Introduction

The Anritsu S412E can be used to measure and verify antenna patterns with a single operator. The operator is located at the antenna under test end where a test CW signal is transmitted. The S412E is located far enough away from the test antenna in “Far field” conditions. Measurements on the S412E are initiated and observed by the operator on a smart phone. The remote operation and viewing is made possible by the Ethernet interface with web server on the S412E. For more information on this see Anritsu Spectrum Master with Web Remote Tools 11410-00846.

In figure 1 the S412E is connected to the internet allowing the antenna under test to be many miles from the S412E.

Figure 1: Block Diagram for Antenna Pattern Measurement with the S412E connected to the Internet
The S412E is used to measure the signal strength from the distant antenna under test. Figure 2 shows a photograph of the receive set up. The Ethernet interface on the receive unit is connected to the Internet through a router. The S412E with Ethernet interface includes a web enabled interface for all of its measurement modes. For antenna pattern measurements the receive unit will be set to spectrum analyzer mode, zero span, 30 second sweep speed.

The level of the CW transmitter should be sufficient to be received at the S412E end. The operator will set up the S412E using the browser on a smart phone. The browser would be set to the external Internet IP address for the receive S412E. Using the browser, the receive unit would be set to single sweep in zero span mode. Sweep time should be slow enough to match the rotation of the test antenna. As the sweep begins the antenna would be rotated 360 degrees. The resulting measurement trace on the remote unit can be viewed on the smart phone display and saved as needed.

Antenna pattern measurements are often made in remote locations to prevent over the air signals from interfering with the measurements and the test signals from interfering with others.

The S412E can be used as a WiFi “Measurement WiFi Hot Spot” with the addition of a small USB powered WiFi router. With this setup the smart phone can be used to operate the S412E without an internet connection.

Figure 2: Showing the S412E connected to the internet through a router and an omnidirectional test antenna.

Figure 3: Block Diagram of S412E as a Measurement “Hot Spot”
The precision signal generator on a second S412E can be used to drive the antenna under test.
Using the smart phone control the zero span sweep is started on the remote S412E. Then the signal turned on at the test antenna. Once the antenna is rotated 360 degrees the signal was turned off. The on and off are used as markers help indicate the antenna direction.

The example test antenna is an Andrew CommScope DB408 with an elliptical pattern. The measurements indicated a 3 dB difference between front and side directions.

**Summary**

The S412E with Ethernet interface and web server supports the measurement of distant receive levels from the location of a rotating test antenna. This process allows a signal operator to do quick assessments of antenna performance.