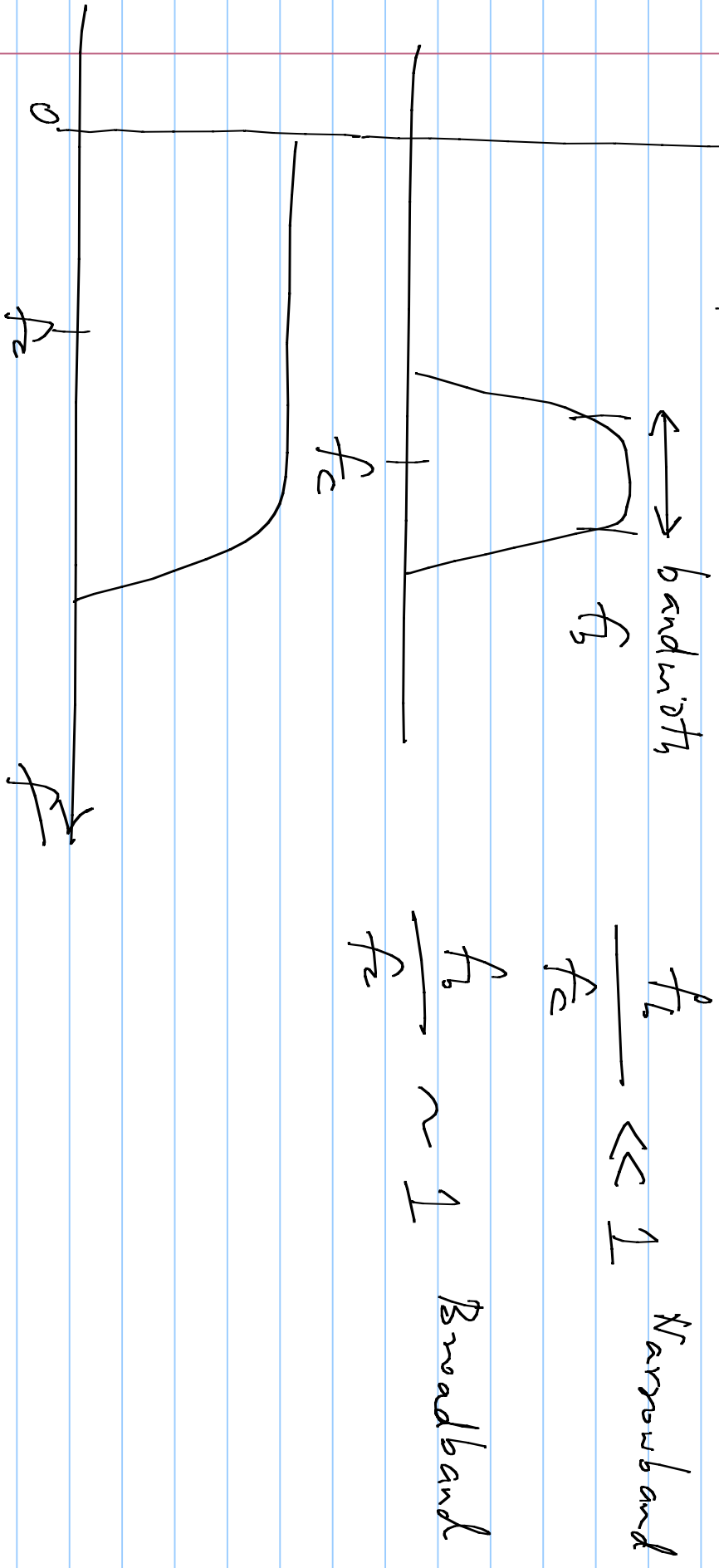


# EE 685: VLSI Broadband Comm. Circuits.

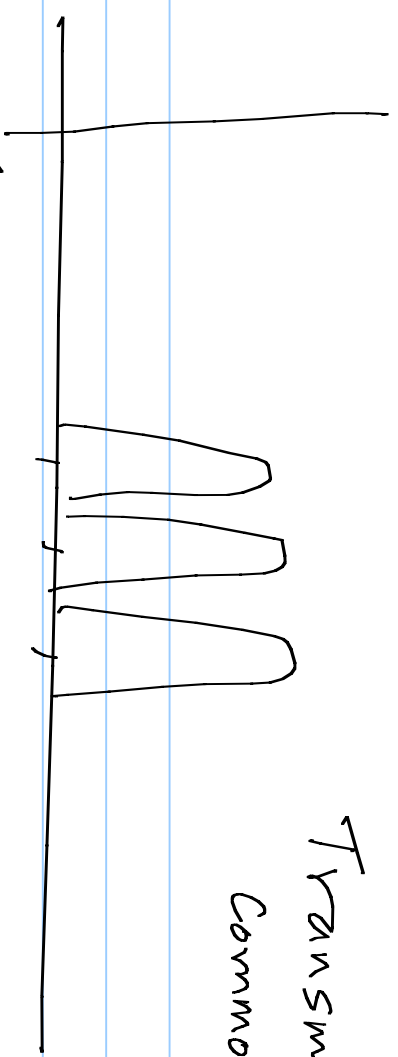
Note Title

30-07-2007

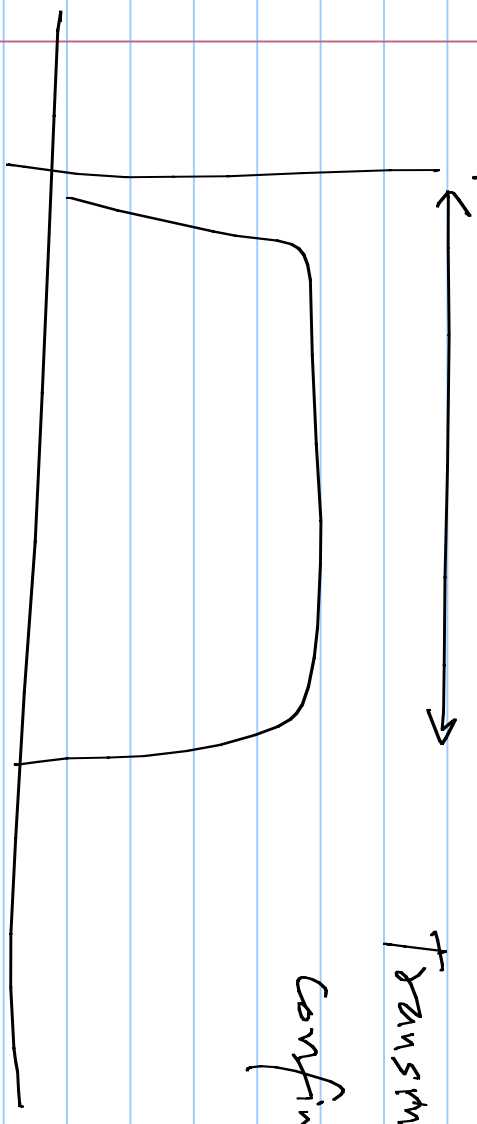
Digital communication: Sending digital data across  $N_s$  spectral density a channel



Transmission over a  
Common medium - air



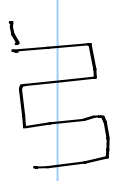
Transmission over a  
confined medium - pair of  
wires.



— Telephone lines.

Voice - analog  $\frac{4 \text{ Kbps}}$   
 DSL - digital  $\frac{4 \text{ DSL}}{384 \text{ Kbps}}$

DSL - digital  $\frac{1000 \text{ Base T}}$

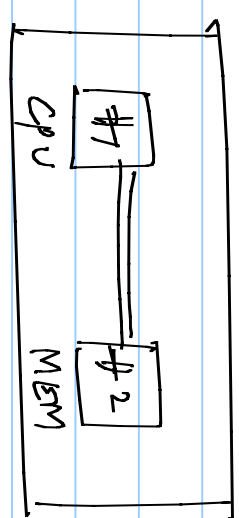


— Ethernet  $10/100/1000$

— USB (480 mb/s)

— optical links [optical domain - narrowband]

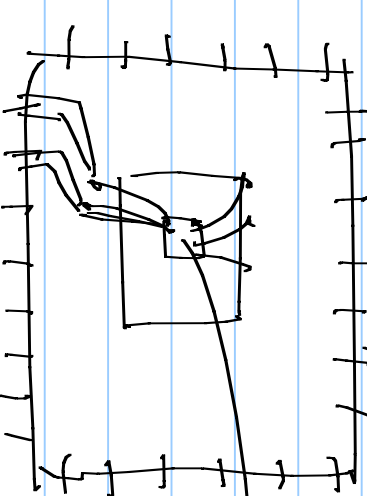
— [PCBs]  
 Backplane (large PCB)



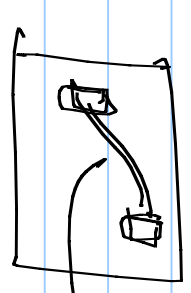
Broadband comm. links.

— PCB traces w/ 1m

Package connections

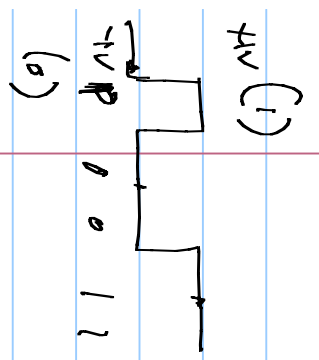
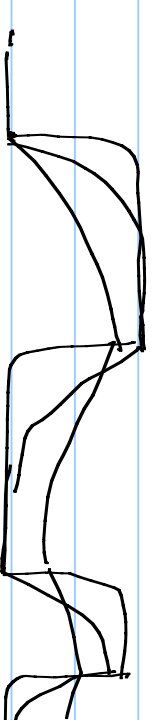
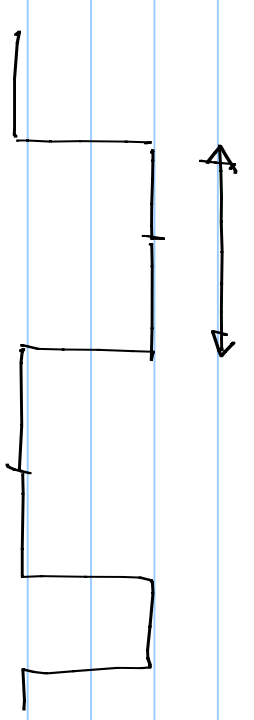
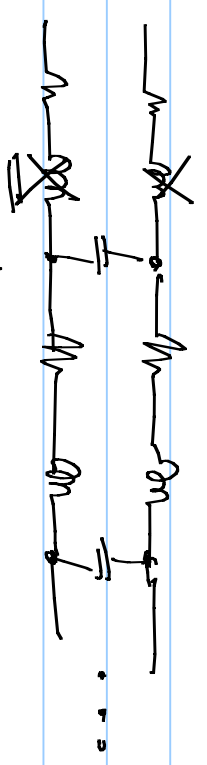
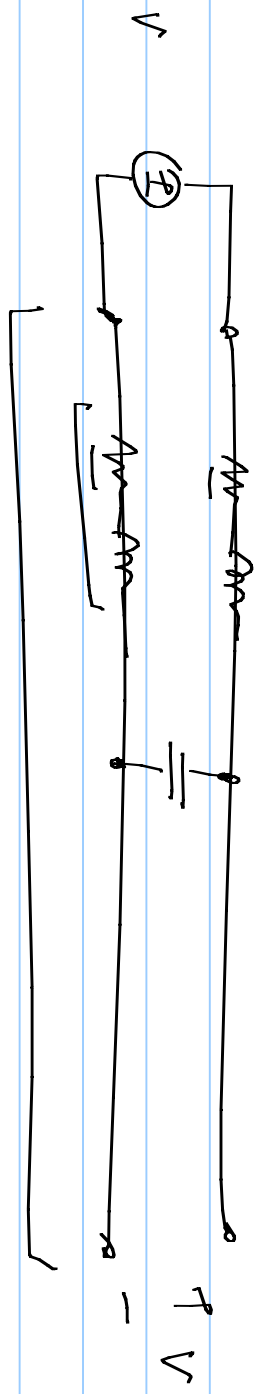


Si Chip. Bondwires.

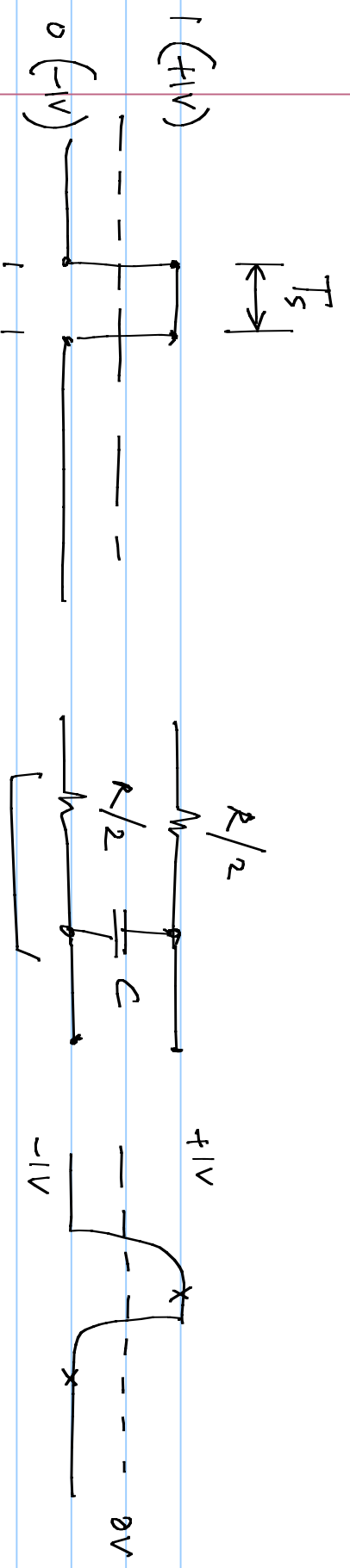


Broadband comm. link

Problems in communicating data across a pair of wires?



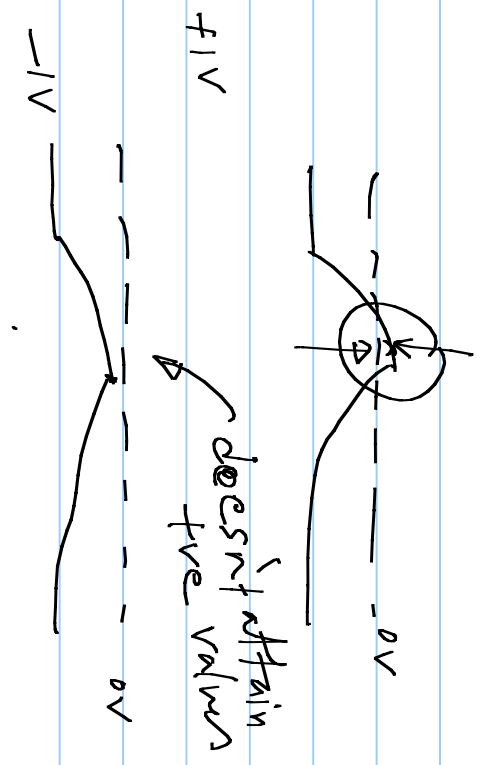
(a)

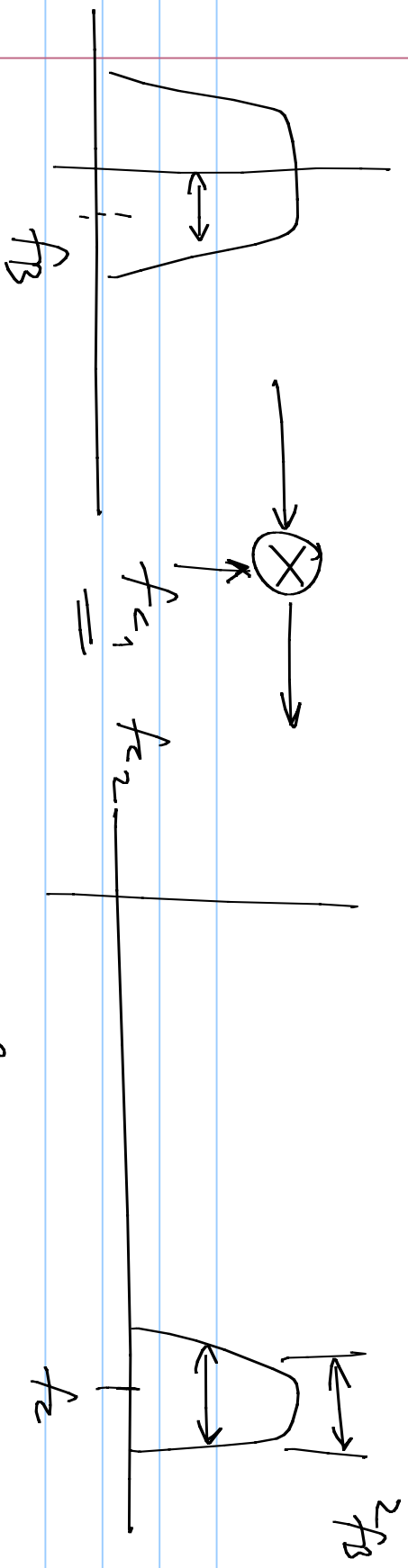


$$Q = \text{RQ}$$

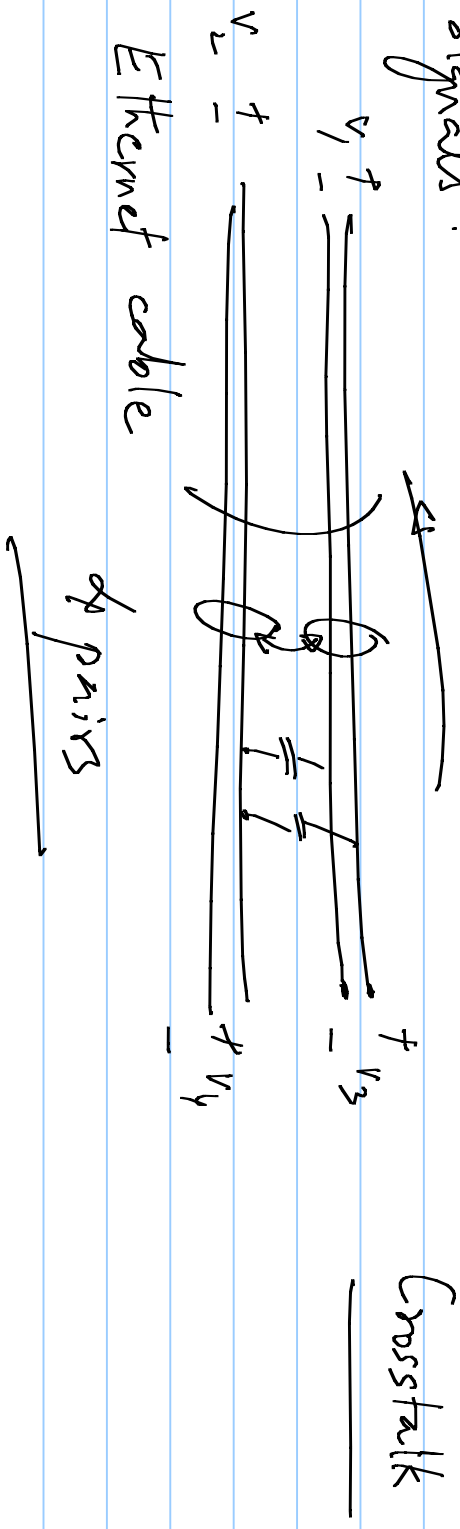
$$f_B = \frac{1}{2\pi RC}$$

- Data rates  $\uparrow$
- Can't multiply infrastructure
  - too expensive
- So, multiply speed
- Data impairments — correct them

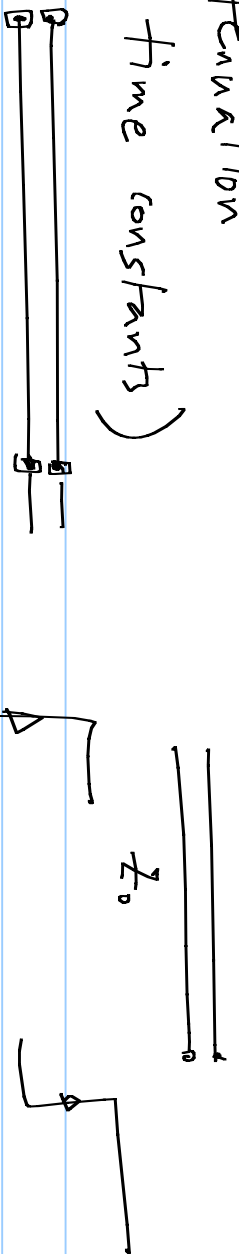




IC design for transmitting & receiving broadband signals.



- ① High freq. attenuation  
 (~~small~~ large time constants)



Reflections

Impedance discontinuities.

- ② Crosstalk

- ③ Timing

