

CHAPTER NO-2

NETWORKING FUNDAMENTALS

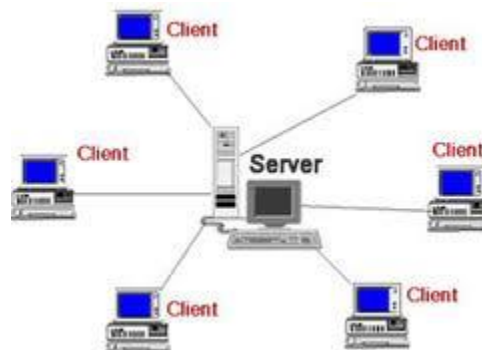
NETWORK ARCHITECTURE:--Network Architecture is an overall design of a computer hardware and their functional organization and configuration. It is of two types:--

1. Peer- To-Peer networking
2. Client –Server networking

1. **PEER-TO-PEER-NETWORKING**:--Peer means equal and therefore in a peer-to-peer network, each computer or node is equal to other computers in terms of the resources that it can access and share. It treats all devices as having equivalent capability.



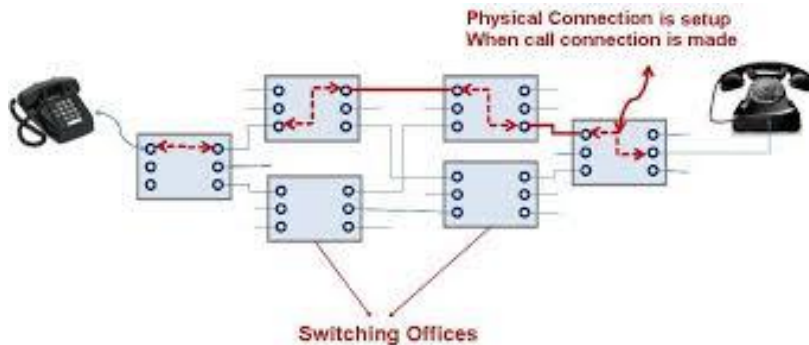
2. **CLIENT-SERVER NETWORKING**:--In a client-server network, there is a powerful central computer which has more resources than the other computers connected to the network. This central computer is known as the SERVER and the other computers are known as clients or Nodes or Workstations. The server is responsible for providing all the information and resources to the clients as per their request.



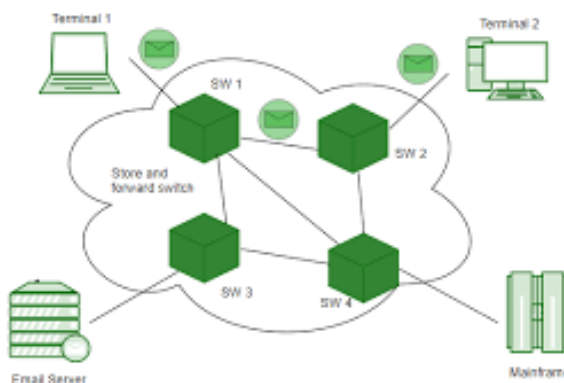
[Write the difference between peer-to-peer and client-server networks.]

SWITCHING TECHNIQUE:--In large networks ,there can be multiple paths linking the sender and receiver. Information may be switched as it travels through various channels in a digital traffic. **Switching** involves sending data along routes so that it can be sent from the sender to the receiver. There are three types of switching techniques employed in Data Communication Networking:--

1. **Circuit Switching:**-- It is a switching technique in which data travels along a dedicated communication path between a source and a destination. The resources along the path are reserved for that circuit for the duration of the connection.



2. **Message switching:**--In message switching, the message is sent from the sender to the receiver through a series of nodes. Each node receives the message ,stores it on the disc, and then transmits the message to the next node.This type of message is called storage-and-forward network.



3. **Packet switching:**--In packet switching ,the message is broken into a series of packets. Each of these packets has a header which contain information about the destinationas well as reassembly instructions. The TCP/IP protocol uses packet switching techniques to transfer message through Internet.

Difference between Circuit Switching and Packet Switching

CIRCUIT SWITCHING	PACKET SWITCHING
In circuit switching there are 3 phases: i) Connection Establishment. ii) Data Transfer. iii) Connection Released	In Packet switching directly data transfer takes place .
In circuit switching, each data unit know the entire path address which is provided by the source.	In Packet switching, each data unit just know the final destination address intermediate path is decided by the routers.
Circuit switching is more reliable.	Packet switching is less reliable.
It is not a store and forward technique.	It is a store and forward technique.

NETWORK COMPONENTS:-

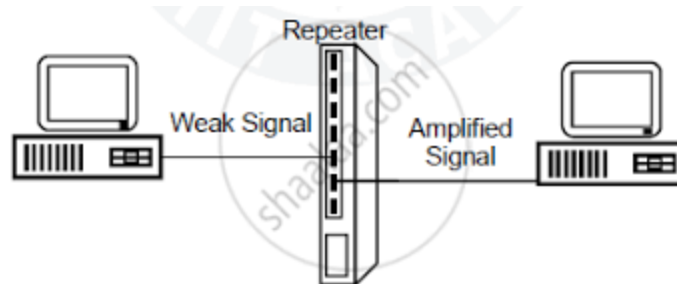
1.SWITCH:--A network switch is a device ,which connects different computers and devices on a computer network. A switch receives data, process it and then forwards it only to the destination device.It uses packets switching technique to transfer data on the network.

NETGEAR 5 Port Network Switch



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2. REPEATER:-- Repeaters are used in transmission systems to regenerate analog or digital signals distorted by transmission loss. The primary **advantage** of using a wireless **repeater** is that it can improve wireless signal strength without having to move a computer or router.This is required at times when the network signal is weakened or distorted over a long distance.This happens if the network passes through an area having strong electromagnetic fields.



Functioning of a Repeater

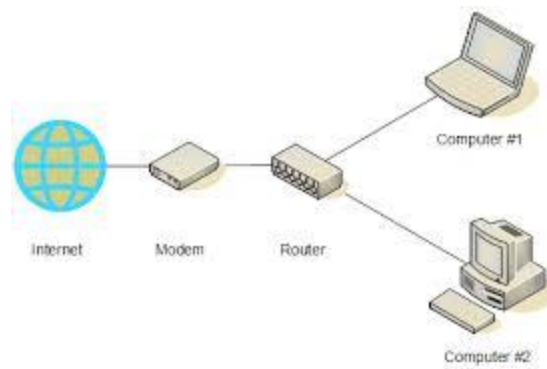
HUBS:- A hub is a networking device which is similar to a switch. But unlike a switch which transmits the information to a particular device, a hub transmits the received information to all devices that are connected to it. That is why hubs are known as Dumb Switches. It is cheaper than the switches.



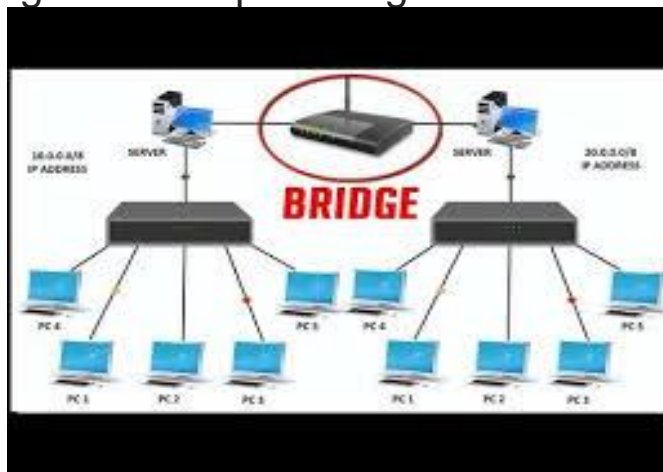
Hub



ROUTER:-- A **router** is a **networking** device that forwards data packets between **computer networks**. **Routers** perform the traffic directing functions on the Internet. A **router** is a physical or virtual appliance that passes information between two or more packet-switched computer networks. A **router** inspects a given data packet's destination Internet Protocol address (IP address), calculates the best way for it to reach its destination and then forwards it accordingly.



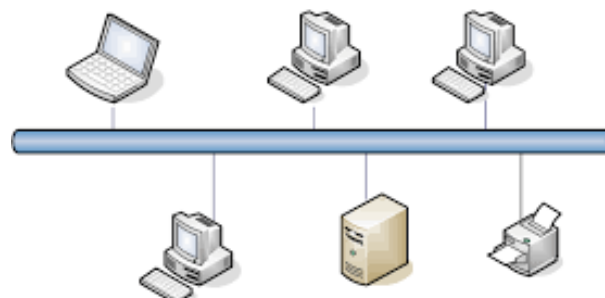
BRIDGE:-- A bridge is a device that connects and passes packets between two networks segments that use the same communication protocols. A **bridge** is a type of computer **network** device that provides interconnection with other **bridge networks** that **use** the same protocol. **Bridge** devices work at the data link layer of the Open System Interconnect (OSI) model, connecting two different **networks** together and providing communication between them.



NETWORK TOPOLOGIES

1. **BUS TOPOLOGY**:-- **Bus topology** uses **one** main cable to which all nodes are directly connected. The main cable acts as a backbone for the **network**. **One** of the **computers** in the **network** typically acts as the **computer** server. The first advantage of **bus topology** is that it is easy to connect a **computer** or peripheral device. **Bus topology** is **used** for: Small workgroup local area networks (LANs) whose computers are connected using a thinnet cable.

BUS Topology



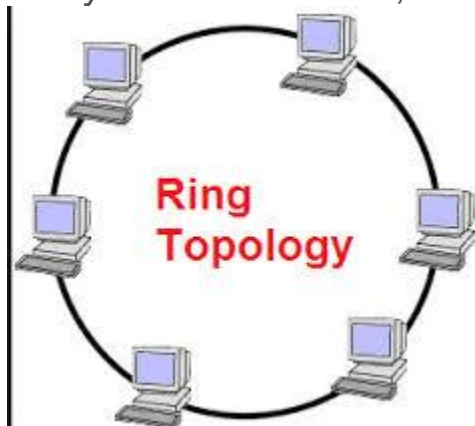
2. **STAR TOPOLOGY**:-- In **star topology** each device in the **network** is connected to a central device called hub. ... If **one** device wants to send data to other device, it has to first send the data to hub and then the hub transmit that

data to the designated device. A **star** takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down.

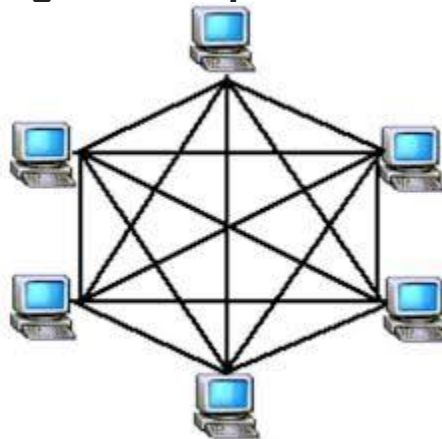
Star Topology



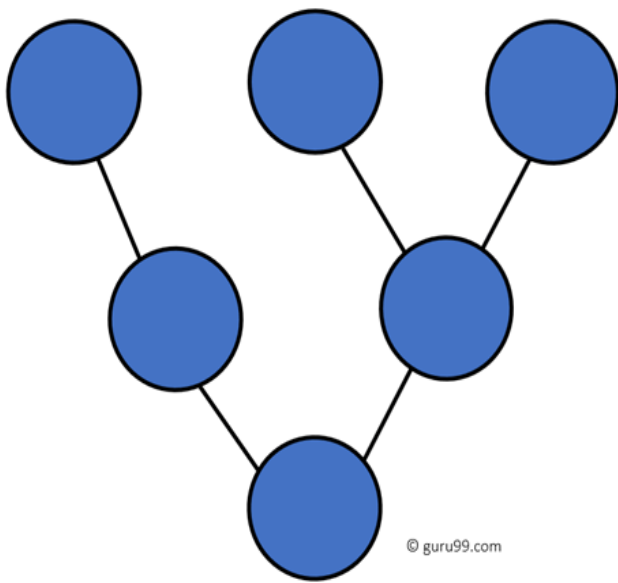
3. **RING TOPOLOGY**:-- A **ring topology** is a **network** configuration in which device connections create a circular data path. Each networked device is connected to two others, like points on a circle. ... Most **ring topologies** allow packets to travel only in one direction, called a unidirectional **ring network**



4. **MESH TOPOLOGY**:-- A **network** setup where each **computer** and **network** device is interconnected with one another, allowing for most transmissions to be distributed even if one of the connections go down. It is a **topology** commonly used for wireless **networks**. **The overall cost of this network is extremely high as compared to other network topologies.**

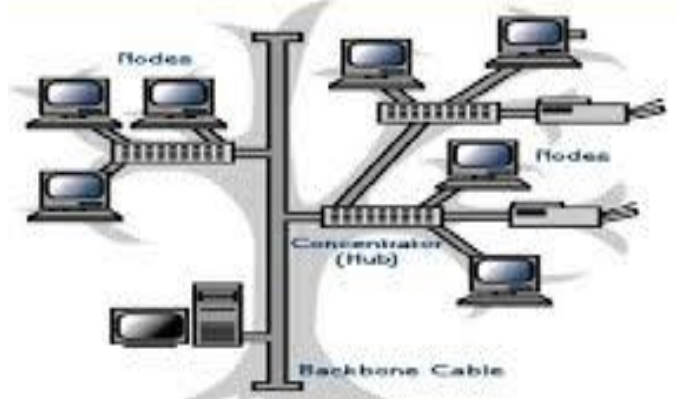


5. **TREE TOPOLOGY**:-- A **tree network**, or star-bus **network**, is a hybrid **network topology** in which star **networks** are interconnected via bus **networks**. **Tree networks** are hierarchical, and each node can have an arbitrary number of child nodes. Tree topologies have a root node, and all other nodes are connected which form a hierarchy. So it is also known as hierarchical topology. This topology integrates various star topologies together in a single bus, so it is known as a Star Bus topology. Tree topology is a very common network which is similar to a bus and star topology.

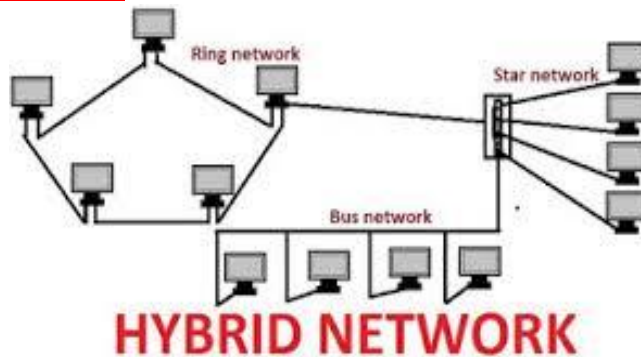


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TREE TOPOLOGY



6. **HYBRID TOPOLOGY**:-- Hybrid topology combines two or more topologies.



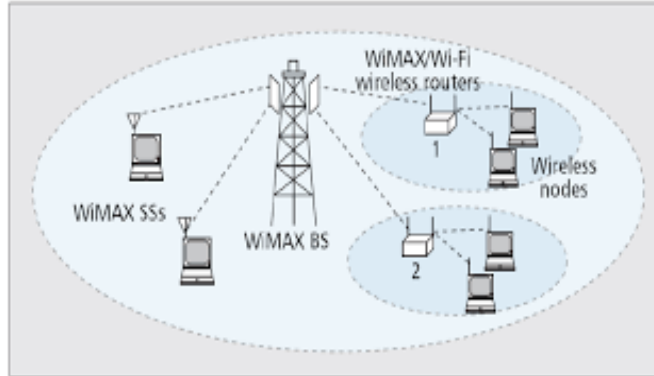
SOME IMPORTANT TERMS:--

1. **Wi-Fi**:-- **Wi-Fi** stands for **Wireless Fidelity**. It is a technology for **wireless** local area **networking** with devices based on IEEE 802.11 standards. **Wi-Fi** compatible devices can connect to the internet via **WLAN network** and a **wireless** access point abbreviated as AP. it uses radio frequencies to send signals between devices. ... And to receive the information found in these waves, your radio receiver needs to be set to receive waves of a certain frequency.



2. **WiMAX**:-- **WiMax** stands for **Wireless Inter-operability for Microwave Access**. This technology is based on IEEE 802.16. It is used to provide higher data rates with increased coverage. It is based on **MAN (Metropolitan Area Network)** technology. The system has two main components: A **WiMax** tower and

a **WiMax** receiver. Like Wi-Fi, **WiMax** can connect directly to the Internet by sending a signal from a **WiMax** tower to a **WiMax**-enabled computer via a wired connection. ... In other words, **WiMax** turns many small, scattered hot spots into one huge wireless hot spot.



[NOTE:- **IEEE 802.11** is part of the **IEEE 802** set of local area **network** (LAN) protocols, and specifies the set of media access control (MAC) and physical layer (PHY) protocols for implementing wireless local area **network** (WLAN) Wi-Fi **computer** communication in various frequencies, In basic terms, **802.11n** is faster than **802.11g**, which itself is faster than the earlier **802.11b**. On the company website, Apple explains that **802.11n** offers "greater performance, more range, and improved reliability"]

[END]