

Unit - 1 Introduction To Data Communication

* Define Data Communication with its components.

=> Data Communication is defined as transfer of data between two devices via some transmission media.

Data Communication is Process to exchange data between two devices.

There are Five Components of Data Communication.

- ci) Message
- cii) Sender
- ciii) Receiver
- civ) Transmission Media
- cv) Protocol

ci) Message: Message is one type of data that can be exchange between two devices.

cii) Sender : Sender can send the data ~~two~~ to other receiver.

ciii) Receiver: Receiver can receive the data that can be send by sender.

civ) Transmission Media: It is a medium between sender and Receiver.

cv) Protocol: Protocol is a set of rules that can be follow for transfer the data.

* Define ~~M~~ Network and Networking with its types.

=> Network:

A set of computing devices that can be connected together for the exchange data.

Networking:

Networking is the process of connecting computers together to enable data communication.

There Four type of Computer Network.

(i) LAN

(ii) PAN

(iii) MAN

(iv) WAN

(i) LAN: LAN stands for Local Area Network.

LAN is used for connecting two or more computers through a communication network in small office.

It is less costly as it is built with hardware.

Local Area Network provides higher security.

(ii) PAN: PAN stands for Personal Area Network.

PAN is used to connect the computer devices like laptop, mobile phones, play stations etc.

PAN is used to connect device within a range of 10 meters.

There are two types of PAN.

(i) Wired PAN

(ii) Wireless PAN

(iii) MAN: MAN stands for Metropolitan Area Network.

MAN is a network that covers a larger geographic area by interconnecting a different LAN.

It has a higher range than Local Area Network.

MAN is used to communication between the banks in a city or an Airline Reservation.

(iv) WAN: WAN stands for Wide Area Network.

A Wide Area Network is a network that extends over a

large geographical area such as states or countries.

A Wide Area Network is quite bigger network than the LAN.

The internet is one of the biggest WAN in the world.

* Defines different kinds of Topologies.

=> Topology defines the structure of network in which how components are interconnected to each other.

There are six types of Topologies.

- ca) Bus Topology
- cb) Ring Topology
- cc) Tree Topology
- cd) Star Topology
- ce) Mesh Topology
- cf) Hybrid Topology.

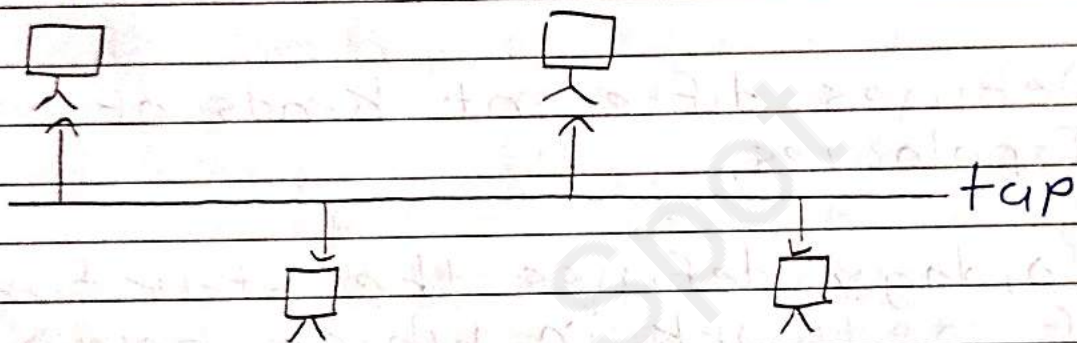
ca) Bus Topology:

In Bus Topology, All the stations

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attach through appropriate hardware interfacing known as a tap.

Bus topology is very cost effective and easy to implement.

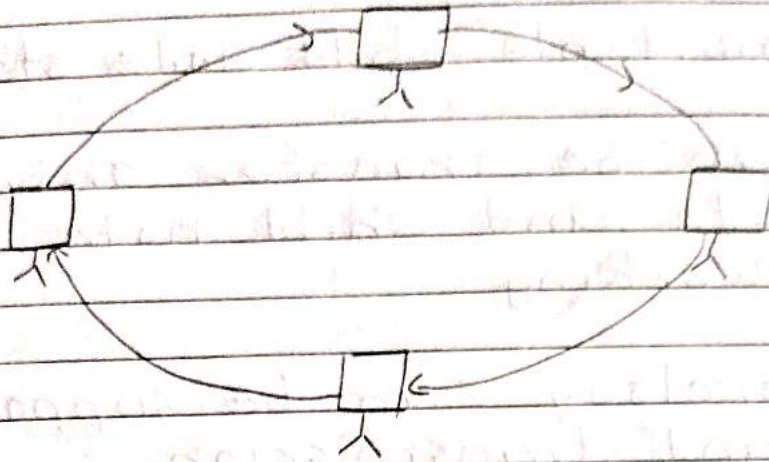


Bus topology does not use any specialized network and require less cable for networking.

26) Ring Topology:

In Ring Topology, each station is joined by point-to-point links in a closed loop.

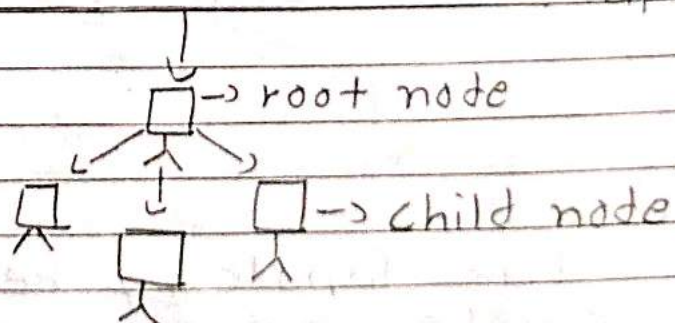
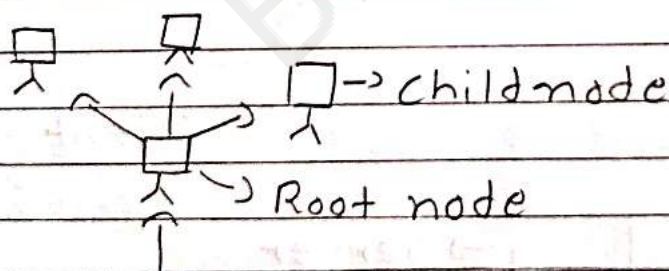
Ring Topology allows to transfer data in only one direction.



Ring Topology is easy to install and easier to making troubleshooting.

(c) Tree Topology:

Tree Topology is combination of Star and Bus Topology.



Root node station is connected

with multiple child node station

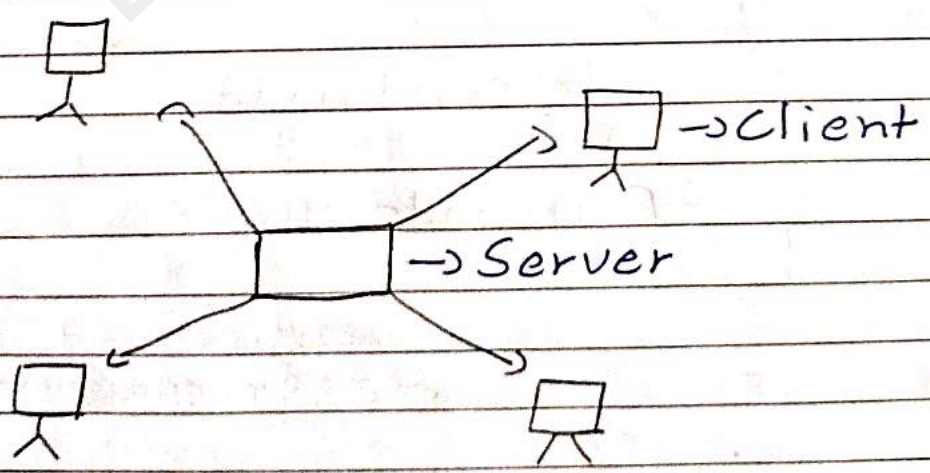
Data can be transfer only root node and child node in networking

Tree topology can be support Broadband transmission.

c) Star Topology:

In star Topology, each station is directly connected to a common central node.

Using star Topology, we can transfer high speed data.

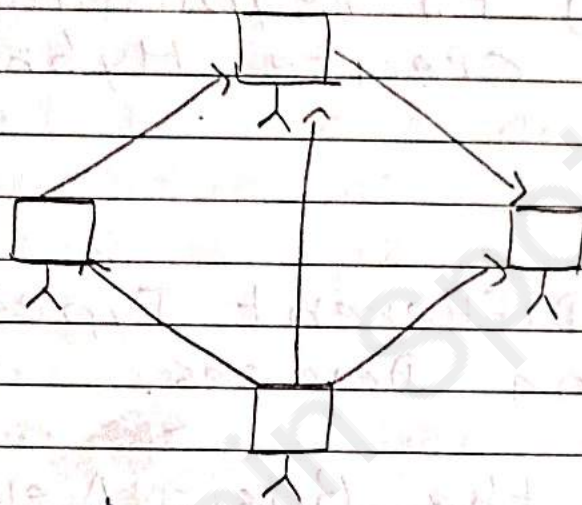


Star Topology require more cable for connection.

(e) Mesh Topology :

In Mesh Topology, every stations are conneted with each other.

In this topology, two nodes are connected by dedicated point-to-point links between them.

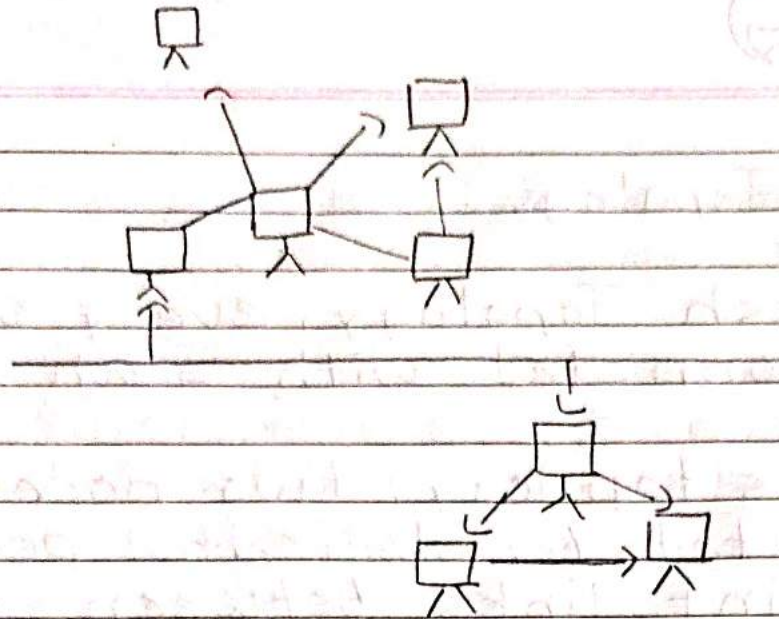


Mesh Topology, Provides redundant paths between two devices for transfer the data.

(f) Hybrid Topology :

Hybrid Topology is combination of all the topology.

Using, Different types of topology, we can create Hybrid Topology.



According to requirement,
we can create Hybrid
topology.

* Explain Different Types of
Connecting Devices.

=> This are the Basic Networking
Devices.

- Ca) Hub
- Cb) Switch
- Cc) & Router
- Cd) Bridge
- Ce) Gateway

ca) Hub : Hub is network devices
which is use for peer-to-peer
Networking connection.

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Hub devices is Operate at Physical Layer 1 devices per the OSI model.

Hub devices is working on Half Duplex transmission mode.

We can push too much traffic in every connected devices.

Hub is used to connect Less than 5 or 10 computer in home network or office network.

(b) Switch: Switch is network devices which is use for peer-to-peer networking connection.

Switch devices is Operate at Data Link Layer 2 of the OSI model.

Switch devices is working on Full Duplex transmission mode

Switch can transfer Frame and packet at 1 Gbps transfer speed.

It is more expensive than a hub and less expensive than Router.

c) Router: Router is a network devices which is used in Client-server connection.

Router Devices is working on Full Duplex transmission mode.

Router can transfer data in the form of Packet and transmission speed will be upto 1-10 Mbps.

Router devices is operate at Network Layer 3 at OSI model.

Router is ~~new~~ used to connect Ethernet or Wi-Fi in Home ~~networking~~ networking.

Router is also used in LAN and MAN Networking.

c) Bridge: Bridge is network devices which is used in peer-to-peer connection.

Bridge is operates in Data Link layer at OSI Model.

Bridge can transfer data in the form of Frames.

The main function of bridge is to keep the traffic separated on both side of the bridge.

Using Bridge we can also connect two different topology.

c) Gate way: Gate way is networking devices which can be operate multiple Layer in OSI Model.

Gate way does ~~not~~ change the format of the Packet.

Gate way can translate the any protocols which is used to communicate with two computers.

* Explain Different types of Transmission Mode in Networking.

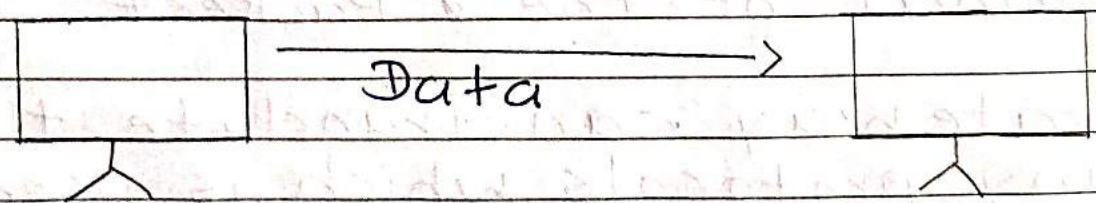
=> Transmission Mode is a method to transfer the data in Networking.

There are three types of Transmission Mode.

- 1) Simplex Mode
- 2) Half-Duplex Mode
- 3) Full-Duplex Mode

1 Simplex Mode : Simplex Mode is a simple transmission mode in which data is transfer in only direction.

In this mode, Only one device can transfer the data. So, there is no-interdevice communication in Networking.



In this mode, One device can

only send the data and second devices can receive only data.

In this mode, Both device can not Transfer data at a same time.

2 Half-Duplex: Half-Duplex is a transmission mode in which data can be transfer in both direction.

In this mode, Both devices can be transfer the data.



In this mode, At a time only one devices can send the data and one devices can receive the data.

At a same time, Both devices can not transfer the data, and always one devices have to wait for transfer the data.

3. Full-Duplex Mode: Full-Duplex is a transmission mode in which Both device can transfer the data.

In this mode, At a same time both devices can transfer the data.



In this mode, Devices does not have to wait for transfer the data.

The Full-duplex mode is provide better performance among the different transmission mode.

* Define the Following ~~Notes~~ Terms:

a Period :

Period is defined as the total time required to complete one Full Cycle.

b Cycle :

Cycle is defined as a single wave complete positive to negative to positive distance.

c Phase :

A Phase is the position of a wave at a point in time to complete one cycle.

d Frequency :

Frequency is defined as a number of cycle completed in one second.

e Peak Amplitude :

The Peak Amplitude of waveform

is the maximum positive or negative deviation of a waveform from zero reference.

F Composite Signal:

Composite Signal is a signal in which we combine two or more sine waves with different phase or amplitude.

g Periodic Signal:

If signal is repeated in regular intervals ~~it~~ than it is called Periodic signal.

h Non-Periodic Signal:

If signal is not repeated in regular intervals than it is called Non-Periodic signal.

i Bandwidth:

Bandwidth is a difference between upper and lower frequencies of signal.

* Explain Difference between Analog and Digital Signal.

Analog Signal	Digital Signal
1 Analog Signal is continuous and time varying.	Digital Signal is non-continuous and Binary Form.
2 Provides continuous values.	Provides Discrete value
3 Represent by Sine waves.	Represent by Square waves.
4 Easily affected by noise.	Less affected by noise.
5 Required More Power.	Required Less Power.
6 Transmitted as waves.	Transmitted as pulses.
7 Provides infinite number of value.	Provides only 0 and 1 value.
8 We can easily measure the signal.	Required specialized equipment for measure.

* Explain TCP/IP Model:

=> TCP/IP Model stands for Transmission Control Protocol / Internet Protocol Model.

There are four Layers in TCP/IP Model.

- 1) Application Layer
- 2) Transport Layer
- 3) Internet Layer
- 4) Network Interface Layer.

1 Application Layer:

The very top of the TCP/IP model stack is a application Layer.

Application Layer which is implemented by the network applications.

Application Layer is provides different types of services like SMTP, FTP, & RIP etc.

Application Layer
Transport Layer
Internet Layer
Network Interface Layer

2 Transport Layer:

Transport Layer provides services to the application Layer.

The Transport Layer follows TCP and UDP protocol.

TCP stands for Transmission Control Protocol which is used to perform full duplex operation.

TCP is a connection oriented protocol which gives acknowledgment for data transfer.

UDP stands for User Datagram Protocol which is connection less protocol.

3 Internet Layer :

Internet Layer is Follows internet Protocol.

Tcp and UDP Both Protocol is Use Internet Protocol for data transfer.

IP is Used to deliver Packets from source to destination according to IP address.

According to IP address, Packets are transfer from the source to destination.

4 Network Interface Layer :

This Layer is defines how data packets are to be formatted for transmission and routings.