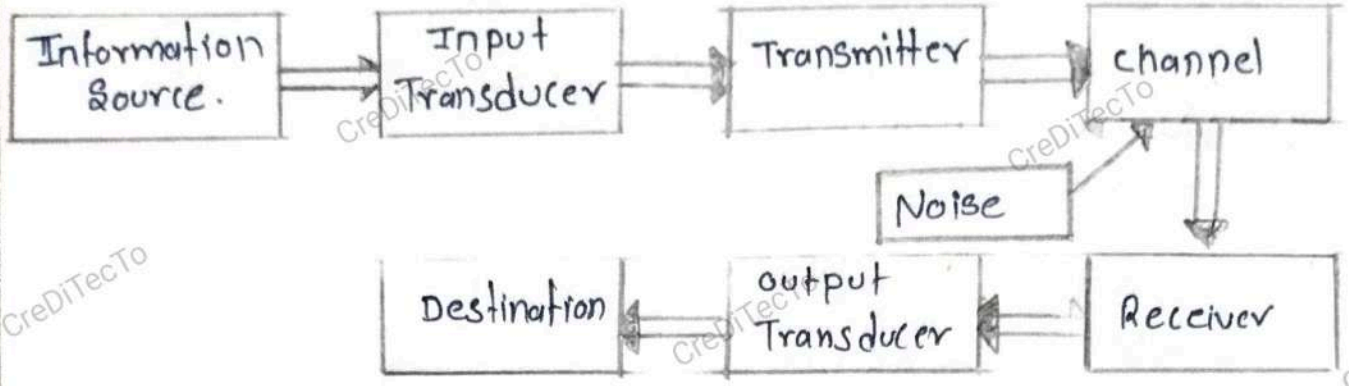
V. Important

BLOCK DIAGRAM OF COMMUNICATION SYSTEM



(a) Information Source: Information source is the place or device which generates the information, message which needs to transmitted.

(b) Input Transducer: It is an important device which converts one of signals into digital form (0 and 1).

(c) Transmitter: Transmitter is responsible for transmitting and processing the electronic signals through the communication chanel.

(d) CHANNEL: Chanel is the transmission medium through data signals or information passes from source to destination.

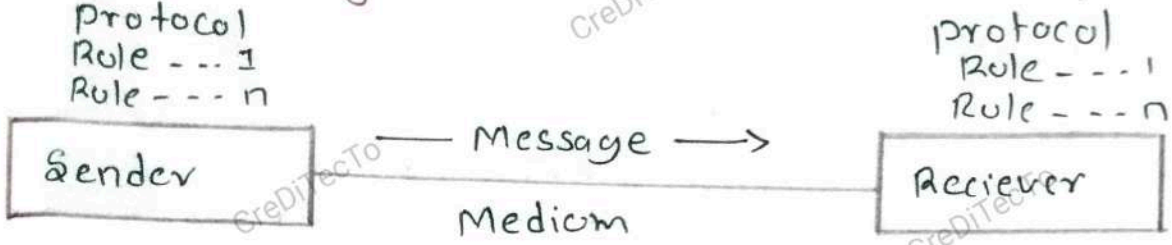
(e) Noise: Those unwanted signal tend to interfere with the information is called Noise.

(f) Receiver: Receiver is used to receive the signals from the channel and send them to output transducer.

(g) Output Transducer: It is an important device which convert digital signals into analog (audio, video, text)

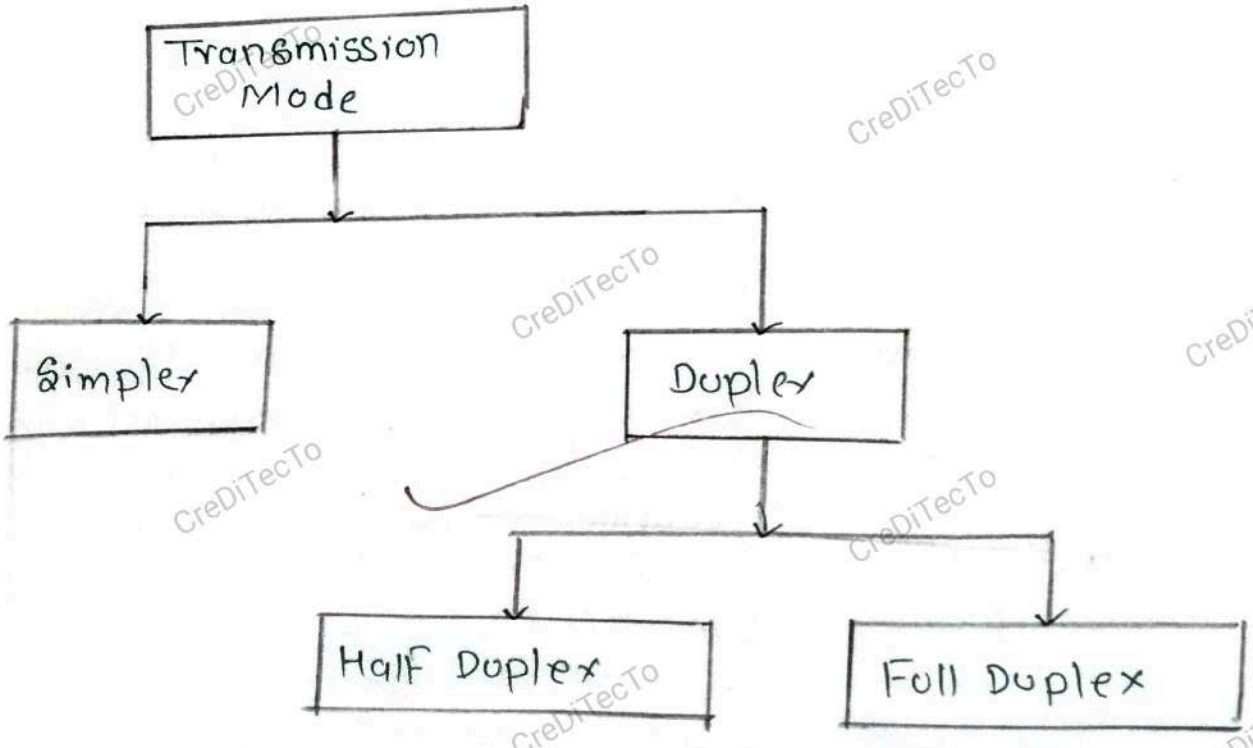
(h) Destination: Destination is the place or device where the data/information needs to be transfered.

Draw block diagram of data communication system #.

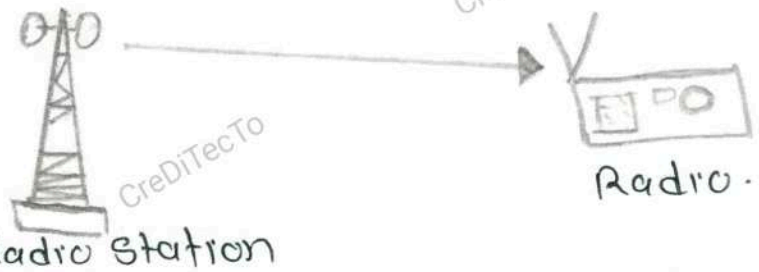


- Message : This is the information that needs to be transimitted. It can take various forms, such as text number, images etc.
- Sender : The Sender is the device that Sends the message. It can be a computer, workstation, telephone handset, video camera etc.
- Reciever : The receiver is the device that receives the message It can be a computer, workstation, television, etc.
- Medium : The medium is the physical path by which the message travels from Sender to Reciever. Example of medium are fiber-optic cable, radio waves etc.
- protocol : Protocols are a set of roles and conventions that govern the format and timing of data transmission. protocols ensures that data is transimitted and received in a standarized and organized manner. protocol can handel error detection and correction, Flow control, addressing and other communication-related tasks

Communication Mode / transmission mode



* Simplex communicatron mode *

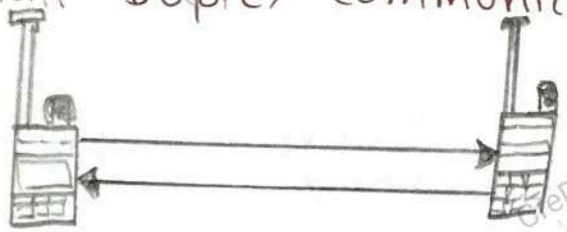


Radio Station

Radio.

Simplex communication is a unidirectional mode of data transmission, where information flows in only one direction, tipically from a sender to a receiver. In Simplex mode there is no feedback or data exchange in the reverse direction. Example radio station and radio, TV, etc.

* Half Duplex communicatron mode *.



Walkie-talkie

walkie-talkie.

Half-duplex communicatron is a mode of transimissron in which information can flow in two-directrons, but not simultaneously In half-duplex system bothe devices transimits and receive data but one at a time. In half duplex system one person transimits data/info and other receves and waits tpto Channel is clear and transimits data back. Example Walkie-talkie.

Full Duplex communicatron mode #.

Mobilephone

mobile phone.

Full duplex communicatron is a mode of data transmissron in which information can flow in two-directrons simultaneously In full-duplex communicatron both devices or partres can transmits and receive data at the same time, allowing for real time bidirectional communicatron. In fullduplex system the data collision chances are very low. Example of full duplex system. Mobile phones, Internet etc.

CHAPTER 2

Describe computer Networks with Advantages and disadvantages.

=> The collection of two or more computers which are interconnected togther For Sharing resources with the help of transmission medra and set of ~~products~~ protocols is called computer network.

The concept of connected computer, Sharing resources is called Network.

[Advantages]

(i) Sharing resources : hardware resources such as processor, Storage devices, prienter, Scanner etc can be Shared among us using computer network. It helps to minimize the operational cost of an organization.

(ii) Faster and Cheaper communication : Communication in modern days has become very Faster and cheaper to send information to a Long distance through network.

(iii) Centrilized Control: All network resources such as computer, printer file, database of all individual can be managed and controlledy by Central Connecting computer also known as the Server.

(iv) Backup and Recover: Server is used to keep data as backup. It maintains backup of all individual computers network.

(v) Remote and Mobile access : A remote user can access resources from the distance using computer Network.

[Disadvantages]

(i) Expensive : In order to install Computer Network, we require Some cost to purchase networking devices Such as hubs, Swith cables, etc.

(ii) Security problems: Network Security is the most challenging for network administrator in order to protect Network resources.

(iii) Need techinical person : It requires Skilled technrcal person to install and operate computer network.

Differences between communication system and data communication system.

=>

Communication system	Data communication system.
It is used to convey information ideas, or messages between individuals or entities.	It is used to transmit digital data between computers or devices.
It may involve voice, text, video or other form of information	It deals with digital data in binary format (0s and 1s)
It involves human participants as sender and receiver.	It involves enectronic devices such as, computer, router etc.
It does not follow specific data transmission protocol.	Adheres to standardized protocol (IP address) for data transmission.
Security measures may be limited to privacy concerns.	Data security is a significant concern, with measure like encryption, firewall etc.

Explain its cont.

Different between incorder and Decorder #.

Incorder	Decorder
An encorder is device which translate Source code into digitral form before transfering data.	Decorder is a device which translate incorded data into human readble form or orginal fom.
Example ADCS. Anodog to digital convorter.	Example Digital to Analog

Differental between LAN and WAN AND MAN

Local Area Network (LAN)	Wide Area Network (WAN)
• Small Limited geogra phical area	Large, covers a wide geographird area.
• Data transfer Speed is very high.	• Data transfer depends on the connection.
• LAN is relatively low in cost	• WAN is relatively higher in cost.
• LAN provides Enhanced Security within the network.	WAN provides Higher vulnera bility to security breaches.
• Limited connectivity between Sites.	connects geographically di persed sites.

Metropoletian Area Network (MAN)	Local Area Network (LAN)
• Medium, cover a city or metro politron	Small climated area.
• Data transfer speed is Slow as compare to LAN	• Data transfer speed is very high.
• It cost more than LAN	• It cost relatively low
• connects multiple sites within a city	• connects climated sites bin a local area.

What are network ~~communication m~~ impairments? Explain any three Network impairments.

=> The errors that occur during data communication From one point to another are called Network impairments.

- Jitter : It is the variance in time, delay in milliseconds (ms) between data packets over a network. Jitter is especially problematic in real time communication like Ip telephony and video conferecing. It is caused due to poor hardware performance, neterwork congestion, transfering data in wireless medra.

- Crosstalk : It is a type of noise signal that corrupts the actual signal while transmission through the communication medium. Crosstalk happens when the signal From one cable gets mixed up with the signal in another cable. It is mainly occurs in communication system involving copper wires For transmission such as UTP or coaxial cable..

- Noise : Noise is an unwanted signal which interferes with the original message signal and corrupts the parameters of the message signal. In Communication, noise can be created by radio waves, powerline, lightining and bad connections.

- Echo : Echo is a continous type of noise signal, which reflecting backs the transmitted signal. Echo is a group Communication protocol where authenticated and encrypted information is addressed to members connected to a node.

Define Data communication media with its type.

Transmission media are the means through which data travel from source to destination. Transmission media are also called communication media. The basic component of communication media are Sender (source), communication media and receiver (destination). which means communication media are used to transfer data. The physical pathway or wireless pathway through the data travel from one place to another is called communication media.

Following are the types.

① Wired / Guided / bounded

* Twisted pair cable: As a name suggest in this type of transmission media the pair of cable or twisted around eachother. They are twisted inorder to reduce the electro magnetic interiference (EMI) This type of cable have greater transmission and fewer chance of error in transmission.

* Co-axial cable: It is one of the most common televisron broadcasting transmission media that carries data signal of high forquency and at higher speed than twisted paircable. It has clarger bandwith and better reliability which means it can handel clarge volume of data at high speed.

* Fiber optics: A fiber optics cable is made up of glass inorder to transmit data at the speed of clight. This cable is diferent than othercable, as it transmit data in the form of photon (clight) not in electricity (electron). Since there is no electricity it is completed immune to EMI

② Wireless / unGuided / unbounded.

* Radio wave: It is the wireless transmission medium that can operate on signals as wellas multiple forquency band.

* Infrared: It is a wireless transmission technology that use red-clight to transmit data. clike optic fiber, infrared uses clight for communication. It is mainly used in T.V remote.

↓ Satellite: They are the microwave transmission system in space. It is used as amplifer or repeater that is used to receive information from one docatron to another docatron on the earth. The communicatron is carried out through updink and downlink.

What are Network impairments? Explain any three.

Network impairments refer to issues or dimitatron that affect the performonce of data transmitatron. These impairments can disturb communicatron between two system. due to impairments the signal at the beginnig of medrum are not same as the signal that are recived.

Types of Network impairments.

Jitter: It is the disturbance in the normal sequence of sending data packets. It is also called fluctuation in delay as packet are being fransferred across a network. The variation in the time between data packets arriving which is caused by network route changes. The clongor data packets take to transmit, the more Jitter affects audro qualit/.

Echo: Echo is a sound that is repeated because the sound waves are reflected back. so, In telicommunrcatron. It is a sound that is a copy of another sound and that are produce when sound waves bounce off a surface.

Noise: Noise is random or onwanted signal that mixes up with original signal. It is the disturbance that corrupts the quality of the signals. The noise causes signal doss or connection poor or data doss. Some common noises are audro and video noise, electricad signod noise. crosstalk noise and wireless noise.

Bandwidth: The amount of data that can be transfered from onepointto anotor within a network in a specifrc amount of time. bandwidth is the maximom rate of data transfer across a given path.

Network Architecture AND IT'S TYPES #.

Network architecture refers to the various services provided by the network and also deals with how data transmitted from one computer to another computer.

① Client Server Network

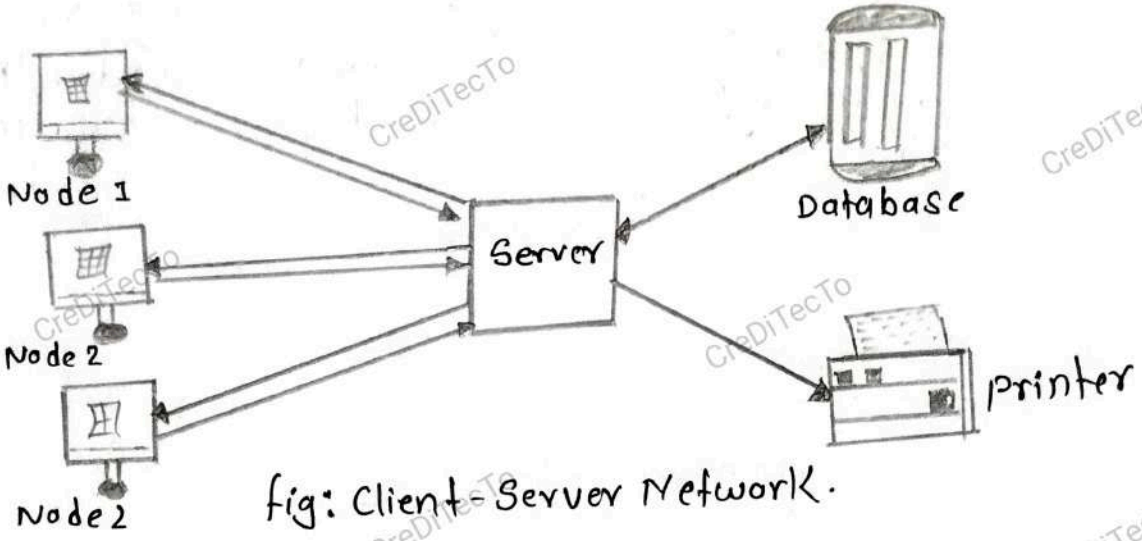


fig: Client-Server Network.

An arrangement of computer to resource sharing and communicate each other through a centeral device (server) to all the work stations is called client server network.

② Peer-peer Network

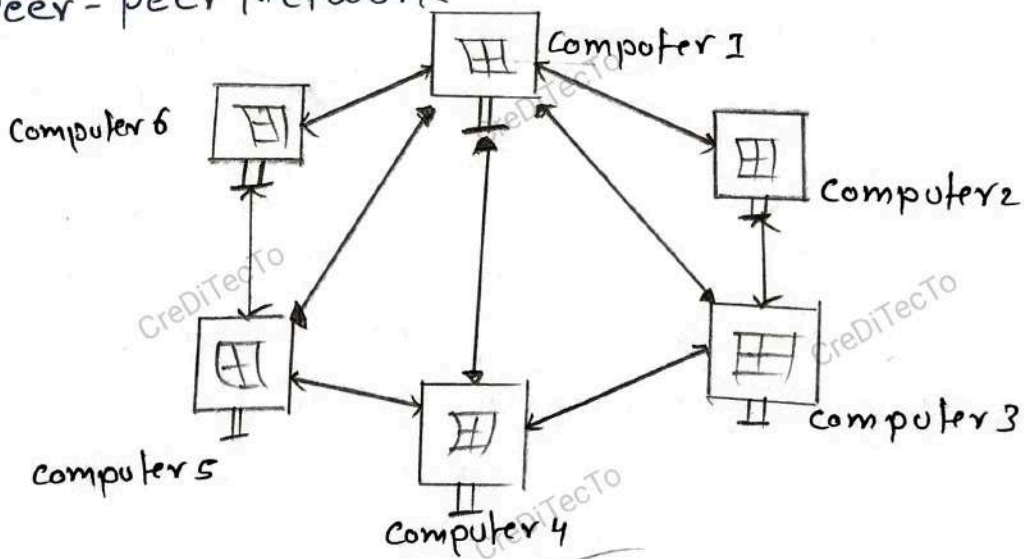


Fig: P-P Network.

A peer to pear network is the type of network in which all computer in the network acts as server and a client.
∴ All the computer can both request and provide servece.

[#. Define Gateway and MAC address]

Gateway is a network hardware device that is used for making communication in between two networks with different transmission protocol togther and it is an entry and exist gate for the network. that halps to bypass the all data with the gateway prior to being routed. Gateways can be used for both WAN and LAN interconnects.
∴ Gatway is a device to connect your network to another network, attenly involving not only a change of addressing but also networking different technology.

MAC ADDRESS

Media access control (MAC) address is also known as hardware or physical address in unique number associated with a network adapter (NIC). It is used to uniquely identify each devices (nodes) of a Network.

MAC Address is usaually assigned by the Manufacture of a network interface card (NIC) and Stored in ROM MAC address is a 12 digit hexadecimal number.

Format: MM:MM:MM:SS:SS:SS
or MM-MM-MM-SS-SS-SS

The first half of the addresss contain ID Number of the adapter regulated by Internet Standards body and other half represents the number assigned by the manufacture. For example.

00:A0:C9:14:C8:2g

↓ Manufacture Intel coporation.

↓ particular host.

Class 'A' Address

The first bit of the first octet is always set to (zero). Thus the first octet range from 1 - 127.

ie

00000001 - 01111111

1 - 127

Class A address only include Ip starting from 1.xx.x to 126.x.x.x only. The Ip range 127.xxx is reserved for loop-back Ip addresses.

The defult subnet mask for class A Ip address is 255.0.00 which implies that class A addresing can have 126 networks (2^7-2) and 16777214 hosts ($2^{24}-2$).

Class A Ip address format is thus:

ONNNNNNN.HHHHHHHH.HHHHHHHH-HH.HHHHHH

Class B address

An Ip address which belongs to class B has the first two bits in the first octet set to 10.

10000000 - 10111111

Class B Ip addresses range from 128.0.xx to 191.255.xx

The defult subnet mask for class B is 255.255.xx.

Class B has 16384 (2^{14}) network addresses and 65534 ($2^{16}-2$) host addresses.

Class B Ip address Format is

10NNNNNN.NNNNNNNN.HHHHHHHH.HHHHHHHH

* Class C address.

The first octet of class C Ip address has its first 3 bits set to 110, that is.

11000000 — 11011111

192 — 223

Class C Ip addresses range from 192.00.x to 223.255.255.x
The defult subnet mask for class C is 255.255.255.x.

Class C gives 2097152(2^{21}) Network addresses and 254(2^8-2) host addresses.

Class C Ip address format.

110NNNNN.NNNNNNNN.NNNNNNNN.HHHHHHHH

* Class D address *

very first four bits of the first octet in class D id address are set to 1110 giving a range of.

11100000 — 11101111

224 — 239

Class D has Ip address range from 224.0.0.0 to 239.255.255.255. class D is reserved for multicasting. In multicasting dat is not destined for a particular host, that is why there is no need to extra host address from the Ip addresses. and Class D doesnot have any subnet mask.

* Class E address *

This Ip class is reserved for experimental purpose only For R and D or study Ip addresses in this class range from 240.0.0.0 to 255.255.255.254. like class D, this class to is not equipped with any subnet mask.

Differentiate between P-2-P and Client Server Network Architecture.

=>

Peer to peer set up Network.	Client Server Network.
• Easy to set up	• Difficult to set up.
• Less Expensive to install	• More expensive to install.
• It can be implemented on a wide range of operating systems	• A variety of operating system can be supported on the client computer. but the server needs to run an operating system that supports networking
• Security support is very low in P2P.	• Security is High level in client server network.
• Only 10 computer can share network	• No limit to the number of computer.

Explain the Following

① Internet

Internet is a global computer network providing a variety of information and communication facilities that consists of interconnecting networks using standardized communication protocals. It is a global network of billions of computer and others electronic devices. It is used to access almost any information and communicate with anybody in the world.

② Intranet

An intranet is a private network within a organization that uses internet technologies and protocls for internal communication and ~~pro~~ Information sharing. only the authorized users within the company can access this network. Intranet typically provide pasword protection, firewall, and other security measure to savegaurd data and maintain privacy.

(III) EXTRANET

An extranet is a controlled private network that extends beyond an organization's internal network to include external partners, customers, employees and other authorized entities. It is more secure communication and collaboration between an organization and its external stakeholders. Extranet are commonly used in large business to business (B-2-B) relations. enabling companies to collaborate with suppliers, share information with distributors or to provide online customer support. It ~~*~~ Improve efficiency while maintaing security and control over shared information.

Difference between IPv4 and IPv6

IPv4	IPv6
• It is 32 bit Ip address • IPv4 is end to end connection integrity is unachievable. • IPv4 is numeric addressing method • It supports manual address configuration process • Example 12.224.233.165	• It is 128 bit Ip address IPv6 is end to end connection integrity is achievable. • IPv6 is an alphanumeric addressing method. • It supports auto address configuration process. • Example: 2001:0db8:0000:0000:0000 ff00:0042:7879.

What is internet addressing?

Internet addressing refers to the system used to identify ~~devices connected to the internet and ena~~ and locate resources on the internet and enable them to communicate with eachother.

Network Tool

The tools which are used for supporting easier and effective network connection are known as Network tools.

Some of Network tools are:

ⓐ Packet tracer:

It is an innovative and powerfull network simulator that can be used for a practice build own network with routers, switches, wireless and much more. It allows to experiment with network behaviour, build network models and to ask "what if" questions. It is used to trace the movement of data packets in data communication.

ⓑ Remote login

Remote login allows a user to connect to a host computer via a network or direct telicommunication link, and interacts with that host computer.

Some of the popular remote access tools are:

(i) Remote pc

(ii) zoho assist

(iii) Splashtop

(iv) Team viewer

(v) Connect wise control.

(vi) LoginMeIn Pro

(vii) Chrome Remote Desktop.

Network Connecting Devices (n##).

The devices of computer network which are used to connect network is Network connecting devices.

@ Network Interface card (NIC)

The NIC contains the electronic circuitry needed to ensure the reliable communication between workstation and servers. It is an interface between the computer and LAN cabling. It is connected into motherbord and exposed side contain cabling ports that plug directely into the LAN cable.

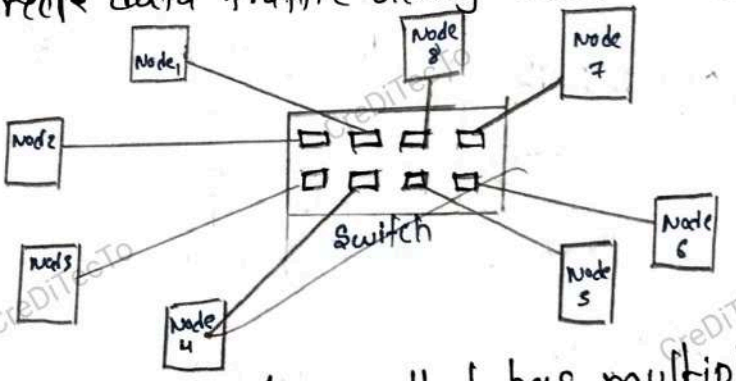
ⓑ MODEM

A modem converts data to a signal so that it can be easily sent and received over teliphone cline. It stand for modulator and demodulator. It allows computer to connect to ginternet.

© Router.

A router transmits information from one network to another The router selects the best path to route a message, based on destination address and origin. It is an intidigent device which prevents head on head data collision and smart enough to direcfe data traffic along back roads and shortcuts.

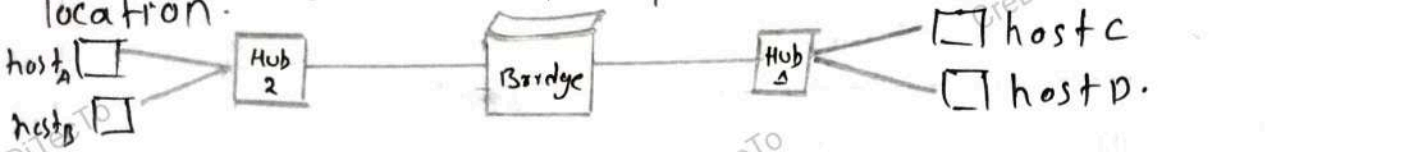
ⓓ Switch



Switch is a network decice that has multiple ports that are used to connect multiple nodes and create a network. It is an intelligent device because it has memory where it maintains the table cable CAM table, and stores the port number and MAC address of all the connected devices. which helps to identify every devices on a network.

⑥ Bridge

A bridge is a device that allows us to segment a large network into smaller, more effecient networks.
A bridge monitors the information traffic on both side of network so that it can pass packets of data to the correct location.



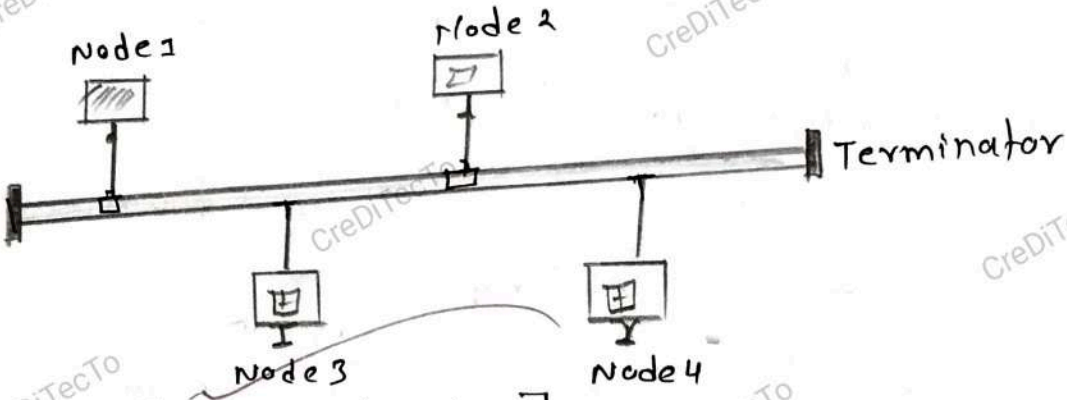
⑤ Hubs

A hub is simply a multi-port repeater. It helps to regenerate network data, add form and function to the Layout of the LAN.

Network Topology OR LAN Topology

Network topology refers to the physical layout of the network. It shows the geographical representation of all the links and linking devices (nodes)

(1) Bus Topology: computer are connected to a single continous cable that is called 'bus'. This cable acts as a backbone.



[Fig: Buss topology]

[Advantages]
- Simple and easy to setup and extend the network.
- It required less cable, which is less expensive.
- Failure of one node doesno affect the network.

[Disadvantages]
- Data traffic is very high in bus
- If there is problem in the main cable whole network will be down
- Less secure and difficult to detect errors.

② Star Topology: In this network system, computer are connected to each other with the help of central device hub or switch or server. It is based on client server architecture It is mostly and widely used topology For LAN.

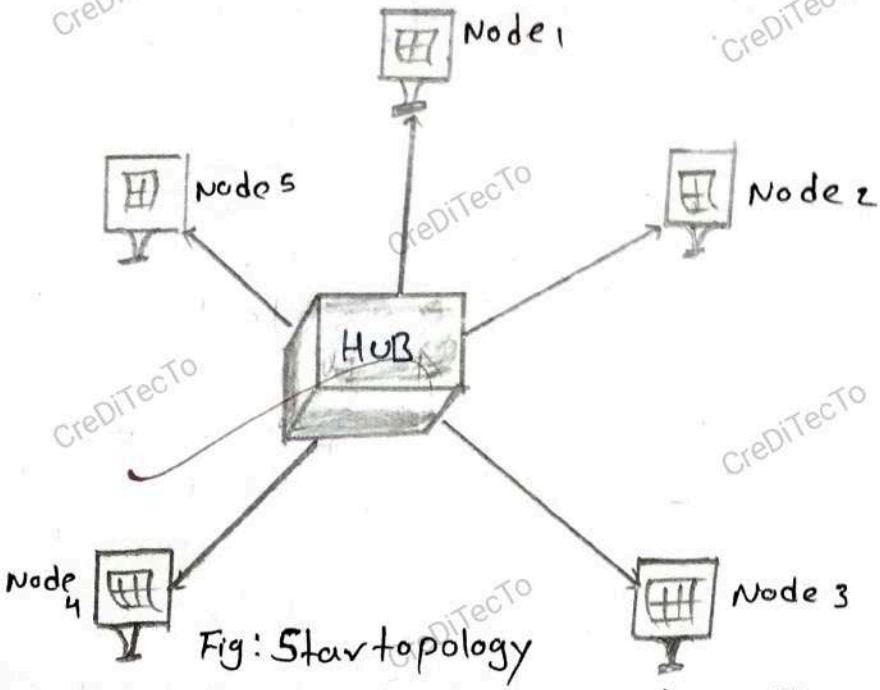


Fig: Star topology

[Advantages]

- Simple, reliable and easy to setup and configuration
- Easy to add and remove computer in the network
- Easy to detect fault.
- failure of one computer doesnot affect the network.

[DISADVANTAGES]

- It requires very large amount of cables.
- It is expensive network topology.
- failure of central device causes to shut down the whole network.

③ Ring ~~Netw~~ Topology: Computer are interconnected to each other by making a closed circular loop. That means each computer are connected to other ~~two~~ adjacent computer in network architecture.

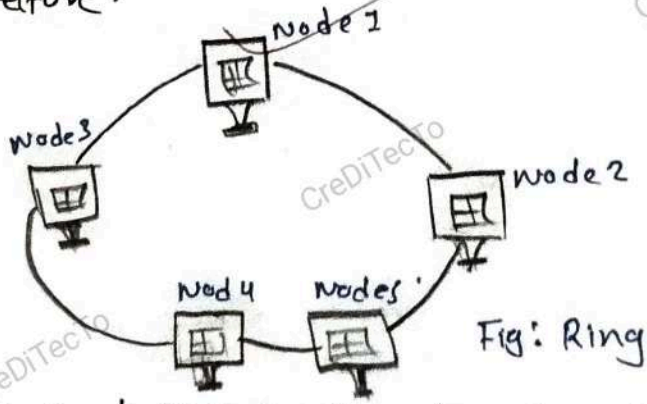


Fig: Ring Topology

[ADVANTAGES]

- It is an simple and inexpensive topology.
- Less chance of dat collision because of unidirectional data transmission
- There is no server so each computer has equal access facilities to the resources.
- Its performance is better than bus topology for small size network.

[DISADVANTAGES]

- It is not flexible topology so it is difficult for adding and removing new nodes.
- It is not suitable for large size network.
- If there is problem in any computer or connection then the entire network goes down.
- It is very difficult to find out the errors in the network.

④ MESH Topology

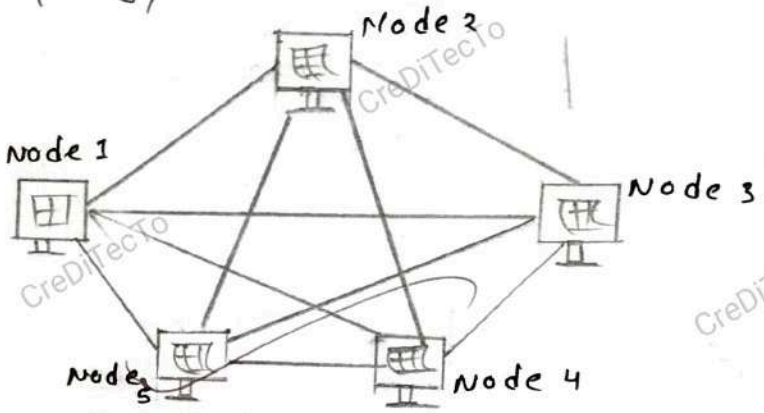


Fig: Mesh Topology

In mesh topology, every computer in the network has point to point connection to all other computers by using multiport connector. It is based on p-2-p architechure.

[ADVANTAGES]

- It is fastest and most reliable topology.
- failure in any computer doesnot affect the rest of the network.
- There is less amount of data traffic due to multiple paths.
- This Topology is secure due to point to point connection.

[DISADVANTAGES]

- Complex and most expensive topology.
- It is difficult to find an error in the network.
- It is difficult to add and remove nodes in the network so, it is not flexible.
- It requires maximum amount of cable and multiport connectors.

⑤ Hybrid topology:

In hybrid topology, two or more than two topologies are combined togther then it is called hybrid topology.

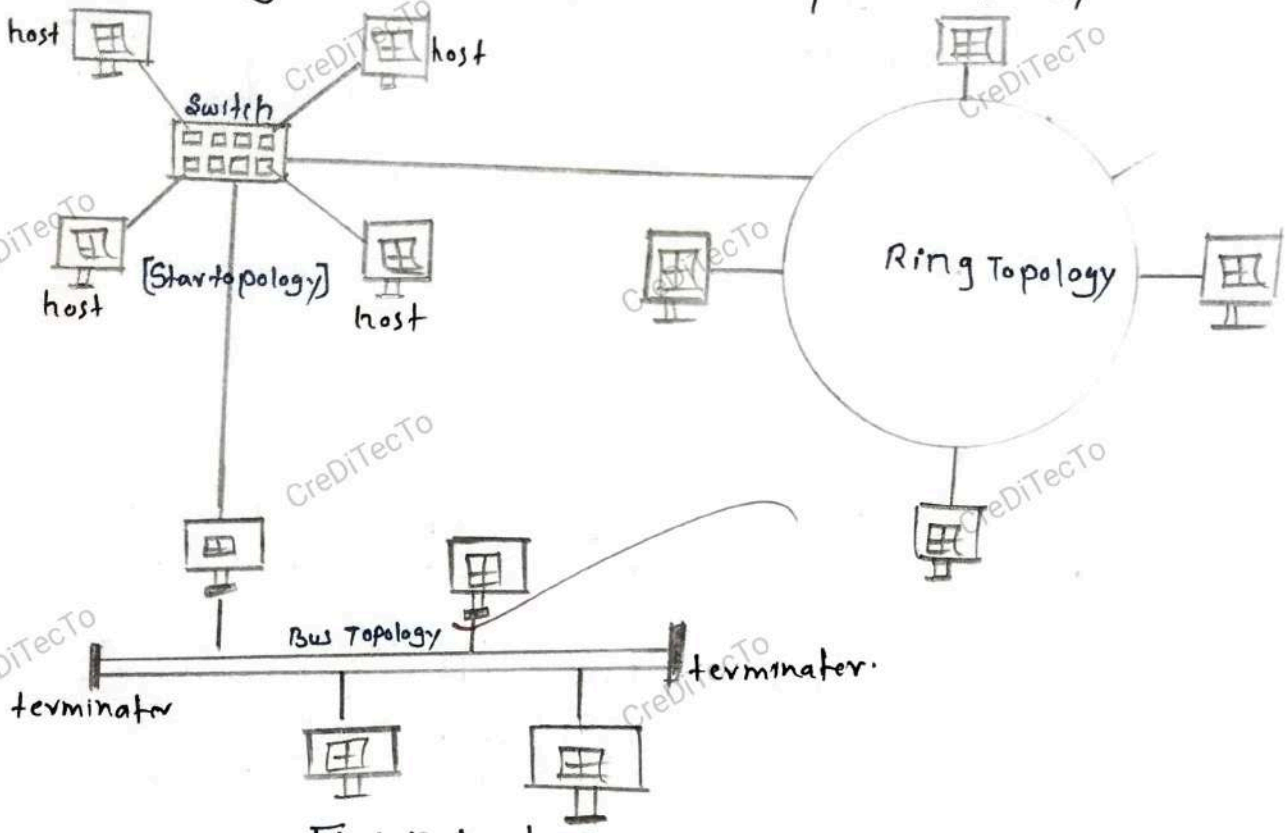


Fig: Hybrid Topology:

[ADVANTAGES]

- Easy to increase the size of network by adding new component without disturbing existing architecture.
- It is more effective as it uses multiple topology.

[DISADVANTAGES]

- It is more complex than other topologies.
- It is difficult to install and configure
- It is very Expensive.

Define OSI reference model? Explain the different Layers:

The open system interconnection (OSI) model is a conceptual model created by the international organization for Standardi-zation which enables diverse communication system to communicate using Standard protcols.

There are 7 Layers of OSI model.

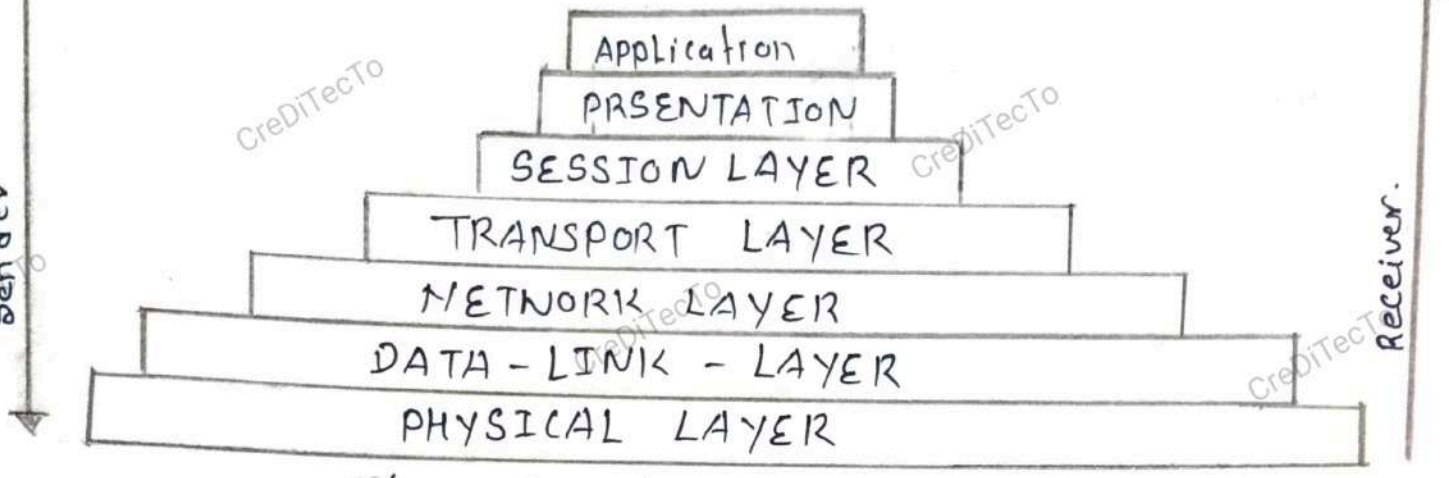


fig: OSI Refrence MODEL

① Physical Layer: This Layer concerned with transmission of bit. it determines voltage Level of 0 and 1. It also determines thedata rate of the system. This Layer involves Standardized protocol dealing with electrical and Signaling interface.

② Data clink Layer: It handels error in physical clayer. This Layer ensure the connect delivery to Frame to the destination address. It consist of 2-parts or 2-sub clayers.

(i) Logical Link ~~Layer~~ Control.
(ii) Media Access Control

③ Network Layer: This Layer is concered with transmission of packet. Network Layer protocol chooses the best path to send a package called routing.

④ Transport Layer: It provides the mechanism for the erchange of data between and systems. It ensures that the data received is in fact inorder. It performs followrg tasks.

(i) Port Addressing
(ii) Segmentation and Reassemble.
(iii) Connection Control.

⑤ SESSION LAYER: It is responsible for requesting Logical connection to be established for communicatron process. This Logical connection is termed as Session. It also provides data synchronization between two communication terminal.

⑥ PRESENTATION LAYER: This layer translates format data to adapt to the needs of the applicatron between two communi catron process (Sending/Receiving). It helps encyrption, decryptrion Formating etc.

⊕ Application LAYER: Application Layer is responsible for providing networking services to the user. It is used by end user software such as web browser and Email Clients. Application Layer allows to send and receive information and present meaningfull data to users.