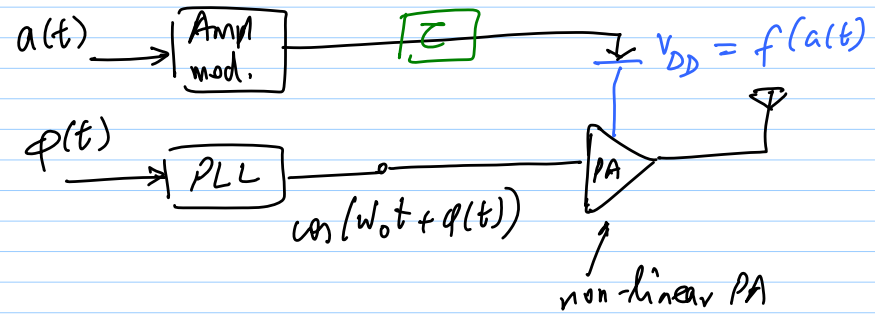
9-10-13

Lec 29

Tx Architectures

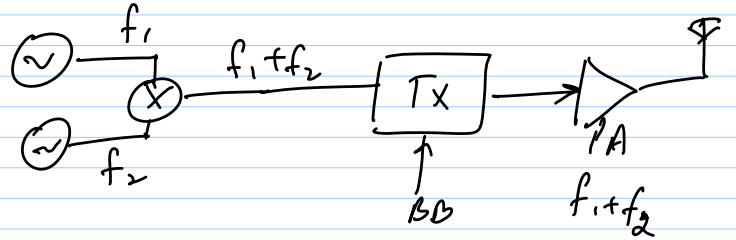
1) Polar



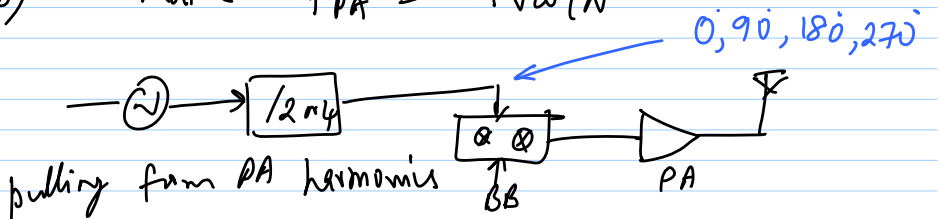
2) Cartesian Tx

* Separate f_{PA} & f_{PLL}

a)

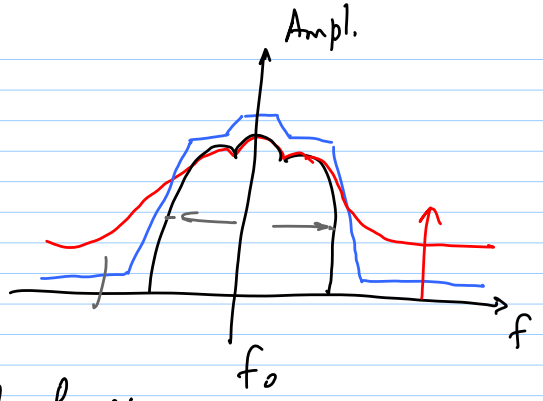


b) make $f_{PA} = f_{VCO}/N$



Tx Metrics

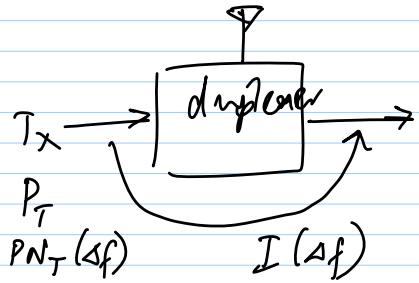
1) Emission Mask



2) Adjacent Channel Power
   - ACPR, ACP, ACLR, ORFS

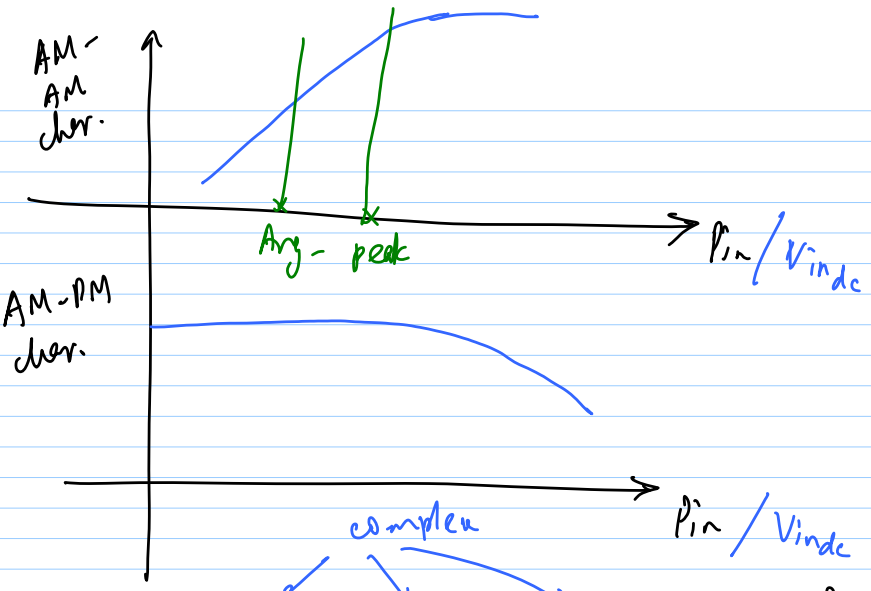
3) Spurs - unwanted tones in output due to PLL, Mixer etc.

4) Noise: raises Rx input noise floor in FDD systems



Rx input noise floor $= -174\,dBm/Hz$

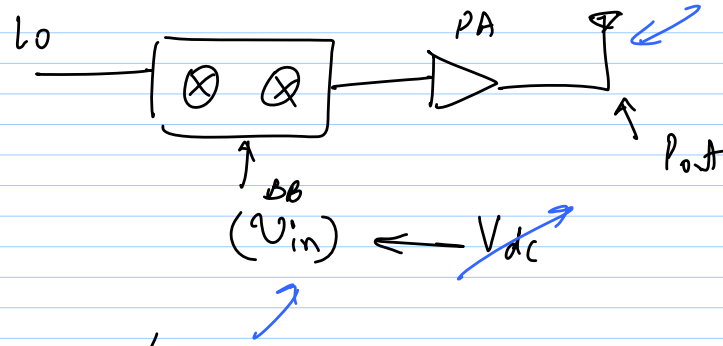
$PN_{Tx}(Rx) = -184\,dBm/Hz$



complex

$V_{out} = a_0 + a_1 v_{in} + a_2 v_{in}^2 + a_3 v_{in}^3 + \cdots$

$v_{out} =$ _____



PAPR / PAR — Peak to avg. power ratio

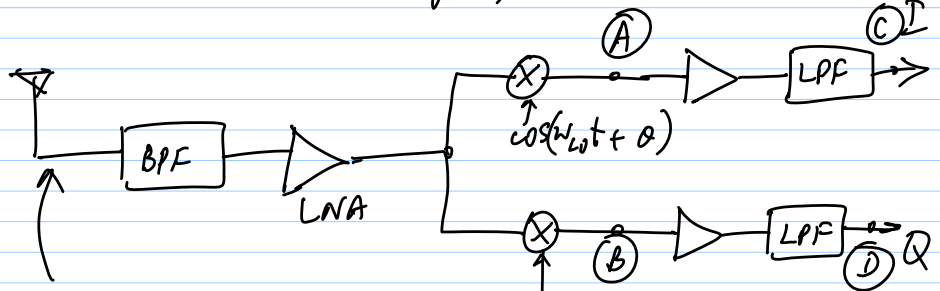
$PAPR_{DC} = 1 = 0\,dB$

$PAPR_{sin} = 2 = 3\,dB$

$PAPR_{LTE} = 10 - 12\,dB$ ←

Rx Architectures

1) DCR Rx / Homodyne / Zero-IF



$x_r(t) = a(t)\cos[\omega_{LO}t + \varphi(t)]$

@ (A) : $x(t) \cdot \cos(\omega_{LO}t + \theta)$

$= \frac{1}{2} a(t) \left[\cos(\varphi(t) + \theta) \right.$

$\left. + \cos(2\omega_{LO}t + \varphi(t) + \theta) \right]$

assume $\theta = 0$

@ (C) : $\frac{1}{2} a(t) \cos(\varphi(t))$

@ (D) : $-\frac{1}{2} a(t) \sin(\varphi(t))$

Demod. algo: $\sqrt{C^2 + D^2} = \frac{1}{2} a(t)$ ← AM

4 quadrant $\tan^{-1}$ → $-\tan^{-1}\left(\frac{D}{C}\right) = \varphi(t)$