COMMUNICATION SYSTEMS

Communication is the act of transmission of **information**

ELEMENTS OF A COMMUNICATION SYSTEM

Every communication system has three essential elements

Transmitter, Medium/Channel and Receiver.

Depending upon the type of communication system, a channel may be in the form of wires or cables connecting the transmitter and the receiver or it may be wireless

Modes of communication: **Point-to-point** and **Broadcast.**

In point-to-point communication mode, communication takes place over a link between a single transmitter and a receiver. Telephony is an example of such a mode of communication.

In the broadcast mode, there are a large number of receivers corresponding to a single transmitter. Radio and TV are examples of broadcast mode of communication.

BASIC TERMINOLOGY USED

Transducer: Any device that converts one form of energy into another can be termed as a transducer.

Signal: Information converted in electrical form and suitable for transmission is called a signal. Signals can be either analog or digital.

Noise: Noise refers to the unwanted signals that tend to disturb the transmission and processing of message signals in a communication system.

Transmitter: A transmitter processes the incoming message signal so as to make it suitable for transmission through a channel and subsequent reception.

Receiver: A receiver extracts the desired message signals from the received signals at the channel output.

Attenuation: The loss of strength of a signal while propagating through a medium is known as attenuation.

Amplification: It is the process of increasing the amplitude of a signal using an electronic circuit called the amplifier

Range: It is the largest distance between a source and a destination up to which the signal is received with sufficient strength.

Bandwidth: Bandwidth refers to the frequency range over which an equipment operates or the portion of the spectrum occupied by the signal.

Modulation: low frequency message signal is superimposed on a high frequency wave, which acts as a carrier of the information.

Demodulation: The process of retrieval of information from the carrier wave at the receiver is termed demodulation.

Repeater: A repeater is a combination of a receiver and a transmitter. A repeater, picks up the signal from the transmitter, amplifies and retransmits it to the receiver sometimes with a change in carrier frequency.

BANDWIDTH OF SIGNALS

For **speech** signals, frequency range 300 Hz to 3100 Hz is considered adequate. Therefore speech signal requires a bandwidth of 2800 Hz

To transmit **music**,an approximate bandwidth of 20 kHz is required.

Video signals for transmission of pictures require about 4.2 MHz of bandwidth. A TV signal contains both voice and picture and is usually allocated 6 MHz of bandwidth for transmission.

BANDWIDTH OF TRANSMISSION MEDIUM

Coaxial cable is a widely used wire medium, which offers a bandwidth of approximately 750 MHz. Such cables are normally operated below 18 GHz.

Communication through free space using radio waves takes place over a very wide range of frequencies: from a few hundreds of kHz to a few GHz.

Optical communication using fibers is performed in the frequency range of 1 THz to 1000 THz (microwaves to ultraviolet). An optical fiber can offer a transmission bandwidth in excess of 100 GHz.

WIRELESS COMMUNICATION FREQUENCY BANDS

Standard AM broadcast 540-1600 kHz

Television

54-72 MHz VHF (very high frequencies)

76-88 MHz TV

174-216 MHz UHF (ultra high frequencies)

420-890 MHz TV

Cellular Mobile Radio

- 896-901 MHz Mobile to base station
- 840-935 MHz Base station to mobile

Satellite Communication

- 5.925-6.425 GHz Uplink
- 3.7-4.2 GHz Downlink