Let’s begin a discussion on Digital Communication

Objectives

- At the end of this session, you will be able to:
  - Understand digital signal representation and its characteristic features
  - Understand the need of digital transmission and edge over analogue counterpart
  - Understand the process of analogue to digital conversion called PCM – Pulse Code Modulation
  - Understand quantization step in PCM, quantization error and its impact on quality of digital quality

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Agenda

- Digital Signal characteristics
- Advantage of digital transmission
- Analogue to Digital conversion process

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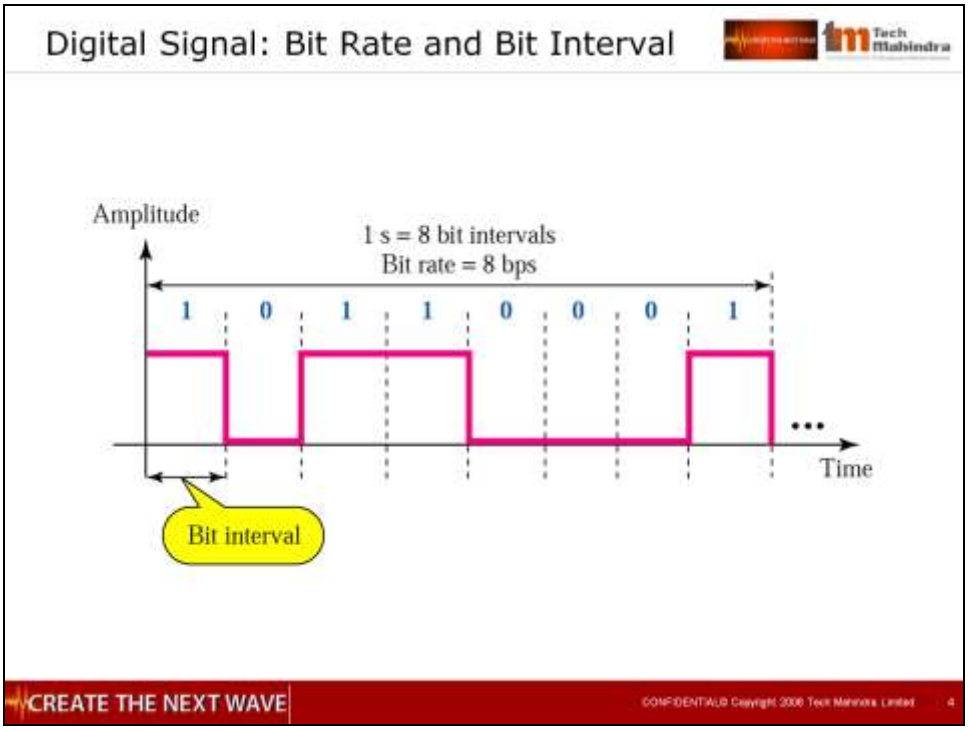
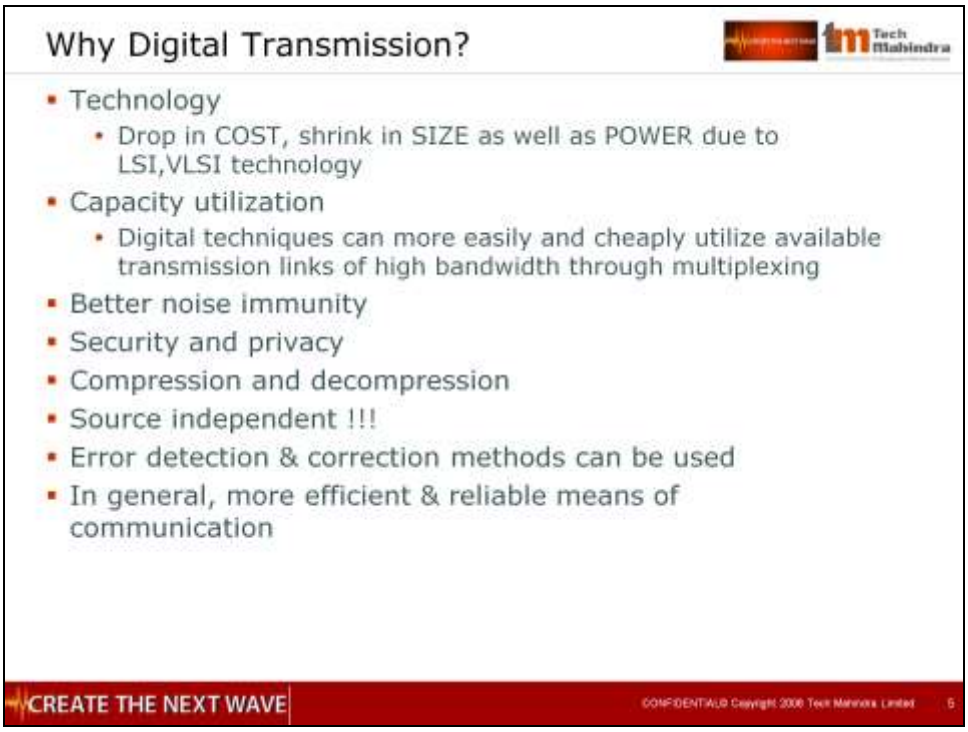


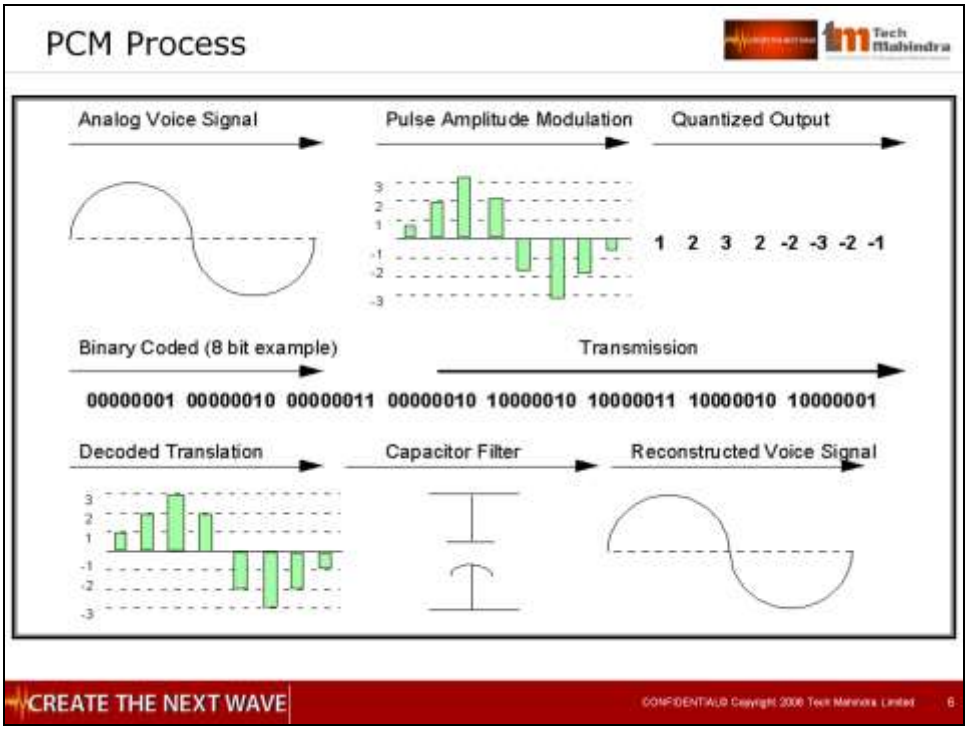
Digital signal can be thought of as series of 1's and 0's.

We have already seen concepts like bit interval, bit rate and so on…



Technology: Sees a drop in cost due to LSI and VLSI

Capacity utilization : Digital techniques can more easily and cheaply utilize, through multiplexing, available transmission links of high bandwidth.
Security and privacy: Encryption techniques are more readily applied to digital data



A/D conversion technique called Pulse Code Modulation PCM involves following processes:

Sampling/Pulse Amplitude Modulation (PAM)

Quantization: which when combined with sampling, allows for representing Analog signal in Discrete form.

Compression forms an important part in Quantization.

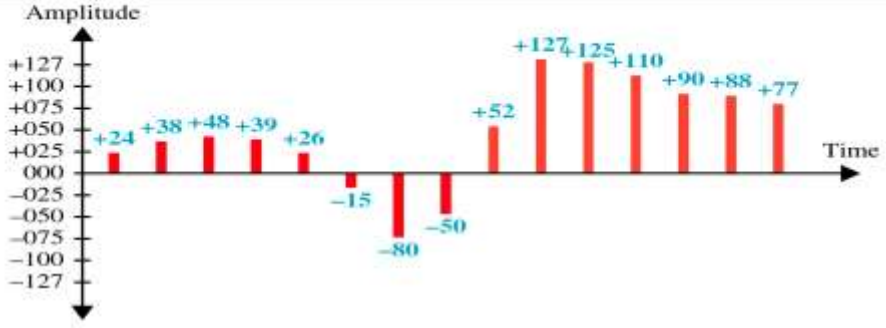
Corresponding TO NA/Europe we have μ-law or A-law compression techniques.

Encoding process: To translate the discrete set of sample values to a more appropriate form of signal.

Transmitting: Sending the bits in suitable form by using line coding techniques

PCM generator produces a series of numbers, or digits.Each one of these digits(in binary code) always represents the approximate amplitude of the signal sample at that instant.

Quantized PAM Signal



Quantizing by using sign and magnitude

+024	00011000	–015	10001111	+125	01111101
+038	00100110	–080	11010000	+110	01101110
+048	00110000	–050	10110010	+090	01011010
+039	00100111	+052	00110110	+088	01011000
+026	00011010	+127	01111111	+077	01001101

Sign bit
+ is 0 – is 1

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Summary

- In this session, we have learned:
  - Digital signal representation and its characteristic features
  - The need of digital transmission and edge over analogue counterpart
  - Process of analogue to digital conversion called PCM – Pulse Code Modulation
  - Quantization error and its impact on digital quality

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Thank You

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