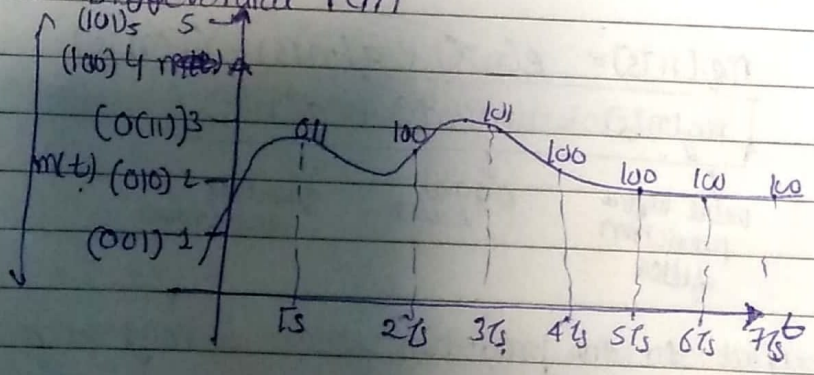
Dec-10

Aug 23, 18

DPCM → Differential PCM



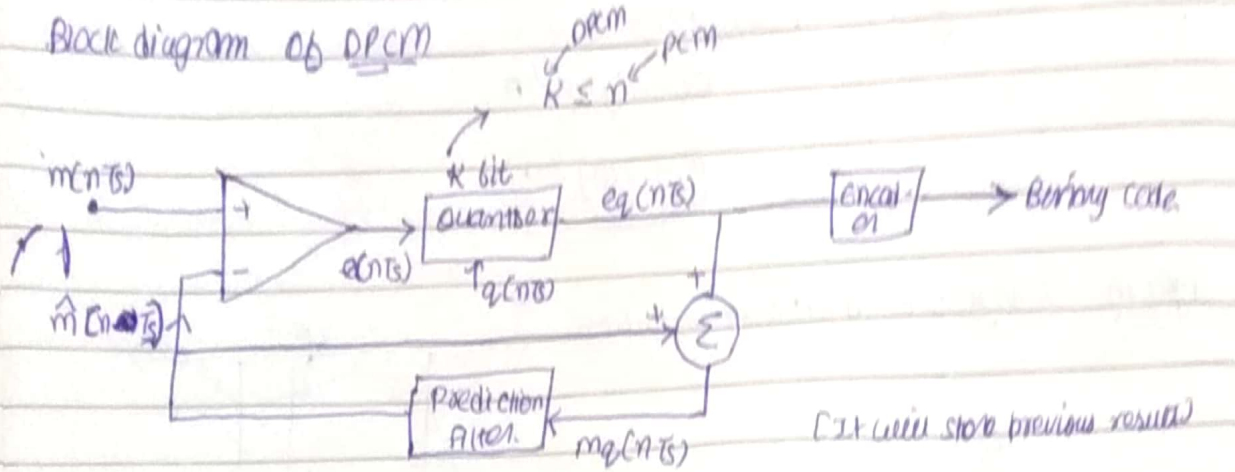
A code is assigned to each sample

→ From the figure, that at sampling instants 4Ts, 5Ts, 6Ts, 7Ts the same code is transmitted which is 100 so PCM does not utilise given bandwidth efficiently. Hence here we need to have a concept of differential PCM which first check the amount of information variation and then assign a code of variable length

DELTA® Notebook

Date
Page No.

Block diagram of DPCM



↳ $e(nT_s) = m(nT_s) - \hat{m}(nT_s)$ — (1)

$e_q(nT_s) = e(nT_s) + q(nT_s)$ — (2)

$m_q(nT_s) = e_q(nT_s) + \hat{m}(nT_s)$ — (3)

Put (2) in (3) we get

$m_q(nT_s) = e(nT_s) + q(nT_s) + \hat{m}(nT_s)$

$\boxed{m_q(nT_s) = m(nT_s) + q(nT_s)}$

from (1) $e(nT_s) + \hat{m}(nT_s) = m(nT_s)$

$m_q(nT_s)$ ↓ value before prediction filter
$m(nT_s)$ ↓ original value
$q(nT_s)$ ↓ quantized value (noise)

↳ The input to the prediction filter is very much dependent on sampled value and quantisation error. The prediction filters works in such a manner so as to minimize these error.

Prediction filter: It is having a delicate process and its memorey. To maintain the data base on for all sample

The no of bits assigned to a signal depends on the difference between $m(nT_s)$ and $\hat{m}(nT_s)$. more the difference, more bits will be assigned. Hence prediction filter tries to predict the next incoming sampled value.

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Date
Page No.

$m(nTs)$ and $\hat{m}(nTs)$ have same nature

Prediction filter have the memory and processor.

→ Prediction filter store all the past values in its database and on this basis this filter tries to find out the next sampled value of signal.

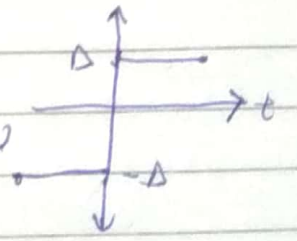
→ If the past result is indicating a +ve error then $\hat{m}(nTs)$ is given a small +ve increment in such a manner so that error $e(nTs)$ is minimized.

→ It is having a coad system in which no of bits are less than that of PCM. $R \leq n$ (DPCM → PCM)

★ Signal to Noise Ration for Δ modulation ★

Delta modulation :

1) It is the type of DPCM
2) Here 1 bit is transmitted for each sample and sampling is done at a faster rate.
3) It is also having one bit quantizer.
4) It is also called as hard limiter. [value is predefined]



$e(nTs)$ → +ve (when zero out +ve) → Δ → then assigned a value Δ → 1

Δ is a (step size) → 1 bit

(when zero out -ve) → then assigned a value -Δ → 0

Δ = 0 [no transfer of data] → negligible

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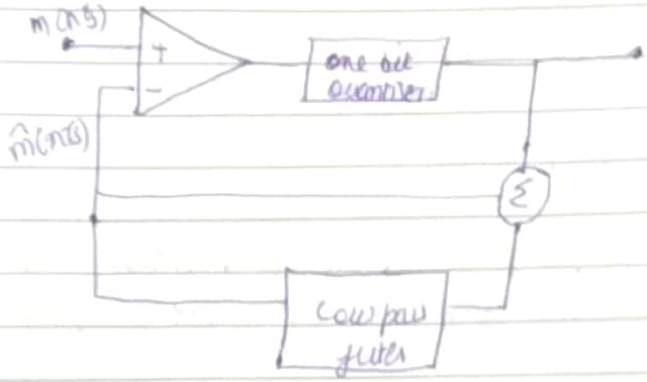
Date
Page No.

One bit quantizer → hard limiter

Low pass filter / integrator / delay filter



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