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Data Communication CS601 Lecture No 16

Lecture Prepared By

Muhammad Abid Ali

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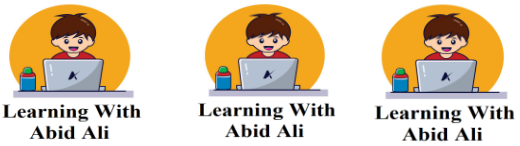
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CS601 Lecture No 16 Topic 76 to 78

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Today's Topic

1. Transmission Mode of Analog Data

   a) Amplitude Shift Keying(ASK)

   b) Frequency Shift Keying(FSK)

   c) Phase Shift Keying (PSK)

      i) Bit Rate

      ii) Data Rate

      iii) Baud Rate

      iv) Signal Rate

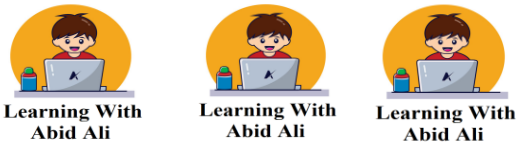
      v) Carrier Signal

      vi) No. of Data Element

      vii) High Frequency Signals

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Digital-To-Analog Conversion

Digital-To-Analog Conversion (DAC), **Process by which digital signals (which have a binary state) are converted to analog signals** (which theoretically have an infinite number of states). For example, a modem converts computer digital data to analog audio-frequency signals that can be transmitted over telephone lines.

A sine wave is defined by 3 characteristics:

Amplitude

Frequency

Phase

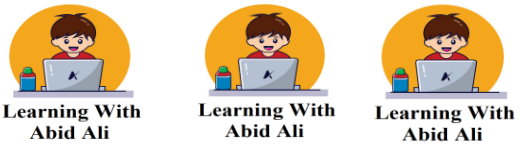
How do your data convert from digital-to-analog?

There are three kinds of digital-to-analog conversions:

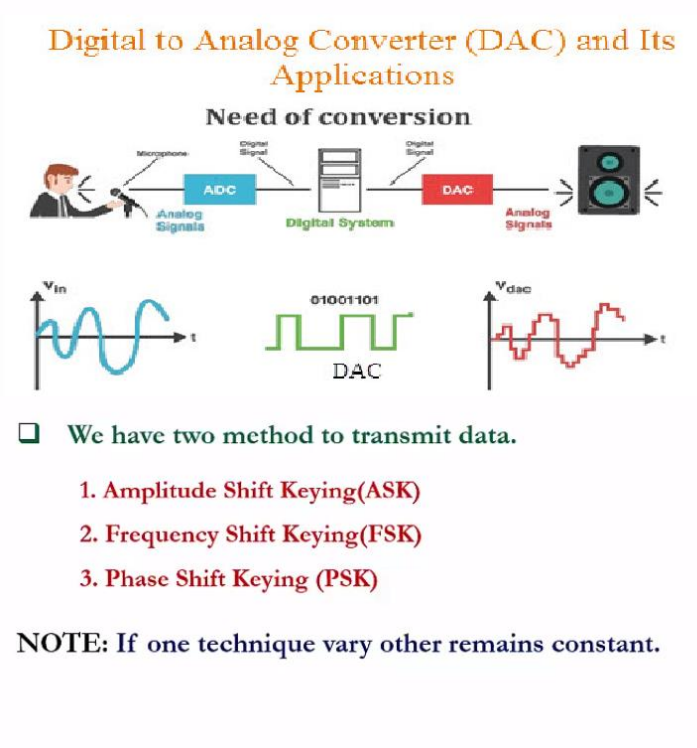
1. Amplitude Shift Keying. In this conversion technique, the amplitude of analog carrier signal is modified to reflect binary data. ...
2. Frequency Shift Keying. ...
3. Phase Shift Keying. ...
4. Quadrature Phase Shift Keying.

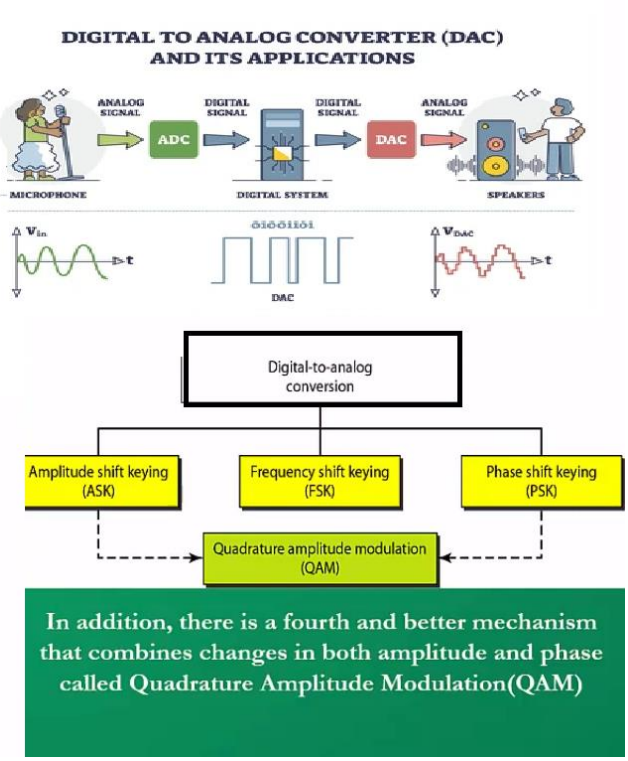
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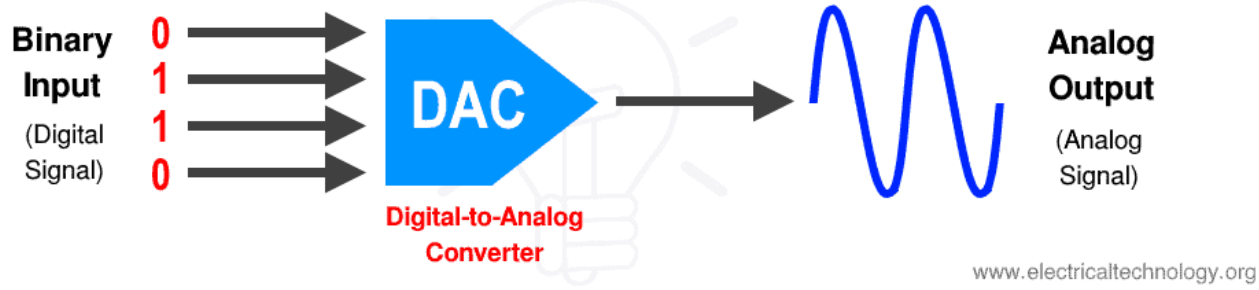
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DAC

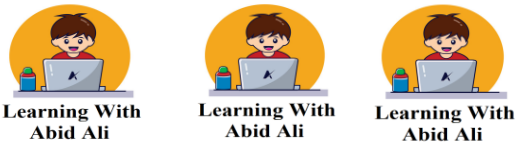
DIGITAL TO ANALOG CONVERTER

Types, Working, Block Diagram & Applications



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An analog signal carries 4 bits per signal element. If 1000 signal elements are sent per second, find the bit rate?

SOLUTION

Formula: S = N / r

S = 1000 R = 4 N = ?

S = N / r N = r x S N = 4 x 1000 **4000 pbs**

An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need?

SOLUTION

Formula: S = N / r

N = 8000 S = 1000 L = ? r = ?

S = N / r r = N / S r = 8000/1000 **8 bits**

$L = 2^r$ $L = 2^8$ **256 bits**

Digital to Analog Conversion

In conversion from digital to analog signals we must review two issues.

1. Bit Rate → Data Rate
   No of Bits Transmitted in One Second
2. Baud Rate → Signal Rate
   No of Signal Units Per Second

} Baud Rate is less than Bit Rate

Calculation of Bit & Baud Rate

(S = N / r) Signal Rate = (Data Rate / No. of Data Element)

$R = \log_2 L$ L = No. of Different Signal Elements

Bandwidth Required → Its depend on Signal Rate as more signal required more bandwidth & vice versa. FSK

3. The Carrier Signal →

When we transmit the signals from sender to receiver. Than we transmit **High Frequency Signals**, these are called **Carrier Signal**.

Exercise

Example # 01

An analog signal carries 8 bits per signal element. If 2000 signal elements are sent per second, find the bit rate?

Example # 02

An analog signal has a bit rate of 16000 bps and a baud rate of 2000 baud. How many data elements are carried by each signal element? How many signal elements do we need?