

Introduction to Computer Network:

Interconnected collection of autonomous computers. Two computers are side to be interconnection if they are able to exchange information.

Or: network is simply a collection of intercommunicating computers and peripherals possibly having access to remote hosts and other computer networks. A network consists of a set of computers: hosts, connected via a communication subnet. The word 'host' refers to an individual computer connected to the network, which can communicate with other hosts via the network.

A Compute network should ensure:

- ✓ **reliability** of the data communication process
- ✓ **security** of the data
- ✓ **performance** by achieving higher throughput and smaller delay times

The benefits of computer networks:

We can summarize the benefits of computer networks as follow:

1. **Resource sharing:** the goal is to make all programs, equipment, and especially data available to anyone on the network without regard to physical location of the resource and the user.
2. **High reliability:** by having alternative sources of supply .for example, all files could be replicated on two or three machines, so if one of them is unavailable (due to a hardware failure).

3. **Saving money:** small computers have a much better price/performance ratio than large ones. Mainframes (room-size computers) are roughly a factor of ten faster than personal computers, but they cost a thousand times more.
4. **Scalability:** is the ability to increase system performance gradually as the workload grows just by adding more processors.
5. **Communication media:** used to provide a powerful media among widely separated employees.
6. **Computer network delivering services to private individuals at home, like:**
 1. Access to remote information.
 2. Person-to-person communication.
 3. Interactive entertainment.

DATA COMMUNICATIONS:

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.

The term ***Telecommunication***, which includes telephony, telegraphy, and television, means communication at a distance.

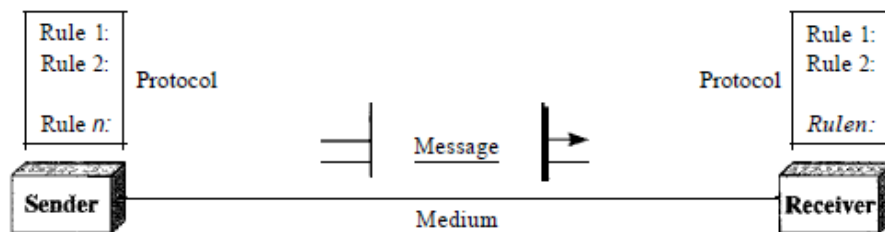
The word ***data*** refers to information presented in whatever form is agreed upon by the parties creating and using the data.

Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable. For data communications to occur, the communicating devices must be part of a communication system made up of a combination of hardware (physical equipment) and software (programs).

Components of data communications system:

A data communications system has five components

Figure 1.1 *Five components of data communication*



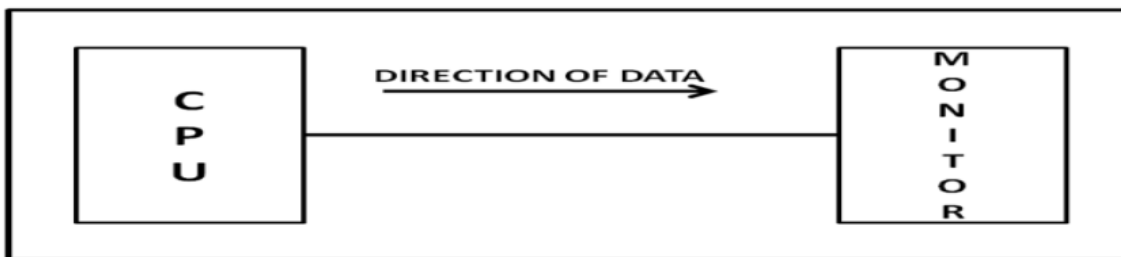
1. **Message.** The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.
2. **Sender.** The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.
3. **Receiver.** The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.
4. **Transmission medium.** The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.
5. **Protocol.** A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

Data Flow:

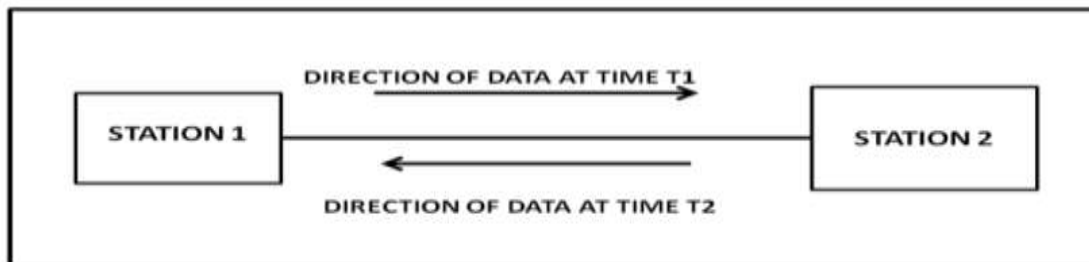
Two devices communicate with each other by sending and receiving data. The data can flow between the two devices in the following ways.

1. Simplex
2. Half Duplex
3. Full Duplex

- In Simplex**, communication is unidirectional
- Only one of the devices sends the data and the other one only receives the data.
- Example: in the above diagram: a CPU send data while a monitor only receives data.



- In Half Duplex** both the stations can transmit as well as receive but not at the same time.
- When one device is sending other can only receive and vice-versa (as shown in figure)
- Example: A walkie-talkie.



- **Full duplex mode**, both stations can transmit and receive at the same time.
 - Example: mobile phones

