

THE MODULATION PROCESS

Amit Kumar, Adnan Sherwani, Akash Singh
 Student ,ECE, DCE, Gurgaon

Abstract- The purpose of a communication system is to deliver a message signal from Associate in nursing data supply in recognizable type to a user destination, with the supply and also the user being physically separated from one another. To do this, the transmitter modifies the message signal into a type that is appropriate for transmission over channel. This modification is achieved by means that of a method called modulation, that involves variable some parameter of a radio wave in accordance with the message signal. Conjointly the receiver recreates the initial message signal from a degraded version of the transmitted signal once propagation through the channel. This recreation is achieved by employing a method referred to as reception. In fact, the reception is that the reverse of the modulation method utilized in the transmitter.

Index Terms- Transmitter, Carrier Signal, Modulation, Demodulation, Message Signal

I. INTRODUCTION

Modulation is that the method by that some characteristics of an indication known as carrier is varied in accordance with the fast worth of another signal known as modulating signal. Signals containing info or intelligence square measure referred as modulating signals. This info bearing signal is additionally known as baseband signal. The carrier frequency is larger than the modulating frequency. The signal ensuing from the method of modulation is named modulated signal. once the radio radiation is continuous in nature, the modulation method is thought as continuous wave(CW) modulation or analog modulation. samples of continuous wave modulation square measure AM and Angle Modulation. once the radio radiation could be a pulse-type wave form, the modulation method is thought as modulation.

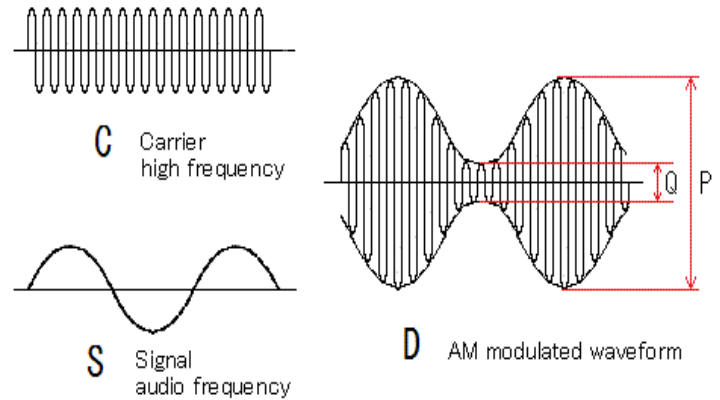


Fig.1: Modulated Waveform

II. TYPES OF MODULATION

Modulation is basically of two types:

- 1) Continuous Wave Modulation
- 2) Pulse Modulation

2.1 CONTINUOUS WAVE MODULATION:

When the carrier wave is continuous in nature, the modulation process is known as continuous wave modulation or analog modulation. Examples of continuous wave modulation are Amplitude Modulation and Angle Modulation(Frequency Modulation and Phase Modulation).

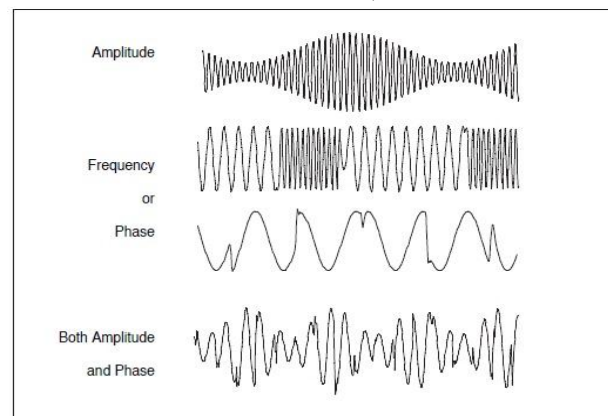


Fig.2: Continuous Wave Modulation

In fig.2, the amplitude of the carrier is varied in accordance with the message signal, it is known as amplitude modulation. Also, when the angle of the carrier is varied according to the instantaneous value of the modulating signal, it is called angle modulation.

Angle modulation may be further subdivided into Frequency modulation(FM) and Phase modulation(PM),in which the instantaneous frequency and phase of the carrier, respectively, are varied in accordance with the message signal

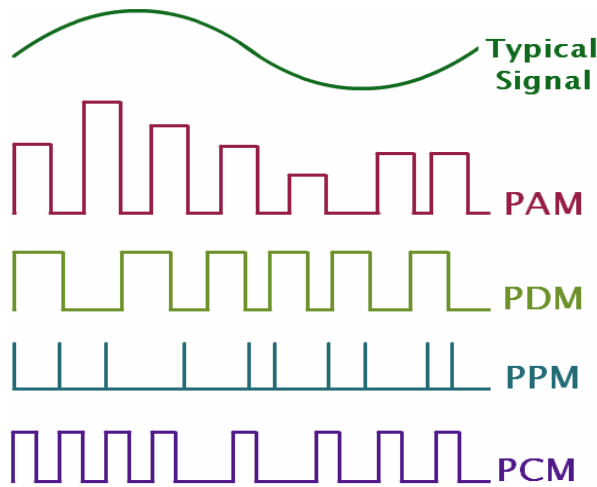
2.2 PULSE MODULATION:

When the carrier wave is a pulse-type waveform, the modulation process is known as pulse modulation. In pulse modulation, the carrier consists of a periodic sequence of rectangular pulses. Pulse modulation can be of an analog or digital type.

In analog pulse modulation, the amplitude, duration or position of a pulse is varied in accordance with the sample values of the message signal. The analog pulse modulation may be of following three types:

- i. Pulse-amplitude modulation (PAM)
- ii. Pulse-duration modulation (PDM)
- iii. Pulse-position modulation (PPM)

On the other hand, the digital form of pulse modulation is known as pulse-code modulation (PCM).



Modulation

Fig.3: Pulse Modulation

III. BENEFITS OF MODULATION

There are many advantages to the use of modulation. These have meant that it has been widely used for many years, and will remain in use for many years.

a) **Reduction of noise:** Noise is the major limitation of any communication. Although noise cannot be eliminated completely, but with the help of several modulation schemes, the effect of noise can be minimized.

b) **Practicality of Antenna:** We know that in case when free space is used as a transmitting medium, messages are transmitted and received with the help of antenna. For efficient radiation and reception the transmitting and receiving antennas must have lengths comparable to a quarter-wavelength of the frequency used.

$$l=c/4f=5 \text{ km.}$$

c) **To remove interference:** Another reason for not radiating modulating signal itself is that the frequency range of audio signal is from 20 Hz – 20 kHz. In radio broadcasting, there are several radio stations. In case, there is no modulation, all these stations transmit audio or sound signals in the range of 20 Hz – 20 kHz. Due to this transmission over same range, the programs of different stations will get mixed up.

IV. CONCLUSION

Since the message signal or baseband signal is employed to modulate a high frequency carrier signal within the transmitter. when modulation, the ensuing modulated signal is transmitted with the assistance of an antenna that is connected at the output aspect of the transmitter. This modulated signal then travels down the channel to succeed in at the input of the receiver. In most communication systems, the baseband signal is employed to modulate a higher-frequency carrier signal than is transmitted by radio.

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