Module -7: Network fundamental

1. which of the following messages in the DHCP process are broadcasted?

Ans. A. Request

C. Discover

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

Ans. B. permit TCP any any EQ 80

3.Explain Network Topologies.

Ans: Network topology is the arrangement of the elements of a communication network. Network topology can be used to define or describe the arrangement of various types of telecommunication networks, including command and control radio networks, industrial and computer networks.

Types of Network topology:

Bus topology.

Ring topology.

Star topology.

Tree topology.

Mesh topology.

Hybrid topology.

4-Explain TCP/IP Networking Model.

Ans: The TCP/IP networking model, also known as the Internet Protocol Suite, is a framework that governs how data is transmitted over networks.

1.application layer:

This is top layer that provides network services directly to user applications. Facilitates end-user services like web browsing ,email ,file transfer etc.

2.transport layer:

Responsible for providing reliable or unreliable delivery of data between applications. Segments data into packets, ensures error recovery, and controls flow.

3.internet layer:

Manages addressing and routing of packets across the network. Handles packet forwarding and addressing so that data can reach the correct destination.

4.link layer:

The lowest layer, responsible for the physical transmission of data over the network. Defines how data is physically sent over a network medium and includes protocols for managing hardware interfaces.

5-Explain LAN and WAN Network

Ans:

LAN (local area network):

A LAN is a network that connects computers and devices within a limited geographic area, such as a home, school, or office building. The primary characteristic of a LAN is its restricted scope, typically covering distances of up to a few kilometres . This limitation allows for high data transfer rates, often ranging from 100 Mbps.

WAN (wide area network):

a WAN connects networks over much larger distances, often spanning cities, countries, or even continents. This broad geographic coverage is one of the defining features of WANs, which can extend thousands of kilometres . While WANs facilitate long-distance communication, they generally experience lower data transfer rates compared to LANs.

6. Explain Operation of Switch

Ans:

1.Frame Reception: when a device sends data (in the form of frames), the switch receives this data on one of its ports.

2. MAC Address Learning: Each device on the network has a unique Media Access Control (MAC) address. The switch reads the source MAC address of the incoming frame and records it in its MAC address table, associating it with the port from which it came.

3.Forwarding Decision: The switch then checks the destination MAC address of the frame:

If the MAC address is found in its table, the switch forwards the frame only to the corresponding port, reducing unnecessary traffic.

If the MAC address is not found, the switch will broadcast the frame to all other ports (except the one it received it from) to locate the device.

4.Frame Transmission: The switch transmits the frame out of the appropriate port(s), ensuring the intended device receives the data.

7. Describe the purpose and functions of various network devices

Ans:

1. Repeater : A repeater operates at the physical layer. Its job is to amplifies the signal over the same network before the signal becomes too weak or corrupted to extend the length to which the signal can be transmitted over the same network. When the signal becomes weak, they copy it bit by bit and regenerate it at its star topology connectors connecting following the original strength.

2. Hub : A hub is a basically multi-port repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects

different stations. Hubs cannot filter data, so data packets are sent to all connected devices.

3. Bridge : A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of the source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

4. Switch : A switch is a multiport bridge with a buffer and a design that can boost its efficiency and performance. A switch is a data link layer device. The switch can perform error checking before forwarding data, which makes it very efficient as it does not forward packets that have errors and forward good packets selectively to the correct port only.

5. Routers : A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs and have a dynamically updating routing table based on which they make decisions on routing the data packets. The router divides the broadcast domains of hosts connected through it.

6. Gateway : A gateway, as the name suggests, is a passage to connect two networks that may work upon different networking models. They work as messenger agents that take data from one system, interpret it, and transfer it to another system. Gateways are also called protocol converters and can operate at any network

layer. Gateways are generally more complex than switches or routers.

8. NIC : NIC or network interface card is a network adapter that is used to connect the computer to the network. It is installed in the computer to establish a LAN. It has a unique id that is written on the chip, and it has a connector to connect the cable to it. The cable acts as an interface between the computer and the router or modem. NIC card is a layer 2 device which means that it works on both the physical and data link layers of the network model.

8. Make list of the appropriate media, cables, ports, and connectors

Ans:

Here's a list of various network media, cables, ports, and connectors commonly used in networking:

Media Types:

1. Copper Cable

- Twisted Pair Cable
    - Unshielded Twisted Pair (UTP)
    - Shielded Twisted Pair (STP)
    - Coaxial Cable

2. Fiber Optic Cable

    - Single-mode Fiber (SMF)
    - Multi-mode Fiber (MMF)

3. Wireless Media

- Radio Waves (Wi-Fi)
- Infrared

Cables:

1. Ethernet Cables

- Category 5 (Cat 5)
- Category 5e (Cat 5e)
- Category 6 (Cat 6)
- Category 6a (Cat 6a)
- Category 7 (Cat 7)

2. Coaxial Cable

- RG-6
- RG-59

3. Fiber Optic Cables

- SC (Subscriber Connector)
- LC (Lucent Connector)
- ST (Straight Tip)

Ports:

1. Ethernet Ports

- RJ-45 (for wired connections)

2. Fiber Optic Ports

- SC Port
- LC Port
- ST Port

3. Coaxial Ports:

- F-Type Connector (used in coaxial cable)

4. USB Ports

- USB-A
- USB-C
- Micro USB

5. Serial Ports:

- RS-232
- DB9

6. HDMI Ports

- HDMI (for video and audio transmission)

Connectors:

1. RJ-45 Connector
   - Used for Ethernet cables (twisted pair)
2. RJ-11 Connector
   - Used for telephone lines (twisted pair)
3. F-Type Connector
   - Used for coaxial cable connections
4. **SC Connector**
   - Used for single-mode and multi-mode fiber optics
5. **LC Connector**
   - Used for single-mode and multi-mode fiber optics, smaller than SC
6. **USB Connectors**
   - USB-A, USB-B, USB-C, Micro USB for various devices

9. connect switches to other.

1. Choose the Right Cables:

Use Ethernet cables (usually Cat 5e, Cat 6, or higher) for connections between switches.

For long distances, consider using fiber optic cables if the switches support fiber ports.

2. Identify the Ports:

Locate the uplink ports on each switch. Many switches have designated uplink ports, but you can often use any standard Ethernet port.

3. Connect the Switches:

Plug one end of the Ethernet cable into the uplink port of the first switch and the other end into the uplink port of the second switch.

If you're connecting multiple switches, you can daisy-chain them by connecting additional switches to the remaining ports.

4. Configure the Switches (if necessary):

For managed switches, you may need to configure VLANs or trunking settings to ensure proper data flow between switches.

Use the management interface (web-based or command-line) to set any required parameters.

5. Verify Connectivity:

After connecting, check the link lights on the switches to ensure they are connected and operational.

Test connectivity by connecting devices to the switches and ensuring they can communicate across the network.

10. Define Network devices and hosts.

Ans:

Network Devices:

Definition: Network devices are hardware components that facilitate communication, connectivity, and data transfer within a network. They help manage, direct, and enhance data flow between various devices and networks.

Examples of Network Devices:

1. Router : Connects different networks and routes data between them.
2. Switch : Connects devices within the same network, forwarding data based on MAC addresses.
3. Hub : A basic device that connects multiple Ethernet devices, broadcasting data to all ports.
4. Access Point : Extends a wired network by allowing wireless devices to connect.
5. Modem : Modulates and demodulates signals for internet connectivity.
6. Firewall : Monitors and controls incoming and outgoing network traffic for security.
7. Bridge : Connects and filters traffic between two or more network segments.

Hosts:

Definition : Hosts are devices that connect to a network and can send, receive, or process data. They typically have

unique IP addresses and can include various types of hardware.

Examples of Hosts ：

1. Computers ：Desktops and laptops that access network resources.
2. Servers ：Machines that provide services, resources, or data to other devices on the network.
3. Smartphones ：Mobile devices that connect to the network for communication and internet access.
4. Printers ：Networked printers that receive print jobs from connected devices.
5. IoT Devices ：Internet of Things devices like smart thermostats, security cameras, and smart home appliances.

In summary, network devices manage and facilitate communication within and between networks, while hosts are the end-user devices that utilize these networks to send and receive data.