

Anritsu Spectrum Master with Web Remote Tools

Web Remote Tools

Anritsu Spectrum Masters may now be controlled from any web-enabled device, including laptops, tablets, and smart phones. Fixed and mobile spectrum monitoring allows a flexibility and timeliness to both short and long term RF measurements that have previously been lacking.

One traditional method of spectrum monitoring involves taking a spectrum analyzer to a site with an RF issue and waiting until the problem can be seen. If that takes too long, the spectrum analyzer would be set up to capture traces for a week or two, and later the captured traces analyzed. If nothing was visible, a few settings would be changed and another week's worth of data would be collected. While this method is time-tested, it can be improved.

Another spectrum monitoring issue focuses on testing Remote Radio Heads (RRH's) and other inaccessible radio units. Skilled technicians may be prohibited from accessing radio equipment located on a tower top or other hazardous location. This obviously makes testing and troubleshooting difficult.



Figure 1. The MS2720T Spectrum Master with Anritsu's Web Remote Control Tools being controlled from a tablet.

Web Remote Tools allows Anritsu spectrum analyzers to be controlled from most Wi-Fi enabled web browsing devices. Once set up, your laptop, tablet, or smart phone can be used to control the spectrum analyzer or check up on what it is seeing. The web browsing device must have a HTML 5 compliant browser and the spectrum analyzer will need Ethernet, either as standard or an option. That's it. PC software is not needed.

While this technique is shared across the Anritsu handheld instrument product line, there are some differences between instrument families. This application note will focus on Spectrum Master remote control.

Anritsu Web Remote Tools has:

- Flexibility
 - Link to the Anritsu handheld instrument from any web-enabled computer, smart phone, or tablet.
- Quick setup
 - Create short range links up to 300 feet using a Pocket Wi-Fi router
- Long Range
 - Create world-wide long range links using a wired Ethernet connection
- Responsiveness
 - Get up to 5 traces per second update rate in fast mode

Remote functionality includes:

- Full instrument control
 - Interactive instrument control from anywhere with web access
 - Use whatever web-enabled computing device you have with you.
- Running easyTest scripting for the Spectrum Masters
 - Simplify complex spectrum monitoring requirements
 - One button measurement sequences
- Download instrument files, directories, and sub-directories as a zip file.
 - Get your test results on your computer where it's needed!
- One-computing-device-to-many-instrument control
 - Control many instruments from one computing device, one instrument per browser tab

While all instrument parameters can be freely controlled from Web Remote Tools, there are a few things that still require physical access to the instrument, including uploading files to the instrument, firmware updates, turning the instrument on, and listening to the instrument's audio output. Uploading files to the instrument can be done remotely using MST.

As mentioned above, the browser must be HTML5 compliant. Currently, Web Remote Tools works completely with current versions of Chrome and Firefox. Since no remote software, other than the browser, is needed this means that these Anritsu instruments may be controlled from iOS, Windows, Android, or Linux based computers, tablets or smart phones as long as they have a compliant browser. You can control or monitor your Anritsu Spectrum Master instruments from your current location, anytime night or day.

Connecting to the Spectrum Master

This control is through the instrument's RJ45 Ethernet port, using the instrument's embedded firmware. It is fully compatible with the TCP/IP protocol. No additional software is necessary.

Short Range Links

For short range links, say from the ground to a tower top, a small Wi-Fi router (a pocket router) powered from the instrument's USB port is handy. This allows control of the Anritsu instrument from any portable computing device with a current Chrome or Firefox browser and a Wi-Fi interface. This control is typically good for a 300 foot range. The browser based interface allows no-hassle recovery from Wi-Fi dropouts, either automatically or by refreshing the browser. This is a great advantage in a noisy RF environment.

Long Range Links

For long distance spectrum monitoring a wired connection is useful. Typically, this will mean a 4G modem, a Cat 5 cable to a router and then to the Internet, or perhaps a dedicated T1 line. An Ethernet enabled power switch on-site will allow you to power down the instrument when it's not needed, or reset it if necessary. An available bandwidth of 1.5 Mbits/sec is sufficient to allow for the instrument's fastest update rates for all measurements.

While configuring a wired Ethernet connection is straightforward if you only need to access from the local area network, it can be complex if you need access from outside the local area network. If there are firewalls in the path, IT assistance may be mandatory. For this reason Anritsu recommends you contact your IT personnel for assistance in setting up a wired Ethernet connection.

Short Range Wireless Link Setup

This section details the use of a travel router to set up a wireless connection to an Anritsu Master Series handheld instrument from any Wi-Fi enabled browsing device. The small size of travel routers, or pocket routers, makes them ideal for enabling remote control of your test equipment from the bottom of a cellular tower or anywhere that a wired connection is impractical. We will use a ZyXEL travel router as our example.



Figure 2. The ZyXEL Travel Router

The ZyXEL MWR102 Travel Router is one of many pocket routers that can be purchased through online retail outlets. All you need to wirelessly connect to your analyzer is included with the router. This includes both a short Ethernet cable, a short USB cable (for powering the MWR102) as well as instructions for its use.

The MWR102 comes pre-programmed with a password for accessing the device. This password can be found on a sticker placed on the reverse side of the router. Write down the password and SSID for this router. You will need this information to access your MWR102.

Connect the Router to your Spectrum Master

The router has two Ethernet ports. One is marked 'LAN' (colored black) and the other is marked 'WAN' (colored blue). Insert the Ethernet cable provided into the black LAN port on the router and insert the other end into the Ethernet port of your test instrument. The WAN port is not used for this application.

For power, insert the Mini-B (small) end of the USB cable provided into the router and the Type-A (larger) end of the cable into one of the USB ports of your test instrument.

Use your Computing device's Wi-Fi Configuration Utility

Use your smart phone, tablet, or laptop's Wi-Fi utility to find the ZyXEL router. The SSID name will be ZyXEL, followed by several other numbers and characters unique to your particular router. Connect to this SSID.



Figure 3. The Pocket Router configuration information

It can be useful to select the "Always Connect" option for this Wi-Fi link, particularly if you will be operating at longer Wi-Fi distances.

"Always Connect" will reconnect automatically if the Wi-Fi link is dropped for any reason. This allows many Wi-Fi link drops and reconnects to happen transparently to the user. Other times, refreshing the browser is all it takes to reconnect.

Configuring the Spectrum Master

While the instrument's IP address may be set through DHCP, it is much easier to deal with a static IP address when working with the travel router. To do this, first set a static IP address on the spectrum analyzer:

- Press <shift> System on the keypad
- Press System Options → Ethernet Config on the softkeys.

This brings up the Ethernet Editor screen as shown to the right. Complete the entries for the IP, Gateway and Subnet addresses with the numbers shown in figure 4 and press ENTER. The IP address shown (192.168.100.100) was selected as a good combination of what is required for the pocket router's local network (the 192.168 part) and what is easy to remember (the 100.100 part). You will type this number into your browser, so making it easy on yourself is a good idea. (Hint: Bookmark this address for the next time you need it.)

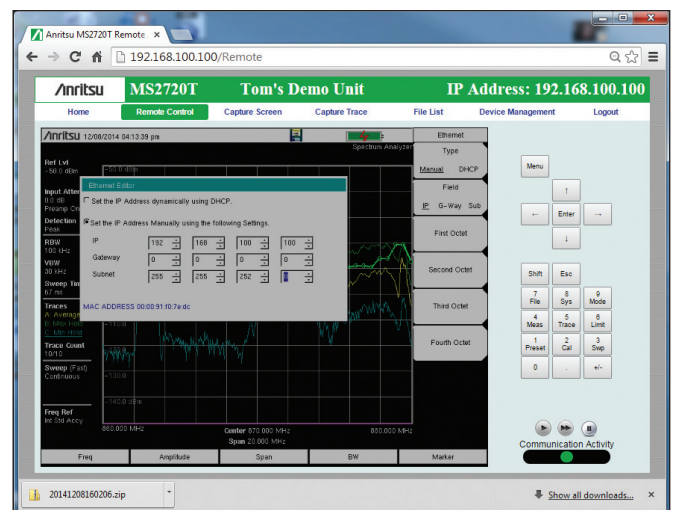


Figure 4. Setting the IP address on the Master series instrument.

Using the Anritsu Web Remote Control Tools

Once the link is in place and the instrument's IP address has been set, it's time to control the instrument. This is as simple as starting your current Chrome or Firefox browser and typing the instrument's IP address into the URL line. No PC, tablet, or smart phone applications, other than the browser, is required. Current versions of Chrome, and Firefox, have been tested and found to work. Internet Explorer is not currently recommended.

In this example, type 192.168.100.100 into the browser's URL line. The instrument will respond with either the password entry page, if one is in place, or the Home screen, which shows instrument system information.

Enter the instrument password, if asked, and then click on the Remote Control tab, shown below in green.

Remote Control works in any instrument mode, and even allows changing instrument modes. This is the tab to use for general purpose instrument monitoring and control.

Normally the Remote Control tab provides compressed screen images. This provides maximum flexibility for users. A network bandwidth of 1.5 Mb/s is sufficient for the fastest updates using this mode.

Fast Mode (see the illustration below) may double the trace update rate if on a fast link, and make a greater difference if the link is slow. Trace update rates as high as 5 traces per second are possible. Fast Mode is available for the Power versus Frequency screens in both Spectrum Analyzer and Interference Analyzer modes. Fast mode also works in zero span. That five trace per second figure can be reached if the Ethernet connection bandwidth is fast enough, and the instrument is set up to produce a fast sweep speed.

Fast Mode is quite useful when interactive spectrum tuning is necessary or when looking for bursty signals. The trade-off is that some error messages, like the "Input Overload" message, will not appear. Still, the mode is useful for fast changing signals, save-on-event, and for interactive instrument control.

Another use for fast mode is, strangely enough, when the link bandwidth is limited. Fast mode works by reducing the amount of information passed from the instrument, so when the Ethernet connection has a limited bandwidth, fast mode can be used to advantage. Fast mode requires a connection bandwidth of approximately 200 kb/s.

Capture Screen does just that. It places an image of the instrument screen in your browser. There are a variety of ways to capture an image in a browser, depending on your operating system and device. Once captured, the image can be re-purposed as needed.

Capture Trace will save the current trace on the instrument, and at the same time, download the trace to your browser. Being able to use a PC style standard keyboard to name the file can make this task quite a bit easier.

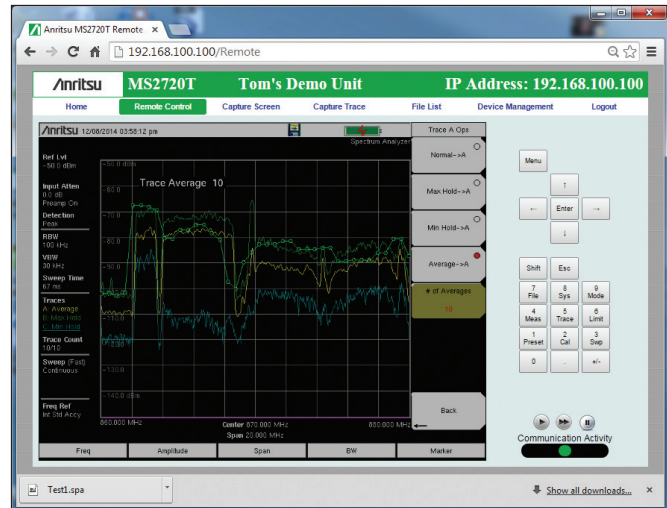


Figure 5. The Remote Control tab

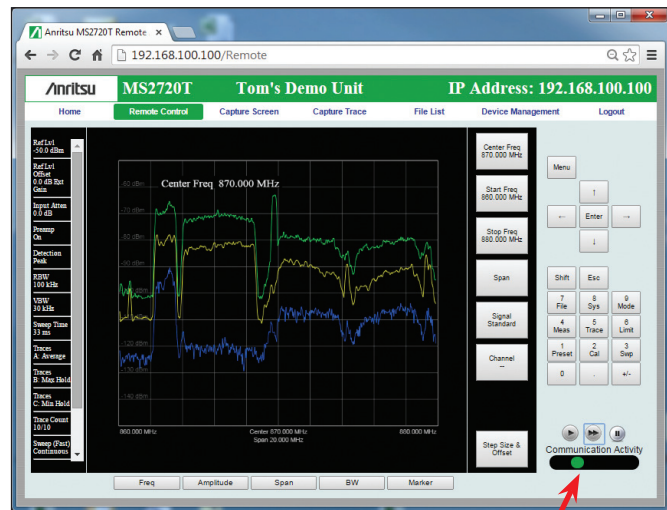


Figure 6. Fast mode display

Fast Mode

File List allows you to select a set of files, directories and sub-directories to download into your browser. The selected files are zipped on the instrument and downloaded into your browser much like any other web based download. From there, the files can be saved locally, used for documentation, or analyzed using Anritsu's Master Software Tools, or other software tools. This is quite useful when downloading the directory families that result from the spectrum analyzer's "Save on Event" and "Timed Spectrogram" functions.

Device Management and One-to-Many Control

Many Anritsu spectrum analyzers can be controlled from one web browsing device. One browser instance, or one browser tab, must be opened for each instrument, and each instrument must have, of course, its own IP address.

The Device Management tab allows you to set and clear passwords as well as set the instrument name. The password can be used to regulate access to the instrument. If a password is not set, the most recent browser to connect to the instrument gains control. This mode eliminates un-intentional lock-outs when more than one person needs to use an instrument. On the other hand, once a password is set, the browser that entered the password can retain control. This behavior reduces multi-user conflicts.

The Instrument Name appears in the green title bar of the browser page and can be used to identify the instrument when you have more than one instrument connected. This name is set under the System tab. Please note, this is an instrument name, but it is not a "hostname" as used in an Ethernet router.

Logout does just that. It logs you out of the instrument and allows someone else to control the instrument. If you simply close your browser window without logging out, the instrument will remain connected for one minute before timing out and becoming available to a new browser.

Home provides system information on the instrument. It covers firmware levels, serial number, operating conditions, and instrument options.

easyTest Scripting

While not a function of the browser interface, Anritsu's easyTest script capability allows users to construct scripts on a PC that execute on the instrument. The Web Remote Control tool allows users to run these scripts remotely, greatly simplifying complex remote tests, such as spectrum monitoring. More information on easyTest is available on the Anritsu web site.

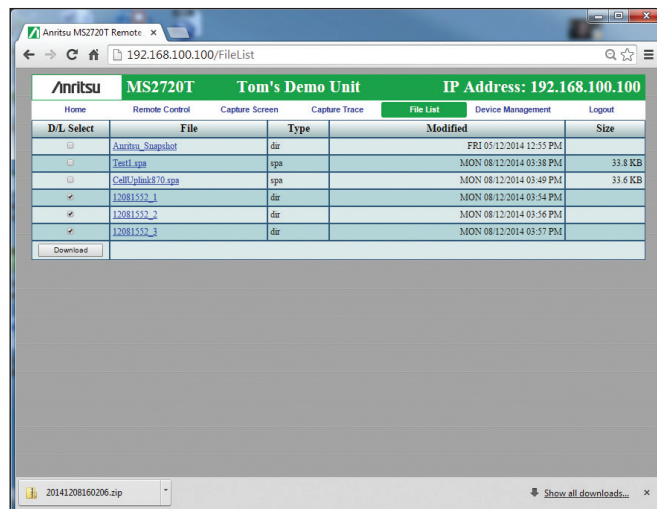


Figure 7. File List screen showing a downloaded ZIP file.

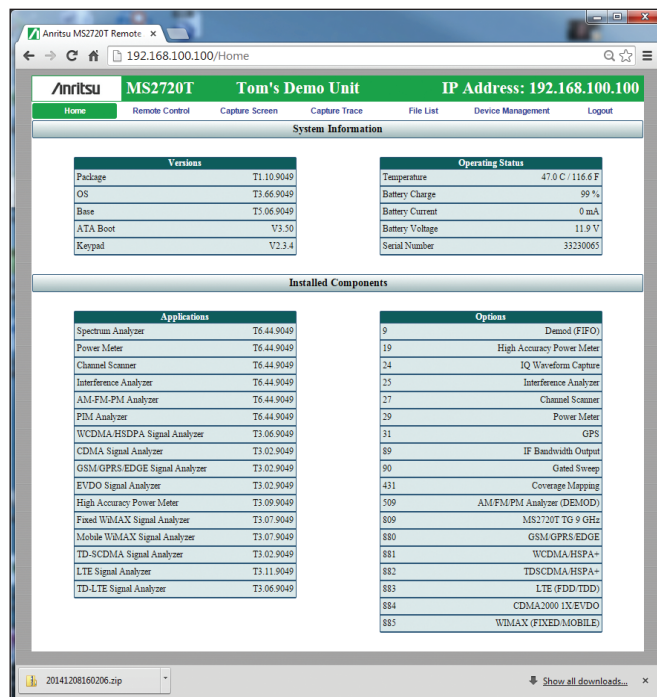


Figure 8. Home screen

Remote Power Control

Controlling an instrument's power state remotely is always a challenge. It's easy to give an instrument under remote control a command to cause it to turn off. Getting it to turn back on again, under remote control, can be a challenge.

Anritsu has addressed this with an instrument setting that allows the instrument power state to be controlled by the AC (mains) power. Once this is enabled, an Ethernet enabled AC power switch can control the power state of the spectrum analyzer. There are a wide variety of Ethernet controlled remote power switches on the market.

The relevant instrument setting is found in the System menu. Press "Shift 8 -> System Options -> More -> Power On -> When DC Applied." Now the instrument will power down when the AC power to the external AC to DC converter is removed, and power up when the power is applied – all without removing the battery.

This allows you to power the spectrum analyzer down remotely when it is not needed, or cycle power if it needs to be reset, all without traveling to the site.

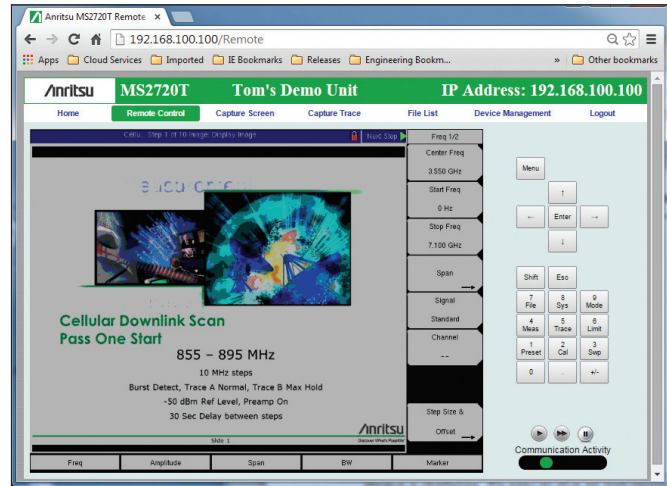


Figure 9. easyTest scripting running over the Web Remote Tools link.

Summary

Anritsu's Web Remote Tools brings flexibility and responsiveness to remote instrument control. The Anritsu Spectrum Master may be controlled from many web enabled computing devices including laptops, tablets and smart phones. All instrument functionality is available remotely, including all modes, file download to the controlling device, and one-computing-device-to-many-instrument control. Spectrum monitoring is now a mobile activity.

Mobile enabled remote spectrum monitoring brings a new timeliness to the most difficult spectrum monitoring problems.

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