What is Computer Network

~~इस~~ computer network एक telecommunication network होता है जो ~~autonoums~~ autonomous digital ~~(nodes)~~ devices (nodes) है। के बीच data exchanges using wired और wireless के लिए use किया जाता है connection for sharing resources (h/w or s/w) interconnected by a single technology e.g. internet.

* Goal of Computer Network

(1) facilitating communication

1. enabling swift and efficient communication between individuals and organizations
2. support video confrencing, emails, instant messaging, etc.

(2) Resource sharing

1. Allow user to share h/w And s/w resources
2. enable printer sharing, file sharing etc.

(3) Data storage and Access

1. Centralised data storage system that allow data access from any devices that connected
2. data backup and recovery को esay करने में help करना।

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(4) Cost efficiency

1. resource sharing से जो cost आता है उसको reduce करना और duplicate h/w & s/w को avoid करना।

(5) Reliability and Redundancy

(1) Enhance ~~rea~~ reliability through alternate paths and redundant system in case of failures.

Application of computer Networks

(1) Bussiness and commerce

(1) E-commerce, online banking, stock trading, etc.

(2) facilitating remote working and global collaboration.

(2) Education

(1) E-learning platforms, virtual classroom online exam, etc.

(2) facilitating research and knowledge sharing.

(3) Healthcare →

(1) ~~Telemed~~ Telemedicine, electronic health records, remote patients monitoring etc. (electronic → patients)

(4) government services

(1) E-governance, online public services, secure communication between goverment agencies etc.

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Entertainment/

(1) online gaming, streaming services, social media platforms etc.

6 Scientific research/

facilitates data sharing and collaboration on research projects between institutions world wide.

7 Travel and hospitality/

(1) online ticket booking, hostel reservation, GPS, and navigation services etc.

Data communication

Data communication are the exchange of data between to two devices via some transmission medium is called Data communication

Data communication system has five components

(1) message → information (data) to be communicated e.g. text, audio, video.

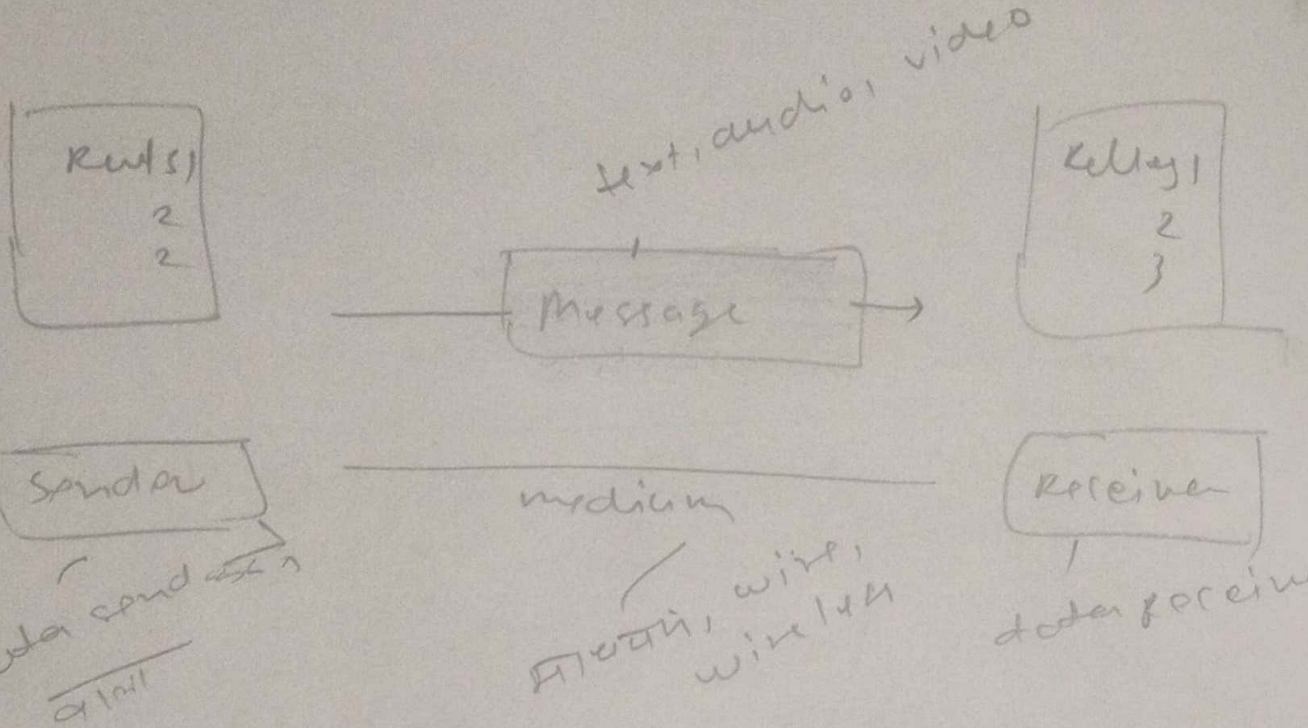
(2) sender → device how sends the message (computer, phone, camera etc)

(3) Receiver → device how receives the message (computer, phone, television etc.)

(4) Transmission medium ~~its~~ is the physical

path by which a message travels form sender to receiver.

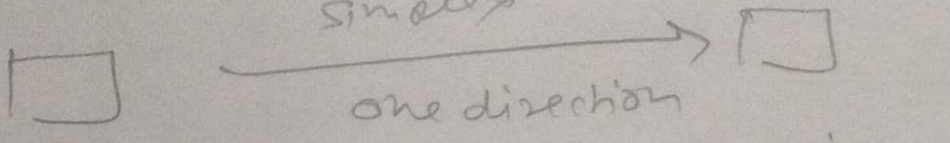
⑤ Protocol → which includes syntax, semantics, timing, De facto, De jure.



Transmission mode

① simplex

The communication is unidirectional as a one-way street, one device always other can always receive, eg. Radio, mouse, The simplex mode can use the entire capacity of the channel to send data in one direction.



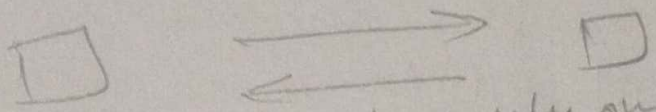
Half duplex

Each station can both transmit and receive, but not at the same time, e.g. → like a one lane road. Walkie-talkie etc.

(1) When one device is sending, the other can only receive and vice versa.

(2) In a half-duplex transmission the entire capacity of a channel is taken over by whichever of the two devices is transmission. at the time.

(3) Walkie-talkie are both half-duplex systems.



at time only one.

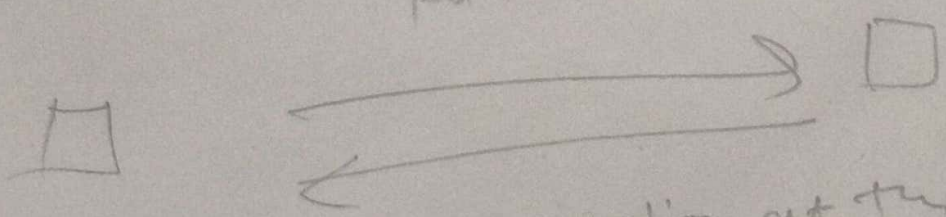
full duplex

- Both station can transmit and receive at the same time, Actually, it is two half duplex connections.

(2) Telephone networks is an example of full-duplex mode when two people are communicating by a telephone line, both can talk and listen at the same time.

(3) The capacity of the channel, must be divided between the two directions.

Full-Duplex



Both direction at the same time.

Network criteria

A network must be able to meet a certain number of criteria. The most important are.

① Delivery & Accuracy

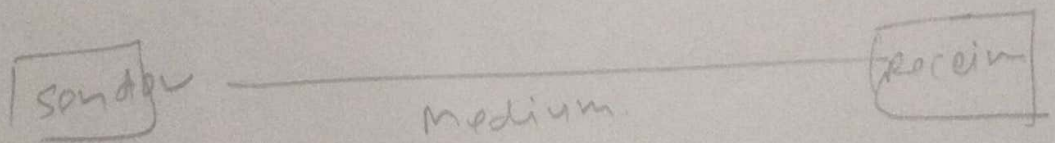
data को destination पर सही सही error के deliver करना आवश्यक

② Performance

Performance को कई factors होते like - transmit time, response time, number of users, type of transmission medium, capabilities of connected h/w and efficiency of software

③ Reliability → is a measure of frequency of failure. and the time taken to resolve form the failure.

④ Security → Includes protecting data from unauthorized access, processing data from damage and development.



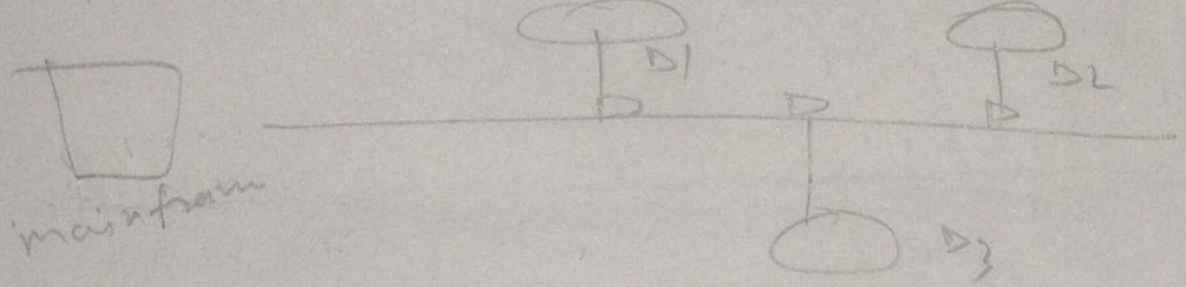
Types of connection

① Point to point

Point to point connection dedicated line provide करता है two devices के between. ये जो connection होता है वो actual length of wire or cable का use करते है पर other options की बात करे तो microwave, satelite links are also possible.

② Multiple point या multipoint →

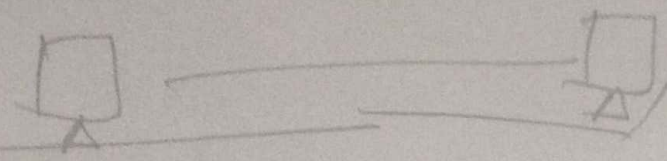
एक single link से multiple devices connected होते है। इसे multidrop भी कहते है



Physical topology

Refer to the way in which a network is laid out physically. Topology of a network is the geometric representation of the relationship of all the links and linking devices to one another.

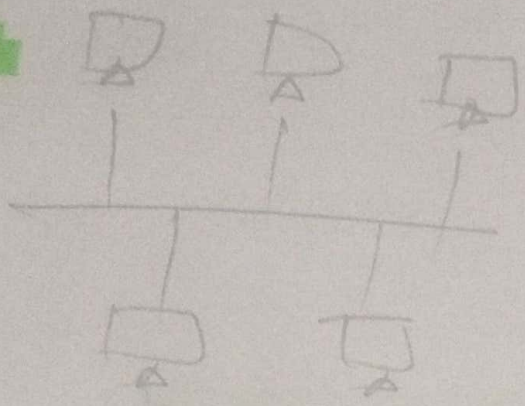
① point to point



Dis control line

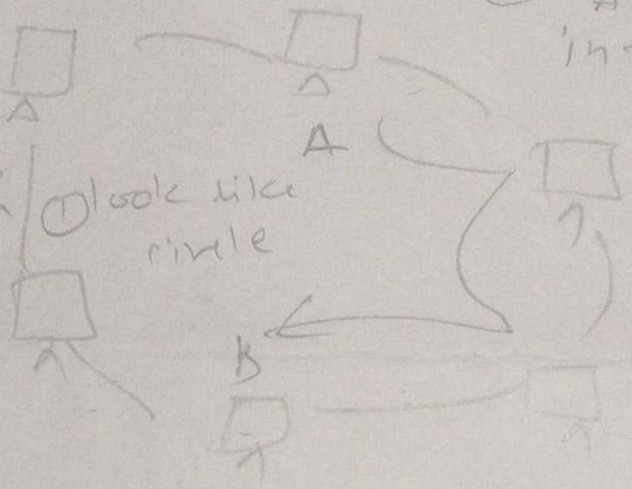
Ad ① Easy of installation
② use less cabling than mesh or star topologies.

② Bus



Dis → ① Difficult reconnection and fault isolation
② difficult to add new devices to network
③ A fault or break in the bus cable stops all transmission.

③ Ring

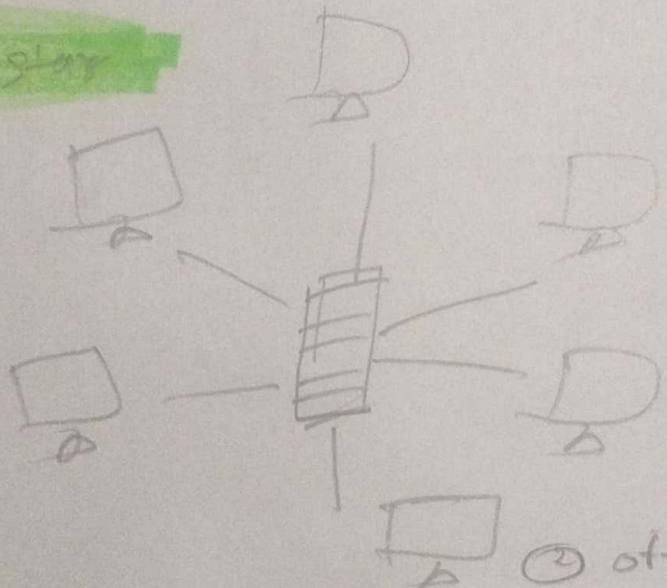


Ad →
① install & re-configure easy.
② fault isolation is simplified.

① look like circle

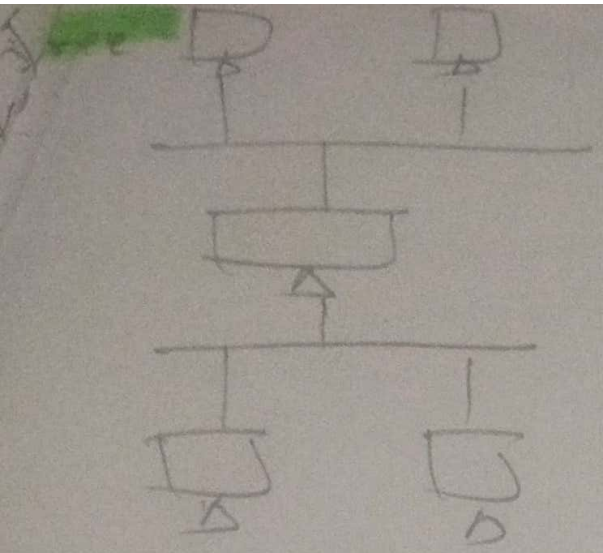
dis → A break in the ring can disable the entire n/w

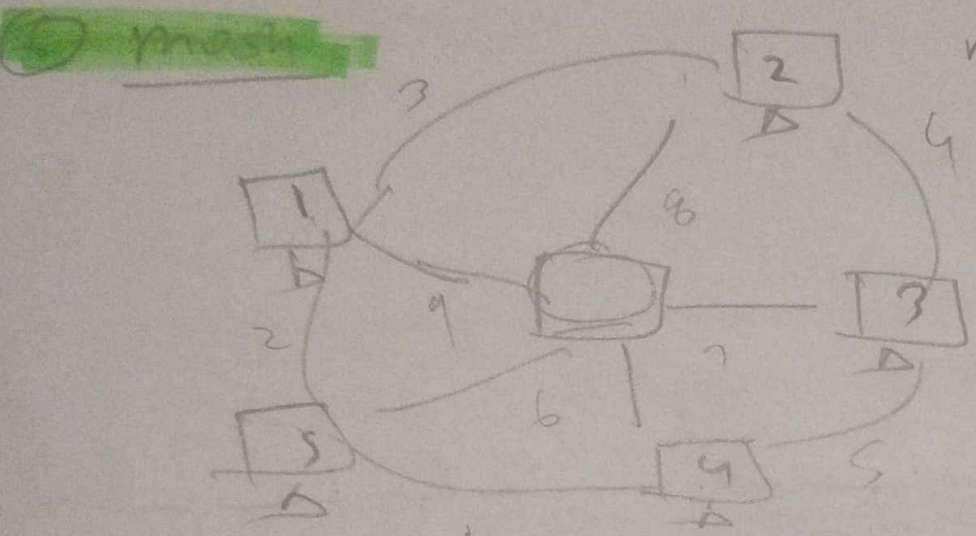
④ Star



Dis → ① Dependency of the whole topology on one single point, the hub
② often more cabling is required than other topology.

Ad →
① Less expensive than mesh topology in a star
② Easy to install and reconfigure and less costly.
③ It is robust, if one link fails only that link affected.
④ Easy fault identification, and fault isolation.





n-1 connection
$n(n-1)/2$ total connection

Adv
- No traffic problem
- Robust
- Privacy or security
- fault identification and fault isolation easy.

Disadv
- Installation, reconnection are difficult.
- The sheer bulk of the wiring.
- Expensive.