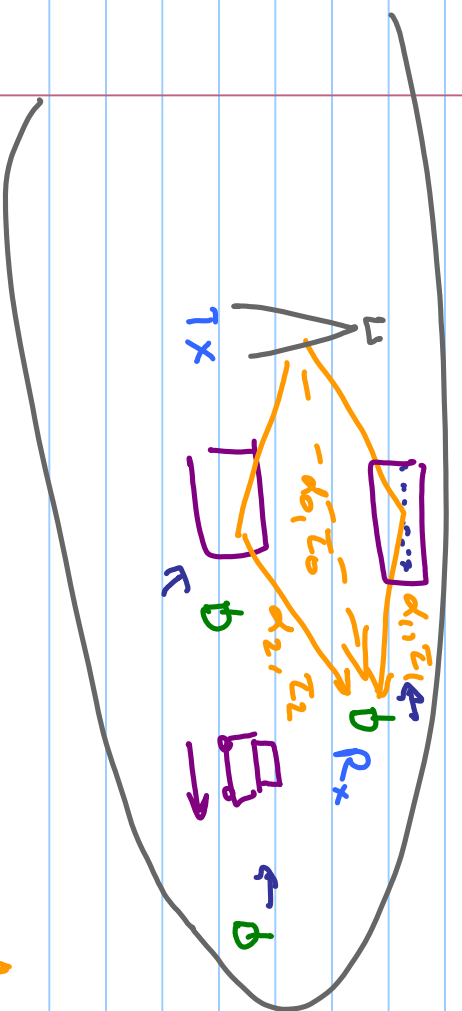


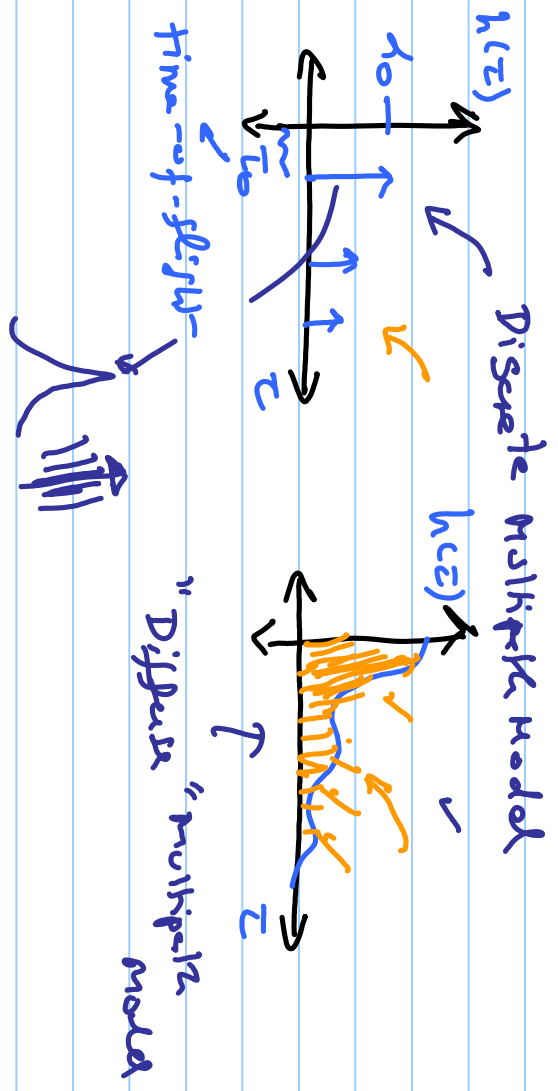
TDMA (2G)

versus

DS-SSMA (3G)

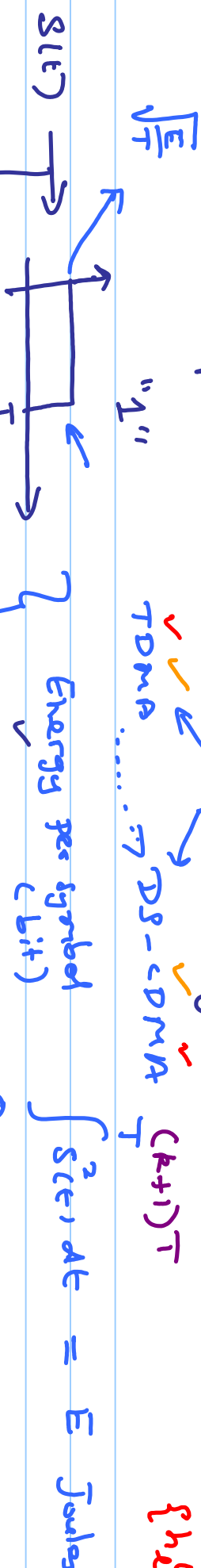


125 MHz



Uplink → Direct Path Only. → $h(f, z) \leftarrow \{h_1, h_2\}$

"1" → TDMA → DS-SS → TDMA → DS-SS → TDMA

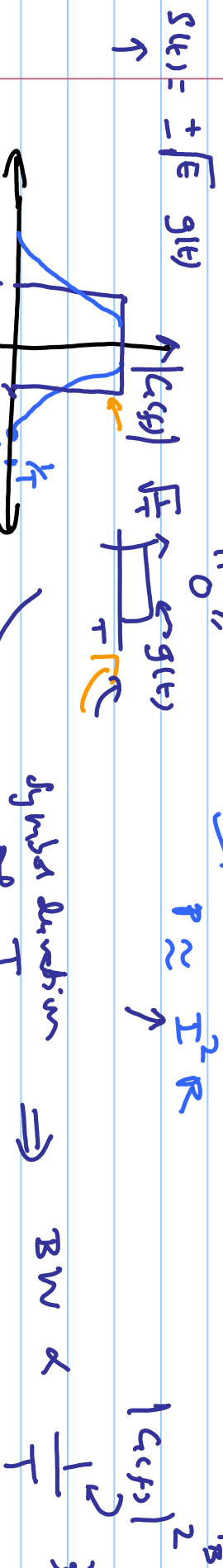
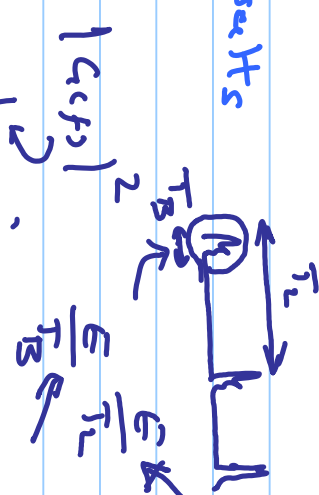


Energy per symbol (bit)

$$\int_0^{KT} s^2(t) dt = E \text{ Joules}$$

Power $P = \frac{E}{T}$ watts

Power $P \approx I^2 R$



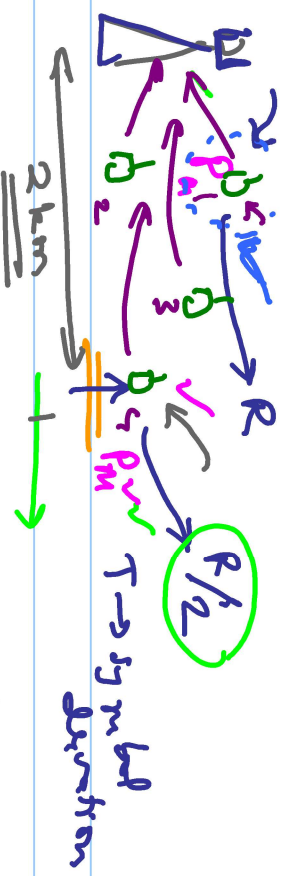
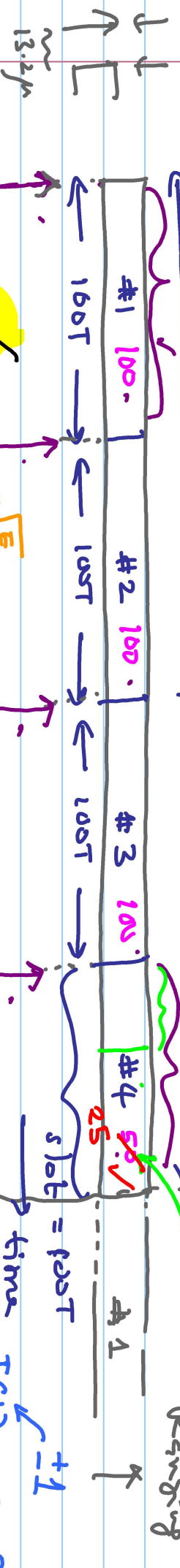
Symbol duration \Rightarrow BW $\propto \frac{1}{T}$

Example: 4 users uplink

1 user \Rightarrow 3.3 users

Frame of T_F sec.

TDMA



Peak power $\frac{E}{T} \left(\frac{100E}{100T} \right)$

BS rxn m of frame beginning

BWd $\frac{E}{4T}$

100E Avg power $\frac{100E}{400T}$

$$E = \int_0^T \left(\sqrt{\frac{E}{T}} \right)^2 dt = \int_0^{2T} \left(\sqrt{\frac{E}{2T}} \right)^2 dt$$

$\sigma_{01} = \sqrt{E_r + \sigma_{ch}^2} \approx \sigma_r$

time $I(\hat{c}_k)$ $\approx \pm 1$

$P(e) = \frac{1}{2} \operatorname{erfc} \left(\frac{\sqrt{E}}{\sqrt{N_0/2}} \right)$

"narrow-banding" AMC

DS-SSDMA

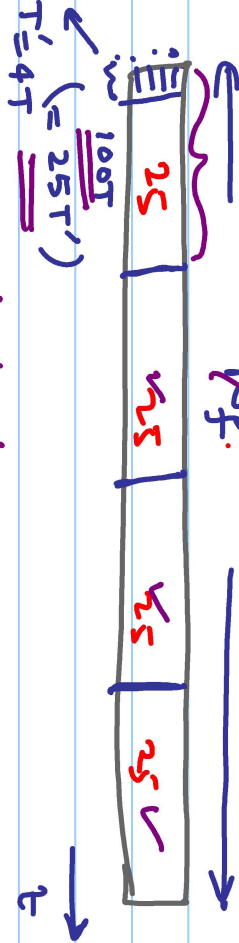
Bit-Duration $T = T_c$ chip duration

$\sqrt{\frac{E}{4T}}$ = $\sqrt{\frac{E}{T}}$

$RW = 1/T$

$S(k) = \pm c(k)E$ "1" → + "0" → -

$100 \leftarrow T_f \quad T \quad \rightarrow 100 + 100 + 100 + 100 = 400$

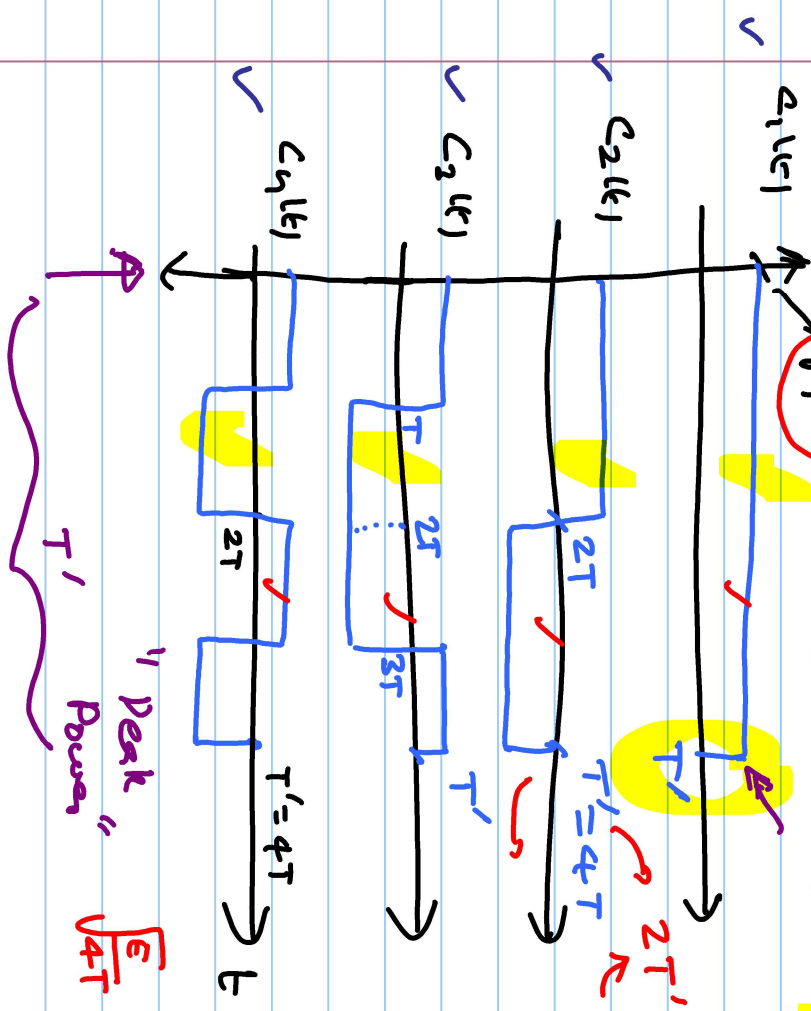


Peak Power for SSDMA

Peak Power E/T watts
Avg Power $E/4T$

$\frac{E}{4T}$ DS-SSDMA

$\sqrt{\frac{E}{T}}$



'Peak' Power

$\sqrt{\frac{E}{4T}}$

$\frac{E}{4T}$

