

INVENTION DISCLOSURE

1. **Invention Title.**

Method to Accurately Measure S-Parameters Using Time and Frequency Transforms

2. **Invention Summary.**

A method to accurately measure return loss comprising attaching long representative cable(s) to a device, launching a test signal through the cables, capturing the complex frequency response, converting the complex frequency response into the time domain, filtering in the time domain, converting the filtered time response back into the frequency domain, wherein the effects of the launch connectors is removed from the frequency response.

3. **Invention Description.**

a. Describe the invention in detail and/or attach a description, drawing(s) and/or diagram(s), if available.

See drawing below. Tap has representative hard-line coax attached with significant length. At the ends of the coax connectors are used to allow attachment to a network vector analyzer. The lousy return loss of the connectors distort the frequency response data, both transmission and reflection, as shown on the top graph. The complex frequency response data is transformed into the time domain, where the reflections from the low return loss connections is removed. Note that if the tap is low loss, multiple reflections will occur between the low return loss connections. The lengths of the long cables can be adjusted to resolve the tap's response. The long cables are not necessarily equal length.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

Advanced cable systems will be using cable taps way beyond their design limits, even out to the GHz range. The problem solved is getting accurate data on tap performance when the connectors commercially-available (stingers) are not representative of the hard-line coax used in the field.

c. Briefly outline the potential commercial value and customers of the invention.

Could be incorporated into Network Analyzers to improve their accuracy.

4. **HOW is your invention different from existing products, processes, systems?**

In time domain reflectometers and optical time domain reflectometers sometimes a piece of cable is used to eliminate a big reflection from the launch point. These don't involve mathematical transforms.

