

Chapter-1

Data Communication

Data Communication is the exchange of data (in the form of 0's and 1's) between 2 devices (computers) via some form of the transmission medium.

Elements of Communication over Networks

- (i) Devices (Sender/Receiver) (used to communicate with each other)
- (ii) Medium (How devices are connected)
- (iii) Messages (Information that travels over the medium)
- (iv) Rules/Protocols (Governs how messages flow across network)

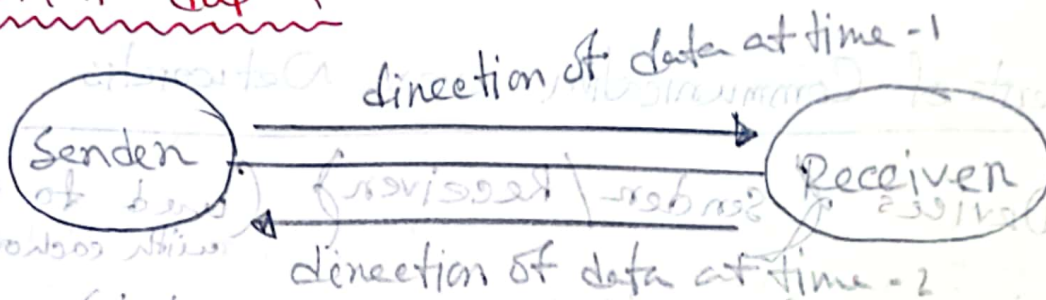
#Dataflow

(I) Simplex

; (उदाहरण) data ; keyboard, speaker

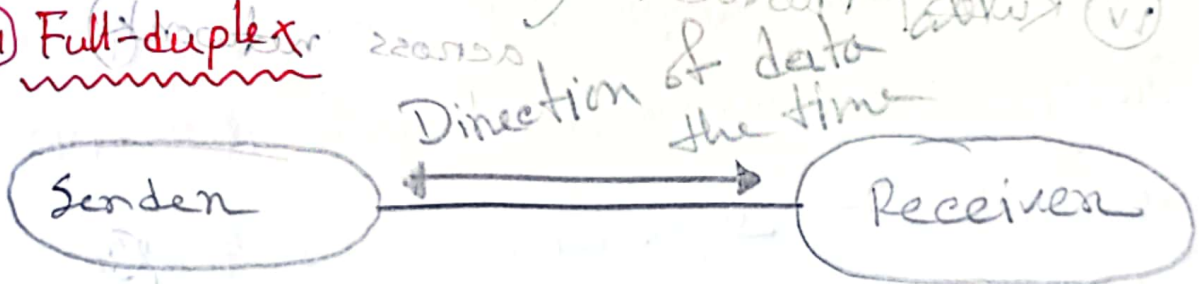


(II) Half-duplex



Sender and receiver both can send data but not at the same time; Walkie-talkie

(III) Full-duplex

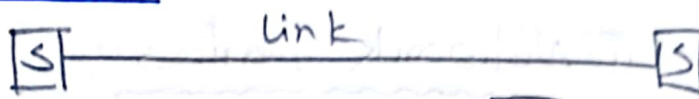


Both can share data at the same time.

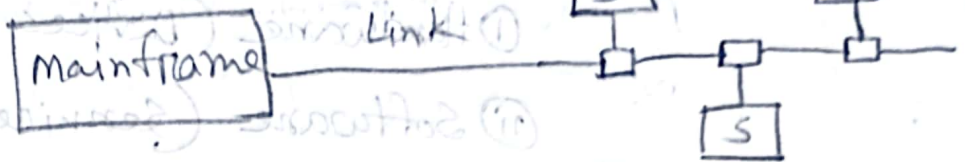
#Types of Connections

S = Station

① Point-to-point

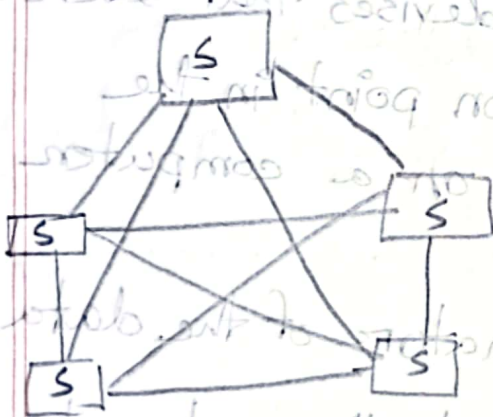


② Multipoint

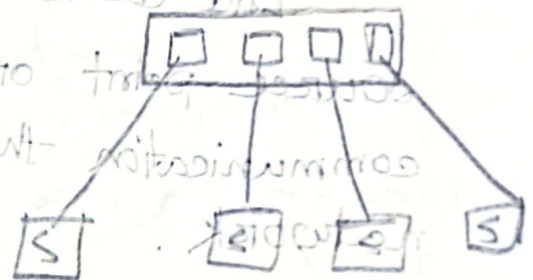


#Topology

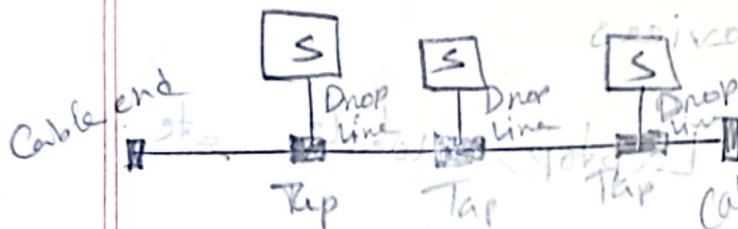
① Mesh



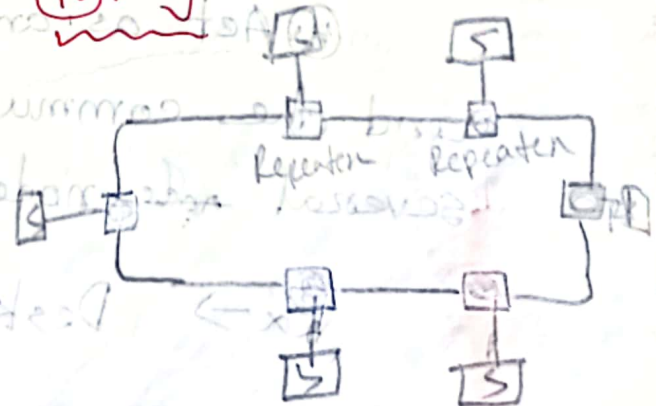
② Star



③ Bus



④ Ring



Network Elements

① Network Devices

- ① Hardware (Devices and Media)
- ② Software (Services and Processes)

Devices

① End Devices :

End devices are node devices that serve as a source point or a destination point in the communication that occurs on a computer network.

① Serve as the originators of the data on information that flows through the network.

② Act as an interface between humans and the communication network having several ~~node~~ node devices.

Ex → Desktop, Laptop, mobile etc.

⑪ Intermediary Devices

Intermediary devices are node devices that are designed to forward data from one side to another side in a computer network.

① Provides

① Provides connectivity between end devices

② Manages data as it flows through the network.

③ Providing network security by permitting or denying the flow of data, based on security settings.

④ Detect errors and faults effectively.

Ex → Hubs, Switches, Routers.

Software

• Services

- ① Provides information in response to a request
- ② For example → e-mail, web hosting service

• Processes

- ① Provide the functionality that directs and moves the messages through the network
- ② Processes are less obvious to us but are critical to the operation of networks

Rules / Protocols

A set of predetermined rules that govern communication

Network Types

① Personal Area Networks (PAN)

- ① A network that connects computers, peripherals and other devices within a personal operating space; Ex → Bluetooth

ii) Local Area Networks (LAN)

① Connects computers, peripherals and other devices within a building (Ex → office home) or in a limited area.

② Typical coverage 50 to 300 meters; Ex → Ethernet Wireless LANs

iii) Metropolitan Area Network (MAN)

① Is a city wide network

② The coverage limitation is not strict, but real implementation may have range of up to 50 km in urban, suburban, or rural area; Ex → WiMax

iv) Wide Area Networks (WANs)

① A network that spans larger geographical area

② LANs separated by geographical distance are connected by a Wide Area Network (WAN)

Ex → PSTN, Cellular Networks (GSM etc)