Lecture 3 - DC

Scalability:- DC allows ideal regener^{n} of bits → noise immunity - hence if you can communicate over a link reliably, you are done

① → Inf^{n} bits are txd without interpretation, the same link can be used for multiple kinds of msgs.

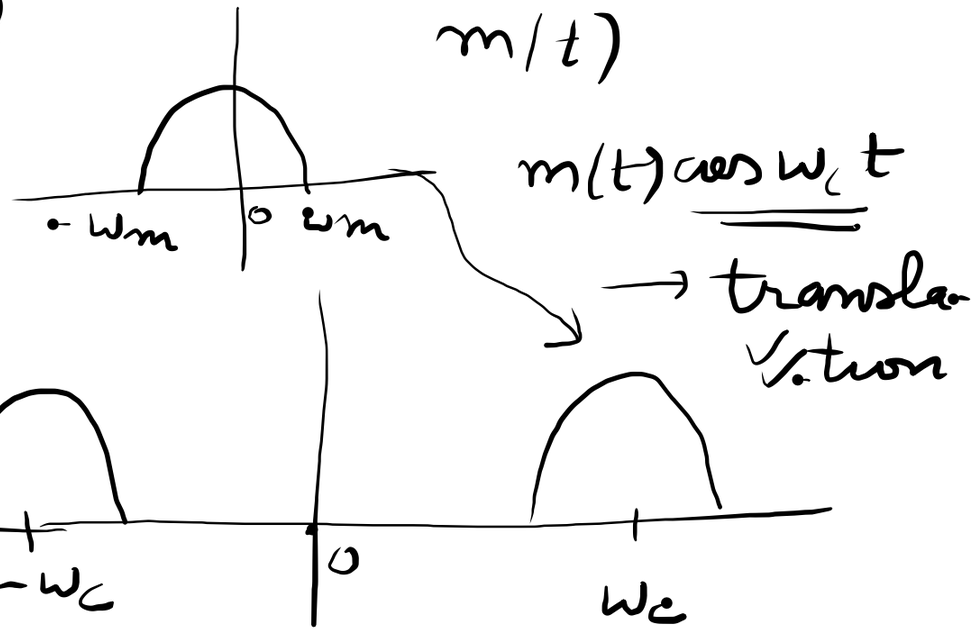
② → Multiple links can be present b/w src encoder & dec. with proper error recovery mechanisms - such as retransmission

① & ② have enabled internet

AM:- link perfer^{n} depends on message prop.; successive links incur noise accumul^{n} & this limits the no. of links that can be cascaded.

Why AM still persists? – RF front end is still analog.

– legacy systems – AM/FM are still in use.



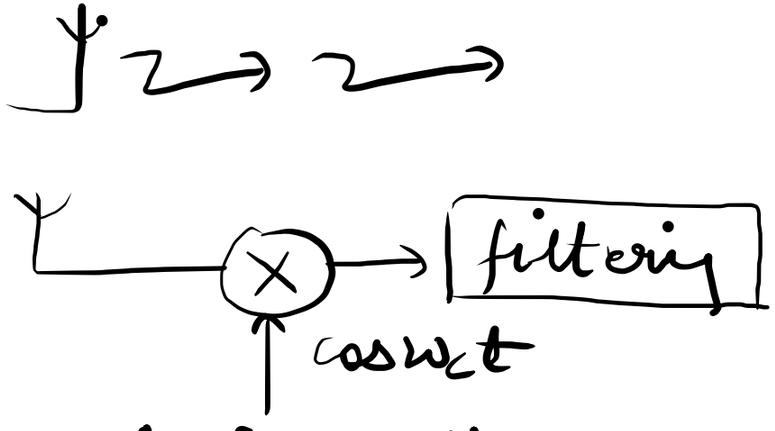
– Modulator in a DC system:-

coded bits after channel encoder

→ Txd signals

req:- Tx sig. to fit within a given freq. band & adhere to 'stringent power constraint' & 'manage interference'.

bit
0 → s(t) → s(t) must fit into
1 → −s(t) spectral constraint. no interf. to other users
i.e. band sepⁿ.



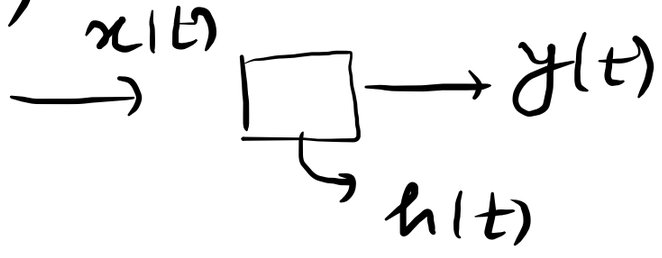
successive bits should not interfere with each other.

→ LTI ? $f(ax + by) = a f(x) + b f(y)$

TI

$x(t) \longrightarrow y(t)$

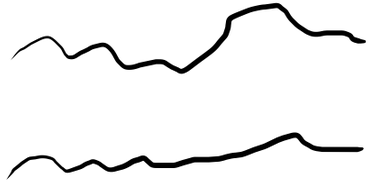
$\rightsquigarrow x(t - t_0) \longrightarrow y(t - t_0)$



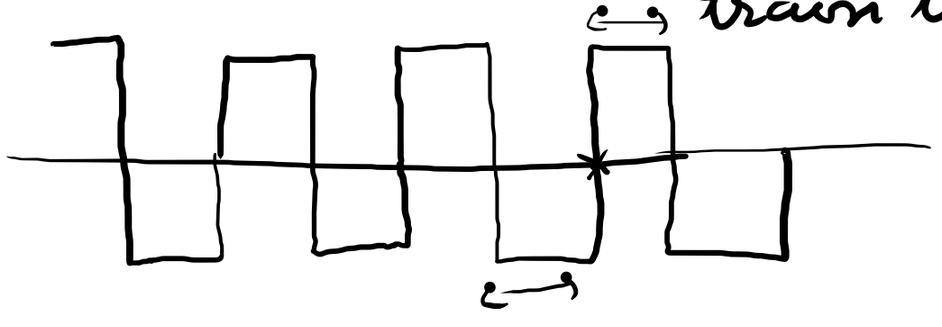
Channel:- practically is LTI but yes others models are also studied.

5/8 g → 6

6/8



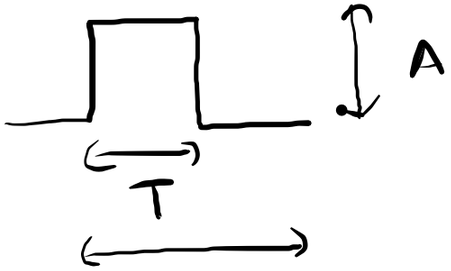
Pulse Modulation (PM) - some parameter of 'periodic' pulse train is varied in accordance with the msg. sig.

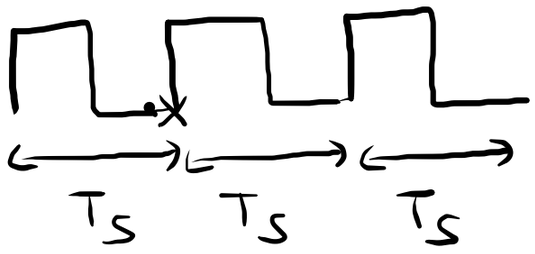


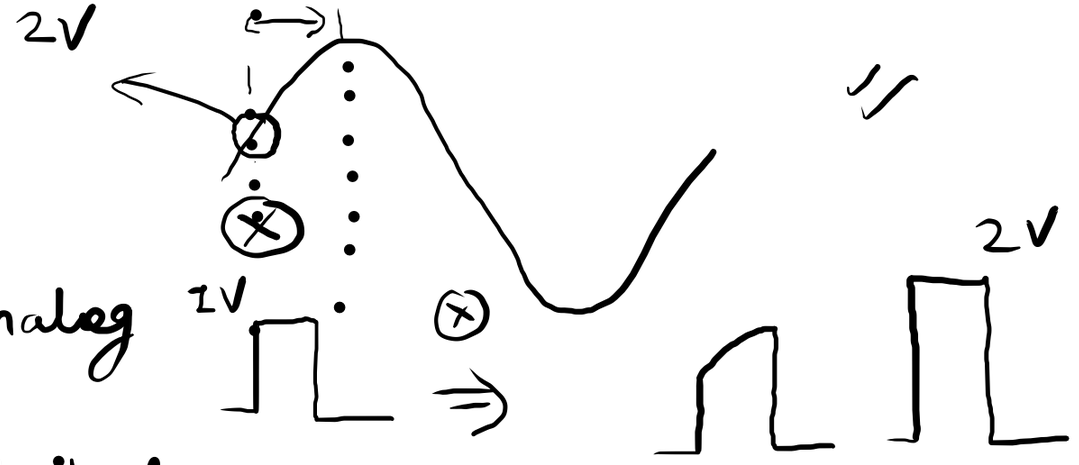
→ amplitude - PAM

→ duration - PWM

→ position - PPM.







Two types of PM < APM - analog
DPM - Digital

$T < T_s$

APM - wifer^n is Txd in analog form but at discrete times

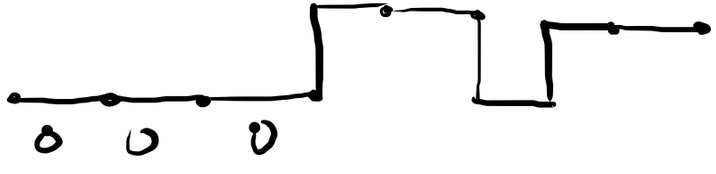
DPM - Message sig. is discrete in time & amplitude both, hence can be txd as seq. of coded pulses.

CW (continuous wave) modulation - some parameter of sinusoidal carrier wave is varied acc. to msg. signal.

{1, 2, 3, 4}

00, 01, 10, 11

! 2, 3, 4



{1, 2, 3, 4}

1 1 2 2 3 4 1 2 3

For DC, the base req. is use of coded pulses for Tx of analog infor^n bearing signals.

Sampling procons:- heart of DSP & DC

Analog sig → seq. of samples that are 'usually' spaced uniformly in time.