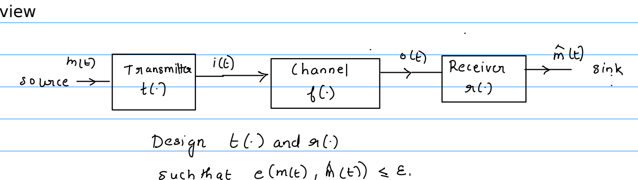
Lecture 8 13/08/2019

Review assignments on Signals and Systems - RA 1,2,3 - not required to be submitted - but review before midterm.

Assignment 1 - general questions about spectrum and modelling - not required to be submitted.
Programming assignment 1 - submission on August 20th 2019 - google link will be put up.

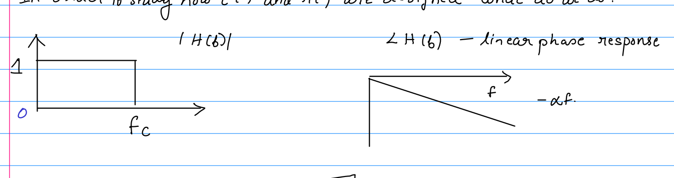
Review

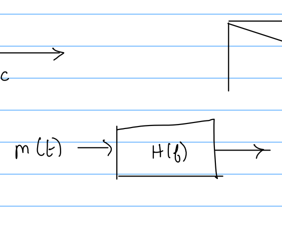


Design $t(\cdot)$ and $r(\cdot)$
such that $e(m(t), \hat{m}(t)) \leq \varepsilon$.
given $f(\cdot)$ modelled as a LTI filter $(h(t))$

Usually wired channels are modelled as low pass filters.

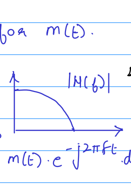
In order to study how $t(\cdot)$ and $r(\cdot)$ are designed - what do we do?





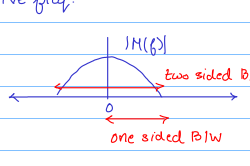
Bandwidth for $m(t)$.

earlier



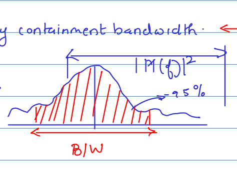
this is a plot of +ive freq.

$M(f)$ as $\int_{-\infty}^{\infty} m(t) \cdot e^{-j2\pi f t} \, dt$, $f \in (-\infty, \infty)$



Definition of bandwidth: energy containment bandwidth ← UM

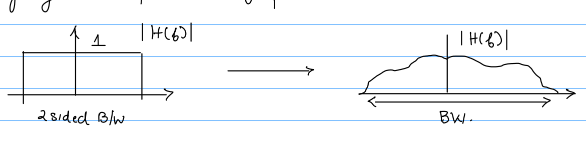
$|M(f)|$ for a real world signal



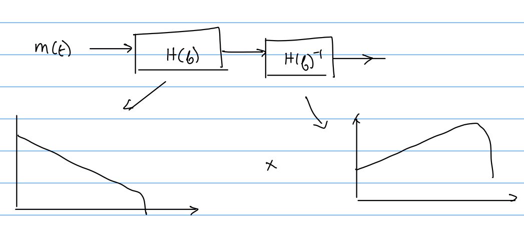
$e(\cdot)$

- if $m(t)$'s BW < Channels BW then $t(\cdot), r(\cdot)$ = identity

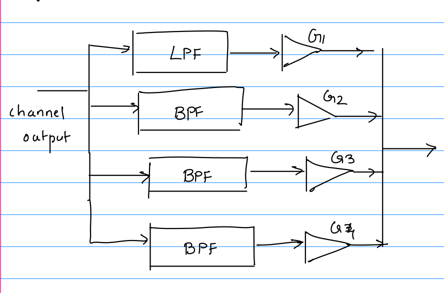
A slightly more complicated design problem.



how to transmit $m(t)$ here?

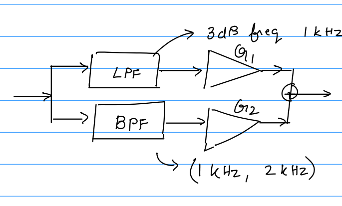


Equalizer design



For baseband channels
- Bandwidths of signal $m(t)$ and channel $h(t)$
- Equalizer design.

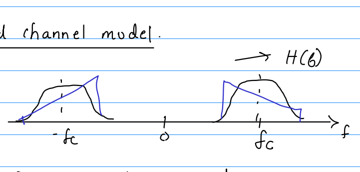
H/W.



circuit realization?

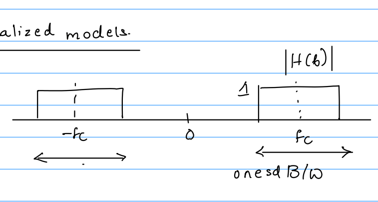
Recall → baseband
→ passband - models for wireless communication.

Passband channel model.



1) $H(f)$ is symmetric around 0.
2) centre freq f_c but an actual channel response need not be symmetric around f_c.

Idealized models.

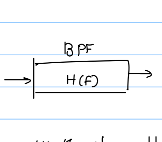


phase response is linear.

e.g. 100 MHz
one sided B/W = 2 MHz

Our problem

$m(t)$ is baseband →



1) $m(t) \notin I$, not compatible with the channel's input set I.