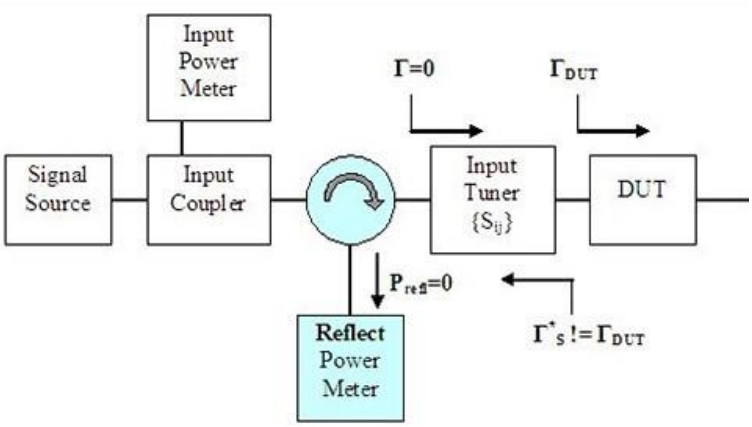
Measure Zin (DUT) using a passive Load Pull System

Some say it is enough to use a circulator or directional coupler at the input (before the input tuner)and tune to minimize the reflected power. Then look at the tuner impedance which is equal Zin*.



Unfortunately, this is not correct(!) By minimizing the reflected power at the input of the setup we match at the interface between input tuner and coupler (circulator), not between input tuner and DUT. Only if the input tuner is lossless both conditions are the same.

If we use the technique of tuning to minimize the reflected power then the input impedance of the DUT must be calculated from the relation:

$\Gamma = S11 + (S12*S21*\Gamma_{DUT})/(1-S22*\Gamma_{DUT}) = 0$

where Γ is the reflection factor seen into the Source tuner from its left port (signal source side) leading to the relation

Γ_{DUT} =S11/(S11*S22 - S12*S21) noting that $\Gamma_{DUT}=(Zin-Zo)/(Zin+Zo)$

where Sij = S-parameters of the tuner, and where the DUT is facing S22.

Another possibility is to tune the input tuner for maximum Transducer Gain and then the input impedance of the DUT becomes: Zin = Zout.tuner*

<u>However, considering the fact that the input impedance of the DUT Zin changes when the sourcetuner moves</u>, the only way to measure Zin at all times is to connect a calibrated VNA in line withthe load pull setup and <u>measure instantaneously</u> both injected and reflected power waves.