:** - Request - The client sends this to tell the server which IP it accepts.

It is also broadcasted so all servers know which offer was chosen.

DHCP Discover - The client sends this message to find DHCP servers.

It is broadcasted because the client has no IP address yet.

2- Which command would you use to ensure that an ACL does not block web-based TCP traffic?

A. permit any

B. permit tcp any any eq 80

C. permit tcp any eq 80

D. permit any any eq tcp

**Ans: -** B. permit tcp any any eq 80

**Reason: -** Web traffic uses TCP port 80, so this command allows it.

3-Explain Network Topologies

**Ans: -** Network Topologies: Network topology means **how computers and devices are connected** in a network.

It shows the **shape or layout** of the network and how data moves between devices.

Types of Network Topologies.

There are Six types of Network topologies.

1. Bus Topology:

* All computers share one main cable.
* If the main cable breaks, the whole network stops.
* Example: Old networks.

2. Star Topology:

* All computers connect to one central device (like a switch or hub).
* Easy to manage and fast.

3. Ring Topology:

* Each computer connects to two others, forming a circle.
* Data goes round in a ring.

4. Mesh Topology:

* Every computer connects to every other computer.
* Very reliable but expensive.

5. Tree Topology:

* Like a combination of star and bus.
* Has a main line with branches.

6. Hybrid Topology:

* Mix of two or more topologies.

4-Explain TCP/IP Networking Model

**Ans: -** The full form of TCP/IP is Transmission Control Protocol / Internet Protocol.  
It is a networking model that explains how data travels from one computer to another over a network or the Internet.  
The TCP/IP model has 4 layers, and each layer has its own specific function.

1. Network Access Layer

* This layer sends the data physically through wires, cables, or Wi-Fi.
* It deals with hardware devices like routers, switches, and network cards.
* Examples: Ethernet, Wi-Fi
* Main Function: To send data across the physical network.

2. Internet Layer

* This layer finds the best path for data to travel between computers.
* It provides each computer with an IP address so they can identify each other.
* Examples: IP, ICMP, ARP
* Main Function: To move data from one network to another.

3. Transport Layer

* This layer ensures that data reaches the destination safely and in the correct order.
* It divides large data into smaller parts and then reassembles them at the receiver’s end.
* Two main protocols are used here:
  + TCP (Transmission Control Protocol): Reliable but slower.
  + UDP (User Datagram Protocol): Faster but less reliable.
* Examples: TCP, UDP
* Main Function: To control the flow and reliability of data transmission.

4. Application Layer

* This layer interacts directly with the user’s applications.
* It provides network services like web browsing, email, and file sharing.
* Examples: HTTP, FTP, SMTP, DNS
* Main Function: To provide services to end users and applications.

5-Explain LAN and WAN Network

**Ans: -** LAN stands for Local Area Network.  
It is a network that connects computers and devices within a small area, like a home, school, office, or building.  
All the devices in a LAN are connected using cables (Ethernet) or Wi-Fi.

Example:

* Computers connected in a school computer lab.
* Office computers connected to one printer.

Main Features:

* Covers a small area.
* High speed data transfer.
* Low cost to set up and maintain.
* Usually owned and managed by one organization.

Advantages of LAN:

* Easy file and printer sharing.
* Faster communication between computers.
* Centralized data storage.

WAN stands for Wide Area Network.  
It is a network that connects computers and LANs across large distances, such as cities, countries, or even the whole world.  
The best example of a WAN is the Internet.

Example:

* Banks connecting their branches in different cities.
* The Internet (largest WAN in the world).

Main Features:

* Covers a large geographical area.
* Slower speed than LAN.
* Expensive to set up and maintain.
* Usually managed by telecom companies or ISPs (Internet Service Providers).

Advantages of WAN:

* Allows long-distance communication.
* Enables global business and information sharing.
* Connects multiple LANs together.

6-Explain Operation of Switch

**Ans: -** A switch is an electrical device used to open or close a circuit — that is, to control the flow of current in an electrical circuit.

When the switch is ON, it completes the circuit and allows current to flow.  
When the switch is OFF, it breaks the circuit and stops current flow.

Basic Operation

1. Switch ON (Closed Position)

* The contacts inside the switch touch each other.
* This closes the circuit.
* Current flows through the circuit, and the connected load (like a bulb or fan) operates.

Example: - When you flip a light switch ON, the metal contacts inside connect, allowing current to flow to the bulb — the bulb glows.

2. Switch OFF (Open Position)

* The contacts inside the switch are separated.
* This breaks the circuit.
* Current cannot flow, and the load turns off.

Example: - When you flip the switch OFF, the contacts separate, current flow stops, and the bulb goes out.

7-Describe the purpose and functions of various network devices

**Ans:** - Network devices are hardware that connect computers and devices so they can share data and resources. Each device has a specific role in the network.

1. Hub

* Purpose: Connects multiple devices in a network.
* Function: Sends incoming data to all devices connected to it.
* Example: Simple LAN in small offices.
* Note: Not smart — can slow the network if many devices are connected.

2. Switch

* Purpose: Connects devices efficiently in a network.
* Function: Sends data only to the device that needs it.
* Example: Office LAN to connect computers and printers.
* Benefit: Reduces network traffic and increases speed compared to a hub.

3. Router

* Purpose: Connects different networks, like LAN to the Internet.
* Function: Uses IP addresses to send data to the correct network.
* Example: Home Wi-Fi router.
* Extra: Can have firewall and NAT features for security.

4. Modem

* Purpose: Connects a network or computer to the Internet.
* Function: Converts digital signals (computer) → analog signals (line) and vice versa.
* Example: DSL or cable modem at home.

5. Access Point (AP)

* Purpose: Allows wireless devices to connect to a wired network.
* Function: Provides Wi-Fi connectivity.
* Example: Wi-Fi hotspot in an office or school.

6. Repeater

* Purpose: Extends the distance a network signal can travel.
* Function: Boosts and regenerates weak signals.
* Example: Wi-Fi signal booster.

7. Bridge

* Purpose: Connects two network segments to work as one.
* Function: Sends data only between segments that need it.
* Example: Linking two departments’ LANs.

8. Gateway

* Purpose: Connects networks using different protocols.
* Function: Translates data from one network type to another.
* Example: Corporate network connecting to the Internet.

7-Make list of the appropriate media, cables, ports, and connectors to

**Ans: -** 1. Network Media (How Data Travels)

* Twisted Pair Cable → Copper wires twisted to reduce interference; used in LAN.
* Coaxial Cable → Copper core with shielding; used in older networks or cable TV.
* Fiber Optic Cable → Glass or plastic strands; carries light signals for high-speed, long-distance networks.
* Wireless → Data travels through air using radio waves; Wi-Fi, Bluetooth.

2. Network Cables (Connect Devices)

* Cat5 / Cat5e → For Ethernet; Cat5e faster than Cat5.
* Cat6 / Cat6a → Higher speed and bandwidth; modern LANs.
* Coaxial Cable → For old Ethernet (10BASE2) or TV networks.
* Fiber Optic Cable → Very fast; for backbone or Internet.

3. Network Ports (Where Cables Plug In)

* RJ-45 Port → Ethernet cable plugs here; most common in LAN.
* RJ-11 Port → Telephone line; used in dial-up modems.
* USB Port → Wireless adapters or network devices.
* Fiber Ports (ST, SC, LC) → For fiber optic cables.
* Coaxial Port (BNC) → For old Ethernet networks.

4. Network Connectors (Connect Cable to Device)

* RJ-45 Connector → For twisted pair cables.
* RJ-11 Connector → For telephone lines.
* BNC Connector → For coaxial cables.
* ST, SC, LC Connectors → For Fiber optic cables.

8-connect switches to other

**Ans: -** Switches are used to connect multiple devices in a network, and sometimes you need to link switches together to expand the network.

1. Connecting Switch to a Computer

* Use a straight-through Ethernet cable (Cat5e/Cat6).
* Plug one end into the switch port (RJ-45) and the other into the computer’s Ethernet port (RJ-45).
* The switch automatically communicates with the computer and assigns network traffic.

2. Connecting Switch to a Router

* Use a straight-through cable.
* Connect one end to the switch port and the other to the router’s LAN port.
* This allows all devices on the switch to access the Internet through the router.

3. Connecting Switch to Another Switch

There are two methods:

a) Using a Straight-through Cable (Modern Switches)

* Modern switches have Auto MDI/MDI-X; they can detect cable type automatically.
* Plug one end into port of Switch 1 and the other into port of Switch 2.
* Network expands, and devices on both switches can communicate.

b) Using a Crossover Cable (Older Switches)

* Older switches require a crossover cable to connect switch-to-switch.
* This cable swaps the transmit and receive wires so the switches can communicate.

4. Connecting Switch to a Hub

* Use a straight-through cable.
* Connect one end to the switch port and the other to the hub port.
* Hub acts as an extension of the network, but traffic may increase since hubs broadcast data to all devices.

5. Connecting Switch to a Wireless Access Point (AP)

* Use a straight-through cable.
* Connect the switch to the Ethernet port of the AP.
* Devices can then connect to the network wirelessly through the AP.

9-Define Network devices and hosts

**Ans: -** Network devices are hardware components that help connect, manage, and control data communication between computers and other devices in a network.

Purpose:

* To connect multiple devices in a network.
* To direct or control data flow.
* To provide security and access control.

Examples of Network Devices:

* Router → Connects different networks (LAN to Internet)
* Switch → Connects devices within a network
* Hub → Connects multiple devices (broadcasts data)
* Modem → Connects a network to the Internet
* Access Point (AP) → Provides wireless network access

2. Hosts

Definition:  
A host is any device that uses the network to send, receive, or access data.

Purpose:

* To communicate with other devices in the network.
* To access network resources like files, printers, or the Internet.

Examples of Hosts:

* Computers / Laptops
* Smartphones / Tablets
* Printers
* Servers