- Principles of Telecommunication
- Module 2 - Amplitude Modulation

- Lecture plan _Part 2(15th May 2021)

2. Classification of Communication System Based on the Nature of Information Signal

Based on the nature of information signal the electronic communication system are classified into two categories namely:
(i) Analog communication systems.
(ii) Digital communication systems.

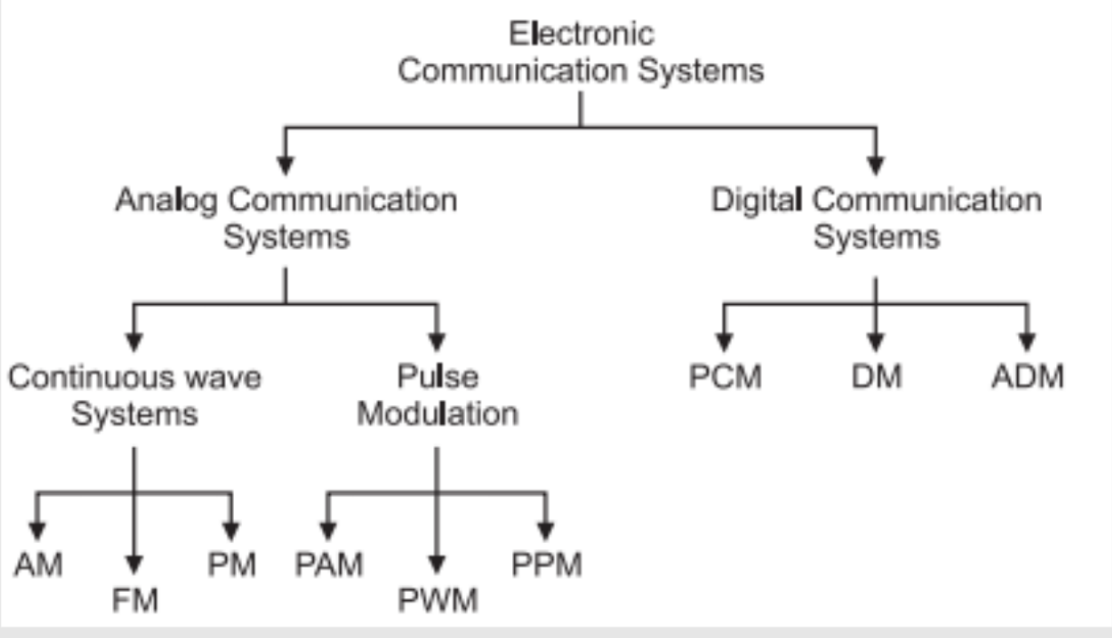

Fig.1 : Classification based on Analog or Digital Communication

Analog Communication

The modulation systems or techniques in which one of the characteristics of the carrier is varied in proportion with the instantaneous value of modulating signal is called as analog modulation system.

If the carrier is sinusoidal, then it's amplitude, frequency or phase is changed in accordance with the modulating signal to obtain AM, FM or PM respectively.

These are continuous wave modulation systems.

Analog modulation can be pulsed modulation as well.Here, the carrier is in the form of rectangular pulses. The amplitude, width (duration) or position of the carrier pulses is varied in accordance with the modulating signal to obtain the PAM, PWM or PPM outputs.

Examples of analog modulation

Following are the examples of analog modulation systems:

(i) Amplitude Modulation (AM)

(ii) Frequency Modulation (FM)

(iii) Phase Modulation (P.M.)

(iv) Pulse Amplitude Modulation (PAM)

(v) Pulse Width Modulation (PWM)

(vi) Pulse Position Modulation (PPM)

Advantages of analog communication

Some of the advantages of analog communication are as under:

(i) Transmitters and receivers are simple.

(ii) Low bandwidth requirement

(iii) FDM (frequency division multiplexing) can be used.

Drawbacks of analog communication

Some of the drawbacks are as under:

(i) Noise affects the signal quality.

(ii) It is not possible to separate noise and signal.

(iii) Repeaters cannot be used between transmitters and receivers.

(iv) Coding is not possible.

(v) It is not suitable for the transmission of secret information.

Applications

(i) Radio broadcasting (AM and FM).

(ii) TV broadcasting

(iii) Telephones

Digital Communication

The modulation system or technique in which the transmitted signal is in the form of digital pulses of constant amplitude, constant frequency and phase is called as digital modulation system.

In a digital communication system (DCS), the objective

at the receiver is not to reproduce a transmitted waveform with precision; instead, the objective is to determine from a noise-perturbed signal which waveform from the finite set of waveforms was sent by the transmitter.

Examples

Pulse code modulation (PCM) and delta modulation (DM) are the examples of digital modulation.

(i) In the PCM and DM, a train of digital pulses is transmitted by the transmitter.

(ii) All the pulses are of constant amplitude, width and position. The information is contained in the combination of the transmitted pulses.

Advantages of digital communication

Some of the advantages of digital communication are as under:

(i) Due to the digital nature of the transmitted signal, the interference of additive noise does not introduce many errors. Hence, digital communication has a better noise immunity.

(ii) Due to the channel coding techniques used in digital communication, it is possible to detect and correct the errors introduced during the data transmission.

(iii) Repeaters can be used between transmitter and receiver to regenerate the digital signal. This improves the noise immunity further.

(iv) Due to the digital nature of the signal, it is possible to use the advanced data processing techniques such as digital signal processing, image processing data compression etc.

(v) TDM (Time Division Multiplexing) technique can be used to transmit many voice channels over a single common transmission channel.

(vi) Digital communication is useful in military applications where only a few permitted receivers can receive the transmitted signal.

(vii) Digital communication is becoming simpler and cheaper as compared to the analog communication due to the invention of high speed computers and integrated circuits (ICs).

Drawbacks of digital communication

Some of the important drawbacks of digital communication are as under:

(i) The bit rates of digital systems are high. Therefore, they require a larger channel bandwidth as compared to analog systems.

(ii) Digital modulation needs synchronization in case of synchronous modulation.

Applications of digital communications

(i) Long distance communication between earth and space ships.

(ii) Satellite communication.

(iii) Military communications which needs coding.

(iv) Telephone systems.

(v) Data and computer communications.