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Data Communication CS601 Lecture No 18

Lecture Prepared By

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CS601 Lecture No 18 Topic 86 to 89

Analog to Analog Conversion

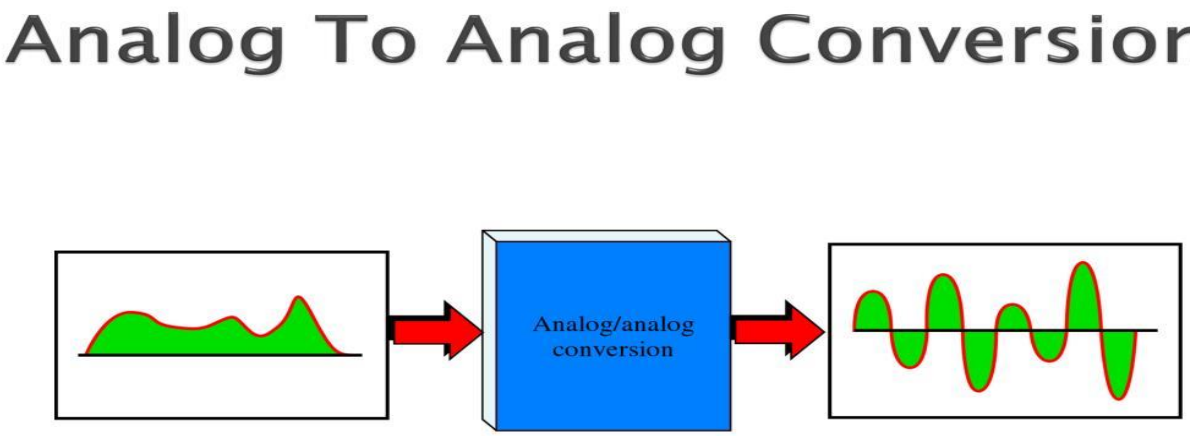
Analog-to-analog conversion, or analog modulation, is the representation of analog information by an analog signal. Modulation is needed if the medium is bandpass in nature or if only a bandpass channel is available to us.

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An example is radio. The government assigns a narrow bandwidth to each radio station. The analog signal produced by each station is a low-pass signal, all in the same range. To be able to listen to different stations, the low-pass signals need to be shifted, each to a different range.



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Que.	The example of an analog to analog conversion is
a.	radio
b.	Video
c.	Television
d.	internet
	Answer: radio

What are the 3 ways of conversion analog to analog?

Analog to Analog conversion can be done in three ways:

- Amplitude Modulation.
- Frequency Modulation.
- Phase Modulation.

What is difference between modulated Signal Carrier Signal and modulating signal?

We take the help of such high frequency signal which is called as a carrier signal to transmit our message signal. Such a process is simply called as Modulation. Modulation is the process of changing the parameters of the carrier signal, in accordance with the instantaneous values of the modulating signal.

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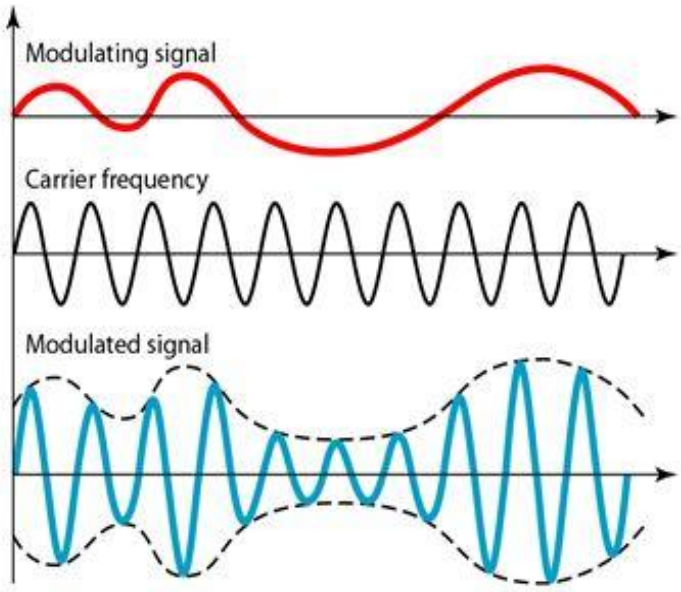
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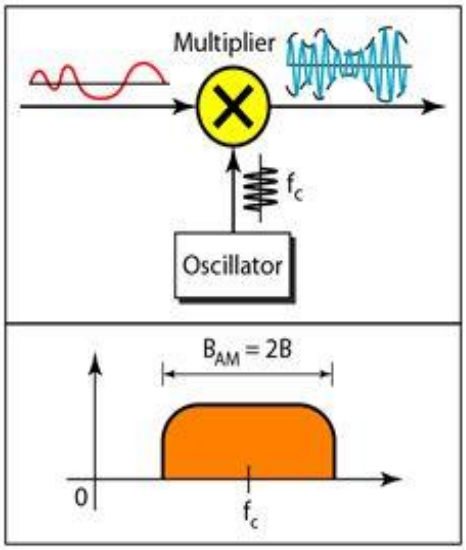


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1. Amplitude Modulation:

In AM transmission, the carrier signal is modulated so that its amplitude varies with the changing amplitudes of the modulating signal. The frequency and phase of the carrier remain the same. Only the amplitude changes to follow variations in the information. The following figure shows how this concept works. The modulating signal is the envelope of the carrier.



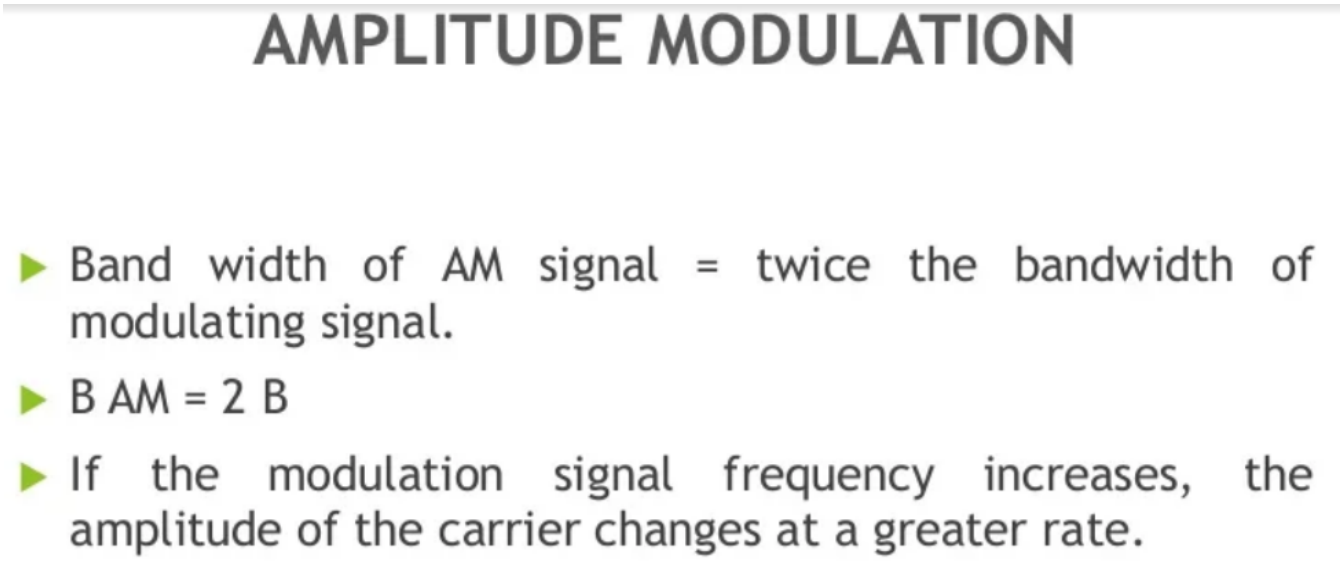


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AM is normally implemented by using a simple multiplier because the amplitude of the carrier signal needs to be changed according to the amplitude of the modulating signal.

2. Frequency Modulation

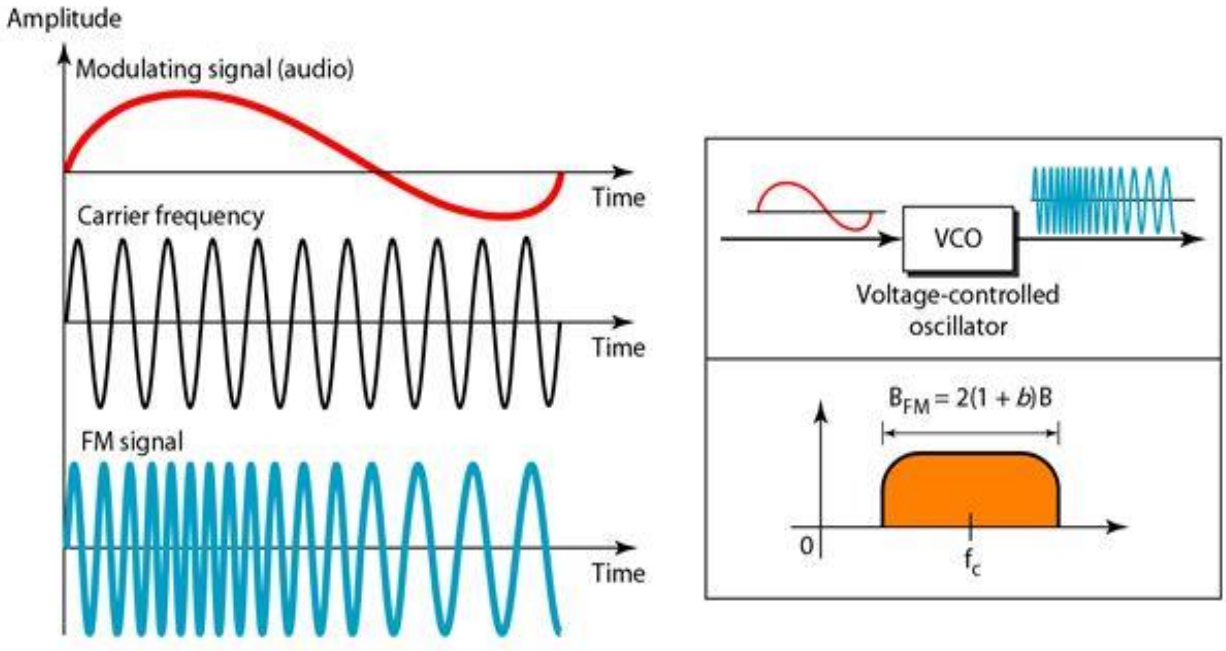
In FM transmission, the frequency of the carrier signal is modulated to follow the changing voltage level (amplitude) of the modulating signal. The peak amplitude and phase of the carrier signal remain constant, but as the amplitude of the information signal changes, the frequency of the carrier changes correspondingly.

The following figure shows the relationships of the modulating signal, the carrier signal, and the resultant FM signal. FM is normally implemented by using a voltage-controlled oscillator as with FSK. The frequency of the oscillator changes according to the input voltage which is the amplitude of the modulating signal.

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3. Phase Modulation:

In PM transmission, the phase of the carrier signal is modulated to follow the changing voltage level (amplitude) of the modulating signal. The peak amplitude and frequency of the carrier signal remain constant, but as the amplitude of the information signal changes, the phase of the carrier changes correspondingly. It is proved mathematically that PM is the same as FM with one difference.

In FM, the instantaneous change in the carrier frequency is proportional to the amplitude of the modulating signal; in PM the instantaneous change in the carrier frequency is proportional to the derivative of the amplitude of the modulating signal. The following figure shows the relationships of the modulating signal, the carrier signal, and the resultant PM signal.

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