

Chapter 2

Data Transmission

Data transmission mechanisms include data to be transmitted either in serial or parallel way. These methods are known as serial transmission and parallel transmission.

i) Parallel Data Transmission:

- Here, multiple data bits are transferred over multiple channels at the same time.
- As multiple bits are sent over multiple channels at the same time, the order in which a bit string is received can depend on various conditions such as proximity to the data source, user location and bandwidth available.
- Parallel data transmission is used when:
 - when a large amount of data is being sent.
 - a data being sent is time sensitive.
 - a data needs to be sent quickly.



Advantages:

- it's easier to program and use.
- data is sent faster.

Disadvantages:

- It may be expensive and unreliable in case of long distance transmission.

ii) Serial Data Transmission:

- Here, it includes the data bits that are organized in specific order, since they can only be sent one after another.
- It's a reliable transmission mechanism because a data bit is only sent if the previous data bit has already been received.



- Serial data transmission are preferred especially during long distance transmission.
- It is used in case where amount of data being sent is relatively small.

Advantages:

- only one communication channel is required because data is sent in a serial way.
- Also the cost is reduced since multiple channels aren't needed.

Disadvantages:

- Speed is relatively slow.
- Conversion device is required between the sender and the receiver.

The serial transmission can be divided into two categories depending upon how transmissions are spaced in time.

i) Asynchronous Serial Transmission:

- Data bits can be sent at any point in time.
- Generally, stop bits and start bits are used between data bytes to synchronize the transmitter and the receiver and to ensure that the data is transmitted correctly.
- Timing isn't constant, so gaps are used to provide time between transmissions.

Advantages:

- No synchronization is needed between transmitter and the receiver.
- It's cost effective method.

Disadvantages:

- Data transmission may be slower but this is not always the case.

ii) Synchronous Serial Transmission:

- Data bits are transferred as a continuous stream in time with a master clock.
- Data transmitter and receiver both operate using a synchronized clock frequency, hence start, stop and gaps aren't used.
- As with perfect timing sync, data moves faster and timing errors are less frequent.

Advantages:

- Provides greater speed with integrity and reliability of data bits.

Disadvantages:

- Comparing to asynchronous serial transmission, this method is generally more expensive.

Line Configuration:

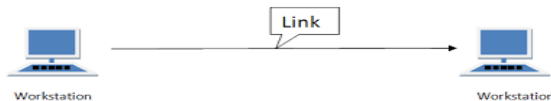
- Generally line configuration refers to the way two or more devices are attached to a link.
- Line configuration is generally referred to as connection.
- For communication to occur, two devices must be connected in same way to the same link at the same speed.
- There are two possible line configuration:-

i) Point-to-point configuration:

ii) Multipoint configuration:

i) Point to point configuration:

- Provides dedicated link between two devices.
- Use actual length of wire or cable to connect the two ends including microwave and satellite link.
- In P2P, the entire channel capacity is reserved for transmission between those two devices.

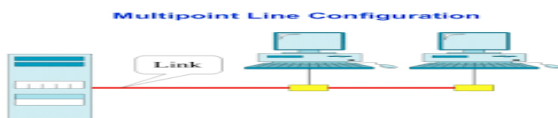


ii) Multipoint configuration:

- Also called a multidrop line configuration, where a specific devices share a single link capacity of the channel.
- The capacity of the channel is shared, as two or more share the link.
- The multipoint line configuration consists of two possibilities:

i) Spatial Sharing: If several devices can share the link simultaneously, it's called spatial sharing.

ii) Temporal(Time) Sharing: If users must take turns using the link, then it's called temporally shared or time shared line configuration.



Bit Rate:

- Bit rate can be defined as the no. of bit intervals per second.
- Generally determines the no. of bits travelled per second.
- Bit rates are used and emphasis is given on determining the computer efficiency.
- Bit rate can't determine the bandwidth.
- Equation is given by:

$$\text{Bit rate} = \text{baud rate} * \text{no. of bits per signal unit}$$

Baud Rate:

- Baud rate is the count of signal units per second.
- It determines how many times the state of signal is changing.

-While data transmission over the channel is more concerned, it can determine how much bandwidth is required to send the signal.

-Baud rate is given by:

Baud rate = bit rate / the no. of bits per signal unit

RS-232C:

-RS-232 standard ("C" is the current version) is the standard that is used to describe the physical interface and protocols for relatively serial data communication on between computers and related devices.

-As PC's DTE(Data Terminal Equipment) agent, it also communicates with the modem or other serial device, which in accordance with the RS-232C standard, has a complementary interface called the Data Communications Equipments (DCE) interface.

-RS-232 consists of 25 pins connector.

-Voltage more negative than -3V is interpreted as binary 1.

-Voltage more positive than +3V is interpreted as binary 0.

RS-449:

-It's generally used for specifying the functional and mechanical characteristics of the interconnection between DTE and complying EIA electronic standards RS-422 and RS-423.

-The RS-449 standard was intended as an enhancement of RS232.

-Aimed for providing serial data transmission at speeds up to 2Mbps.

Interface Standard:

-Generally in telecommunications, an interface standard is a standard that describes one or more functional characteristics (such as code conversion, line assignments, or protocol compliance) or physical characteristics (such as electrical, mechanical or optical characteristics) necessary to allow exchange of information between two or more systems or equipments.

-An interface standard may include operational characteristics and has acceptable level of performance.

-Moreover, interface standard permit command and control functions to be performed using computer and communication systems. Example of interface standard are communication protocol.