EXPERIMENT NO: 01

Title: To study various networking hardware components.

Theory:

The networking hardware components of a computer network include various software & hardware devices and media that enable connectivity and data exchange between devices. The server, client, peer, transmission media, and connecting devices make up the hardware components. The operating system and protocols are examples of software components. A computer network is made up of several computers connected so that resources and data can be shared.

- **Types of hardware Components**

A computer network consists of several hardware components. In other words, two or more devices are connected via a computer network to exchange an almost infinite amount of data and services. Here Below are some hardware components of computer Networks:

1. NIC(Network Interface Card)

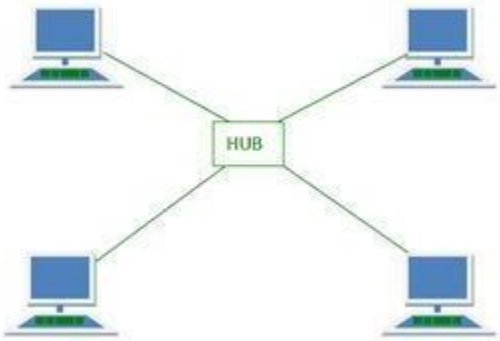
NIC or Network Interface Card is a network adapter used to connect the computer to the network. It is installed in the computer to establish a LAN. It has a unique ID that is written on the chip, and it has a connector to connect the cable to it. The cable acts as an interface between the computer and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

- **Types of NIC**

- **Wired NIC:** Cables and Connectors use Wired NIC to transfer data.
- **Wireless NIC:** These connect to a wireless network such as Wifi, Bluetooth, etc.

2. HUB

A hub is a 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. In other words, the collision domain of all hosts connected through hub remains one. Hub does not have any routing table to store the data of ports and map destination addresses., the routing table is used to send/broadcast information across all the ports.



HUB

Types of HUB

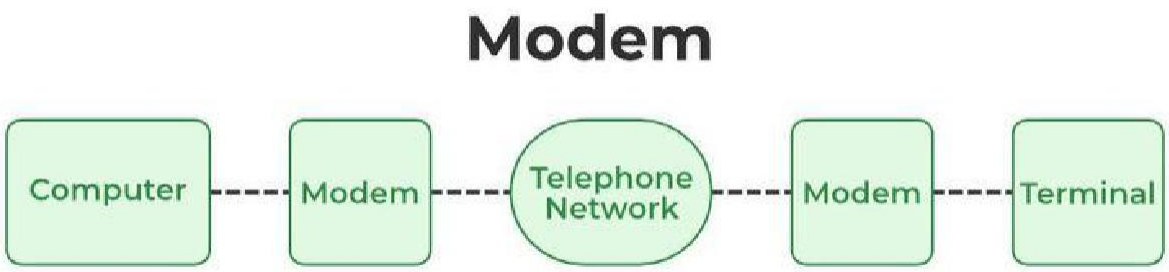
- **Active HUB:** Active HUB regenerates and amplifies the electric signal before sending them to all connected device. This hub is suitable to transmit data for long distance connections over the network.
- **Passive HUB:** As the name suggests it does not amplify or regenerate electric signal, it is the simplest types of Hub among all and it is not suitable for long-distnace connections.
- **Switching HUB:** This is also known as intelligent HUB, they provide some additional functionality over active and passive hubs. They analyze data packets and make decisions based on MAC address and they are operated on DLL(Data Link Layer).

3. Router

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.

4. Modem

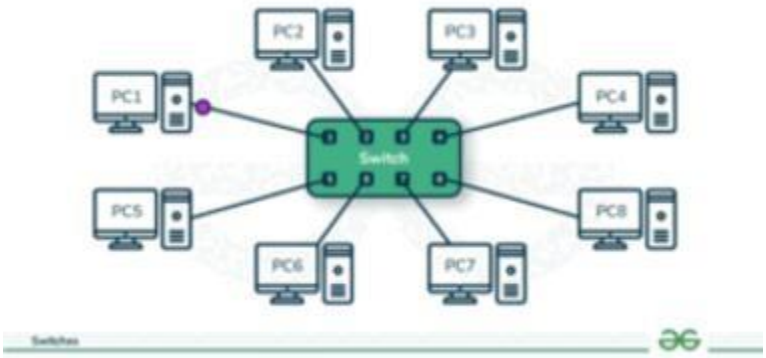
A Modem is a short form of Modulator/Demodulator. The Modem is a hardware component/device that can connect computers and other devices such as routers and switches to the internet. Modems convert or modulate the analog signals coming from telephone wire into a digital form that is in the form of 0s and 1s.



Modem

5. Switch

A Switch is a multiport bridge with a buffer and a design that can boost its efficiency(a large number of ports implies less traffic) 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.



Switches

6. Nodes

Node is a term used to refer to any computing devices such as computers that send and receive network packets across the network.

Types of nodes

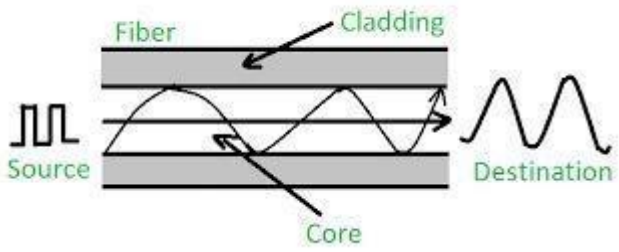
- **End Nodes:** These types of nodes are going to be the starting point or the end point of communication. E.g., computers, security cameras, network printers, etc.
- **Intermediary Nodes:** These nodes are going to be in between the starting point or end point of the end nodes. E.g., Switches, Bridges, Routers, cell towers, etc.

7. Media

It is also known as Link which is going to carry data from one side to another side. This link can be Wired Medium (Guided Medium) and Wireless Medium (Unguided Medium). It is of two types:

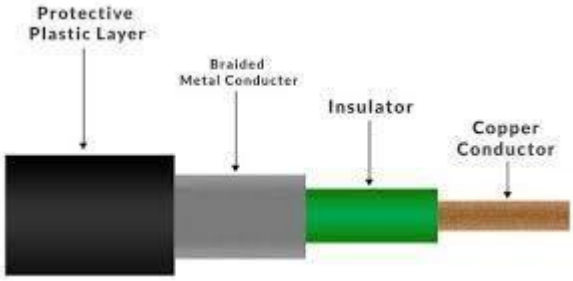
7.1 Wired Medium

- **Ethernet:** Ethernet is the most widely used LAN technology, which is defined under IEEE standards 802.3. There are two types of Ethernet:
- **Fibre Optic Cable:** In fibre optic cable data is transferred in the form of light waves.



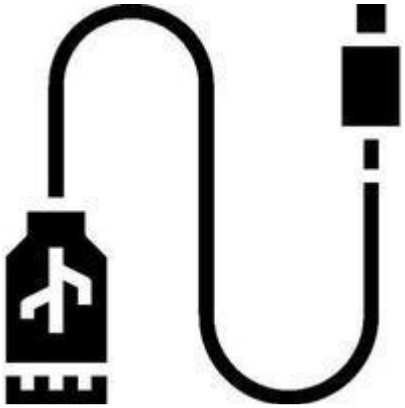
Fibre Optic Cable

- **Coaxial Cable:** Coaxial Cable is mainly used for audio and video communications.



Coaxial Cable

- **USB Cable:** USB Stands for Universal Serial Bus it is mainly used to connect PCs and smartphones.



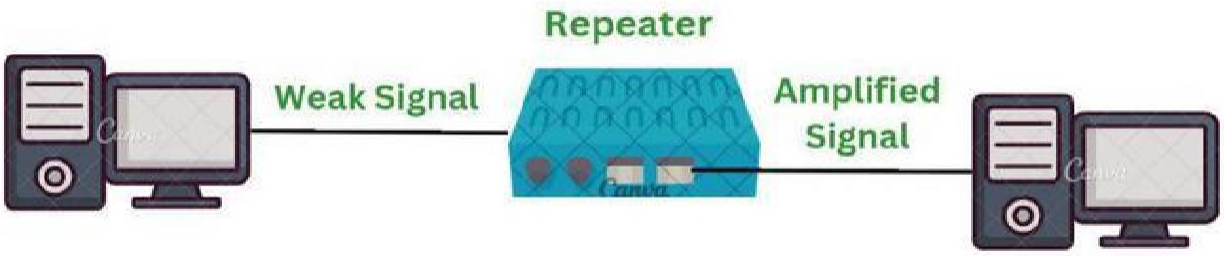
USB

7.2 Wireless Medium

- Infrared (E.g. short-range communication – TV remote control).
- Radio (E.g. Bluetooth, Wi-Fi).
- Microwaves (E.g. Cellular system).
- Satellite (E.g. Long range communications – GPS).

8. Repeater

Repeater is an important component of computer networks as it is used to regenerate and amplify signal in the computer networks. Repeaters are used to improve the quality of the networks and they are operated on the Physical Layer of the OSI Model.



Repeater

9. Server

A server is a computer program that provides various functionality to another computer program. The server plays a vital role in facilitating communication, data storage, etc. Servers have more data storage as compared to normal computers. They are designed for the specific purpose of handling multiple requests from clients.

Servers

CONCLUSION:

Assessment Scheme:

Performance (08-M)	Record (07-M)	Total (15-M)	Signature of Faculty