

**Computer science**  
**9<sup>th</sup> class**  
**lecture#01**  
**ch#04**

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# Data and information:

## **Data:**

Representation of facts, concepts or instructions in a formalized manner which should be suitable for communication, interpretation or processing by human or electronic machine.

Example: costs, addresses, employee names etc.

## **Information:**

- organized or classified data which has some meaningful values for the receiver.
- On which decisions and actions are based.

Example: pay slips, receipts, marks obtained by students etc.

# Data communication

Data communication is the transmission of data between two points.

## Data Transmission:

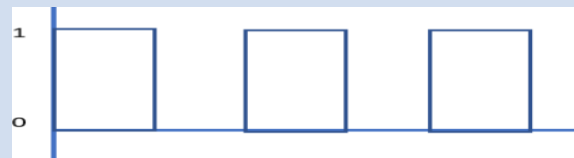
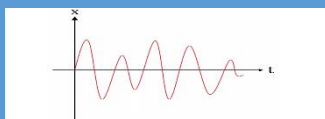
In computer technology, data transmission means sending information (streams of bits or bytes) from one place to another using guided and unguided media.

There are two methods used to transmit data between digital devices. They are serial and parallel transmission.



# Analog and digital signal

Analog	Digital
An analog signal is a continuous signal that represents physical measurement.	Digital signals are time separated signals which are generated using digital modulation.
It is denoted by sine waves.	It is denoted by square waves.
It uses continuous range of values to represent information.	It uses discrete 0(OFF) and 1(ON) to represent information.
The analog signal bandwidth is low.	The digital signal bandwidth is high.
Analog hardware never offers flexible implementation.	Digital hardware offers flexible implementation.
It is suited for audio and video transmission.	It is suited for computing and digital electronics.
It does not offer any fixed range.	It has a finite number, i.e., 0 and 1.
Temperature sensors, FM radio signals, photocells, light sensor, resistive touch screen are examples.	Computers, CDs, DVDs are examples.



# Elements/Components of network communication

- **sender**

It is a device (computer, telephone handset etc.) that sends the message. The message may consist of text, numbers, pictures etc. It is also called source or transmitter.

- **message**

It is the data, information or instruction to be transmitted. It may consist of text, number, picture, audio, video or combination of these.

- **receiver**

It is the device (computer, radio etc.) that receives the message. It is also called sink (destination). The receiver must be capable of accepting the message.

# Continued.....

- **Transmission medium**

It is the physical path (channel) on which message travels from sender to receiver. The medium can be wired or wireless. Examples of medium are radio waves, fiber optic cable etc.

- **Protocol**

It is the set of rules between the two communicating devices that governs the process of data communication. Without protocol communication is not possible.

# Characteristics of a good communication system

- **Delivery**

Data communication must deliver the message to the correct destination to whom it is sent.

Example: an e-mail

- **Accuracy**

System must deliver the message accurately without any change. If incorrect data is transmitted by the system, it may not be usable by the receiver.

- **Timeliness**

The system must deliver the data without significant delay in a timely manner. It is very important in real time transmission (video conferencing). Data deliver late may be useless.

Example: A computer real time system is used to monitor the temperature in an oil refinery.

# Asynchronous & synchronous transmission Modes

## Asynchronous

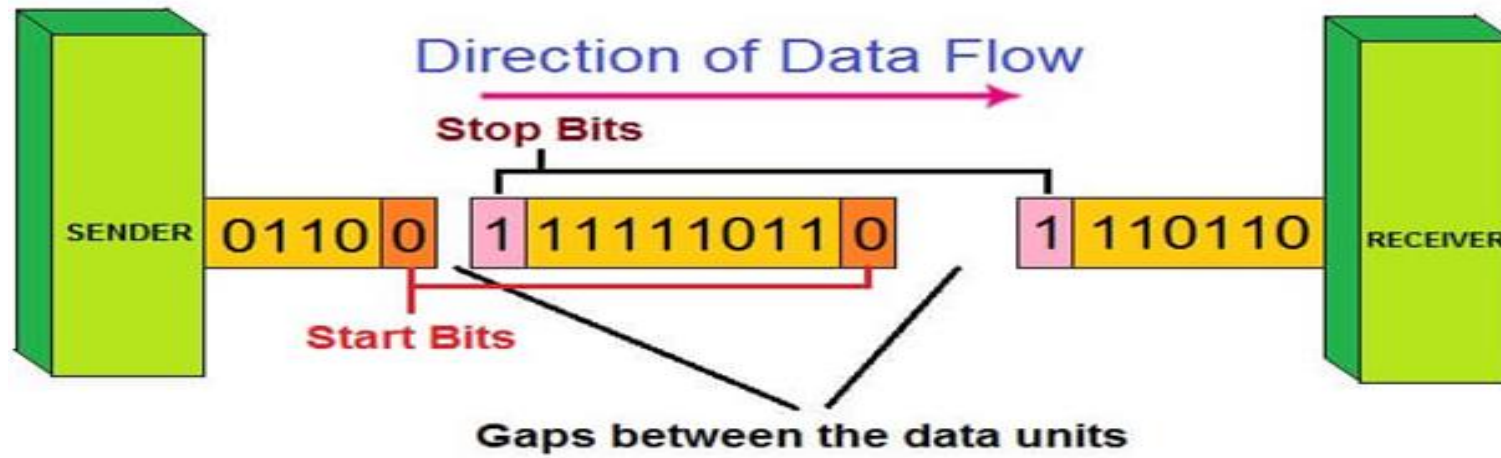
- Data is transmitted character by character.
- The sender and receiver are not synchronized with each other.
- The time interval between two character is not fixed.
- There may gaps between characters being transmitted.
- It uses start and stop bits to control the data transmission.
- It provides less efficient and slower data transmission.
- **Examples** are file transfer, email and the World Wide Web etc.

## Synchronous

- Data is transmitted block by block.
- The sender and receiver are synchronized with each other.
- The time interval between two character is same.
- There are no gaps between characters being transmitted.
- It uses clock signals to control the data transmission.
- It provides more efficient and faster data transmission.
- IP telephony, IP-TV and video conferencing are **examples**.



# Asynchronous Communication



# **Synchronous Transmission**

