

Assignment-1

NARAYANI

Date: _____

Page: _____

Q. For what purpose you would use simplex Transmission? Half Duplex Transmission? Full Duplex Transmission?

⇒ Simplex transmission is used when information needs to flow in one direction only, from the sender to the receiver, without any possibility of reverse communication. It's ideal for situations where only one party needs to convey information, like in broadcasting, where a single source transmits to many receivers. Here are some uses of simplex transmission:

- (i) Broadcasting: It is commonly used for radio and television broadcasts, where the signal travels from the broadcasting station to the audience.
- (ii) Data Collection: Temperature sensors and other monitoring devices often use simplex transmission to continuously send data to a central location without requiring a response.
- (iii) Peripheral Devices: Printing from a computer to a printer is a simplex operation, as the computer sends the print job, but the printer does not send any information back.
- (iv) Remote Control: TV remotes and other similar devices use simplex to send signals in one direction.

Half-Duplex transmission is used in systems where bi-directional communication is needed, but not simultaneously. This means data can flow in both directions, but only one direction at a time. Common examples include walkie-talkies, where one person speaks and the other listens.

and some internet communication protocols. Its advantages are:

- (i) It allows for bidirectional communication, which is useful in situations where devices need to send and receive data.
- (ii) It is a more efficient mode of communication than simplex mode, as the channel can be used for both transmission and reception.

In Full-Duplex mode, both stations can transmit and receive simultaneously. In this mode signals going in one direction share the capacity 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 and the other for receiving.
- Or the capacity is divided between signals traveling in both directions.

Q) Which transmission mode will have higher speed and why?

⇒ Full-duplex transmission generally offers the highest speed among simplex, half-duplex, and full-duplex modes because it allows simultaneous two-way communication without any turn-around delays. Unlike half-duplex, which must alternate between sending and receiving, full-duplex uses separate channels for transmitting and receiving data, effectively doubling throughput. Simplex, being one-way only, can achieve high speeds in a single direction but lacks any feedback mechanism, making it unsuitable for interactive communication. While half-duplex can match

simplex in one direction at a time, it need to switch between transmitting and receiving introduces latency, reducing overall efficiency. Thus, full-duplex is the fastest, followed by half-duplex, with simplex being the least efficient for bi-directional applications despite its simplicity in unidirectional data flow.

Q1, Which transmission mode will incur more cost and complexity? Give reasons.

⇒ Full-duplex transmission incurs the highest cost and complexity compared to simplex and half-duplex modes. This is because full-duplex requires separate dedicated channels for simultaneous two-way communication, along with advanced hardware like duplexers, echo cancellation circuits, and dual antennas in wireless systems. Additionally, full-duplex systems need sophisticated protocols for flow control and interference management, increasing both implementation complexity and power consumption. In contrast, half-duplex is less expensive since it uses a single shared channel, but it still requires switching mechanisms and collision avoidance protocols, introducing moderate cost and latency. Simplex transmission is the simplest and most cost-effective, as it only supports one-way communication without the need for return-path hardware, protocol overhead, or bidirectional coordination. Thus, while full-duplex offers the highest

performance, it comes at a premium, whereas simplex is ideal for low-cost, unidirectional applications, and half-duplex provides a middle-ground solution.

In summary, full-duplex offers the highest performance but at a significantly higher cost and complexity compared to half-duplex and simplex. Half-duplex provides a balance between efficiency and cost, while simplex is the simplest and most cost-effective but limited to one-way communications.