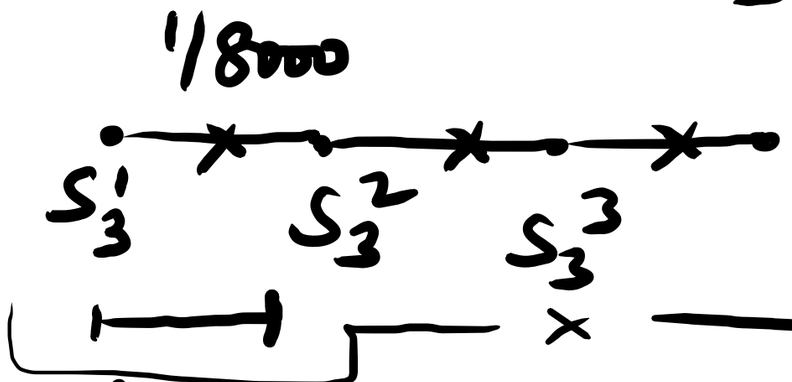
→ Commutator freq. is the (generally) H.C.F of the incoming rates / req. sampling rates.

→ Output of the commutator is a multiple of the highest incoming rate / req. sampling rates.

→ pulse stuffing as an idea.

→ In the design, efficiency is paramount & any possible design won't waste.

— 4Kbps T_{S_1}
— 4Kbps T_{S_2}
— 8 Kbps T_{S_3}



Next module :- Intersymbol Interference (I.S.I)

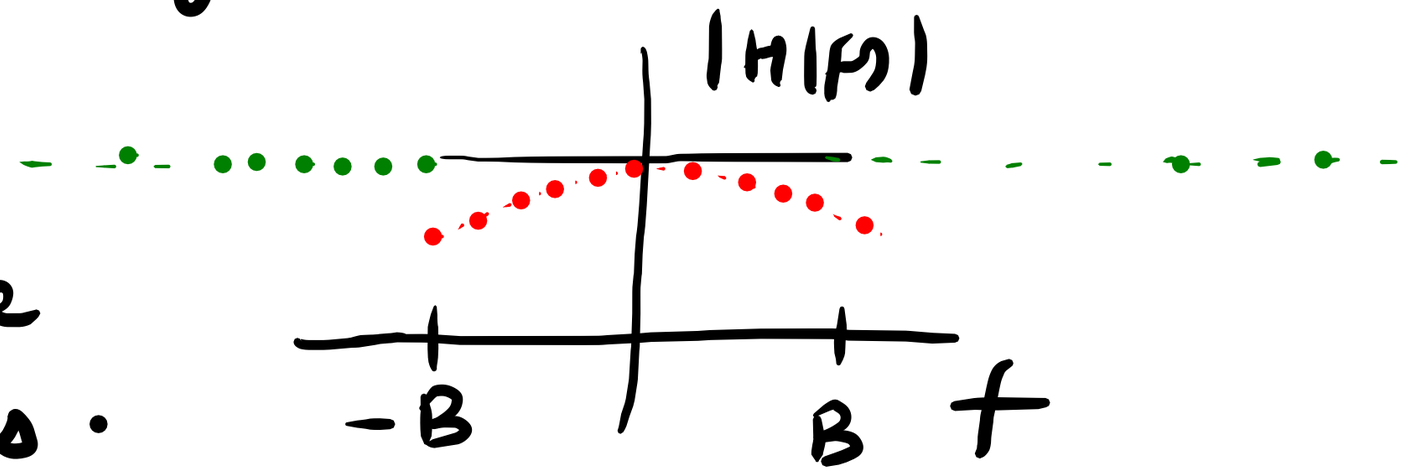
→ motivation :- Until now, we have assumed the channel to be distortionless (DL).

If channel is represented as an LTI system & its impulse response is $h(t)$, then $H(f)$ has the foll. prop.

1. $|H(f)| = 1$ $\forall f$ / in band of interest
2. $\angle H(f) \rightarrow$ linear function of f.

→ Satisfying cond. 1 may not be possible in real life scenarios.

→ Phase will also have corresponding issues.



flat resp. thro - ughout

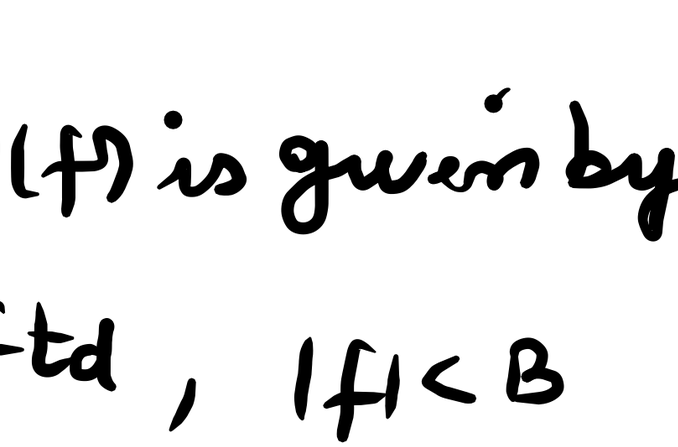
→ If Bandlimited

Example 3.14 (Lathi & Ding)

A LP filter transfer function $H(f)$ is given by

$$H(f) = \begin{cases} (1 + k\cos 2\pi f T)\, e^{-j2\pi f t_d}, & |f| < B \\ 0, & |f| > B \end{cases}$$

A pulse $g(t)$ BL to B Hz is applied at the input of this filter. Find the output $y(t)$.



Ans:- $Y(f) = G(f)\, H(f)$

$= G(f)\ \Pi(f/2B)(1 + K\cos(2\pi f T))\, e^{-j2\pi f t_d}$

$= G(f)\, e^{-j2\pi f t_d} + k[G(f)\cos 2\pi f T]\, e^{-j2\pi f t_d}$

IFT, $g(t - t_d) + \ldots\ldots$ (next lec.)