Second Chapter Lesson-1: Concept of Data Communication System and Data Transmission Speed.

At the end of this lesson-

1. You will be able to explain the concept of data communication.

2. You will be able to describe the elements of a data communication system.

3. You will be able to explain the data communication speed.

Data communication:

Data communications refers to the transmission of the digital data between two or more nodes in a network. OR Data communication refers to the reliable exchange of data or information from one place to another or from one device to another in a network. Emails, SMS, Phone calls, Chatting etc. are examples of data communication.

For data communication between digital devices softwares is required. These softwares are called communication software. For Example- WhatsApp, IMO, messenger etc.

Before digital communication, people were used as a medium to exchange information in a remote place. That is, people would pass information from one place to another. Moreover, people used to communicate by typing letters on the legs of pigeons. Later, with the invention of devices like telegraphs and telephones, the concept of communication changed. Then the discovery of radio, television and the Internet revolutionized communication. Communication is now done through text and audio as well as video exchange.

Data communication system:

Communication system is a collection of communication devices and networks to transmit data/information among different nodes.

There are several types of communication systems. Such as:

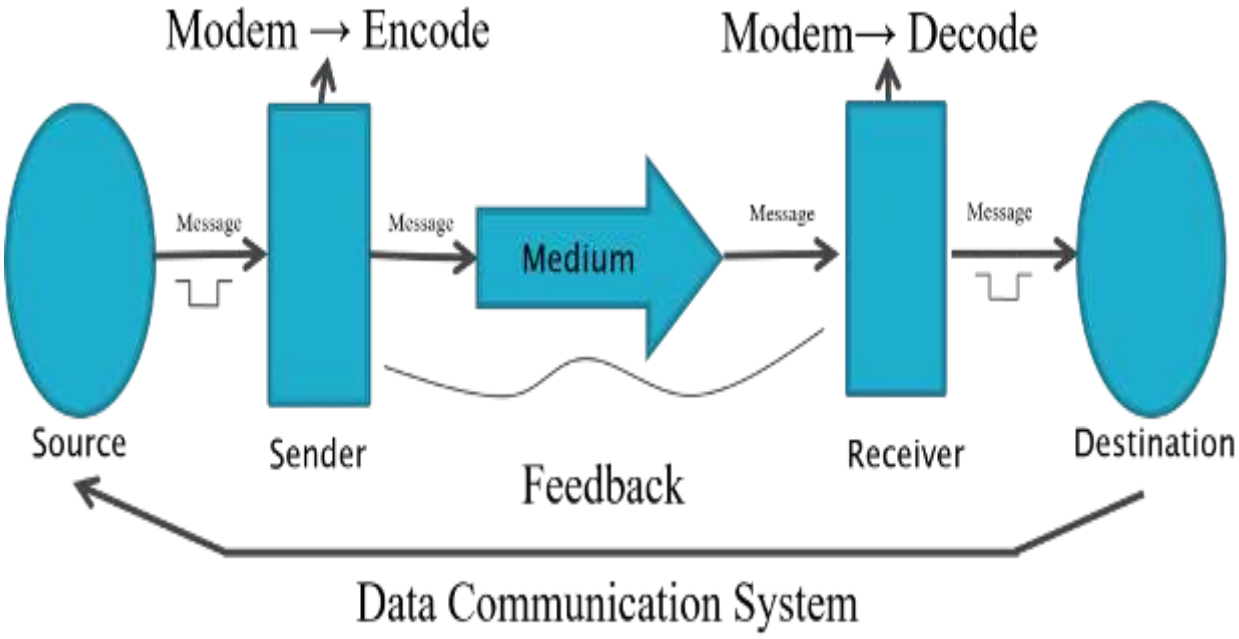
- Telephone communication system.
- Mobile phone communication system.
- Computer based communication system.
- Internet based communication system.

Below are some examples of communication systems through diagrams.

Elements of Data Communication System:

Data communication system has five basic elements. They are-

1. Source
2. Transmitter
3. Medium
4. Receiver
5. Destination



Source: The device from which data is sent. Example- Computer, Telephone, Mobile Phone etc.

Transmitter/Sender: The device that makes data for transferable and sent to the receiver through media. Example- Modem.

Encode: Conversion of human language to machine language.

Medium: That connects source and destination and through which data is transmitted. Such as- wired medium (coaxial cable, twisted pair cable, fiber optic cable, telephone line) and wireless medium (radio web, microwave, infrared).

Receiver: The device that receives data from communication medium and converts it for destination. Example- Modem.

Decode: Conversion of machine language to human language.

Destination: The device where data is sent or target device. Example- Computer, Telephone, Mobile Phone etc.

Efficiency of a data communication system:

Efficiency of a data communication system mainly depends on the following data transmission characteristics.

1. Data Transmission Speed
2. Data Transmission Mode
3. Data Transmission Method
4. Data Transmission Medium

Data Transmission Speed:

The amount of data (bit) that is transferred from one computer to another or from one device to another per second is called data transmission speed. That is,the data transfer rate of a communication system is called data transmission speed. Data transmission speed is also called bandwidth. This bandwidth or data transmission speed is usually measured in units of Bit per Second (bps), Mbps, Gbps, etc. Binary digits 0 and 1 are called bits. It is expressed by b. 58 kbps means 58 kilobits of data is transferred from one device to another per second.

- 1 byte= 8 bit
- 1 kilobyte= 1024 Byte
- 1 Megabyte = 1024 Kilobyte
- 1 Gigabyte = 1024 Megabyte
- 1 Terabyte = 1024 Gigabyte

The higher the bandwidth of a system, the more data will be exchanged through the system.

Data transmission speed can be divided into three parts based on the speed of data transfer. E.g.

1. Narrow Band
2. Voice Band
3. Broad Band

Narrow band(45 – 300 bps): Data is transferred in a speed from 45 to 300bps. It is used in telegraph communication system.

Voice band(1200 – 9600 bps): Data is transferred in a speed from 1200 to 9600bps. It is used in telephone system and also used in computer or peripheral devices.

Brod band(1Mbps +): Data is transferred in a speed from 1 Mbps to very high speed. It is used in data transmission through optical fiber cable, microwave etc.

Lesson Evaluation-

Knowledge Based Questions:

a) What is data communication?

a) What is a data communication system?

a) What is the channel?

a) What is bandwidth/data transmission speed?

a) What is a narrow band?

a) What is a voice band?

a) What is broadband?

Comprehension Based Questions:

b) What do you understand by bandwidth 58kbps?

b) Explain 9600bps.

b) Which band is indicated by 1.4kbps? explain.

b) Explain the bandwidth of mobile phones.

b) Explain the bandwidth of telegraph.

Creative Questions:

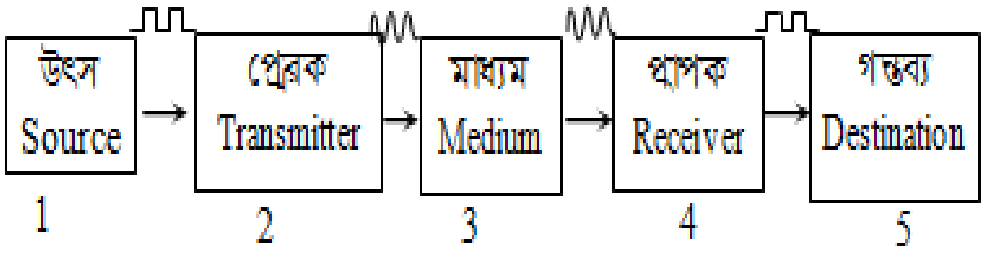
Read the following stem and answer the questions:

Mr. Mokarram created his own network through cable in various offices in the metropolitan area and he controlled the branch office from his head office. This allows its data transfer to be very slow. Whose data transmission speed is 300bps. But he found out that in Bangladesh, all the railway stations across the country have very fast data exchange through eco-friendly wires. Mr. Mukarram thought of changing his network cable to make it look like a railway.

c) Explain by identifying the cause of Mr. Mukarram's problem in the stem.

d) How effective do you think the decision of Mr. Mukarram will be to the stem? Analyze with logic.

Notice the following stem and answer the questions:



c) Explain the flow diagram.

d) Analyze the role of (2) and (4) in data transmission.

Multiple Choice Questions:

1. What is bandwidth?

a) Mode of data flow

b) The medium of data flow

c) Rate of data flow

d) The direction of data flow

2. What is the bandwidth of broadband ?

a) 1 mbps or more

b) 9600 bps

c) 45-300 bps

d) less than 45 bps

3. Data transmission speed can be divided into how many parts?

a) 2 b) 3 c) 4 d) 5

4. What is data communication?

a) Exchange of information between two devices

b) The flow of information without media

c) Wired information flow only

d) Computer based communication only

5. What is the minimum speed of narrow bands in bps?

a) 35 b) 45 c) 200 d) 300

6. What is the full form of bps?

a) bit per second

b) byte per second

c) binary per second

d) bit per system

7. What is the maximum speed of data transfer in a voice band?

a) 300 bps

b) 1200 bps

c) 9600 bps

d) 1 Mbps

8. Where is the voice band used?

a) Telegraph b) Telephone c) Router d) Gateway