



# Which measurements matter for your Network Analyzers?

# Network Analysers for Every Need

Whether you require an extended repair plan to ensure long-term coverage, or an efficient and quality calibration plan that balances your uptime and performance requirements, Agilent has your solution.

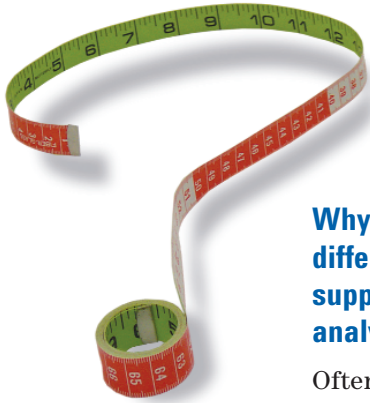
## Network Analysis – A Critical Measurement

Often, your Network Analyzer provides you with the measurements most critical to your production line throughput. Whether you are simply measuring transmission or reflection characteristics, or more complex S-parameter measurements, Agilent has a Network Analyzer to meet your needs. But our offering doesn't stop there, guaranteeing that your equipment is capable of providing the answers you seek, and doing so whenever required is core to our commitment to the test and measurement industry. Whether you require an extended repair plan to ensure long-term coverage, or an efficient and quality calibration plan that balances your uptime and performance requirements, Agilent has your solution.

## Do you expect anything less from the leader in test and measurement?

Agilent service solutions are not just plans, processes or procedures that have unclear value. We let you know what will be delivered and what you will realize from each of our services. We are committed to ensuring you are able to meet your critical test and measurement objectives.

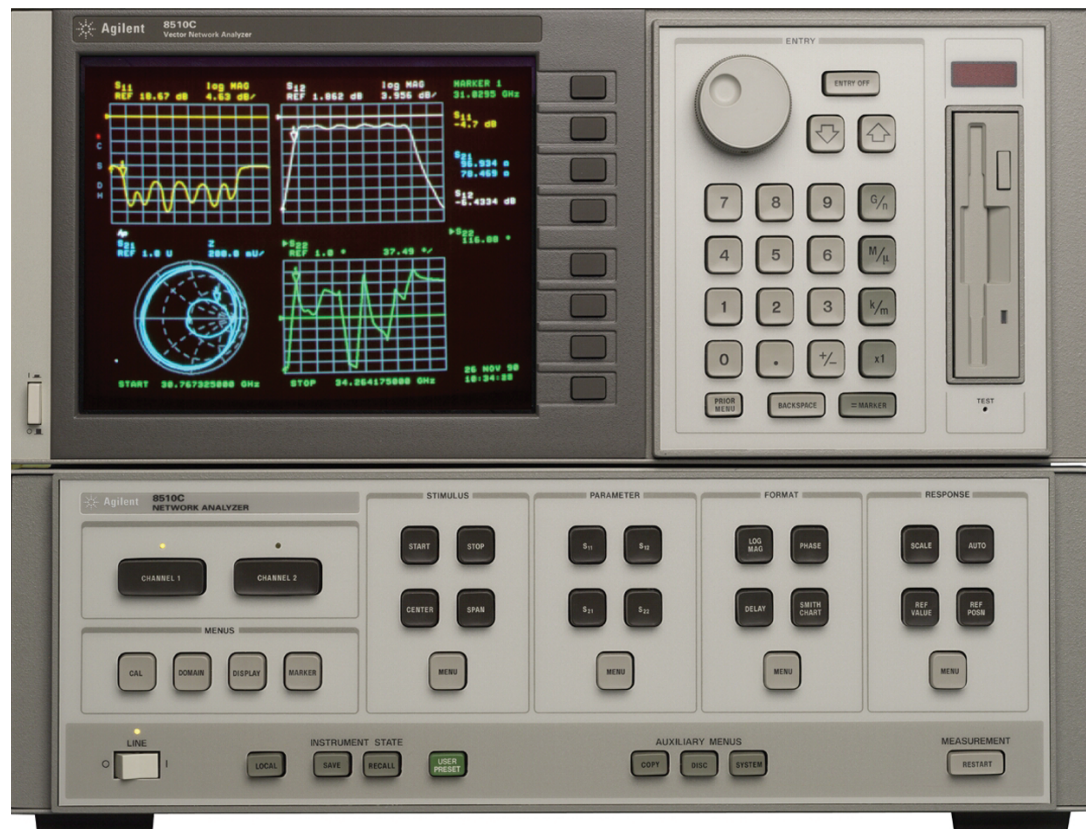


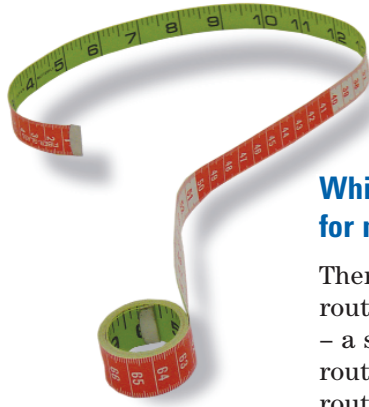


### Why are there price differences between service suppliers for my network analyzer equipment?

Often price is used in the consideration of services. But be assured that a relatively small difference in service price represents a large difference in value of service received. When comparing service providers, it's critical to understand exactly

what each company delivers, and what's included in the price of the service. For example, many companies claim to provide full calibrations, when on closer inspection they merely test only the parameters easily measured by the equipment they have. High complexity instruments require quality, comprehensive calibrations.





## Which test should I receive for my network analyzer?

There are two types of testing routines for Network Analyzers – a system verification test routine and a performance test routine. System verification is a ‘tops-down’ instrument level test set that confirms instrument operation within a functional specification. Performance tests are a ‘bottoms-up’ test set that allows a more comprehensive check of how well the instrument is performing. At Agilent we provide a comprehensive performance test protocol that ensures your Network Analyzer is giving you the best analysis of transmission lines, reflection, characterizing devices, or measuring S-parameters.

Our performance verification test for a sample network analyzer includes the test parameters opposite.

## Not all calibrations are equal

The calibration process for some simple test and measurement equipment only has ‘easy tests’, making them very easy to calibrate. Network Analyzers are complex instruments. They require specific calibration tests to ensure they are performing at their optimal level. More complex products such as

Network Analyzers have easy and hard tests. The hard tests are more time (sometimes several hours) and cost intensive requiring more investment in training and equipment. Not all of Agilent’s competitors have made the investment and commitment to be able to provide comprehensive calibration services by making the hard tests part of their protocol.

### Tests performed by Agilent

#### Easy Tests

- Don’t take long
- Don’t require special equipment

#### Hard Tests

- Take a long time

#### Hard Tests

- Require special equipment

### Tests performed by a typical low-cost supplier

#### Easy Tests

- Don’t take long
- Don’t require special equipment

#### ~~Hard Tests~~

- ~~• Take a long time~~

#### ~~Hard Tests~~

- ~~• Require special equipment~~

### Which is calibration?

They both are.

### Which is the best calibration?

The top one because:

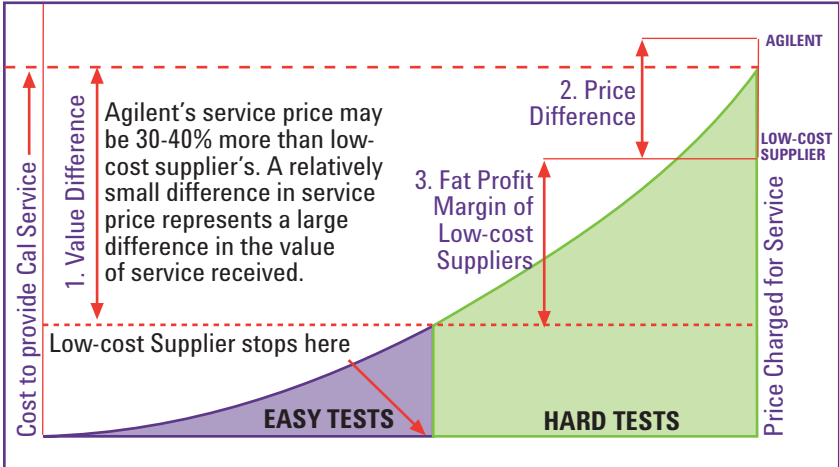
- It fully tests the instrument to its specifications
- It offers better confidence in the instrument
- It provides a full ‘health check’ which can be an early indicator of potential future problems that can be fixed before they become problems

<b>Sample Test Parameters</b>	
<b>1 Test Port Output Frequency Range and Accuracy</b>	Perform this test to verify the frequency accuracy of the network analyzer over its entire operating frequency range. A frequency counter is used to determine the analyzer's output frequency.
<b>2 External Source Mode Frequency Range</b>	Perform this test to verify that the analyzer's reference channel, R channel In, is capable of phase locking to an external CW signal. CW signals from an external source are fed into the R channel input when the instrument is in external source mode. Proper phase lock conditions are confirmed at a power level of -25 dBm.
<b>3 Test Port Output Power Level Accuracy</b>	Perform this test to confirm the accuracy of the network analyzer test port output power. A power meter is used to determine the output level from port 1. This measurement is compared to the level set by the network analyzer. The difference must be within the specified tolerance.
<b>4 Test Port Output Power Linearity</b>	This test verifies the analyzer's test port output power linearity throughout the analyzer's frequency range. A power meter calibration is used to set the reference output power across the frequency range of the analyzer. The analyzer's B-channel receiver is used to determine power linearity after each change in output power.
<b>5 Minimum R Channel Level</b>	This test confirms that phase lock can be achieved at a specified minimum R channel input power. Power from the analyzer's output port is fed into the R channel receiver using the input found on the front panel. Observations are made for proper phase lock conditions.
<b>6 Test Port Input Noise Floor Level</b>	The analyzer's noise floor level is measured at minimum power with loads connected to the test ports.
<b>7 Test Port Input Frequency Response</b>	Power meter calibration is used to control the input to the analyzer's receiver across its frequency range. The network analyzer's input receiver frequency response is measured against this calibrated input.
<b>8 Test Port Crosstalk</b>	Perform this test to measure the maximum level of signal leakage between the analyzer's test ports. Crosstalk is measured with shorts attached to the test ports after a normalization measurement with a thru.
<b>9 Uncorrected Port Performance</b>	The analyzer can perform error-correction and store the error coefficients. These error coefficients are, in fact, measurements of the analyzer's uncorrected port performance. Also see the Test Port Crosstalk performance test.
<b>10 System Trace Noise</b>	Ratio measurements A/R and B/R are made at 3 GHz and 6 GHz to determine the variability of the analyzer's measurement data. IF bandwidths of 3 kHz and 10 Hz are used for the test.
<b>11 Test Port Receiver Magnitude Dynamic Accuracy</b>	The analyzer's receiver linearity versus input power is measured with a calibrated step attenuator. Using the analyzer's capability to perform error correction minimizes measurement uncertainty.
<b>12 Test Port Receiver Magnitude Compression</b>	Perform this test to verify the magnitude compression/expansion of the analyzer's test port receivers. Power sweeps from low to high power are made at designated CW frequencies. A reference measurement is made while the signal to the receiver is attenuated to avoid compression. The attenuation is removed and compression is observed and measured.
<b>13 Test Port Receiver Phase Compression</b>	Perform this test to verify the phase compression/expansion of the analyzer's test port receivers. Power sweeps from low to high power are made at designated CW frequencies. A reference measurement is made while the signal to the receiver is attenuated to avoid compression. The attenuation is removed and compression is observed and measured.
<b>14 Test Port Output/Input Harmonics</b>	Perform this test to determine the spectral purity of the analyzer's input and output test ports. Output and input harmonic levels are measured using the analyzer's harmonic mode, which sets the receiver's frequency at the second or third harmonic of the source frequency.
<b>15 Harmonic Measurement Accuracy</b>	This test verifies the network analyzer's accuracy when operating in the harmonic measurement mode (Option 002). Using a power splitter, an external source injects the harmonic signal into both the analyzer's receiver and the power meter. The analyzer's reading is compared to that of the power meter.

Agilent has fully equipped service centers located across the globe, staffed with experienced engineers with in-depth technical knowledge.

### Understanding Service Difficulties

Agilent provides a full range of high-quality, comprehensive services for the network analyzer family. As an original equipment manufacturer of your test equipment, we have exclusive knowledge of your instrument design. Agilent has fully equipped service centers located across the globe, staffed with experienced engineers with in-depth technical knowledge. Our teams of experienced engineers are the best in the industry. Their in-depth knowledge of the latest developments in technologies, test techniques, measurement equipment and regulatory requirements means you will always stay on top of the competition.



**Services available for your network analyzer:**

Service	Agilent's Value	Agilent's Service Features
<p><b>Return-to-Agilent Repair</b></p>	<ul style="list-style-type: none"> <li>• Reduced financial risk by getting instruments up and running quickly</li> <li>• Get it done right the first time</li> <li>• Ensure measurement confidence</li> </ul>	<ul style="list-style-type: none"> <li>• Agilent trained technicians, recommended parts</li> <li>• Latest automated verification systems for quality assurance</li> <li>• Repair service centers located across the globe</li> </ul>
<p><b>Calibration Services</b></p>	<ul style="list-style-type: none"> <li>• Ensure accurate, valid and useful information from your design and test instrumentation</li> <li>• Optimize measurement confidence through quality calibration</li> <li>• Maximize precision and utilization of equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Latest Agilent technology - &gt;70% calibrations automated</li> <li>• Standards compliant processes &amp; documentation</li> <li>• Direct links back to factory for latest information</li> <li>• Single vendor solution – services for most brands available</li> <li>• Calibration service centers across the globe</li> <li>• Scheduling tools to meet delivery commitments</li> </ul>
<p><b>VOSCAL (Volume On-Site Calibration)</b></p>	<ul style="list-style-type: none"> <li>• Improved production – maximize uptime</li> <li>• Convenience – calibrate your entire inventory at a single or multiple visits</li> <li>• Lower costs – reduces cost of logistics, transport and rental</li> </ul>	<ul style="list-style-type: none"> <li>• A fully operational, high quality calibration laboratory at your site, complete with high-specification systems and automation</li> <li>• Dedicated project manager with a prearranged calibration schedule, meaning minimal disruption</li> <li>• Lower costs - reduces cost of logistics, transport and rental and/or purchase of spares</li> </ul>
<p><b>On-Site Repair</b></p>	<ul style="list-style-type: none"> <li>• Reduced risk – get your equipment up and running quickly</li> <li>• Accuracy – OEM design and manufacturing knowledge means getting it right the first time</li> <li>• Quality – Agilent On-Site Repair teams are made up of our best service specialists</li> </ul>	<ul style="list-style-type: none"> <li>• Access to global resources</li> <li>• Extensive parts availability for fast repair</li> <li>• Remote diagnostics available for some systems</li> <li>• Minimal downtime on mission critical equipment</li> </ul>

## **Agilent Technologies' Test and Measurement Support, Services, and Assistance**

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

### **Our Promise**

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

### **Your Advantage**

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

**By internet, phone, or fax, get assistance with all your test & measurement needs**

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**[www.agilent.com/find/assist](http://www.agilent.com/find/assist)**

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