

DATA COMMUNICATION AND OPTICAL FIBRE

(data communication \rightarrow dc)

\Rightarrow components of data communication =

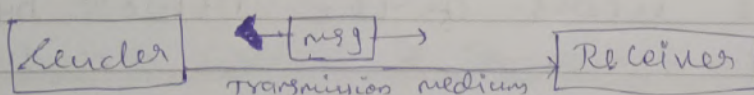
- 1) msg.
- 2) ~~Sender~~
- 3) Receiver
- 4) Transmission media \rightarrow It is the physical path by which a msg travels from Sender to Receiver.
eg \rightarrow Twisted pair ^{wire} ~~cable~~, coaxial cable, fibre optic ^{wire} ~~cable~~ & radio waves.
- 5) protocol \rightarrow It is a set of rules that governs data communication.

* Set of rules (protocols)

Rule 1
Rule 2
~
Rule n

Set of rules (protocols)

Rule 1
Rule 2
~
Rule n



\Rightarrow Network \rightarrow It is a set of devices connected by communication links.

A node can be a comp, printer, / any other device capable of sending / receiving data generated by other nodes on the network.

\Rightarrow Components of network =

- 1) servers \rightarrow They are the comp that hold

Shared files, programs & network OS.

* Servers provide access to network resources to all the users of the network.

2) Clients = clients / workstations are comp that access & use the network & shared network resources.

3) Transmission media =

4) Shared data → Are the data that file servers provide clients such that as data files, printers, accessed program & email

5) Network Interface card (NIC) =

It prepares (formats) & sends data, receives data & controls data flow b/w the comp & network.

6) Shared printers & other peripherals =

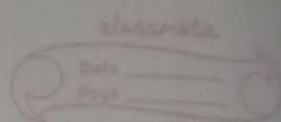
They are hardware resources provided to the users of the network by the servers.

7) Local OS = It allows personal comp to access files, print to a local printer & use 1 or more storage devices that are located on the comp.
eg → windows

⇒ Network OS (NOS) =

The NOS runs on servers that allow the comp to communicate over the network.

Hub also receives request send out.



- * Hub = It is a device that splits ~~that to~~ a network connection into multiple comp.
- It is like a distribution center.
- When a comp ^{needs} requires info from a network / a specific comp, it sends the request to the hub through a network connection.
- Hub will receive the request & ~~send~~ transmit it to the entire network.

- * Switch = It is like a hub but build-in with advanced features.
- It connects devices together on a comp network, process & forward data to the destination device.

- * Router = It is a networking device that forwards data packets b/w diff. comp networks.

=> Network cables & connectors =

- * cable is a transmission media that can transmit communication signals.
- There are several t. media types including coaxial cable, fibre optic cable, wireless connections, etc

* Repeater =

- It is a communication device that connects 2 segments of the network connection

- used to extend the network connection length to enlarge networks.
- WAN contains many repeaters.

* Bridge =

- It interconnects 2 networks using same technology.
- It is more sophisticated than a repeater.
- Sometimes it is necessary to divide networks into subnets to reduce the amount of traffic on each larger subnet / for security reason.

* modem =

It is a device that modulates an analog carrier signals (sounds) to encode digital info, & that also ~~be~~ demodulate such a ^{carrier} signal to decode the transmitted info.

eg → used when a comp communicates with another comp over a telephone network.

* WAP (wireless Access point) =

- They are a transmitter & receiver device used for wireless LAN* (WLAN) radio signals.
- It is typically a separate network device with a built-in antenna, transmitter & adaptor.
- It ~~also~~ typically has several ports allowing ~~the~~ a way to expand the

network to support additional clients.

→ protocols = (p)

- * communication b/w comp on a network are defined by protocols.
- * Network (p) are formal standards & policies comprised on rules, procedures & formats that define communication b/w 2 or more devices over a network.
- * Network comp run a series of protocols → (p) stack.

→ Firewall =

- * It is a networking device either hardware / software based that controls access to the network.
- * This control access is designed to protect data & resources from outside threats.

⇒ Network Criteria =

a) performance = It can be measured in many ways -

- * Transit time (msg deliver time)
- * Response time (enquiry & response time)

- Transit time is the amount of time required for a msg to travel from 1 device to another.
- Response time is the elapsed time

data of transfer \rightarrow transmission media

classmate

Date

Page

b/p an enquiry & a response.

b) Reliability =

s. of a network depends on accuracy, freq. of failure.

c) Security = It includes protect from unauthorised access.

\Rightarrow ~~properties~~ Network Standards & (P) =

* Elements of protocols =

a) Syntax = Refers to the str / format of the data, meaning the order in which they are presented.

b) Semantics = The word s. refers to the meaning of each section of bits.

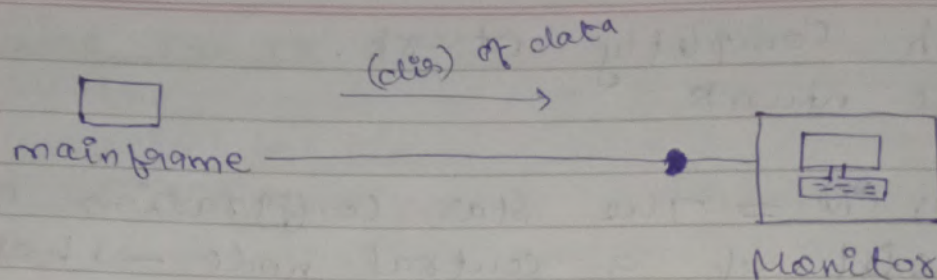
c) Timing = Refers to 2 characteristics: ~~when~~ data should be sent & how fast they can be sent.

\Rightarrow Channel trans^{mission} modes =

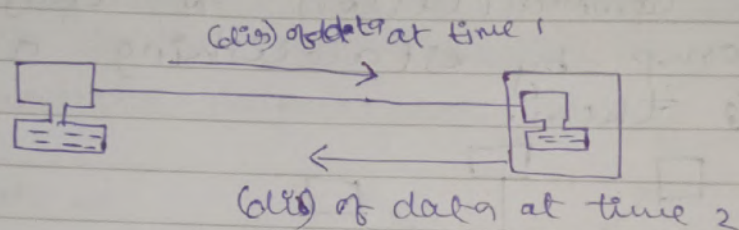
3 types of c.t. modes \rightarrow

1) Simplex = Communication is unidirectional, as on 1 way street only 1 of the 2 devices on a link can transmit the other can only receive.

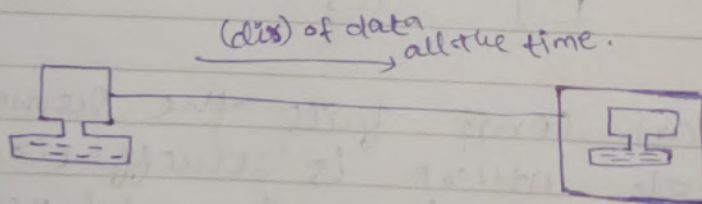
• Keyboards & traditional monitors are eg of s. devices.



b) Half duplex = Here, each station can both transmit & receive data.



c) Full duplex = Here both stations can transmit & receive simultaneously.



=> Network Topologies = (T)

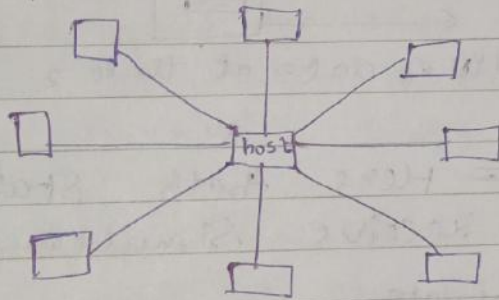
* Term topology refers to the way in which the individual comp, → nodes of a network are linked together.

* Diff types of (T) are —

- 1) Star network =
- 2) Ring network
- 3) Bus network
- 4) Completely connected network.

- 5) mesh completely network.
- 6) Tree network

1) Star (N) = The star configuration of network consist of a central node \rightarrow host, to which all ^{other} nodes are connected by a single path, the routing (?) is performed by the central comp, which centrally controls communication b/w any 2 local comp by establishing a logical path b/w them.



Adv

- * If any local comp fails the remaining portion of network is unaffected.
- * It is easy to modify & add new nodes to a star network without disturbing the rest of network.

Dis adv

- * The system If the central comp fails the entire network fails.
- * Each device requires its own cable segment.
- * Installation & configuration is difficult.

2) Ring network =

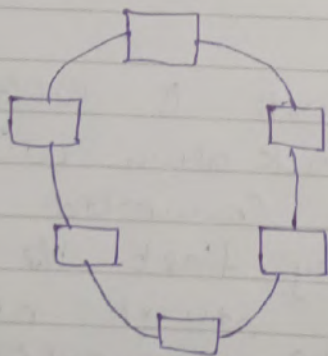
- * All the nodes in a (R) network are connected in a closed circle of cable (ie) this configuration is a ring arrangement of communicating nodes & there is no controlling in the network.

Adv →

- * A ring is relatively easy to install & reconfigure.
- * Link failure can be easily found as each device is connected to its immediate neighbours only.

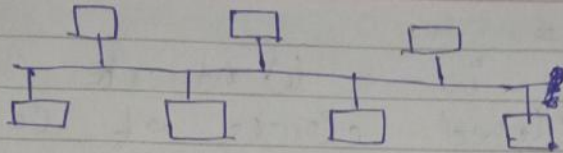
Disadv →

- * max ring length & no. of devices is limited.
- * Adding / removing nodes disrupts the network.



3) Bus network =

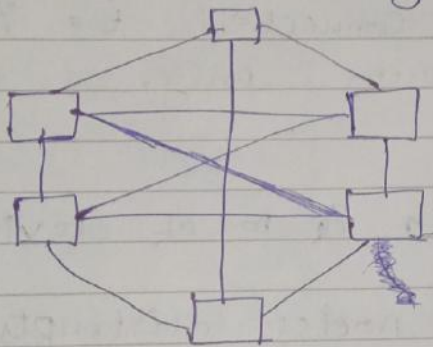
- * Here, nodes share a single common channel.
- * Each node has a unique address.
- * All nodes will receive a msg, but only the address node will respond.



~~→ Data & Signals~~

4) Completely connected network =

* Has separate physical link for connecting each node to any other node



Adv →

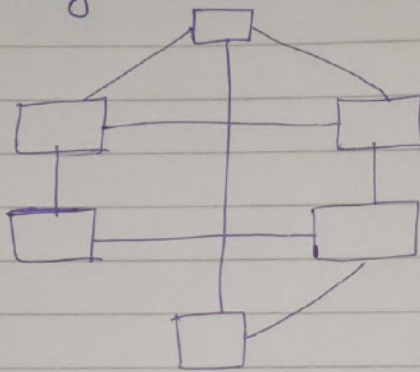
- * This type of network is reliable, -
As any line break down will affect only 1 communication of the connected comp.
- * Communication is very fast b/c any 2 nodes.
- * Each node of network need not have individual routing capability.

Disadv →

- * It is the most expensive system from the point of view of line cost.
- * Large amount of cabling & higher I/O ports required.
- * Difficulty in installation.
- * Difficult to reconfigure.

5) mesh network =

- * Here, each node is connected more than 1 node to provide alternative routes in case the node is either down ~~or~~ ~~node~~ to busy.



Adv →

- * Dedicated links b/w nodes ensure optimum data ~~range~~ rate & less traffic probm.
- * Better privacy & security.
- * Failure of any will not cause failure of entire network.
- * point to point links makes fault identification & fault isolation easy.

Disadv →

- * Large amount of cabling & I/O ports required.
- * Difficulty in installation
- * Difficult in ~~re~~ configure.