



# COMPUTER NETWORKS

Prepared by:  
Prof. Palak Patel,  
Asst. Professor,  
Computer Department  
Umiya Arts and Commerce College

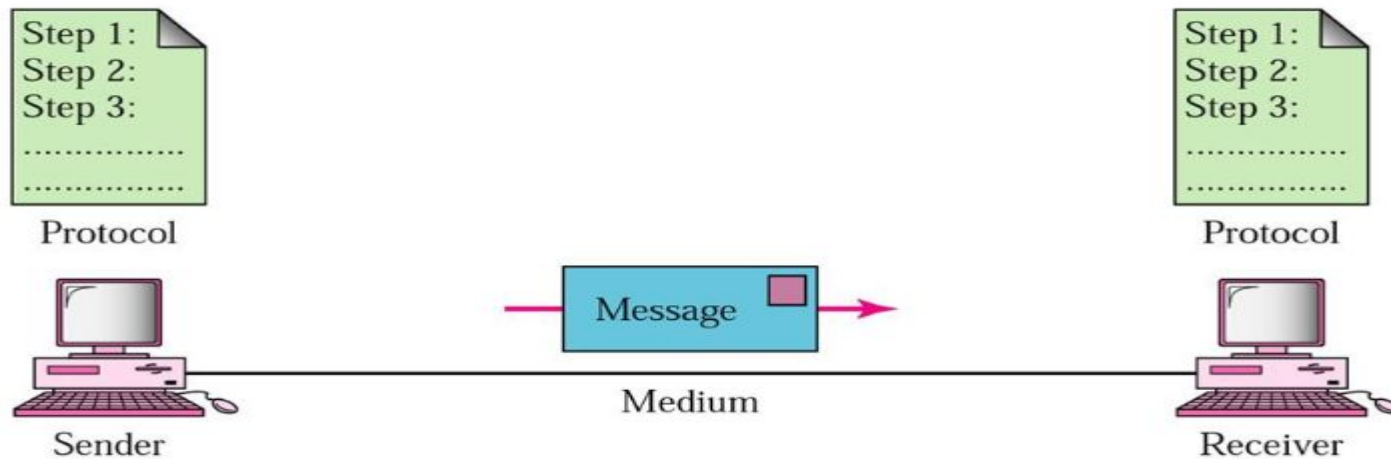
## DEFINITION

*“ A computer network is a group of computer system and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users.”*



## WHAT IS DATA COMMUNICATION ?

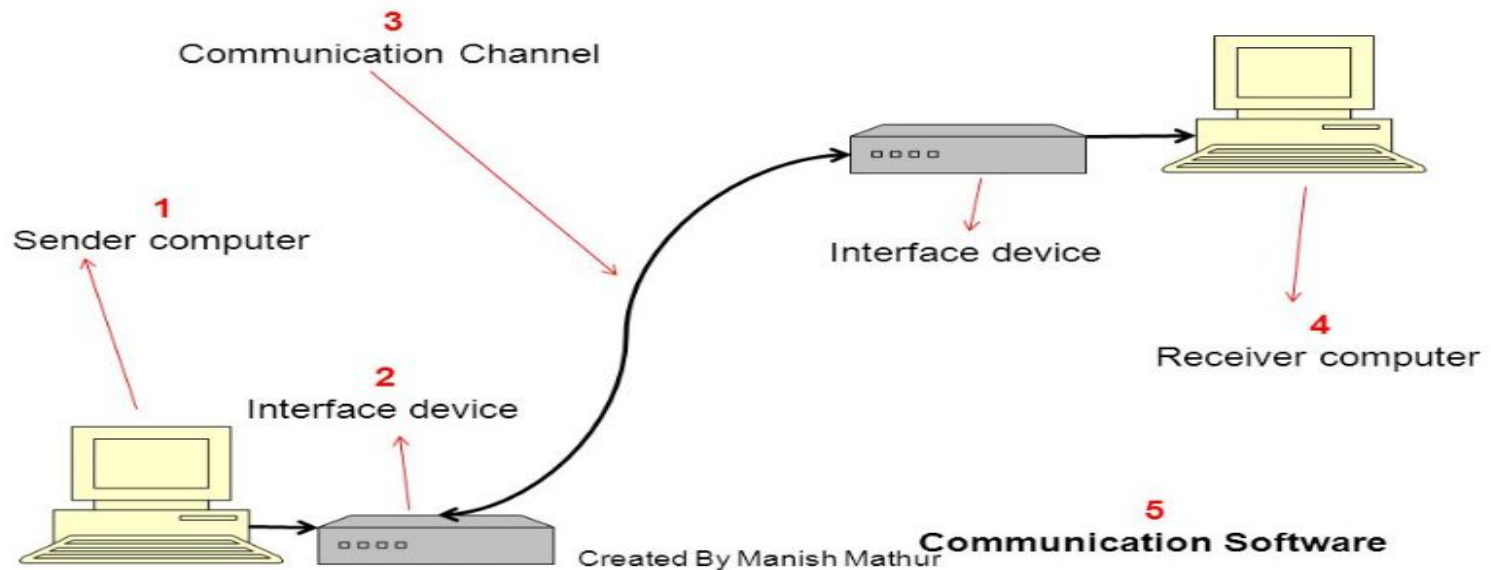
When we communicate, we are sharing information. This sharing can be local or remote . Between individuals, local communication usually occurs face to face , while remote communication takes place over distance.



# DATA COMMUNICATION COMPONENTS

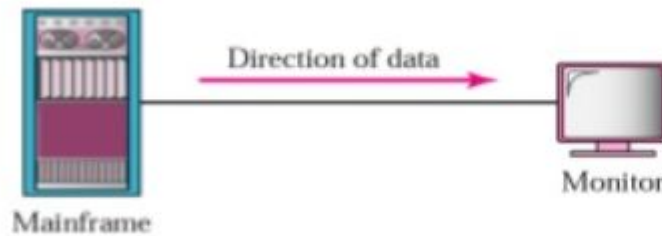
A data communications system has five components.

1. Message
2. Sender
3. Receiver
4. Transmission medium
5. Protocol

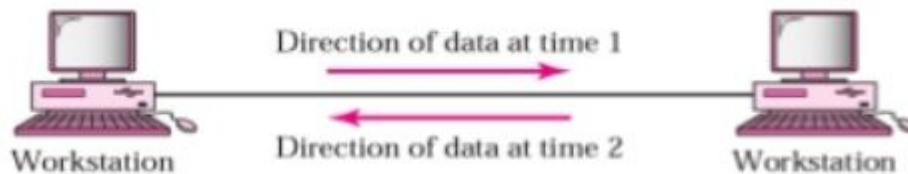


# DATA FLOW

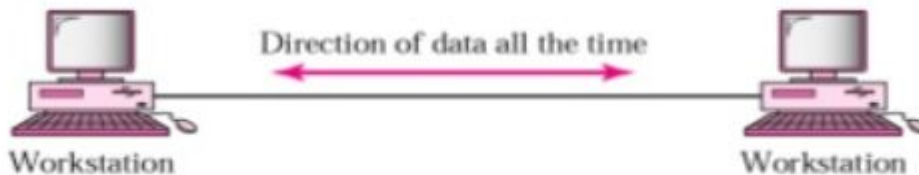
Communication between two devices can be simplex, half-duplex or full-duplex.



Simplex



Half Duplex



Full Duplex

## DATA FLOW TYPES

- **Simplex:**

In simplex mode, the communication is unidirectional, as on a one-way street. Only one of the devices on a link can transmit; the other can only receive. Keyboards and traditional monitors are example of simplex devices. The keyboard can only introduce input; the monitor can only accept output.

- **Half-duplex:**

In half-duplex mode, each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive, and vice versa the half-duplex mode is like one-lane road with traffic allowed in both direction. Walkie-talkies and CB radios are both half-duplex system.



- **Full-Duplex:**

Full-Duplex data transmission means that data can be transmitted in both direction on a signal carrier at the same time. For example, on a local area network with a technology that has Full-duplex.

## COMPUTER NETWORKS IN OTHER WORDS..

A network is a set of devices connected by communication links. A node can be a computer, printer, or an other device capable of sending and receiving data generated by other nodes on the network.

### **Distributed Processing :**

Most network use distributed processing, in which a task is divided among multiple computers.



# DISTRIBUTED PROCESSING



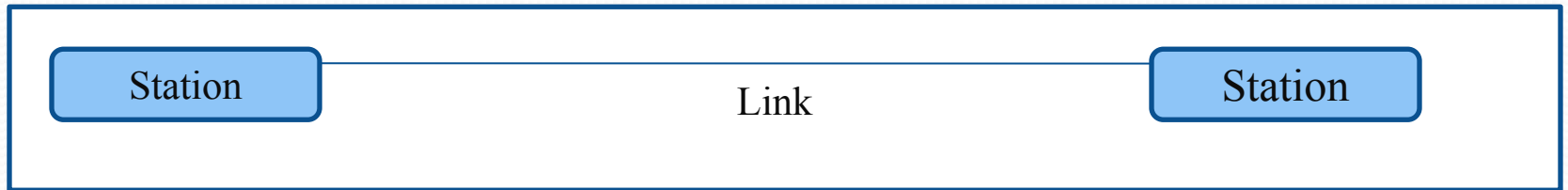
## PHYSICAL STRUCTURE

### □ Types of Connection :

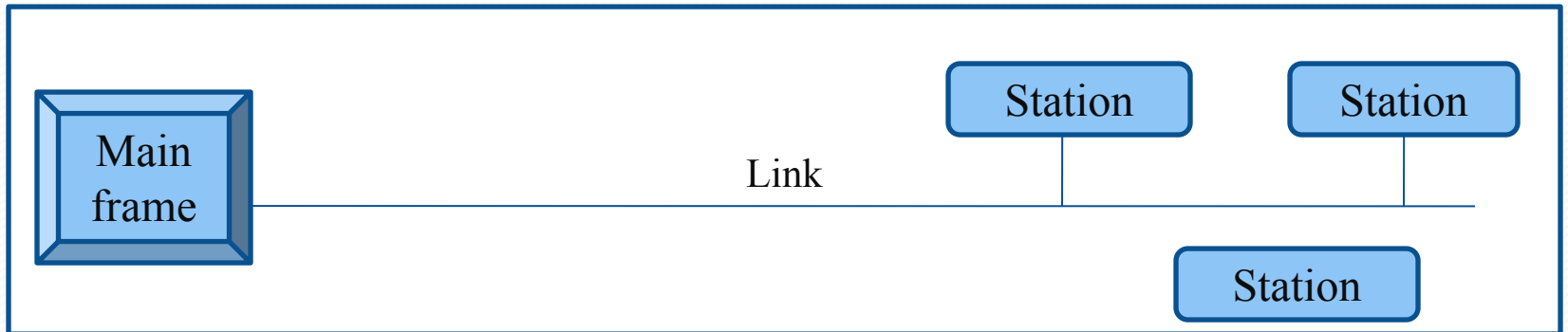
A network is two or more device connected through links. A link is a communications pathway that transfer data from one device to another. For visualization purposes, it is simplest to imagine any link as a line drawn between two points.

- A. **Point -to-point:** A point-to-point connection provides a dedicated link between two device s. The entire capacity of the link is reserved for transmission between those two devices. Most point-to-point connections use an actual length of wire or cable to connect the two ends.
- B. **Multipoint:** A multipoint (also called multidrop) connection is one in which more than two specific devices share a single link. In a multipoint environment, the capacity of the channel is shared, either spatially or temporally. If several devices can use the link simultaneously, it is a spatially shared connection. If users must take turns, it is a timeshared connection.

## A. Point-to-Point



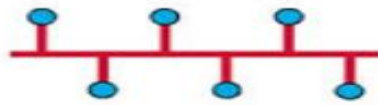
## B. Multipoint



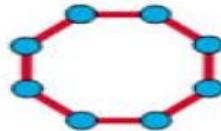
## PHYSICAL TOPOLOGY

The term physical topology refers to the way in which a network is laid out physical. One or more devices connect to a link; two or more links form a topology. The topology of a network is the geometric representation of the relationship of all the links and linking devices to one another. There are four basic topologies possible: mesh, star, bus, and ring.

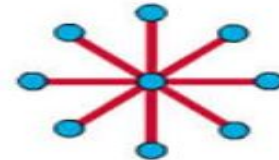
### Physical Topology



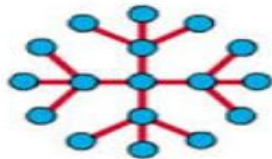
Bus Topology



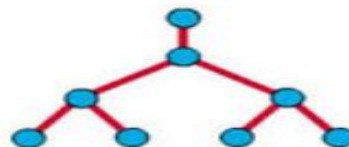
Ring Topology



Star Topology



Extended Star Topology



Hierarchical Topology



Mesh Topology

- ❖ **Mesh Topology:** In a mesh topology, every device has a dedicated point-to-point link to every other device. The term *dedicated* means that the link carries traffic only between the two device it connects.
- ❖ **Star Topology:** In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. The device are not directly linked to one another. Unlike a mesh topology, a star topology does not allow direct traffic between device.
- ❖ **Bus Topology :** The preceding examples all describe point-to-point connection. A **bus topology**, on the other hand, is multipoint. One long cable acts as a **backbone** to link all the devices in a network . Node are connected to the bus cable by drop lines and taps. A drop line is a connection running between the device and the main cable.
- ❖ **Ring Topology:** In a ring topology, each device has a dedicated point-to-point connection with only the two device on either side of it. A signal is passed along the ring in one direction, from device to device, until it reaches its destination.

## CATEGORIES OF NETWORK

- **Local Area Networks:(LAN)**
- **Metropolitan Area Networks:(MAN)**
- **Wide Area Networks:(WAN)**



# LOCAL AREA NETWORK

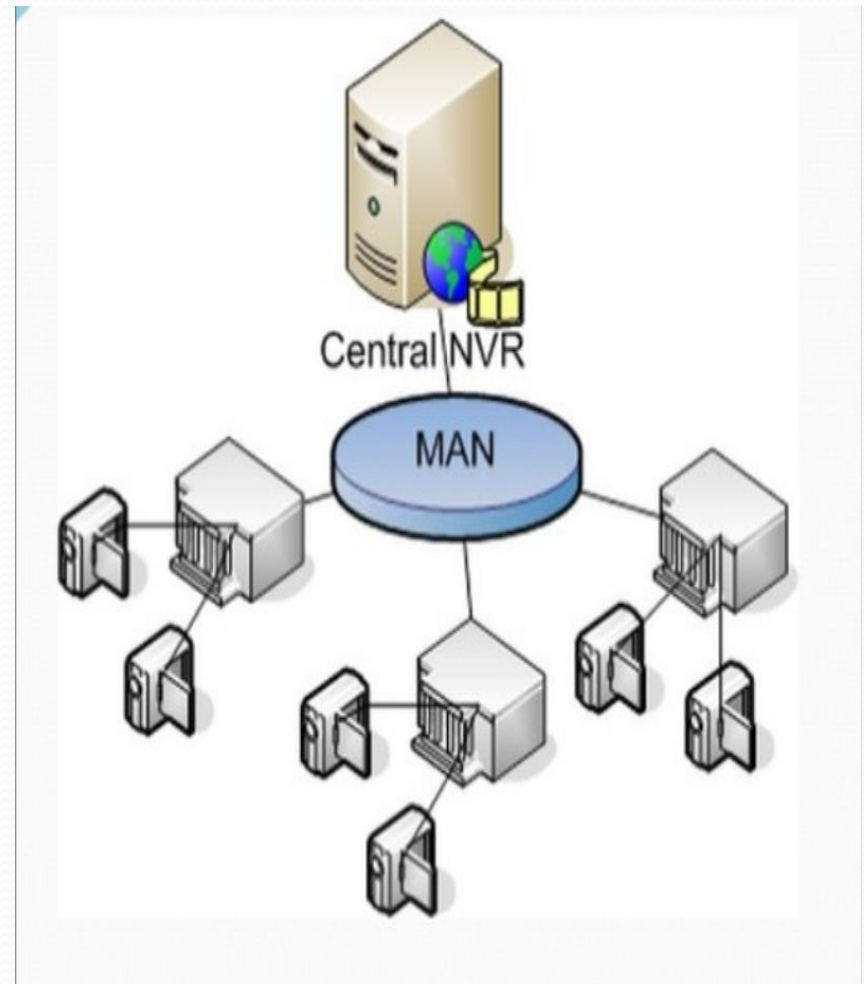
Local area networks, generally called LANs, are privately-owned networks within a single building or campus of up to a few kilometres in size. They are widely used to connect personal computers and workstations in company offices and factories to share resources and exchange information. LANs are distinguished from other kinds of network by three characteristics:

- I. **Their size,**
- II. **Their transmission technology,**
- III. **Their topology.**



## METROPOLITAN AREA NETWORK

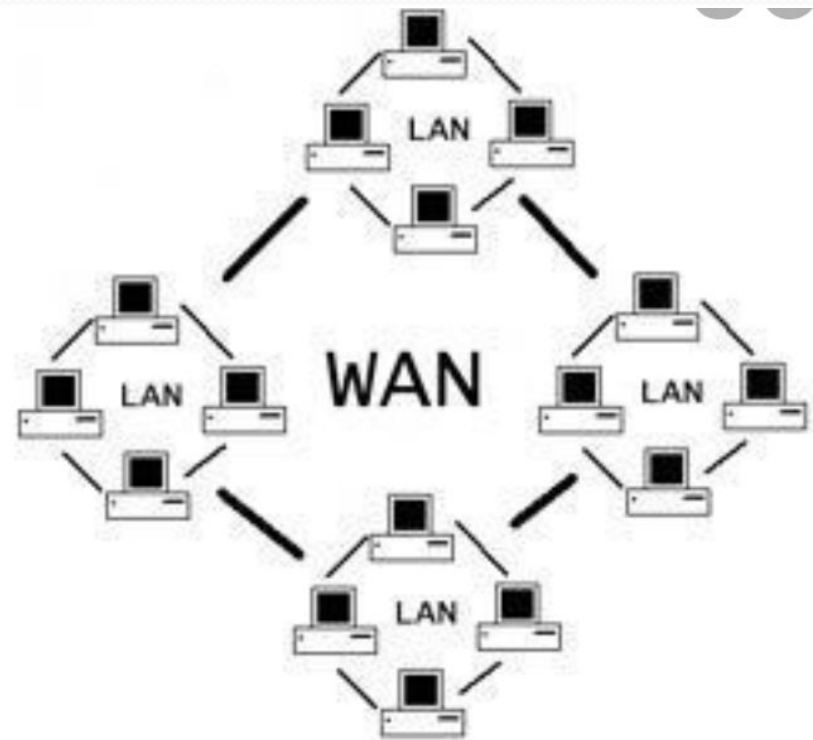
A metropolitan area network, or MAN, covers a city. The best-known example of a MAN is the cable television network available in many cities. This system grew from earlier community antenna systems used in areas with poor over-the-air television reception. In these early systems, a large antenna was placed on top of a nearby hill and signal was then piped to the subscribers' houses. At first, these were locally-designed, ad hoc systems. Then companies began jumping into the business, getting contrast from city governments to wire up an entire city.





## WIDE AREA NETWORK

A wide area network, or WAN, spans a large geographical area, often a country or continent. It contains a collection of machines intended for running user programs. These machines are called as hosts. The hosts are connected by a communication subject for short. The hosts are owned by the customers, whereas the communication subnet is typically owned and operated by a telephone company or internet service provider. The job of the subnet is to carry messages from hosts to host, just as the telephone system carries words from speaker to listener.



## ADVANTAGES

- Sharing devices such as printers saves money.
- Site (**software**) licences are likely to be cheaper than buying several standalone licences.
- Files can easily be shared between users.
- Network users can communicate by email and instant messenger.
- Security is good - users cannot see other users files unlike on standalone machines.
- Data is easy to backup as all the data is stored on the file server.

## DISADVANTAGES

- Purchasing the network cabling and file servers can be expensive.
- Managing a large network is complicated, requires training and a network manager usually needs to be employed.
- If the file server breaks down the files on the file server become inaccessible. Email might still work if it is on a separate server. The computers can still be used but are isolated.
- Viruses can spread to other computers throughout a computer network.
- There is a danger of hacking, particularly with wide area network.



*THANK YOU*