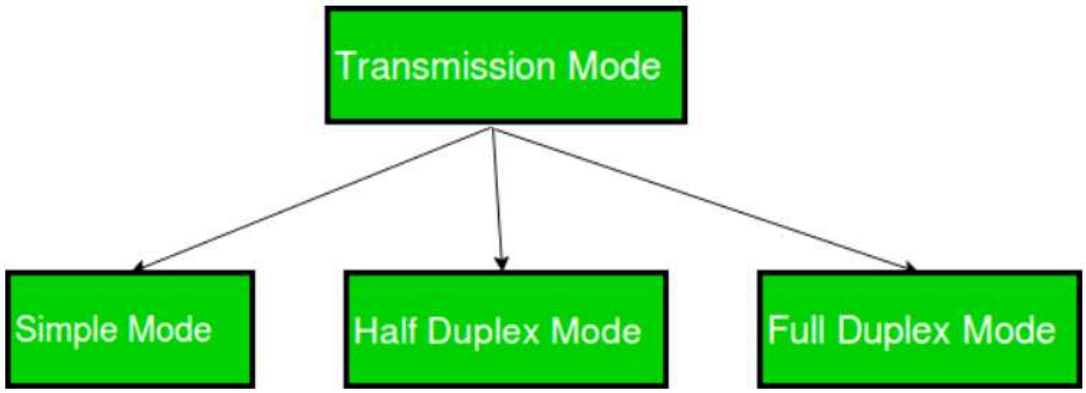
Transmission Modes in Computer Networks (Simplex, Half-Duplex and Full-Duplex)

Transmission mode means transmission data between two devices. It is also known as a communication mode. Buses and networks are designed to allow communication to occur between individual devices that are interconnected.

There are three types of transmission mode:-



1. Simplex Mode –

In Simplex mode, the communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit, the other can only receive. The simplex mode can use the entire capacity of the channel to send data in one direction.

Example: Keyboard and traditional monitors. The keyboard can only introduce input, the monitor can only give the output.

Sender **Receiver**

Advantages:

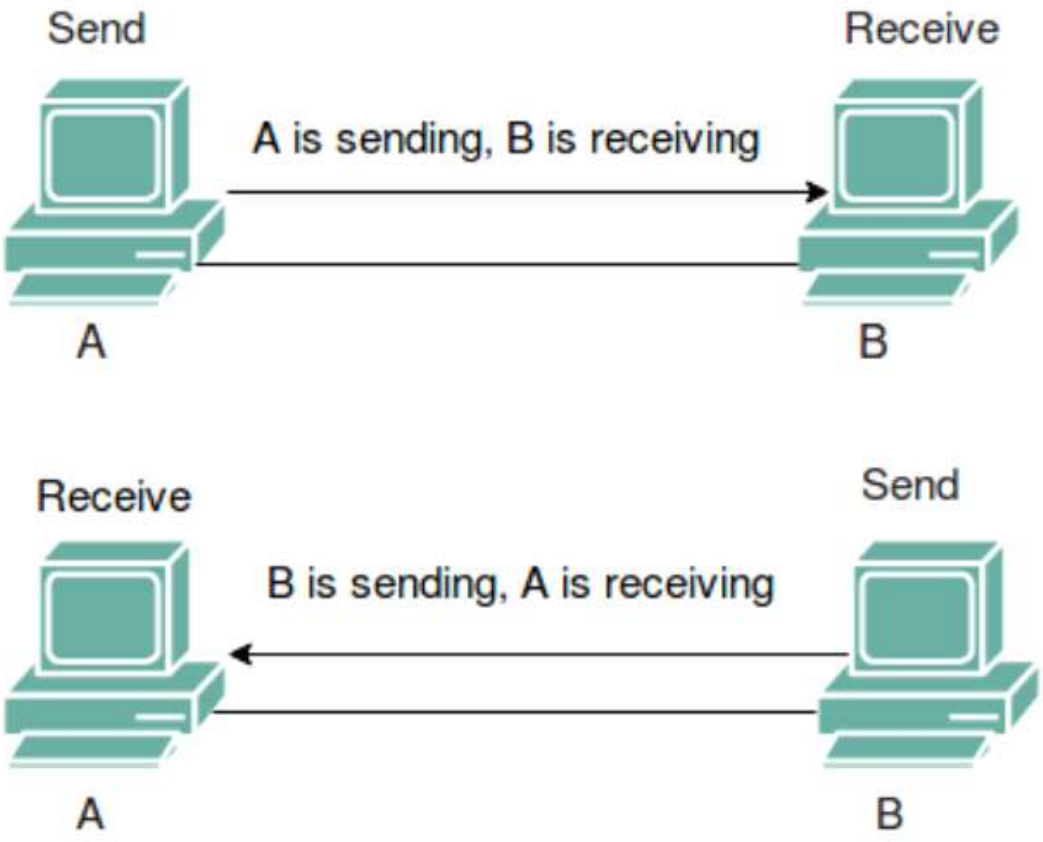
- Simplex mode is the easiest and most reliable mode of communication.
- It is the most cost-effective mode, as it only requires one communication channel.
- There is no need for coordination between the transmitting and receiving devices, which simplifies the communication process.
- Simplex mode is particularly useful in situations where feedback or response is not required, such as broadcasting or surveillance.

Disadvantages:

- Only one-way communication is possible.
- There is no way to verify if the transmitted data has been received correctly.
- Simplex mode is not suitable for applications that require bidirectional communication.

2. Half-Duplex Mode –

In half-duplex mode, each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive, and vice versa. The half-duplex mode is used in cases where there is no need for communication in both directions at the same time. The entire capacity of the channel can be utilized for each direction. Example: Walkie-talkie in which message is sent one at a time and messages are sent in both directions.



Advantages:

- Half-duplex mode allows for communication in both directions,

which is useful in situations where devices need to send and receive data.

- It is a more efficient mode of communication than simplex mode, as the channel can be used for both transmission and reception.
- Half-duplex mode is more cost-efficient than full-duplex mode, as it only requires one communication channel.

Disadvantages:

- Half-duplex mode is less reliable than Full-Duplex mode, as both devices cannot transmit at the same time.
- There is a time delay between transmission and reception, which can cause problems in some applications.
- There is a need for coordination between the transmitting and receiving devices, which can complicate the entire communication process.

3. Full-Duplex Mode –

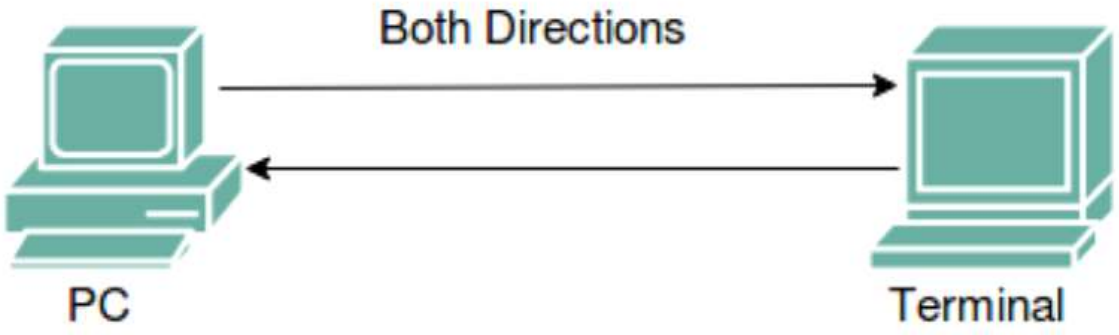
In full-duplex mode, both stations can transmit and receive simultaneously. In full duplex mode, signals going in one direction share the bandwidth of the link with signals going in another direction, this sharing can occur in two ways:

- Either the link must contain two physically separate transmission paths, one for sending to receiver and the other for receiving data from sender.
- The capacity is divided between signals traveling in both directions.

Full-duplex mode is used when communication in both directions is required all the time. The capacity of the channel, however, must be

divided between the two directions.

Example: Telephone Network in which there is communication between two persons by a telephone line, through which both can talk and listen at the same time.



Advantages:

- Full-duplex mode allows for simultaneous communication in both directions, which is ideal for real-time applications such as video conferencing or online gaming.
- It is the most efficient mode of communication, as both devices can transmit and receive data simultaneously.
- Full-duplex mode provides a high level of reliability and accuracy, as there is no need for error correction mechanisms.

Disadvantages:

- Full-duplex mode is the most expensive mode, as it requires two physical communication paths.
- It is more complex than simplex and half-duplex modes, as it requires two physically separate transmission paths or a division of channel capacity.

- Full-duplex mode may not be suitable for all applications, as it requires a high level of bandwidth and may not be necessary for some types of communication.