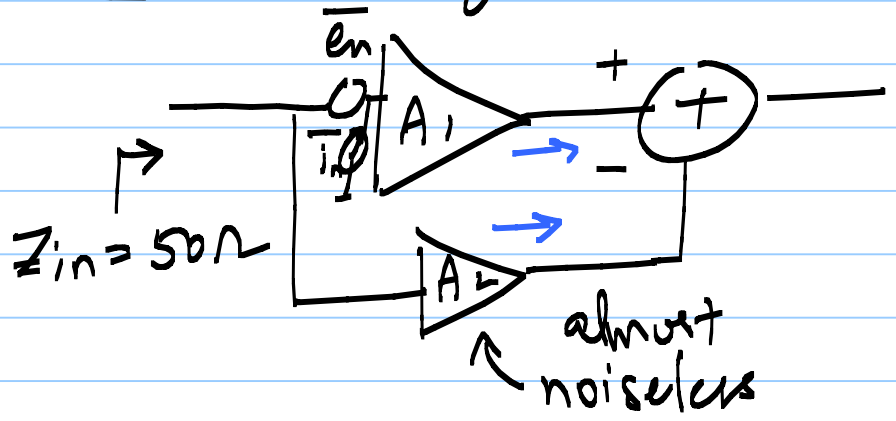
20/2/20

Lec 16

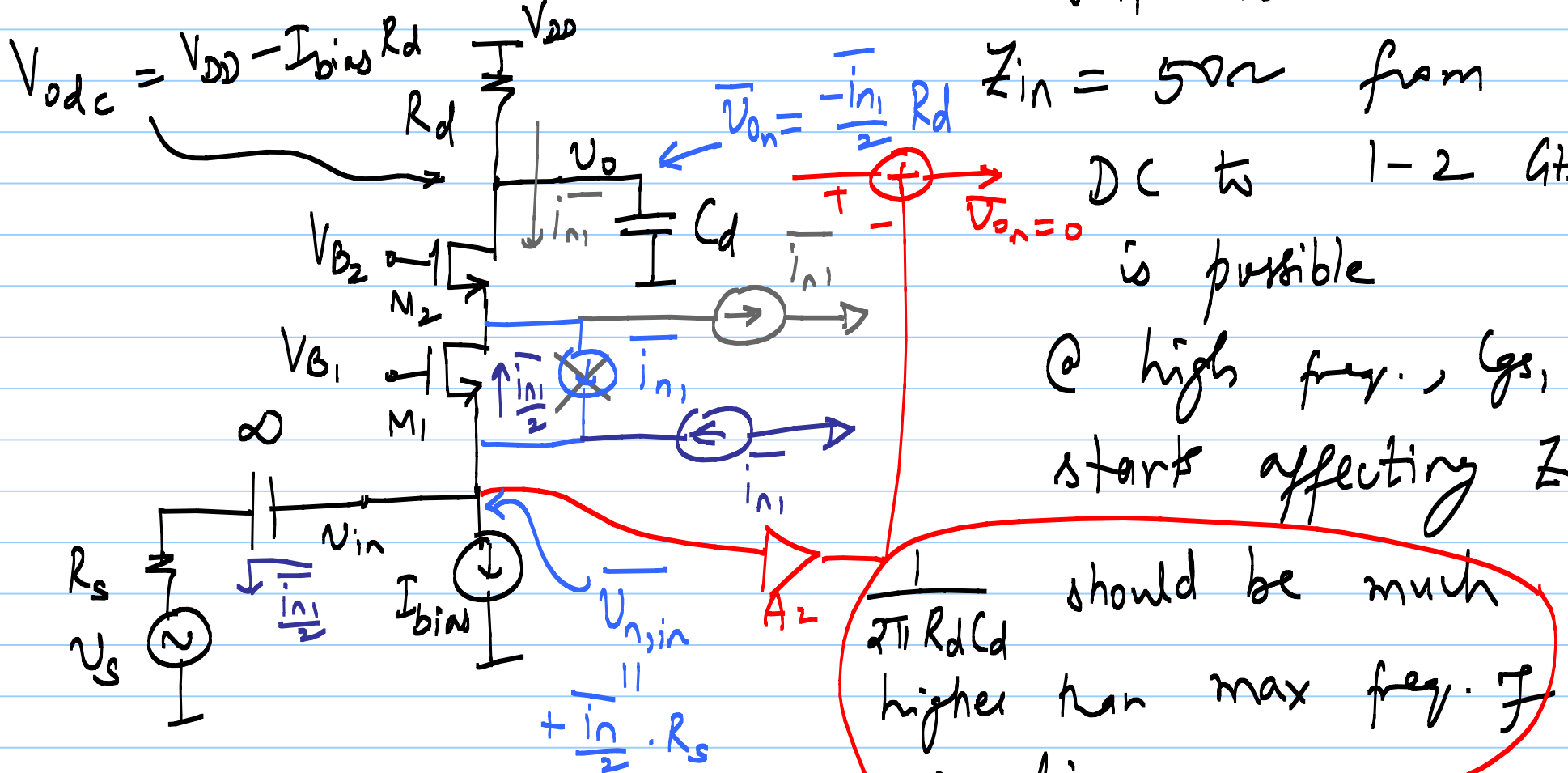
Noise cancelling LNAs



these can be quite broadband

* A_1, A_2 – opposite signs equal magnitude
* A_2 should have low noise
* $Z_{in} = 50\Omega$ e.g. A_1 was originally matched to 50Ω @ input
* A_2 should have $Z_{in} \to \infty$

Broadband CG LNA



$g_{m_1} = 20mS$

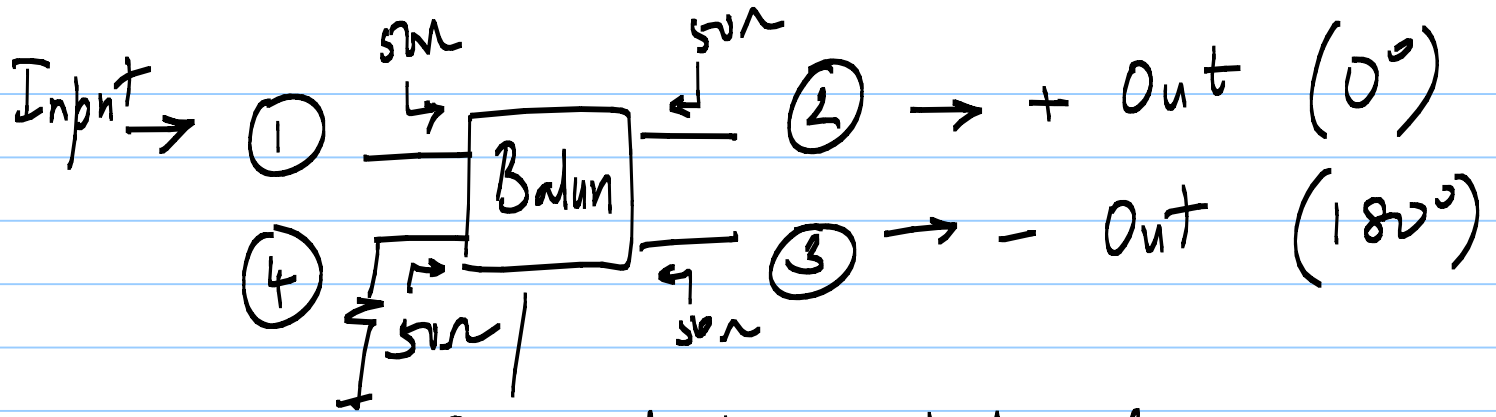
$Z_{in} = 50\Omega$ from DC to 1-2 GHz is possible

@ high freq., C_{gs_1} start affecting Z_{in}

should be much higher than max freq. of operation

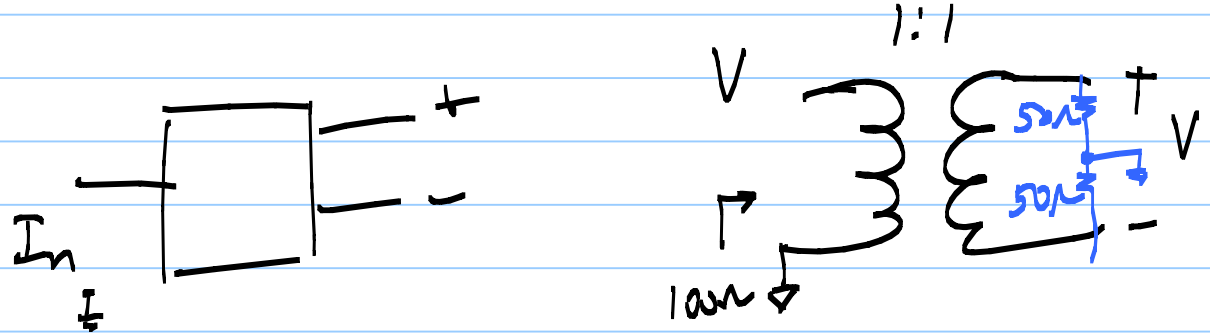
$$NF = 1 + \frac{4R_s}{R_d} + \gamma$$

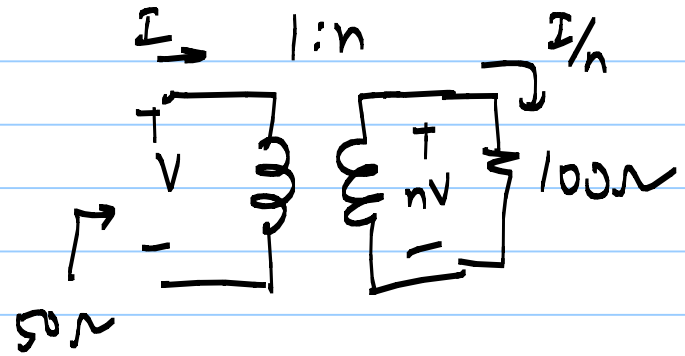
$$gain = \frac{R_d}{2R_s}$$



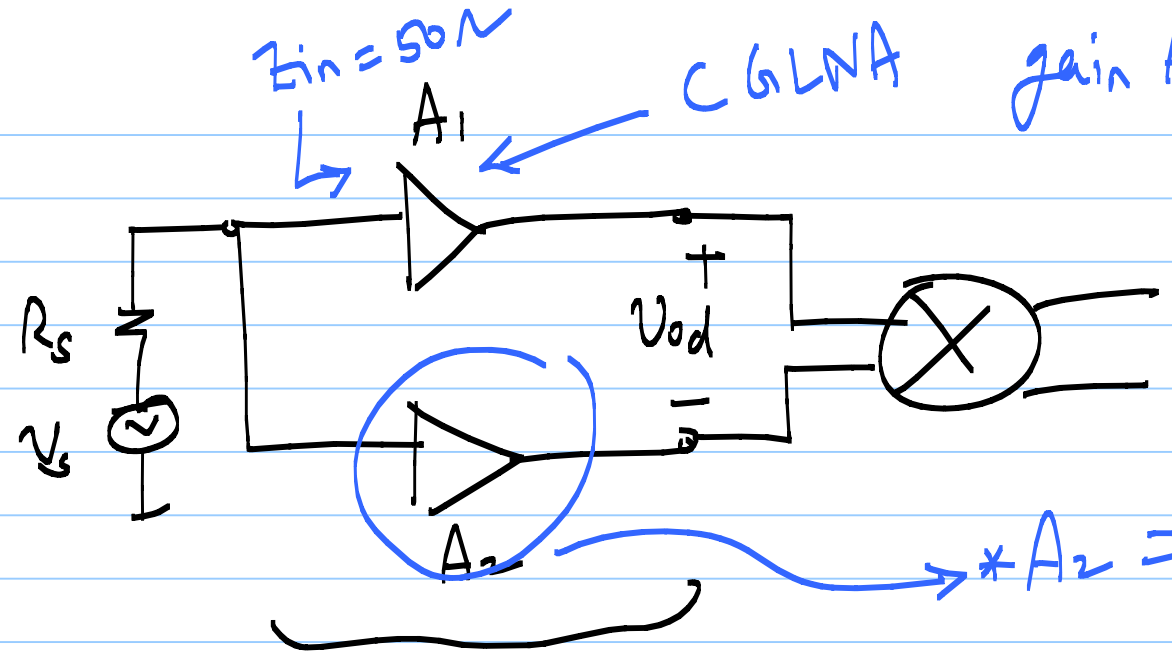
Normally purely passive

Balanced to Unbalanced





$1:\sqrt{2}$ transformer can be a good narrowband balun



achieves Active balun

* A_2 = choose so that $V_{od_n} = 0$

* $Z_{in_{A_2}}$ = high impedance

* Broad band

* almost noiseless

Candidate 1 : CS amplifier with large g_m { $\overline{e_n}$ is small }

No L_s, keep $\frac{1}{RC}$ BW large