

## Networking Notes – 2

Network Devices: We understand what networking is and what are the different types of media used to connect devices. But for a network to exist and work properly, we need several hardware devices that perform distinct functions.

**Definition:** Network devices are physical devices that enable communication and interaction between hardware on a computer network.

Various Networking devices are used to establish and use connections between several devices and also within the computers. Some of these devices are:

1. Modem: Modem is a device that enables a computer to send or receive data over telephone or cable lines.

As the data that your computer transmits is digital and telephone lines can only transmit analog data, the modem is used to convert these digital signals into analog signals and vice versa if necessary.

It is a combination of two devices:

- a. Modulator: Converts digital data into analog data.
- b. Demodulator: Converts analog data into digital data signals.

There are three basic types of Modems:

- a. Simplex: It can transfer data in only one direction.
- b. Half Duplex: It can transfer data in both directions but only one at a time.
- c. Full Duplex: It can transfer data in both directions simultaneously.



2. **RJ45 Connector:** RJ45 is the acronym for Registered Jack 45. RJ45 connector is an 8-pin jack used by devices to physically connect to Ethernet based local area networks (LANs). The cable used for Ethernet LANs are twisted pair ones and have RJ45 connector pins at both ends. These pins go into the corresponding socket on devices and connect the device to the network.



3. **Ethernet Card:** More popularly known as Network Interface Card(NIC) is a hardware component used by computers to connect to Ethernet LAN and communicate with other devices on the LAN. Your computer has a NIC card built into it and might have a RJ45 connection port too. Most NIC cards in modern computers can also interface with wifi and Bluetooth enabled Internet connection.



4. **Wi-Fi Card:** Wi-Fi is the acronym for wireless fidelity. Wi-Fi technology is used to achieve wireless connection to any network. Wi-Fi card is a card used to connect any device to the local network wirelessly. The physical area of the network which provides internet access through Wi-Fi is called Wi-Fi hotspot. Hotspots can be set up at home, office or any public space. Hotspots themselves are connected to the network through wires.

# HUB

- Hub is a broadcast device which connects several computers together.
- It can not handle network traffic.
- Message is delivered from one computer to rest of all computers i.e. broadcasting.
- In a Hub, ports are there which are used to connect NIC of computers.



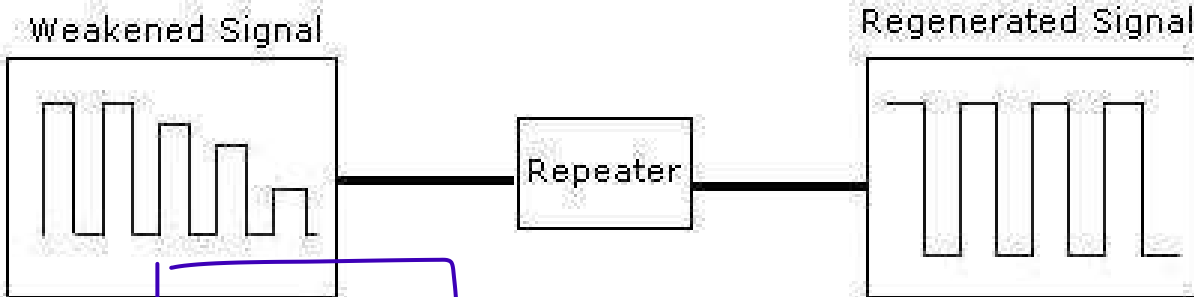
# SWITCH

- Switch is a type of Hub. It contains a filter which filters the data before sending and it is then directed to the intended node only.
- It is an intelligent Hub.
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# Repeater

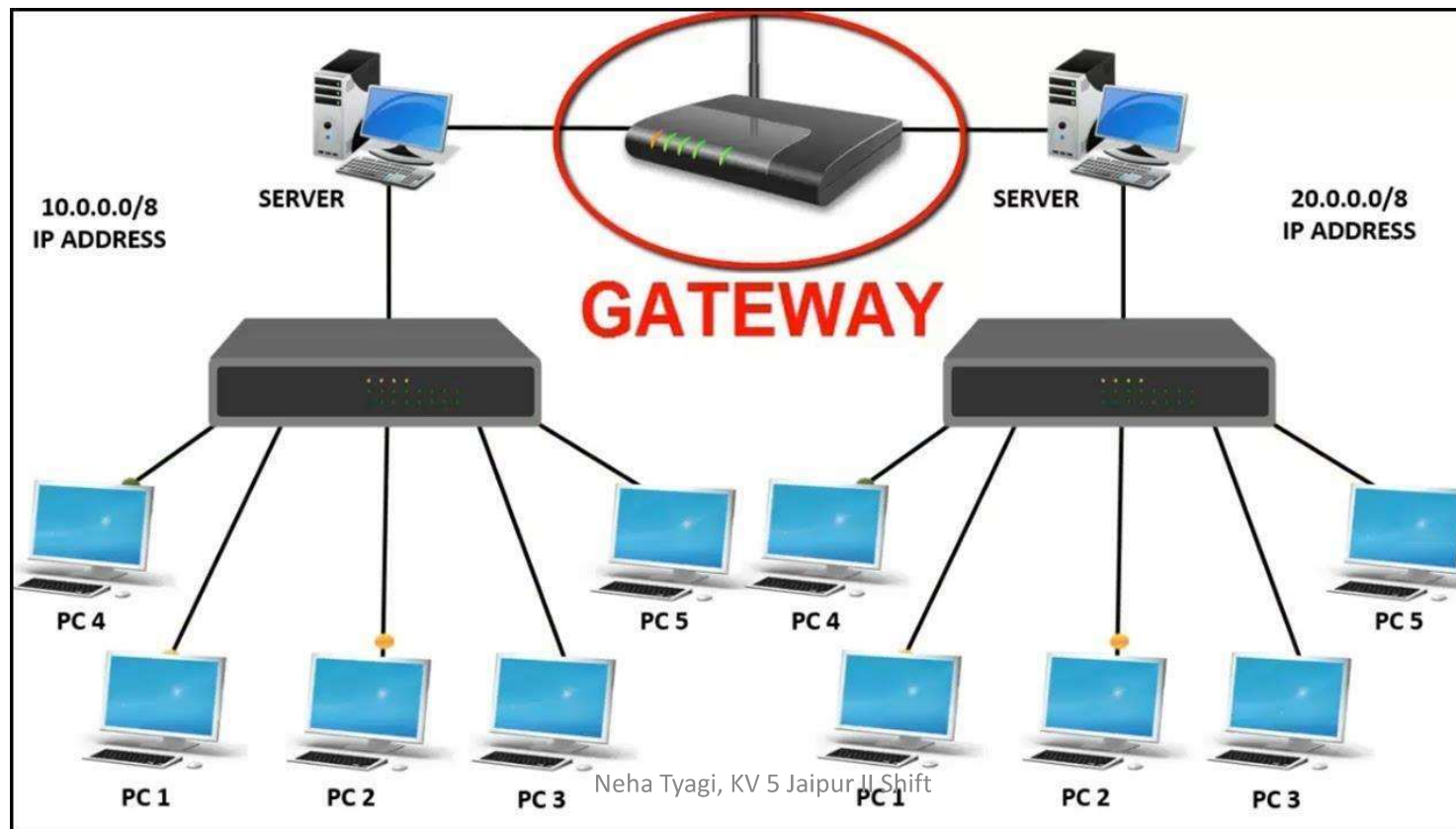
- It is a device which accepts the weak signals and amplifies the signals for further broadcasting.
- With the use of it, signal length increases.
- It is also known as amplifier.



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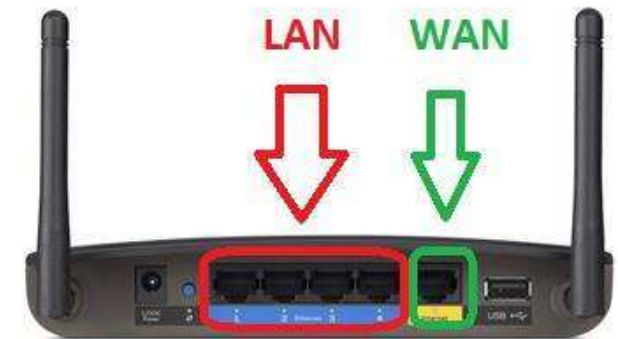
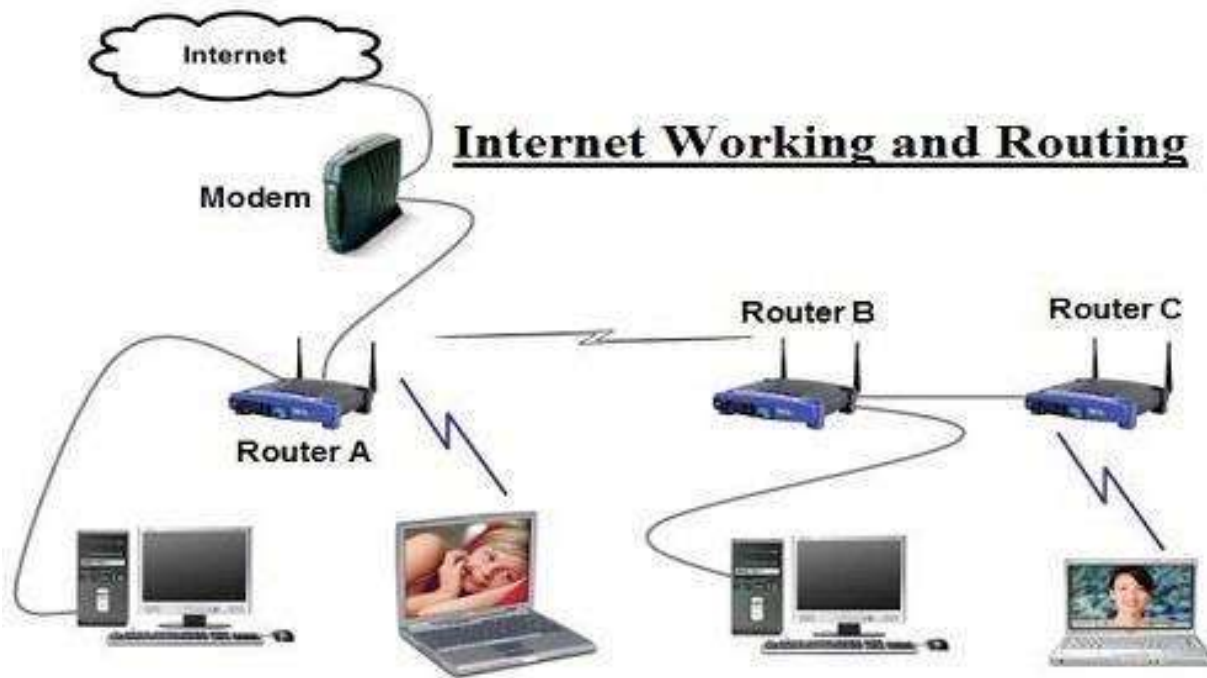
# Gateway

- On internet, when two or more networks uses different hardware and software then gateway is used to set coordination between them.
- It converts one network language into another network language so that they can communicate.



# Router

- Router is also a networking device which sent data packets from source machine to destination machine.
- It takes the shortest path for this.
- 🌀 Router, works on third layer (NETWORK LAYER) of OSI reference model.



A network exists between two or more interconnected computers and based on the spread of the connection we can classify networks into different types. They are:

- a. Local Area Network (LAN): A local area network is a collection of interconnected computers and its associated devices that are located in a close proximity.

Characteristics:

- i. It occupies a small area not more than 1-5 kms.
- ii. Usually operated or owned by a single person or organisation.
- iii. Speed of data transfer is high.

- b. Metropolitan Area Network (MAN): It is a collection of interconnected computers and its associated devices that are located at one Geographic location such as multiple office building in a city.

Characteristics:

- i. Occupies area between 5 to 50 kms.
- ii. Usually owned and operated by an organization.
- iii. It can be public.

- c. Wide Area Network (WAN): It is a collection of interconnected computers and its associated devices that are located at different Geographic location such as different cities, states or countries. It is a large computer network.

Characteristics:

- i. Covers a large area
- ii. Owned and operated by multinational organizations.
- iii. Most often it is Public.

We know computers connect to each other in a network, but they can also be fashioned into different styles according to the networks and the user's need. These different styles are termed as Network topologies (NOT A FORMAL DEFINITION).

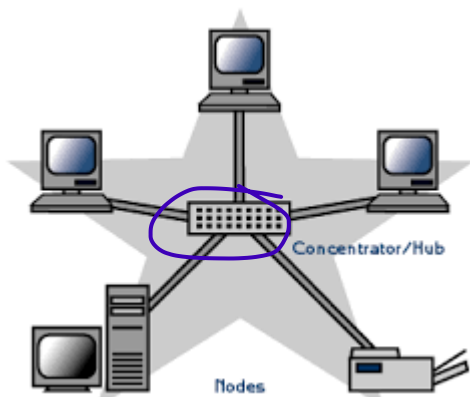
**Definition:** A Network Topology is the arrangement with which computer systems or network devices are connected to each other.

There are mainly five types of topologies: Star, Bus, Ring, Tree and Mesh Topology. But in accordance with your syllabus we will discuss only three among them.



## Types of Topologies:

1. **Star Topology:** In a star topology, each device on the network is connected to a central hub. The hub acts as a gateway, providing a single point of connection for all devices on the network.

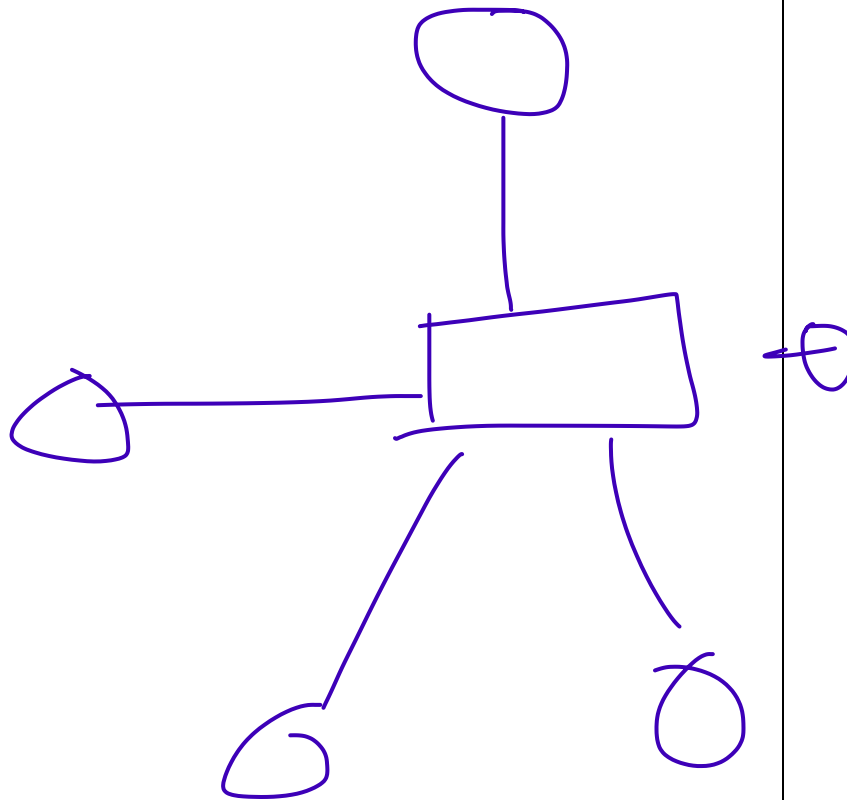


### Advantages of Star Topology

- It is less expensive.
- Easy to install and update
- Easy troubleshooting
- Robust network
- Easy to add new node

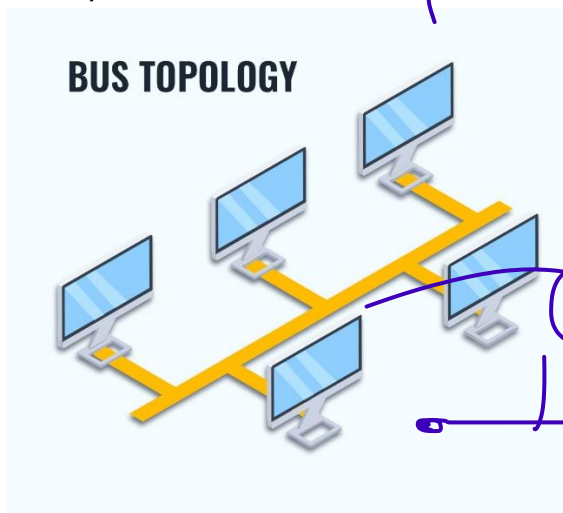
### Disadvantages of Star Topology

- If central device (hub/switch) fails, entire network goes down.
- Performance of entire network depends upon central device.
- Needs long cable to connect each node to central device.



Cable / Wife

2. Bus Topology: In a bus topology, every computer is connected to a common bus. The bus is a single cable that carries data from one computer to another. If one computer wants to send data to another computer, it sends the data on the bus. All computers on the bus can see the data, but only the intended recipient will accept it.

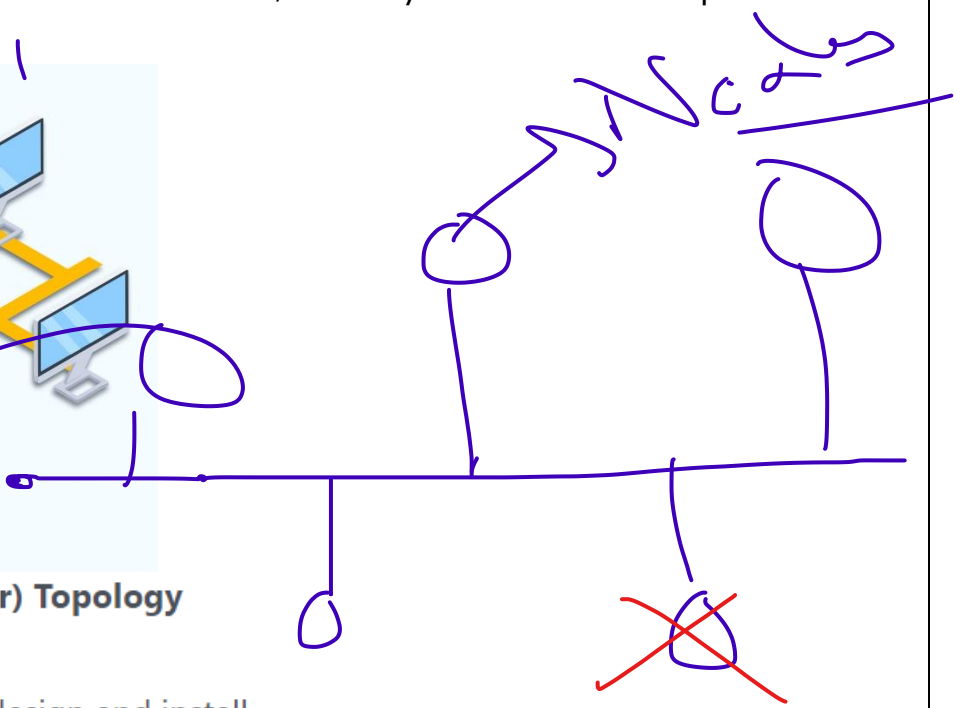


#### Advantages of Bus (linear) Topology

- It is very simple to design and install.
- less cabling is required as compared to other topologies.
- Best suited for small network (LAN).
- Very cost effective.
- easily expandable.

#### Disadvantages of Bus (linear) Topology

- Not suitable for large network.
- If cable (backbone) is failed, entire network goes down.
- though its design is simple, it is difficult to diagnose the fault.
- data loss is high
- slow network



3. Ring Topology: In a ring topology, every node is connected to two other nodes, forming a loop. Data flows from one node to the next in a continuous sequence i.e. information sent by a node transmits from one node to another node until it reaches to destination node.



### **Advantages of Ring (Circular) Topology**

- No need of Server control for data transmission.
- Data collision rate is very low as data travels unidirectionally.
- Easy maintenance and troubleshooting
- High Speed Communication Network.
- Each node has equal access to resources

### **Disadvantages of Ring (Circular) Topology**

- Failure of any node may cause entire network down.
- Less secured network
- Slower than star topology
- Expensive network as it uses expensive components to establish the network.