Power Calibration

The Copper Mountain Technologies S2 family of instruments, including all 2-port 2-path (so-called "full reversing") VNAs supports power calibration with certain specific R&S power meters including the NRP-Z51 USB power sensor.

However, power calibration with any other model of power meter from any vendors is possible via an automation process which can be implemented in the programming language of your choice. In this application note, we describe installation and use of a power calibration plug-in routine developed based on the Agilent N1912A power meter in concert with the N1921A power sensor.

This example was developed in C# and can be directly launched from within the VNA's user interface via its Plugin capability. The Plugin is available for download in the Support section of Copper Mountain Technologies' website; source code can also be found there should you wish to adapt the plugin for use with your power meter or modify it for any other purpose.

"Calibrate with Power Meter" Plug-in

- Performs automated output power level calibration of port 1 for Copper Mountain Technologies TR, S2, and S4 VNAs.
- Supports Agilent Technologies N1912A P-Series power meter.
- Works with power meters connected via USB, IEE-488, or Ethernet.

Installation

1. Close the VNA software application (if running).
2. Copy the file "Calibrate with Power Meter.exe" into the "Plugins" directory (e.g. C:\VNA\S2VNA\Plugins).
3. Open the VNA software application.
4. Start the plug-in by selecting System $\Rightarrow$ Plugins $\Rightarrow$ Calibrate with Power Meter.

IMPORTANT: This plug-in uses the VISA Shared Components library that is installed by the specific power meter vendor's VISA implementation.

Check for the existence of the following files to determine whether the VISA Shared Components library is installed:

- For the 64-bit version you should find "GlobMgr.dll" in this location: C:\Program Files\IVIFoundation\VISA\VisaCom64
- And, "Ivi.Visa.Interop" should be in this location: C:\Program Files\IVIFoundation\VISA\VisaCom64\Primary Interop Assemblies

If these components are not already installed you must install them to use the Calibrate with Power Meter plug-in.

For the Agilent N1912A the VISA Shared Components can be downloaded from:
http://www.keysight.com/main/software.jspx?ckey=2504667&lc=fre&cc=CA&nid=-11143.0.00&id=2504667

Step-by-step Instructions for Using the Plugin

Step 1: Select the Power Meter

- Upon startup, the plug-in detects VISA (Virtual Instrument Software Architecture) compliant test equipment instruments connected either through USB or IEE-488.
- Select the power meter to be used from the list of connected instruments.
- You can click the "Find" button at any time (e.g., after you've plugged-in the power meter's USB cable) to search for instruments again.

NOTE: It is not possible for the plug-in to detect a power meter connected through Ethernet. To use an Ethernet-connected power meter it is necessary to determine the power meter's VISA address and enter it into the VISA address text box on the plug-in.

Step 2: Start the Calibration Process

- Click the "Calibrate" button to begin the VNA output power calibration process.
- The current VNA configuration state will be automatically saved so that it can be restored at the end of the calibration process.
- The VNA configuration is then preset for purposes of the output power calibration.

Step 3: Zero and Calibrate the Power Meter

- You will now see the following dialog:
- Click the "OK" button after you have connected the power sensor to the reference output of the power meter.
- The power meter will begin the process of zeroing followed by calibrating itself with the connected reference.

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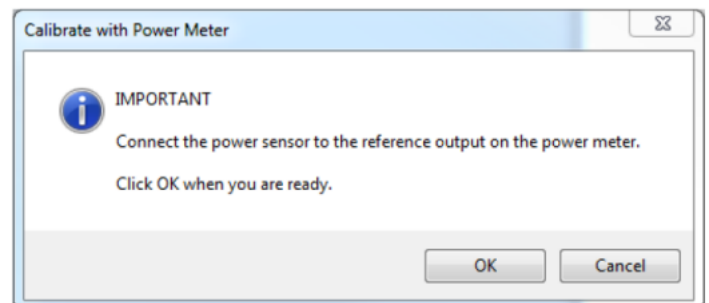
*Step 4: Configure the VNA for Output Power Calibration*
- The next dialog prompts you to configure the following settings on the VNA as needed for the output power calibration:

    Start Frequency: Stimulus $\Rightarrow$ Start
    Stop Frequency: Stimulus $\Rightarrow$ Stop
    Number of Points: Stimulus $\Rightarrow$ Points
    Output Power: Stimulus $\Rightarrow$ Power $\Rightarrow$ Power

- Once you've completed these settings click the "OK" button.

Step 5: Connect the Power Meter to Port 1 of the VNA
- Finally, you are prompted to connect the power sensor to Port 1 of the VNA. Be sure the power meter zeroing and reference calibration processes are complete before doing this.
- Click the "OK" button when you are ready.

The VNA Power Output Calibration Process
- The plug-in cycles the VNA and power meter through each measurement point, reads the power level, and calculates the necessary correction factor for that frequency.
- You can stop the calibration process at any time by clicking "Cancel".
- Following the calibration process the plug-in restores the VNA configuration state, sends the power output correction table to the VNA, and turns on Power Calibration Correction (Calibration>Power Calibration>Correction = ON).
- The power output calibration is now complete.
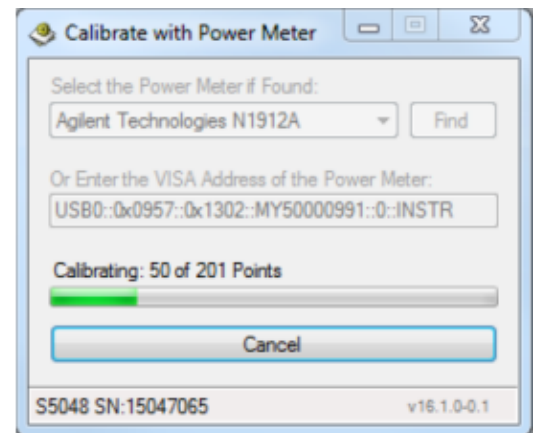
Conclusion

As can be seen, performing power calibration of a Copper Mountain Technologies VNA using a VISA-compatible power meter is straightforward. While the VNA application itself offers native support for a specific power meter vendor and model, through use of a simple program such as the described plugin, you can use a power meter you have on hand to calibrate the instrument.

For more information, please contact us at support@coppermountaintech.com.

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