Agilent Technologies

Optimizing Throughput For Mobile WiMAX™ Measurements Using the Agilent N9020A MXA Signal Analyzer

The following describes the settings and recommendations to optimize the throughput for making Mobile WiMAX™ measurements using the N9020A MXA Signal Analyzer and N9075A 802.16 OFDMA measurement application. This process will help you yield faster overall measurement times

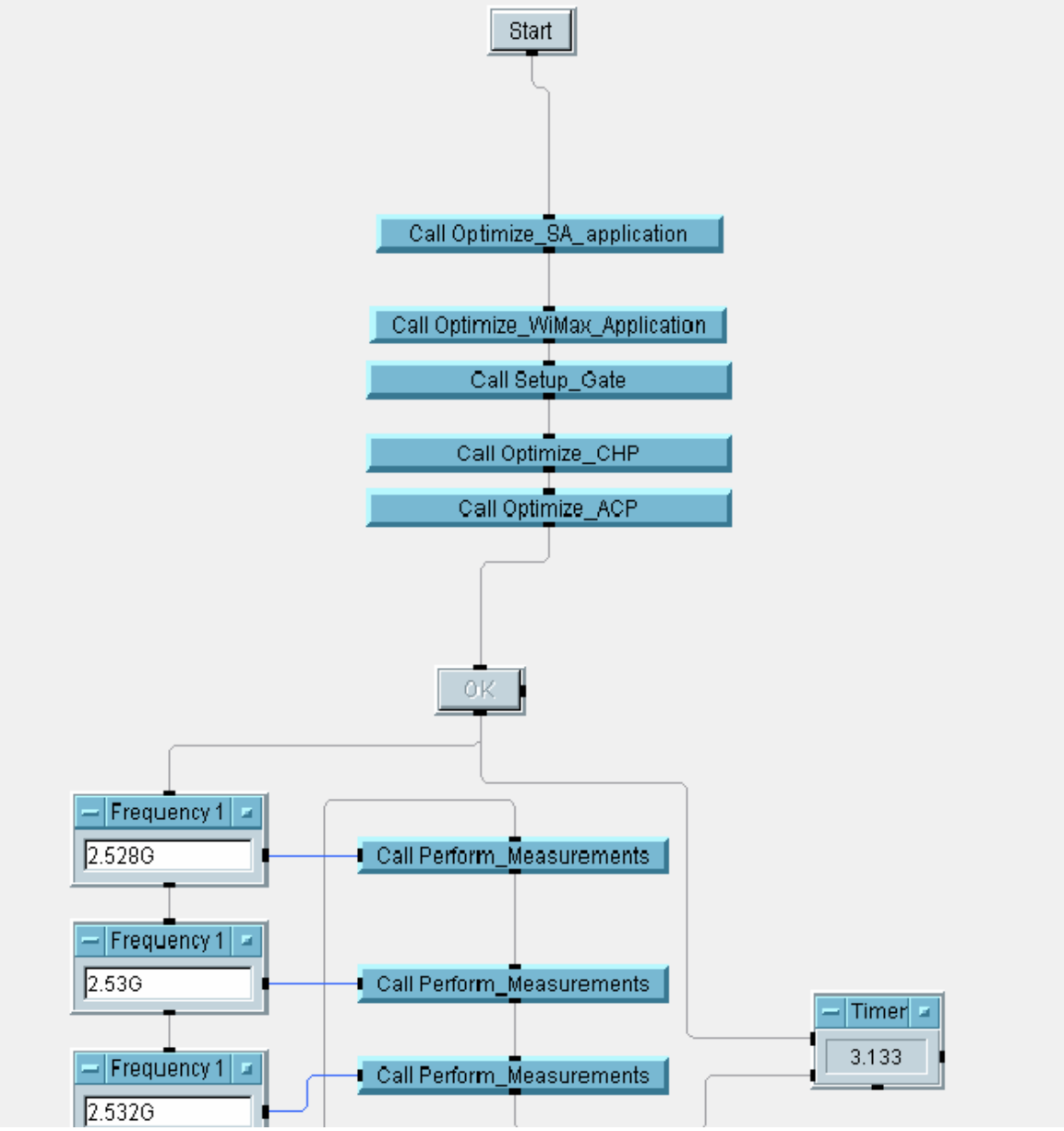

Figure1. Test Flow Diagram

Figure1 graphically describes the test flow for optimizing the measurement speed. Specifically the diagram shows that majority of the settings for each set of measurements can be setup prior to the actual measurements and these settings will be retained throughout the test process provided the Application Mode has not been preset. All functions prior to the **OK** button only need to be run one time when the system is initialized. All tests after the **OK** button will be run on each DUT.

Therefore, each mode and measurement can be setup independently. The difference between the two cases is that measurement specific parameters are parameters that are located under the **Meas Setup** key and have a SCPI syntax of the form **SENSE:<Measurement>:<Parameter>** such as SENSE:ACP:AVER:STATE OFF. These are referred to as *measurement specific* settings. Setting that are global to the application such as attenuator settings are referred to as *measurement global* settings.

Figure2 shows the recommended settings to optimize the Spectrum Analysis (SA) Application for the highest measurement throughput. These commands need to be sent to the instrument once only to prevent spending additional time on setting up the instrument.

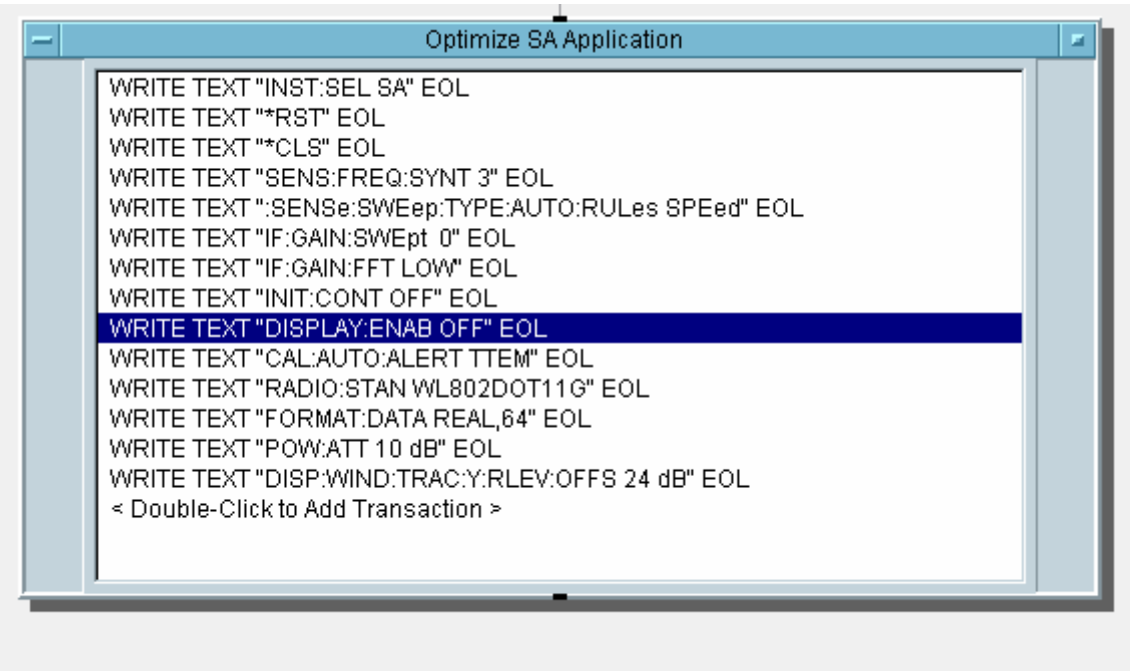

Figure2. Spectrum Analysis (SA) Application Optimum Settings

The above functions perform the following:

- Select SA Application.
- Set the instrument to Mode Preset in Single measurement state.
- Clear the error queue and status register byte.

- Set the local oscillator's phase noise behavior to fast tuning method when possible.
- Cause any automatic coupling in the instrument to couple for the fastest method.
- Select a set IF Gain that prevents the instrument from automatically determining the gain which adds additional time to the measurement.
- Set the instrument to single sweep.
- Disable the display for the fastest throughput because updating the display slows down the measurement. For remote testing, there is no need to display the data on the analyzer screen.
- Set the auto alignments to alert so that they do not automatically initiate during a measurement.
- Select the Radio Standard to be used in the SA Application.
- Set the data type to Real 64, which selects 64-bit binary data format, since data input/output is faster using the binary format.

In addition, it is recommended to avoid automatic attenuator setting when possible. If a known input attenuator value is sufficient for all measurements, then this value should be set to prevent additional time of the attenuator changing from measurement to measurement.

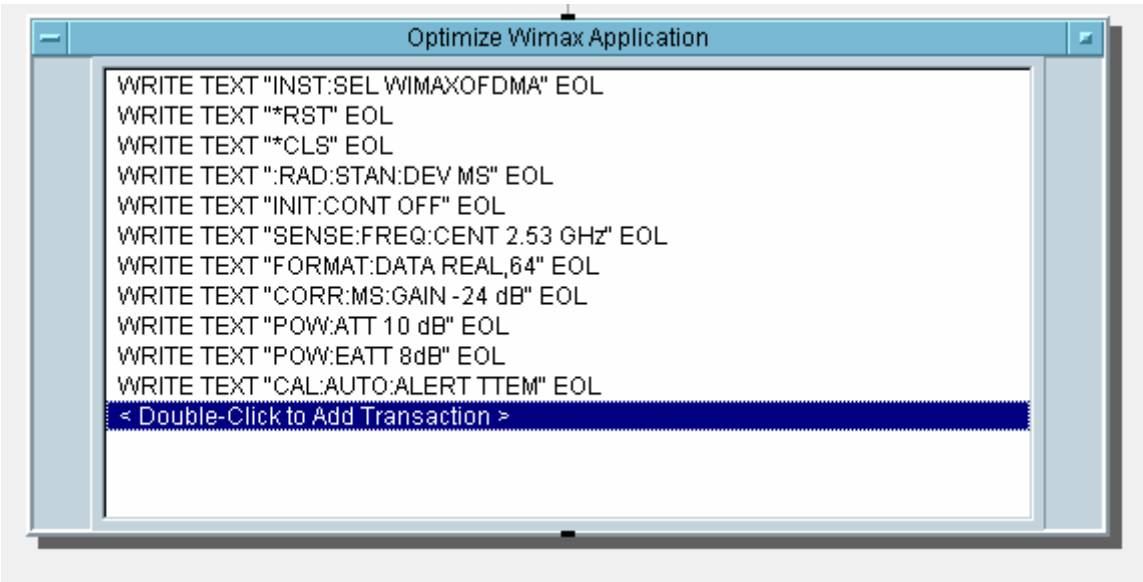

Figure3. WiMax Application Optimum Settings

Figure3 shows the recommended WiMax Application Settings. The attenuator value will need to be changed based upon manually DUT testing with the **Auto Scaling** set to **On**. The ultimate goal is to determine an attenuator value that is acceptable in all measurements.

Also, individual measurements can be setup prior to making the measurements. A recommendation for optimizing the channel power (CHP) measurement is shown in **Figure4**.

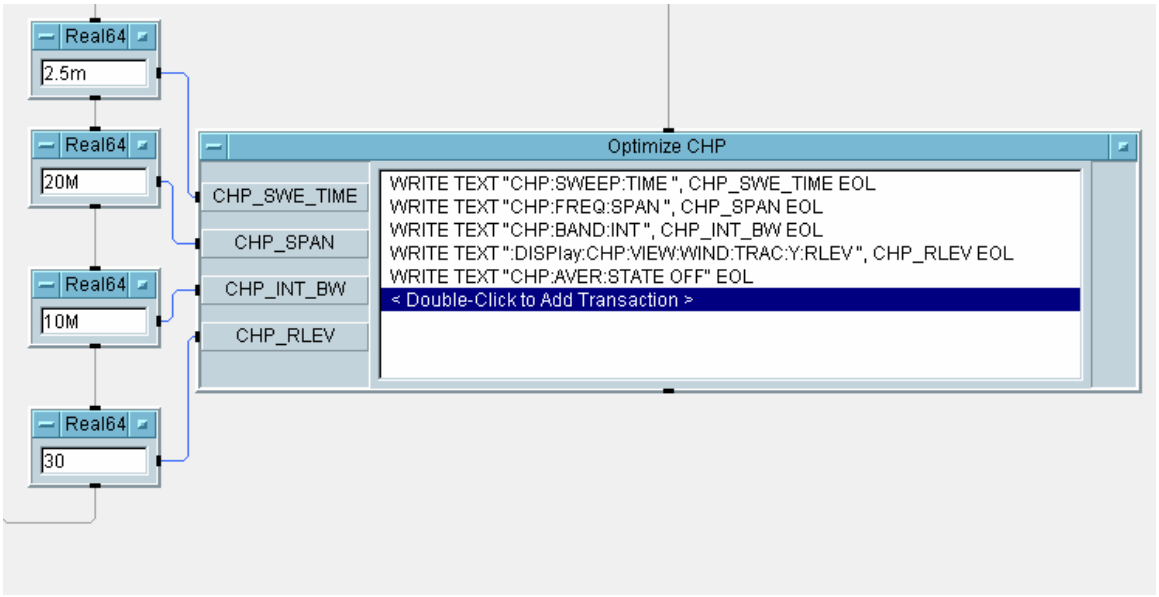

Figure4. Channel Power (CHP) Optimum Settings

The channel power measurement setup should include a fixed reference level to prevent the measurement from restarting. Turing off averaging avoids averaging the results during each measurement. Power measurement such as CHP and ACP utilize the average detector. This detect will allow for averaging at a finer resolution than increasing the number of averages. This averaging is controlled by the sweep time of the instrument. Start at the default setting for the sweep time with the sweep time auto coupled. If this does not produce the desired variance, then increase the sweep time in small increments until the desired variance in results is achieved.

Figure5 shows the recommended settings for the Adjacent Channel Power (ACP), which is similar to the settings for CHP.

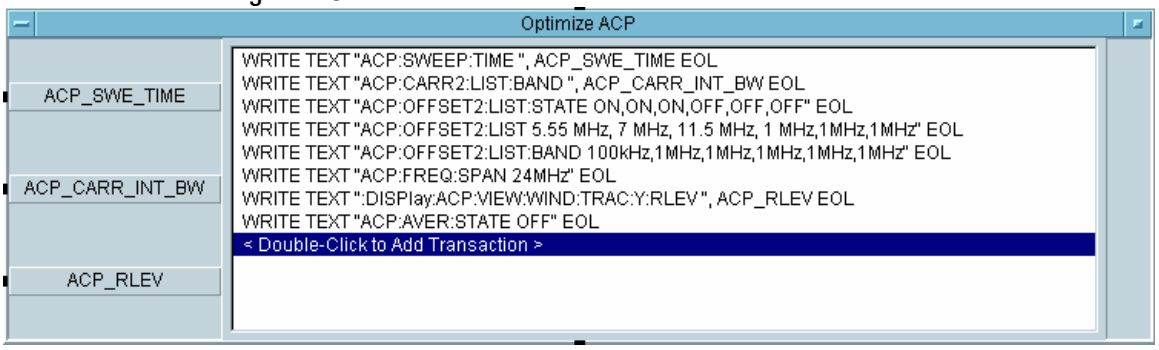

Figure5. ACP Optimum Settings

The Gate settings should be applied across all measurements that require gating. The Gate settings are determined by using the **Gate View** function. Once the gate delay and gate length are determined, the Gate View should not be used in production test. An example of the gate setup is shown in **Figure6**.

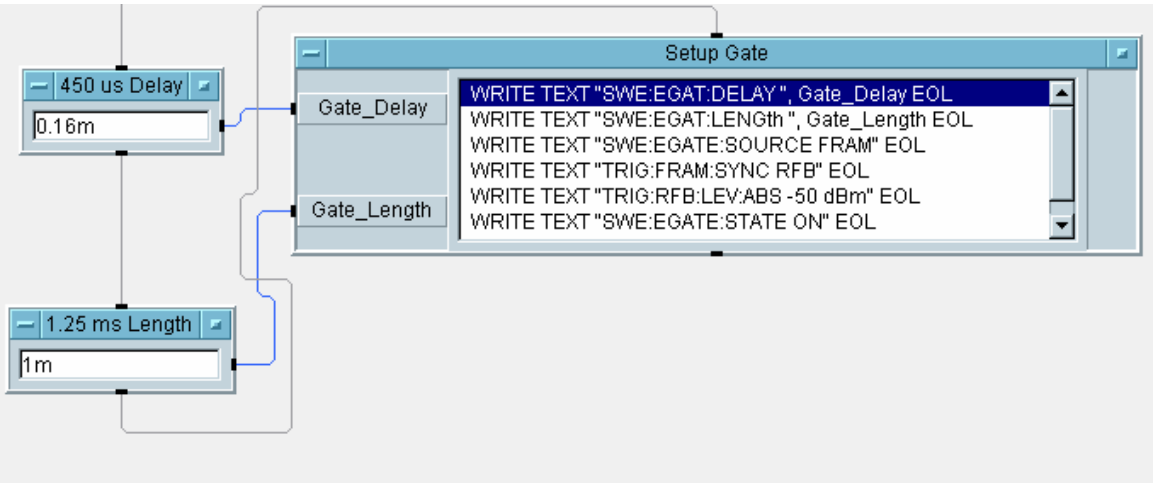

Figure6. Gate Setup

The Gate Function should only be turned on when the instrument is in the WiMax mode and turned off when it is in the Spectrum Analyzer application.

The test flow should be written that at this point only measurement need to be made with minimal measurement specifics or measurement global settings changing during production tests.

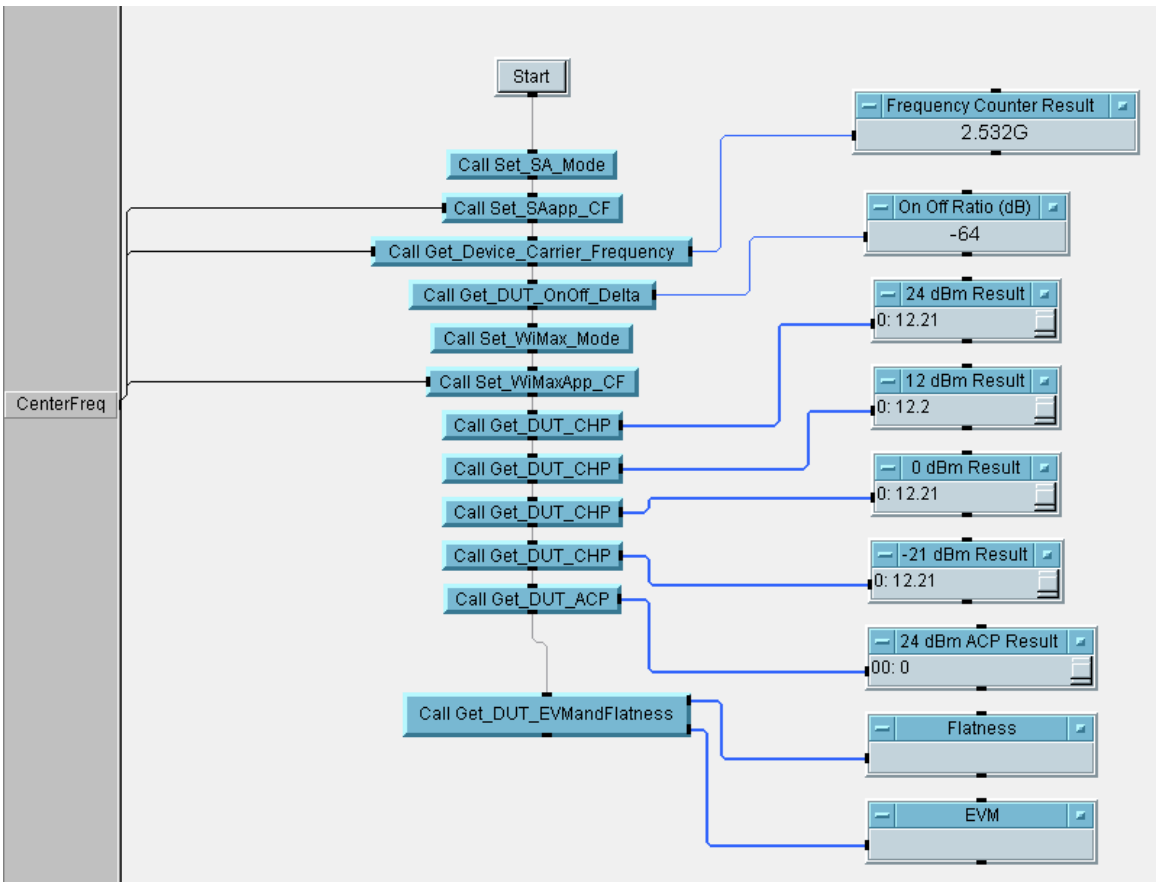

Figure7. Ideal Flow for in-channel measurements

Figure7 shows the ideal test flow for a single frequency set of measurements. The measurements are made in both the SA Mode and WiMax Mode. The ability of MXA to switch modes quickly is of benefit in this application.

The first two functions (**Set_SA_Mode and Set_SAapp_CF)** set the instrument to SA Mode and the center frequency to the carrier frequency. In your case the center frequency needs to be 3MHz above the carrier. At this point the function **Get_Device_Carrier_Frequency (Figure8)** is called.

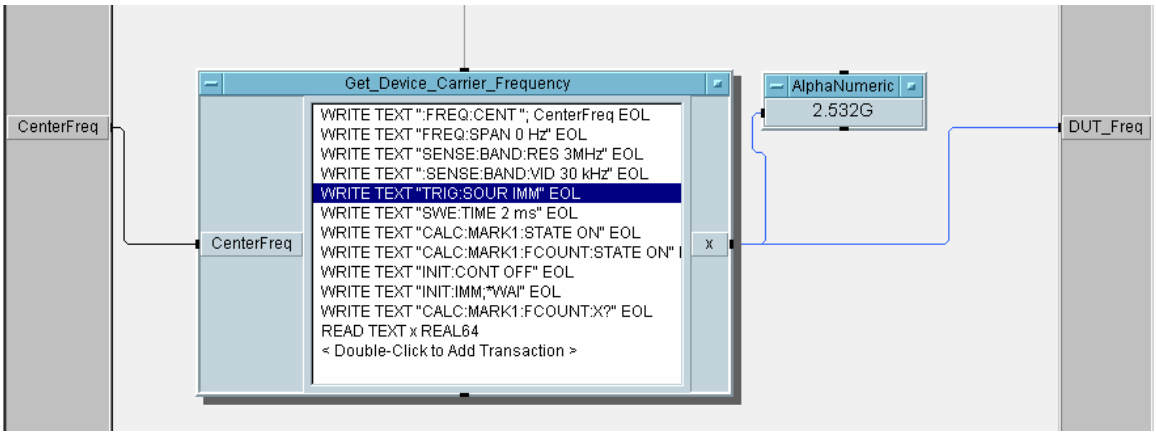

Figure8. Get_Device_Carrier_Frequency

MXA is switched into the WiMax mode for the remainder of the tests after the **Set_WiMax_Mode** Function is called. The channel power measurement **(Figure9)** is run four times to measure multiple power levels if needed.

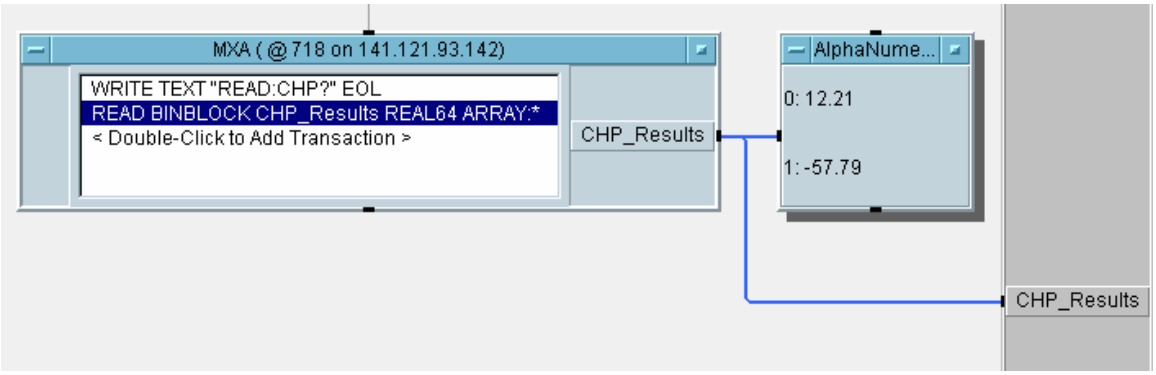

Figure9. Channel Power Measurement

It is hoped that a single attenuator setting is sufficient for all amplitude levels because changing the attenuator value between measurements will cause a minor loss in speed. If this condition cannot be achieved, then it is recommended finding a set Mechanical

attenuator setting that works in both the SA and WiMax applications and change the electronic attenuation between the different power level measurements. Also, if more repeatability is needed, it is recommended to increase the sweep time in slight increments until the desired variance is achieved.

The same settings apply to the ACP Measurement as shown in **Figure10**.

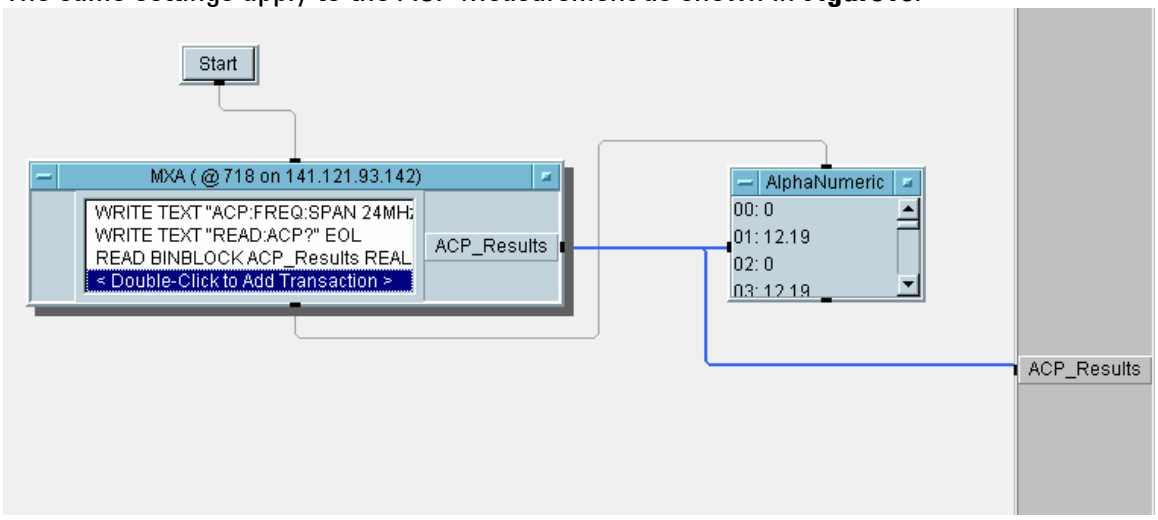

Figure10. ACP Measurement

Figure11 shows the EVM AND Flatness Measurement settings. The EVM, Flatness and Carrier feed thru are made in a single acquisition, **READ:EVM1?**. **FETCH:EVM9?** returns the flatness data without causing another acquisition.

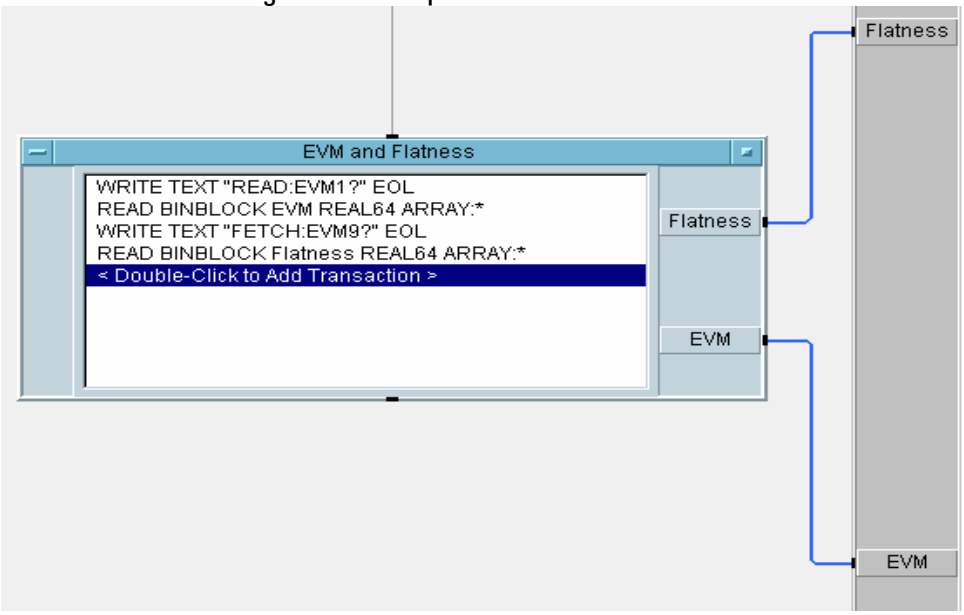

Figure11 EVM, Flatness and Carrier Feed thru