

Brochure

# Cable Subscriber Installation and Test Guide

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### Testing RF and DOCSIS performance

**Problem:** A wide range of issues can impact the service quality at the installation, and comprehensive testing is imperative to ensure that any complications are addressed while the technician is on site for installation. Issues include, but are not limited to, new installation craftsmanship, condition or limitations of existing network and components, damage caused in modifications to the home network or in unassociated DIY projects, modem provisioning problems, or other issues in the network that must be referred to maintenance. Testing must be performed at the tap, ground block and CPE locations, and include both RF and service performance verification.

**Solution:** VIAVI offers a variety of the most capable, rugged meters for installation and service testing. The DSP Trilithic Series meters cover the most basic signal level measurement (180 DSP) to DOCSIS 3.1 service testing (DSP 360). The OneExpert series meters (ONX-220 and ONX-620) are the most advanced meters on the market for complete home network installation and service testing, with speed, simplicity, and power. Channel Check and OneCheck test modes provide quick, comprehensive tests in about two minutes, and Session Expert (ONX-620 only) reveals any problems that need attention. A partial list of tests includes RF levels, MER, BER, as well as DOCSIS physical and service performance.

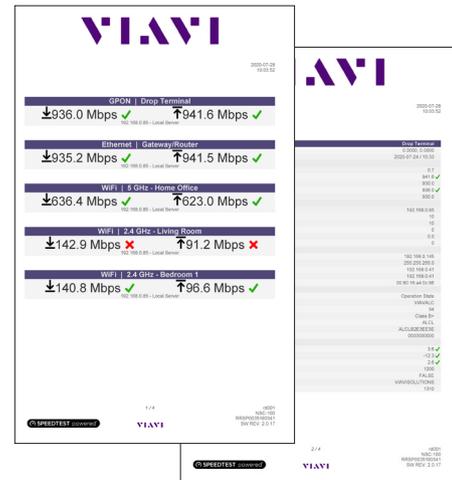
### Advanced WiFi Testing

**Problem:** 50% of service provider trouble calls are WiFi related. WiFi performance is critically important as final link to customer, who expects the same performance via WiFi as a direct connection. When performance is degraded, customers begin to think about alternative providers. Poor WiFi performance is very costly due to return visits, and potentially the cost of a lost customer.

Currently, tech tools for testing are minimal, and typically only test the RF layer with signal-to-noise and RSSI measurements with one client (probably cell phone). This is inadequate to get a realistic assessment of the user experience. Technicians have very limited access to the customer home (only when invited) and this opportunity is wasted when WiFi is insufficiently untested. A tech needs to have the ability to test WiFi to verify performance and ensure that there won't be trouble around the corner. Customers don't have to tolerate bad service and will go to other providers when multiple service calls are needed.

**Solution:** WiFi testing must be included in the subscriber installation process.

The Advanced WiFi option on the ONX-220 allows you to include WiFi as part of the OneCheck test – to certify home WiFi performance as part of a complete verification process. The process is simplified with test capability in the same meter used for installation/service performance testing. Home birth certificate reports are instantly available via StrataSync, with WiFi results included in installation/service test data. The configured OneCheck test can include SpeedCheck, Ookla Speedtest, web connectivity, ping, IP address, WiFi link info, and physical WiFi info. WiFi expert enables the tech to map the home, testing throughout for throughput, airtime, and SNR. Clear results enable customer education for remediation of performance issues, and potential upsell for coverage improvement.



## Home Leakage Pressure Testing and Ingress Mitigation

**Problem:** There are many devices in the home that emit RF signals, including cell phones. Ingress that interferes with services can enter the home coaxial network at any point where the integrity of the grounded shield is broken. Some examples include older devices with poor shielding, bad connectors, loose connections, and damaged cable. Because the source of the ingress and possibly the nature of the leaks are intermittent, the disruption to service can also be intermittent. When technicians don't have a good, efficient way to test for ingress/leakage repeated service calls are more likely. When ingress occurs, there is potential for disrupted service to multiple customers on the same node. Anywhere there is a leak, there is also a potential for ingress – the leak is like a bi-directional antenna.

An ingress scan is often required at installation and service calls to verify that no ingress is coming from the home. The technician connects the meter to the tap or ground block looking back into the home network. If ingress is present, it will be seen in the displayed scan. This assumes that the ingress source signal is active at the time of the test. If it shows that there's a problem, it doesn't indicate exactly where in the home network the signal/noise is getting in. The ingress scan is a good test and is especially useful in troubleshooting ingress in the cable plant. A leak detector can be used to look for leaks in the home, but this requires a very sensitive specialized instrument, as the cable signals within the home are at a relatively low level.

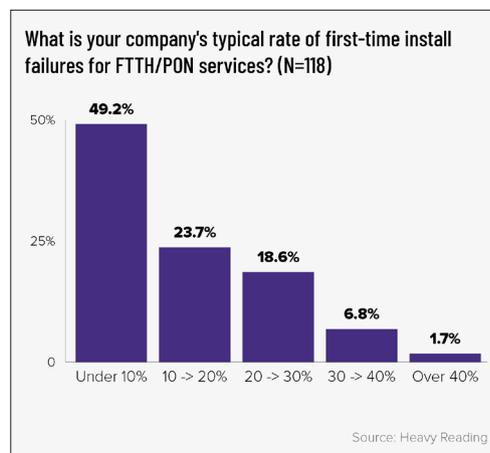
**Solution:** RF "pressure tests" of the home network are now used to verify shielding integrity and keep leakage from impacting devices in the home and keep on-air signals from entering the network. For the home network pressure test, high level signals are injected into the drop from the tap, or into the network from the ground block. The signals are at a much higher level than the signals from the cable network (+60 or +40 dBmV) so the leaks from the network will be accentuated. The technician walks through the home with the meter in the leakage mode, and it emits a tone when a leak is detected, and the tone pitch increases as the detected field strength increases. This enables techs to find exact points of failure – a much quicker process than trial-and-error.

The Home Leakage Test Kit includes a hand-held Seeker HL Transmitter that generates two frequencies that can be set at two levels. The receiver is the technician's DSP or OneExpert (ONX) meter with an antenna on the input. This means there is no separate meter required to do this test.

## Fiber Installation

**Problem:** Fiber to the home is becoming more common, and with consolidated workforces, subscriber installation and service is performed on either coax or fiber. Many are familiar with the need to test the coax side, for performance verification and troubleshooting. Testing fiber is also required, because without testing 20 to 50% of homes don't pass at first install and/or turnup, resulting in three additional tech dispatches in more than 10% of cases.

**Solution:** Fiber testing is simple and saves time as techs get to the root of problems quickly. A feature of the OneExpert instruments is the OneCheck Fiber application, which incorporates both inspection and optical power tests as part of a consistent, repeatable automated installation/service test process. The tech is guided through a step-by-step process and test results are collected for analytics to ensure consistent process compliance and enable continuous improvement.



**Inspect before you connect** – the fiber face must be inspected before connecting, to ensure a clean, reliable connection. Dirty connections can cause problems that may be difficult to troubleshoot later. The P5000i simplifies this process with clear pass/fail results. The P5000i connects to VIAVI instruments or a smartphone/tablet via the USB port. The tech simply cleans the fiber face, and when the inspection passes and continues with assurance that the connection will be reliable.

**Optical power** – checking optical power level is also a quick and easy way to improve first time install success rate. The MP-60 is a broadband power meter which connects via USB, and is suitable for use in single wavelength environments where only a single PON service is being delivered (e.g. a single 1490nm downstream wavelength for G/E-PON) the tech can verify optical power level at the ONT and troubleshoot as needed. Situations where more than one downstream wavelength is present on a fiber (e.g. G/E-PON plus 1550nm RF overlay) will require a dual band or wavelength selective power meter such as the SmartPocket V2 OLP-37XV2 or the Optimeter.

**Drop Certification and Connection Quality Verification** – For PON/FTTH, to ensure successful installation and activation of service on the first visit and to reduce the amount of unnecessary fault escalations, CPE swap outs or drop fiber replacements fiber end face inspection and power level checks must be combined with certification of the fiber drop and verification of the quality of connection to the PON (splitter). The Optimeter provides everything a tech needs in one simple and fast solution. In just 1 minute, with a single fiber connection, and 1 key press, any tech can completely validate and certify a drop fiber. Presenting result on a single view means no need to navigate between different screens and menus. While the fault-finding test feature gives a simple but powerful troubleshooting tool enabling diagnosis of any fiber issue immediately while still on-site in order to determine correct ownership of the repair.

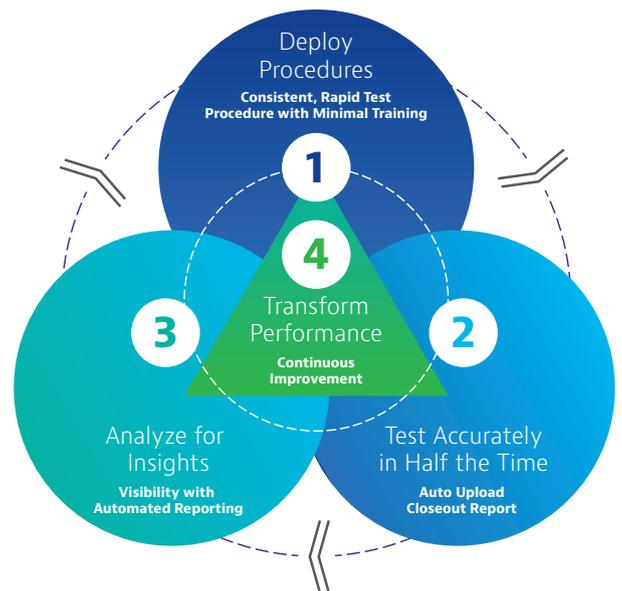
**Fiber, Ethernet, and WiFi** – The Network and Service Companion (NSC-100) can be used to verify optical power level, utilize PON ID information to confirm connection to the correct OLT port, prove the PON network's service delivery by testing throughput directly from the drop fiber and then validate service delivery within the premises via Ethernet or WiFi (or both) networks in order to troubleshoot and optimize service coverage or set expectations about service performance within the premises.

## **Test Process Automation**

**Problem:** Even with the best test equipment, there are challenges for managing installation and service tests and ensuring that the prescribed processes are being consistently followed. Some difficulties in process management include the need with some test equipment to manually configure each instrument to conform to the process. If the process isn't automated, the testing is likely to be inconsistent, tests can be complicated, or the test equipment may be out of date or not properly equipped with the test capabilities required. These issues can be compounded with an inexperienced work force, and the need to communicate and coordinate the resources, resulting in time consuming errors. Without automation, the results data is often inconsistent, with missing or invalid data, and there is a lack of key performance indicators that provide insight into network performance.

This difficulty in deployment of consistent procedures (MoPs) leads to a longer work/rework cycle, delayed deployment, unpredictable operational cost, unpredictable staff needs and activation schedules, inability to audit results, and difficulty in addressing problem causes.

**Solution:** StrataSync Test Process Automation – An efficient, closed-loop system that eliminates manual work and provides data for continuous improvements to network, team, and process. A test expert or process engineer deploys procedures to instruments to automate the workflow and save time. The technician steps through the process with the meter configured with the plan, and doesn't miss a test, a port, a fiber, etc. Reports from the team are aggregated into an analytics dashboard that provides insight and highlights areas needing improvement.



**Benefits:**

- Job consistency, repeatability, and quality
  - Test process workflows and thresholds are expertly defined once and pushed to technicians' instruments to ensure consistent results regardless of technician skillset
  - Objective evidence of build, activation and maintenance facilitates rapid close out and payment between operators and contractors
- Simplified process with streamlined training for a flexible workforce:
  - Pass/Fail tests enable a novice to execute jobs efficiently with reduced repeats
  - Shift training away from technical expertise needed to determine procedures and interpret results
- Improve management's productivity with systems integration:
  - The VIAVI TPA suite deploys open APIs and mobile apps so that workorders and test results reporting tie instruments into a network provider's existing dispatch, authorization, and reporting systems
  - Stop handling paper/email workorders, collating progress reports, and reduce management's administrative time
- Increase profitability:
  - Accelerate jobs and time to revenue
  - Eliminate repeat trips due to undiscovered faults

VIAVI Product	Product Link	Photo
OneExpert CATV (ONX 620)	<a href="http://www.viavisolutions.com/en-us/products/oneexpert-catv">http://www.viavisolutions.com/en-us/products/oneexpert-catv</a>	
OneExpert DSP (ONX 220) and Advanced WiFi Option	<a href="http://www.viavisolutions.com/onx-220">www.viavisolutions.com/onx-220</a>	
DSP Trilithic Series	<a href="https://www.viavisolutions.com/en-us/products/trilithic-dsp-series-meters">https://www.viavisolutions.com/en-us/products/trilithic-dsp-series-meters</a>	
Home Leakage Test Kit	<a href="https://www.viavisolutions.com/en-us/products/home-leakage-test-kit">https://www.viavisolutions.com/en-us/products/home-leakage-test-kit</a>	
MP-60	<a href="http://www.viavisolutions.com/en-us/products/mp-60-80-miniature-usb-20-power-meters-fiberchek-pro-integration">http://www.viavisolutions.com/en-us/products/mp-60-80-miniature-usb-20-power-meters-fiberchek-pro-integration</a>	
P5000i	<a href="http://www.viavisolutions.com/en-us/products/p5000i-fiber-microscope">http://www.viavisolutions.com/en-us/products/p5000i-fiber-microscope</a>	
Optimeter	<a href="https://www.viavisolutions.com/en-us/products/optimeter">https://www.viavisolutions.com/en-us/products/optimeter</a>	
NSC-100	<a href="http://www.viavisolutions.com/nsc100">www.viavisolutions.com/nsc100</a>	
Test Process Automation	<a href="https://www.viavisolutions.com/en-us/solutions/service-providers/wireline/test-process-automation-tpa">https://www.viavisolutions.com/en-us/solutions/service-providers/wireline/test-process-automation-tpa</a>	



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