## MILLER'S THEOREM

- The introduction of an impedance that connects amplifier input and output ports adds a great deal of complexity in the analysis process. One technique that often helps reduce the complexity in some circuits is the use of ***Miller's theorem***.

- Miller's theorem applies to the process of creating equivalent circuits. This general circuit theorem is particularly useful in the high-frequency analysis of certain transistor amplifiers at high frequencies.

***Miller's Theorem generally states:***

*Given any general linear network having a common terminal and two terminals whose voltage ratio, with respect to the common terminal, is given by:*

$$V_2 = A\,V_1 . \qquad (10.5\text{-}1)$$

*If the two terminals of the network are then interconnected by an impedance, Z, an equivalent circuit can be formed. This equivalent circuit consists of the same general linear network and two impedances; each of which shunt a network terminal to common terminal. These two impedances have value (Figure 10.5-1):*

$$Z_1 = \frac{Z}{1-A} \qquad Z_2 = \frac{AZ}{A-1} \qquad (10.5\text{-}2)$$

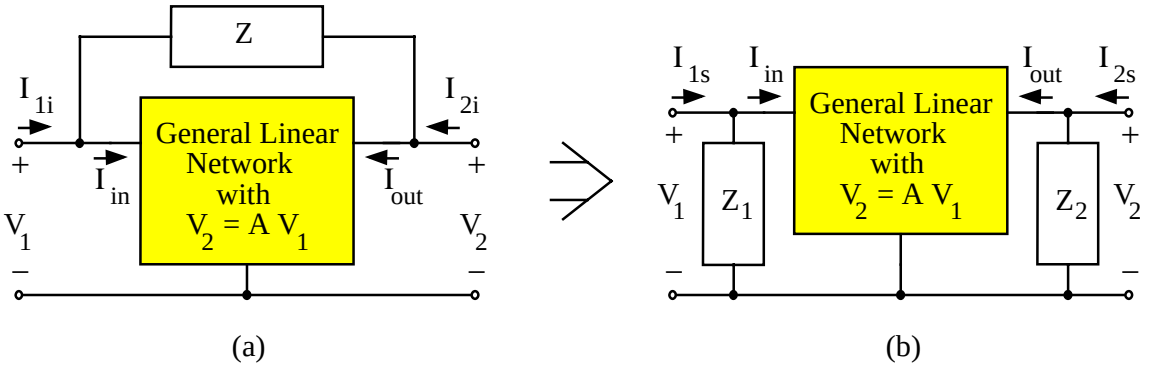


Figure 10.5-1 Miller Equivalent Circuits
a) Interconnecting Impedance
b) Port-Shunting Impedances