

4.2 - Impedance and Admittance Matrices

Reading Assignment: pp. 170-174

A passive load is an example of a **1-port** device—only **one** transmission line is connected to it.

However, we often use devices with 2, 3, 4, or even more ports—**multiple** transmission lines can be attached to them!

Q: *But, we use impedance Z , admittance Y , or reflection coefficient Γ to **characterize** a load. How do we characterize a **multi-port** device?*

A: The analogy to Z , Y , and Γ for a multi-port device is the **impedance matrix**, the **admittance matrix** and the **scattering matrix**.

HO: THE IMPEDANCE MATRIX

HO: THE ADMITTANCE MATRIX

We can determine **many** thing about a device by simply looking at the **elements** of the impedance and scattering matrix.

HO: RECIPROCAL AND LOSSLESS DEVICES

Q: *But how can we **determine**/measure the impedance and admittance matrix?*

A: EXAMPLE: EVALUATING THE ADMITTANCE MATRIX

Q: *OK, but what are the impedance and admittance matrix good for? How can we **use** it to solve circuit problems?*

A: EXAMPLE: USING THE IMPEDANCE MATRIX