

Basic Definitions and Terms

- **Communication**: Is the transfer of information from one place to another.
- **Electrical Communication System**: The system that uses electrical signals for the purpose of information transmission. It is reliable and economical communication technology of transmit information for long distances. Typical electrical communication system is shown in fig. 1.1. The function of each element in the system is listed below:

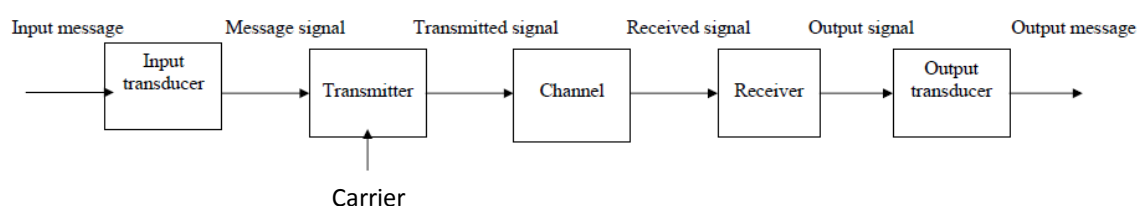


Fig. 1.1 The Block Diagram of a Communication System.

- 1) **Input message (source)**: Originals the message (e.g. human voice, TV picture, teletype message or data).
- 2) **Input transducer**: Is usually required to convert the output of a source into an electrical signal that is suitable for transmission.
- 3) **The Transmitter**: The transmitter converts the electrical signal into a form that is suitable for transmission through the physical channel or transmission medium.
- 4) **The Channel**: The communications channel is the physical medium that is used to send the signal from the transmitter to the receiver.
- 5) **The Receiver**: The function of the receiver is to recover the message signal contained in the received signal.

- 6) **Output transducer:** Is required to convert the electrical signals that are received into a form that is suitable for the user.
- 7) **Output message (Destination):** The unit to which the message is communication.

- **Basic Transmitter Components:** is consist from two parts encoder and modulator.

- ✓ **Encoder:** Is algorithm or person that converts information from one format or code to another, for the purposes of standardization, speed or compressions.
- ✓ **Modulator:** Takes a baseband input signal and then outputs a radio frequency modulated signal.

- **Basic Receiver Components:** is consist from two parts demodulator and decoder.

- ✓ **Demodulator:** Performs the invers operation of the modulator signal to recover the signal in its original form.
- ✓ **Decoder:** Performs the inverse operation of the encoder to make the best decision that a message was indeed sent.

- **Signal-to- Noise Ratio (SNR):** The ratio of the signal power (S) to noise power (N).

$$SNR = \frac{S}{N} \quad \dots(1)$$

$$SNR(dB) = 10\log\left(\frac{S}{N}\right) \quad \dots(2)$$

- **Analog and Digital messages:**

- ✓ **Digital messages:** Constructed with a finite number of symbols (e.g. binary information).
- ✓ **Analog messages:** Characterized by data whose value varies over a continuous range (e.g. the temperature, pressure, and speech).

- **Transmission System Types:**

1) **One-way transmission (Simplex SX):** The flow of information in this system is only in one-way (from Tx to Rx). See fig. 1.2. Where Tx: Transmitter.

Rx: Receiver.

2) **Two-way transmission (Duplex DX):** There are two types in such system, these are:

a. **Half duplex (HDX).**

Here, although communication flows in both directions the flow of information is only one-way at a given time.

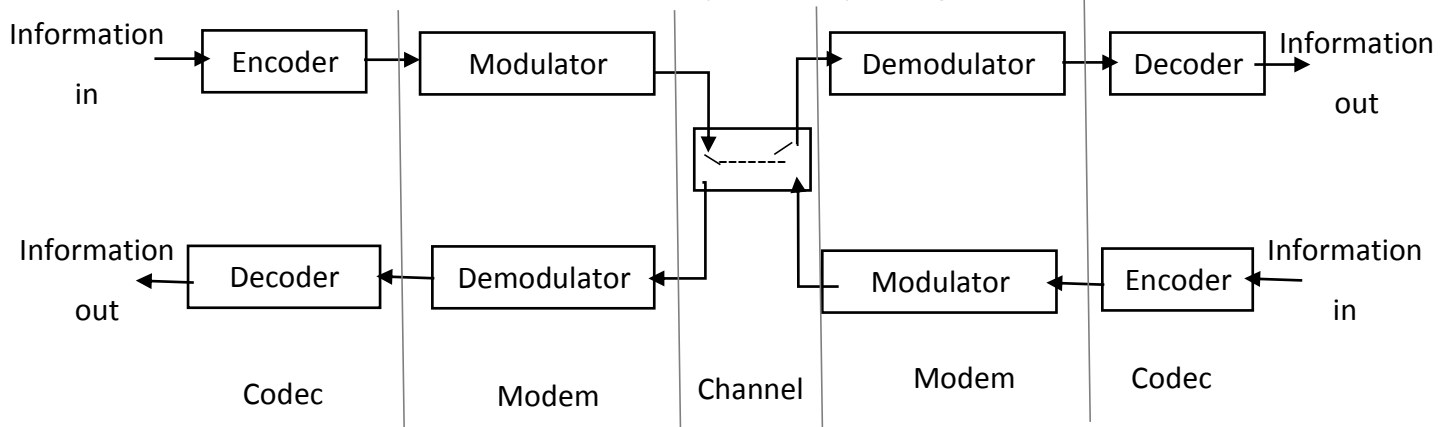


Fig. 1.2 Communication system using half-duplex transmission.

b. Full duplex (FDX).

Here, simultaneous communication is accomplished in both directions see fig. 1.3.

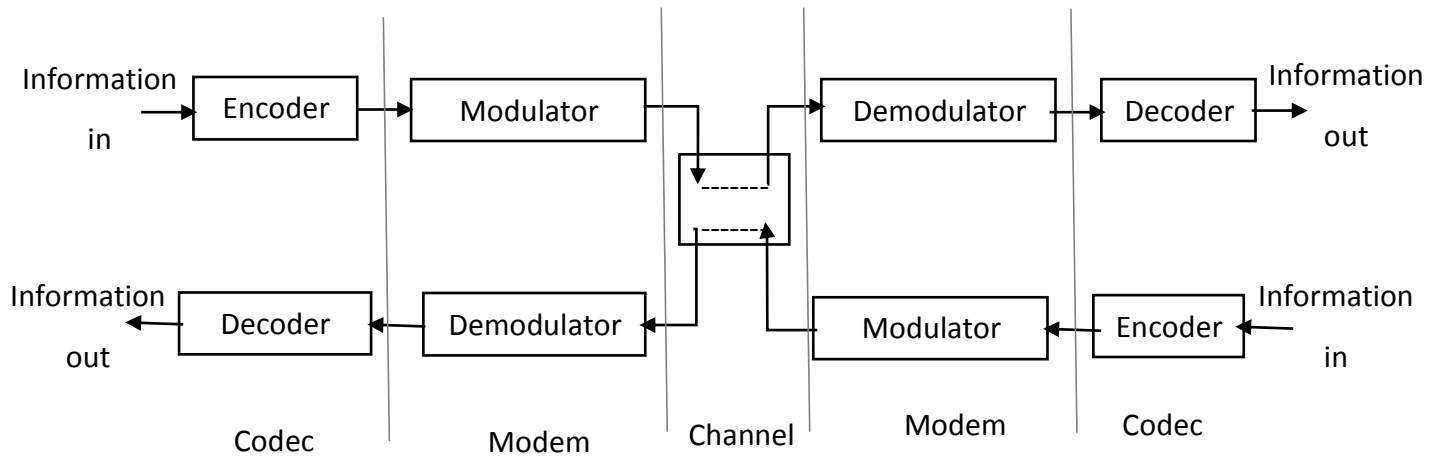


Fig. 1.3 Communication system using full-duplex transmission.