

Data Transmission

Data transmission or communication is the process of transferring digital or analog data from one device to another in a point-to-point, point-to-multipoint, or multipoint-to-multipoint environment.

Types of Data Transmission

Data transmission, there are two types of transmission:

- Parallel Transmission
- Serial Transmission
 - Synchronous Transmission
 - Asynchronous Transmission
- **Serial transmission:** It sends one data-bit at a time over a single channel.
- **Parallel transmission:** It can send multiple data-bits at a time over multiple channels.

Parallel Transmission

Parallel Transmission refers to the process of sending multiple data parallelly at the same time over multiple channels known as “**Parallel Transmission**”.

Advantages of Parallel Transmission

- Transferring speed of data is fast.
- This type of transmission is best suitable for short-distance communication.
- A lump sum amount of data can be sent easily.
- It matches the system’s internal hardware as well.

Disadvantages of Parallel Transmission

- It is costly due to the requirement of channels on each node.
- It is not suitable for long-distance communication.

Serial Transmission

In serial data transmission, Multiple data can be sent over a single channel one after another known as “**Serial Transmission**”. At the time of transmitting the data from sender to receiver that time each node does not require multiple channels, in this case, it can be sent with a single communication channel. When the first node is sent over the single channel then the second node turn next to send from the sender to the receiver over the channel.

Advantages of Serial Transmission

- It is cost-effective transmission where only a single communication channel is required.
- It is suitable for short and long-distance communication.

Disadvantages of Serial Transmission

- It takes time while transmit the data
- The technology used in this type of transmission is old which is one bit at a time.

In serial transmission, there are two types:

- Synchronous Transmission
- Asynchronous Transmission

Synchronous Transmission

In synchronous transmission, It is **the method of sending a huge amount of data** in the form of blocks (each block has many characters). The data is transmitted in a full duplex method where the **sender and receiver both can get the data at the same time**. It is known as **“Synchronous Transmission”**.

Advantages of Synchronous Transmission

- Huge amount of data can be sent
- It reduces the timing error
- It provides real-time communication

Disadvantages of Synchronous Transmission

- To communicate successfully, both the sender and receiver must use the same clock frequency simultaneously.
- The accuracy level of the data received relies on how effectively the receiver can count the bits it has received.

Asynchronous Transmission

In asynchronous communication, **only one character at a time is sent**. If a character is a number or an alphabetic letter. It uses start and stops bits for transferring the data. it is known as **“Asynchronous Transmission”**.

Advantages of Asynchronous Transmission

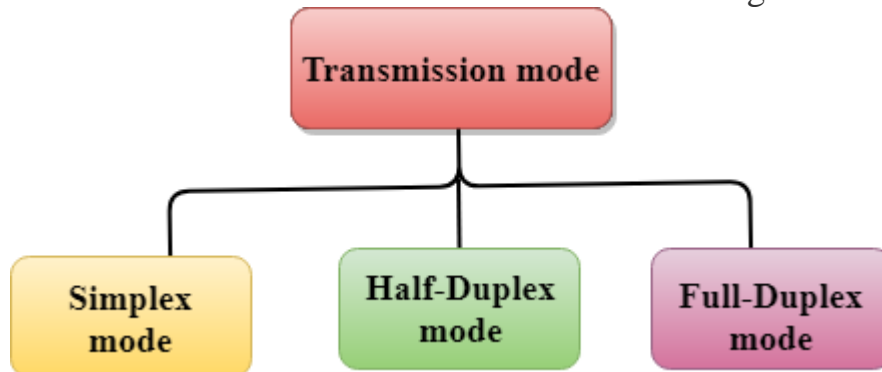
- It is easy to implement
- It's a very flexible technique for the transmission of data.
- There is no need to synchronize the sender and the receiver.
- When data byte transmission is available, data transmission can resume.

Advantages of Synchronous Transmission

- It is difficult to determine synchronization.
- transferring of information is slow
- Start and stop bits require additional information, which increases the size of the transmitted data.

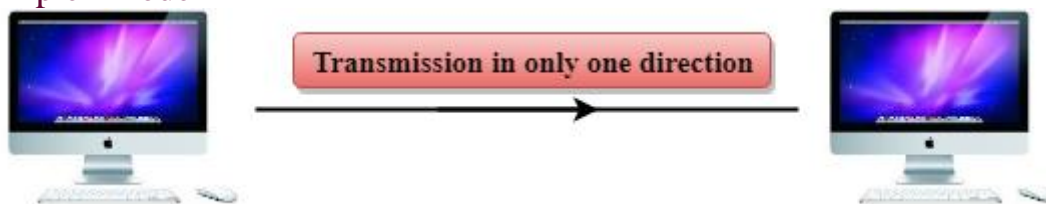
Transmission modes

The Transmission mode is divided into three categories:



- Simplex mode
- Half-duplex mode
- Full-duplex mode

Simplex mode



- In Simplex mode, the communication is unidirectional, i.e., the data flow in one direction.
- A device can only send the data but cannot receive it or it can receive the data but cannot send the data.

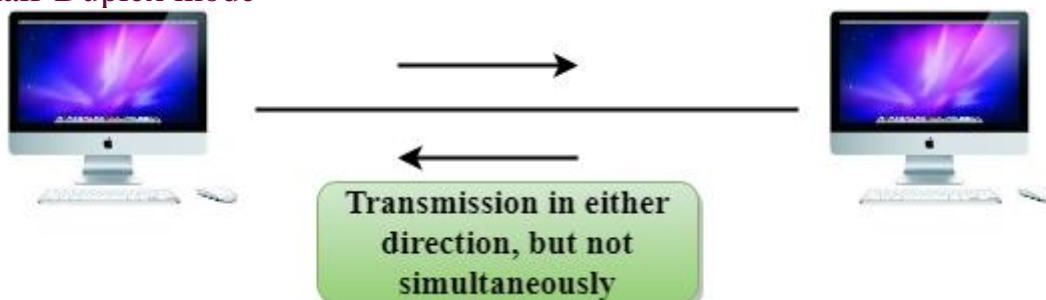
Advantage of Simplex mode:

- In simplex mode, the station can utilize the entire bandwidth of the communication channel, so that more data can be transmitted at a time.

Disadvantage of Simplex mode:

- Communication is unidirectional, so it has no inter-communication between devices.

Half-Duplex mode



- In a Half-duplex channel, direction can be reversed, i.e., the station can transmit and receive the data as well.
- Messages flow in both the directions, but not at the same time.

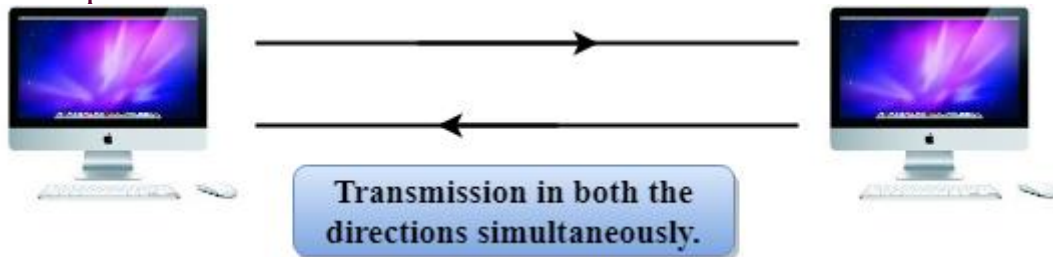
Advantage of Half-duplex mode:

- In half-duplex mode, both the devices can send and receive the data and also can utilize the entire bandwidth of the communication channel during the transmission of data.

Disadvantage of Half-Duplex mode:

- In half-duplex mode, when one device is sending the data, then another has to wait, this causes the delay in sending the data at the right time.

Full-duplex mode



- In Full duplex mode, the communication is bi-directional, i.e., the data flow in both the directions.
- Both the stations can send and receive the message simultaneously.

Advantage of Full-duplex mode:

- Both the stations can send and receive the data at the same time.

Disadvantage of Full-duplex mode:

- If there is no dedicated path exists between the devices, then the capacity of the communication channel is divided into two parts.