



**ONX-580**  
**User's Guide**



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## Federal Communications Commission (FCC) Notice

This product was tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

The authority to operate this product is conditioned by the requirements that no modifications be made to the equipment unless the changes or modifications are expressly approved by VIAVI.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with the limits of a Class A digital device VIAVI requires that quality interface cables be used when connecting to this equipment. Any changes or modifications not expressly approved by VIAVI could void the user's authority to operate the equipment.

### **CAUTION:**

- To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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## Industry Canada Requirements

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with Industry Canada radiation exposure limits set forth for an uncontrolled environment.

Cet équipement est conforme à l'exposition aux rayonnements Industry Canada limites établies pour un environnement non contrôlé.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### **CAUTION:**

- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec une autre antenne ou émetteur.

## EU WEEE and Battery Directives

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations.

VIAMI has established a take-back processes in compliance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive, 2012/19/EU, and the EU Battery Directive, 2006/66/EC.

Instructions for returning waste equipment and batteries to VIAMI can be found in the WEEE section of VIAMI Standards and Policies web page.

If you have questions concerning disposal of your equipment or batteries, contact VIAMI WEEE Program Management team at **WEEE.EMEA@ViaviSolutions.com**.

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## EU REACH

Article 33 of EU REACH regulation (EC) No 1907/2006 requires article suppliers to provide information if a listed Substances of Very High Concern (SVHC) is present in an article above a certain threshold.

For information on the presence of REACH SVHCs in VIAVI products, see the Hazardous Substance Control section of VIAVI Standards and Policies web page.

## EU CE Marking Directives (LV, EMC, RoHS, RE)

This product conforms with all applicable CE marking directives. Please see EU Declaration of Conformity for details.

## Compliance with 2014/53/EU Radio Equipment Directive (RED)

In accordance with Article 10.8(a) and 10.8(b) of the RED, the OneExpert CATV instruments for sale in the EU operates in the 5-205 MHz frequency range at a maximum RF transmit power of +15dBm.

Please contact us for more information:

**VIAVI Solutions**  
**Network Service Enablement**  
**6001 America Center Drive**  
**San Jose, CA, 95002**

## California Proposition 65

California Proposition 65, officially known as the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted in November 1986 with the aim of protecting individuals in the state of California and the state's drinking water and environment from excessive exposure to chemicals known to the state to cause cancer, birth defects or other reproductive harm.

For the VIAVI position statement on the use of Proposition 65 chemicals in VIAVI products, see the **Hazardous Substance Control** section of the [VIAVI Standards and Policies web page](#).





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# About this Guide

Thank you for purchasing the OneExpert DSL. This prefix explains how to use this manual to get you up and running with the instrument as soon as possible.

## Purpose and scope

The purpose of this guide is to help you successfully use the OneExpert DSL features and capabilities. Additionally, this guide provides a complete description of the VIAVI warranty, services, and repair information.

## Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the OneExpert DSL effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication concepts and terminology.

## Technical assistance

If you require technical assistance, call 1-844-GO-VIAVI / 1.844.468.4284.

Outside US: +1-855-275-5378

Email: [CATVsupport@viavisolutions.com](mailto:CATVsupport@viavisolutions.com)

For the latest TAC information, visit

<https://support.viavisolutions.com>

<https://www.viavisolutions.com/en/services-and-support/support/technical-assistance>

## Safety and compliance information

Safety information is contained in a separate guide and is provided in printed format with the product.

For information about CE compliance, see the Declaration of Conformity. A copy of the declaration is included in the shipping package.

## Conventions

This guide uses typographical and symbols conventions as described in the following tables.

### Typographical conventions

Description	Example
User interface actions	On the Status bar, press <b>Start</b> .
Buttons or switches that you press on a unit	Press the <b>ON</b> switch.
Code and output messages	All results okay
Text you must type exactly as shown	Type: <b>a:\set.exe</b> in the dialog box
Variables	Type the new <i>hostname</i> .
Book references	Refer to <i><b>Newton's Telecom Dictionary</b></i>
A vertical bar   means "or": only one option can appear in a single command.	platform [a b e]
Square brackets [ ] indicate an optional argument.	login [platform name]
Slanted brackets < > group required arguments.	<password>

## Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press <b>Ctrl+s</b>
A comma indicates consecutive key strokes.	Press <b>Alt+f,s</b>
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, press <b>Start &gt; Program Files</b> .

## Symbol conventions



This symbol indicates a note that includes important supplemental information or tips related to the main text.



This symbol represents a general hazard. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See "[Safety definitions](#)" on [page 22](#) for more information.



This symbol represents an alert. It indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.



This symbol represents hazardous voltages. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See "[Safety definitions](#)" on [page 22](#) for more information.



This symbol represents a risk of explosion. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message. See "[Safety definitions](#)" on [page 22](#) for more information.

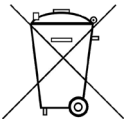


This symbol represents a risk of a hot surface. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See "[Safety definitions](#)" on [page 22](#) for more information.

## Symbol conventions (continued)



This symbol represents a risk associated with fiber optic lasers. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message. See the *Safety Definitions* below for more information.



This symbol, located on the equipment, battery, or the packaging indicates that the equipment or battery must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

## Safety definitions

Term	Description
DANGER	Indicates a potentially hazardous situation that, if not avoided, will result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
WARNING	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. When applied to software actions, indicates a situation that, if not avoided, could result in loss of data or a disruption of software operation.
ALERT	Indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.

# Introduction

This chapter provides a general description of the OneExpert DSL, including the following:

- "About the OneExpert DSL" on page 24
- "Features and capabilities" on page 28
- "What ships with the OneExpert DSL" on page 30
- "Preparation for use" on page 30
- "Attaching or removing a test module" on page 31

## About the OneExpert DSL

OneExpert DSL is a modular test platform that addresses the emerging need for an installation tool supporting the service provider technicians responsible for installing triple play services, in particular, Broadband Data services at customer premises. Technicians use it to test broadband delivery to the home, supporting wiring inside of the home, and the proper operation of delivered services.

The OneExpert is designed to support DSL, copper, services, and home networks. Each OneExpert instrument provides the controls and display needed for measurement analysis, and the instrument's modularity will ensure years of use. The combination of its multi-touch user interface and unique VIAVI OneCheck automated tests provides field technicians with ease of use and more expertise when performing complex tasks. This equips technicians to fix problems the first time while improving access and home network quality.





## Available mainframes

The following OneExpert DSL mainframes are currently available:

- The ONX-580 and ONX-580P support DSL, copper, services, and home network testing.
- The ONX-580A supports DSL, services, and home network testing; copper testing is not supported.



**NOTE:**

**For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).**

## Available test modules

The table below lists the available OneExpert test modules and part numbers.

Part Number	Description
ONX580-BDCM-DSL-BONDED	OneExpert Broadcom 63168 (bonded ready) test module
ONX-BDCM-DSL-ANXAB	OneExpert Broadcom 63168 (VDSL, ADSL2+ ANX A/B) test module
ONX-BDCM-GFAST	OneExpert Broadcom 63138 (VDSL, ADSL2+ ANX A/B, G.fast single and ADSL/VDSL bonded) test module
ONX-TM-GFAST	OneExpert Broadcom 63138 (VDSL, ADSL2+ ANX A/B, G.fast single and ADSL/VDSL bonded) and Scipio 1001 G.fast test module
ONX-TM-BDCM-212	OneExpert Broadcom 63158 (VDSL, ADSL2+ ANX A, single & bonded. G.fast (212MHz & 106 MHz) single and (106 MHz) bonded)
ONX-COVER	OneExpert cover module

## Software options

You can order software options to add functionality to the OneExpert DSL.

Part Number	Description
ONX-TRUESPEED	Provides the ability to run the RFC 6349 TCP throughput test (“TrueSpeed”) against a Virtual TrueSpeed server.
ONX580-BLUETOOTH	Allows wireless connectivity to either connect/communicate with mobile devices, to test with a Smart ID Plus probe, communicate with WiFi Advisor devices, or transfer files from the OneExpert DSL to a PC.
ONX580-BONDED	Allows xDSL testing over two pairs.
ONX580-GFAST	Provides the ability to perform xDSL testing over G.fast lines using the Broadcom chipset. Requires a ONX-BDCM-GFAST or ONX TM-GFAST test module.
ONX580-GFAST-SCKIPIO	Provides the ability to perform xDSL testing over G.fast lines using the Sckipio chipset. Requires a ONX-TM-GFAST test module.
ONX580-GFAST-212	Provides the ability to perform xDSL testing over G.fast 212 MHz lines using the Broadcom chipset. Requires a ONX-TM-BDCM-212 test module.
ONX580-HPNA	Allows testing of HPNA networks.
ONX580-IPVIDEO	Allows testing of IP Video services.
ONX580-MOS	Provides the ability to specify a Mean Opinion Score (MOS) scaling method and obtain call scores. Requires the ONX-VOIP software option.
ONX580-RFL	Allows Resistive Fault Locater (RFL) testing.
ONX580-TIMS	Allows Transmission Impairment and spectral testing.
ONX580-V35B	Provides a 35b profile for VDSL2 testing.

## Software options (continued)

Part Number	Description
ONX580-VOIP	Allows testing of VoIP services.
ONX-OOKLA-SPEEDTEST	Provides the Ookla Speedtest option.
ONX580-MOBILE-001	Provides the mobile option.
ONX-SPEEDCHECK	Allows Speed Check testing.
ONX-SMARTID-MOCA	Allows SmartID MoCA testing.
ONX580-COPPER-EXPERT	Provides the Copper Expert testing option.
ONX580-DSL-HELPER	Provides the DSL Helper option.

If you received an option file from a VIAVI representative, copy it to USB, insert the USB in the instrument, copy the file to the internal file system, turn the power off, then turn the power back on. For more information, see *"Installing software options" on page 64*.

### Additional resources

Providers can also improve their work processes, data flow, and OPEX by expanding field tester usage in a connected world with StrataSync™ and a mobile connectivity application.

For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).

## Features and capabilities

Features and capabilities of the OneExpert DSL include the following:

- A multi-touch user interface that is similar to those provided on smart devices
- A mobile-connectivity iOS application that provides remote control, data enhancements, and technical support, including tutorials
- Bluetooth and WiFi connectivity. The ONX-580 supports both 2.4 GHz and 5 GHz.
- The StrataSync™ cloud-enabled architecture for easy asset and test data management
- G.fast / xDSL testing, including:
  - Turning up and troubleshooting DSL services,
  - Packet statistics and analysis,
  - ADSL2+/VDSL2 testing, including bonded and vectored pairs (requires supporting test module)
  - Single-ended Loop Testing (SELT)
  - DSL/G.fast PHY (firmware on modem) updates
- HPNA testing (monitor and test modes)
- Home Wiring testing, including:
  - Wire Map, Tone Trace, and Hub Flash
  - Port Discovery, and a Ping Tool
- WiFi testing, including:
  - WiFi Scan and WiFi Access Point testing
  - WiFi Advisor
    - Site Assessment Assistant
    - Single-Ended Troubleshooting
- SpeedCheck testing. SpeedCheck application is used to test downstream and upstream throughput via Ethernet or xDSL/G.fast test interfaces.
- IP Video and VoIP testing
- Fiber inspection
- RFC 6349 TCP TrueSpeed testing
- Coax testing, including:
  - SmartID™ Plus smart-probe testing
  - Locating SmartIDs
  - Single-ended and dual-ended coax map
  - Whole home check

- Full Sweep Coax testing, including:
  - Full Bandwidth 1.6 GHz SmartID testing
- Copper testing (ONX-580 or ONX-580P platforms required) features:
  - Multimeter (AC volts, DC volts, Resistance)
  - TDR (including OneCheck™ TDR)
  - Crosstalk TDR for ONX-580P only
  - Opens (distance) and capacitance
  - Balance, Load Coil, and POTS call testing
  - OneCheck™ Copper, which automates field tests and simplifies copper results
  - RFL, K-Test
  - OneCheck Good Pair test
  - OneCheck Copper with UltraFed test
  - Spectral testing
  - Noise testing
  - Impulse Noise testing
  - Wideband Sweep Loss with UltraFED, and Wideband Balance Sweep
- ONX-580A functions without Copper board to reduce cost
- Customizable work order integration (contact your sales representative for information):
  - Sending multiple work orders to OneExpert DSL via iOS mobile application (app-to-app share) and USB
  - Including customers' work order information in the test reports
  - Providing standardized JSON and XML report formats for backoffice integration

## What ships with the OneExpert DSL

When you unpack the OneExpert DSL, the following items are included as standard.

- OneExpert base unit (mainframe)
- Test module (attached to the mainframe)
- Battery (installed in the base unit)
- AC adapter and power cord
- OneExpert Getting Started Guide (a laminated guide that fits easily in the OneExpert carrying case/glove)

## Preparation for use

This section explains how to start using the OneExpert. When you unpack your instrument, do the following:

- Inspect the OneExpert for damage. If the instrument is damaged, put it back in the box and contact VIAVI customer service (see "[Technical assistance](#)" on page 19).
- If undamaged, save the box and packing materials in case you need to ship the instrument in the future.
- Remove the protective film from the LCD. This film is in place to protect the LCD during shipment. Use the tab in the lower right corner to easily remove the film.

Before using the OneExpert DSL for the first time, do the following:

- Turn the OneExpert DSL **ON** (use the green button on the front of the instrument), and then verify that it is operating properly by navigating through a few menus.
- If the **Batt** indicator is red, charge the battery.



**NOTE:**

***This hand-held instrument is not intended to be body worn, or operated while held against the body.***

## Attaching or removing a test module

When shipped from the factory, the test module comes attached to the base unit. If another module is ordered later, or if you have more than one module, this section describes how to attach a different module to your base unit.

**NOTE:**

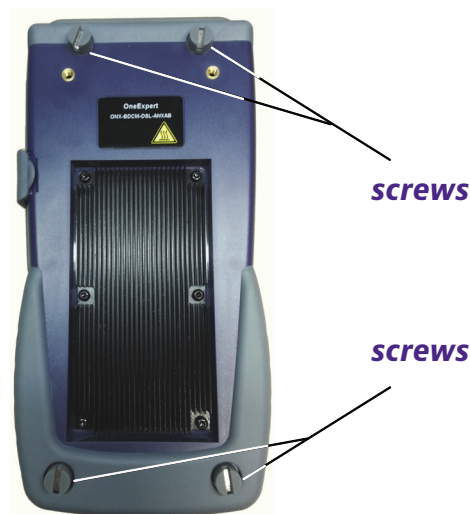
***Before removing or attaching a test module, the instrument must be powered down and all cables must be disconnected.***

**CAUTION: STATIC SENSITIVE**

***Static shock may damage the instrument. Observe anti-static precautions when handling the module.***

### Removing a test module

Modules can be removed by loosening the four screws on the back of the base unit.



1. Loosen the four screws using a screwdriver or a coin.
2. Pull the module from the base. You may have to slightly wiggle the module to loosen it from the gasket.

The module is removed.

## Attaching a test module

1. Position the module so that the connectors on the module line up with the connectors on the back of the base unit. If correctly positioned, the four screws also line up.
2. Gently push the module to mate the connectors.
3. Tighten the four screws:
  - Tighten by hand until the housing and screw contact each other.
  - Turn the fastener one complete turn, using a screwdriver or a coin.

The module is connected.



## Quick Tour

This chapter introduces the keypad, status indicators, connectors, and graphical user interface, including the following:

- "Exploring the front panel" on page 34
- "Exploring the bottom panel" on page 37
- "Exploring the right side panel" on page 38
- "Exploring the ONX-580 / ONX-580P top panel" on page 41
- "Navigating the user interface" on page 43

## Exploring the front panel

The controls and indicators on the front panel are used to operate the OneExpert DSL, set up tests, and view data.

The following sections describe each of the controls and indicators on the front panel.



## Status indicators

The controls and indicators on the front panel are used to operate the OneExpert DSL, set up tests, and view data detailed below.

**Sync** – Reports the status of G.fast/xDSL modem synchronization.

- Blinking green indicates that the modems are training.
- Solid green indicates that the modems are synchronized (reached Showtime).

**Network** – Indicates the status of network connectivity.

- Blinking green indicates that the unit is acquiring an IP address.
- Solid green indicates frames an IP address has been acquired.
- Blinking amber indicates a timeout; the unit was unable to acquire an IP address.
- If the Frame indicator is not illuminated, the network is not active (either the unit is not connected or it is logged off).



**NOTE:**

***The Sync and Network indicators alternately blink green when in sleep mode (power saving mode).***

**Error** – Solid red indicates error and alarm conditions.

**Batt** – A multi-color indicator that shows the battery status.

- Solid green indicates either the battery charge is higher than 30%, or that an external source is powering the unit.
- Solid amber indicates the battery is getting low, the charge is between 10% and 30%.
- Solid red indicates the battery charge is critically low, less than 10%. An audible beep occurs 30 seconds before shutdown.

## Touchscreen display

The touchscreen display operates similar to a smart phone or tablet, where you swipe to go to the next page or zoom in/out by pinching or opening your fingers.

## Softkeys

Use the softkeys to select screen-specific options or to select pop-up menus associated with each key.

## Arrow buttons

Use the arrow buttons to navigate through menu selections.

## OK button

Use the **OK** button to accept a changed setting or to proceed to the next menu.

## System buttons

The **Back**, **Home**, and **Tray** buttons are found under the arrow buttons.



**Back/Cancel** – Exit a menu or to go back to the previous menu. You can also quit or exit an application when it is highlighted on the Main menu.



**Home** – Return to the main/home screen.



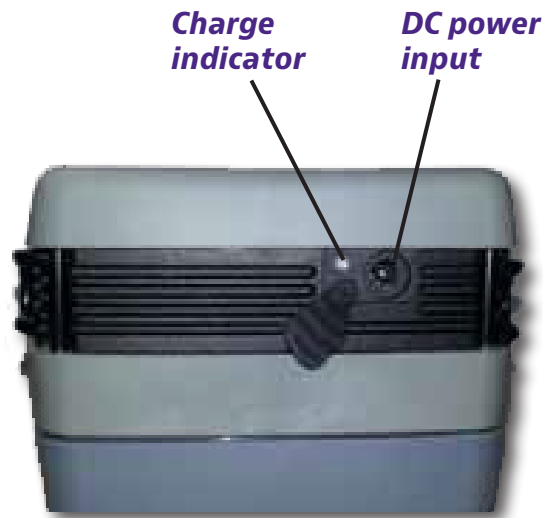
**Tray** – Displays the Tray menu to save test reports, turn on/off Bluetooth, or enable/disable remote operation, etc.

## Power button

Press and hold the **Power** button to turn the OneExpert DSL on or off.

## Exploring the bottom panel

The OneExpert DSL +12 VDC connector is located on the bottom end of the instrument. This connector is used to power the OneExpert DSL and to charge the lithium battery inside.



### Charge Indicator

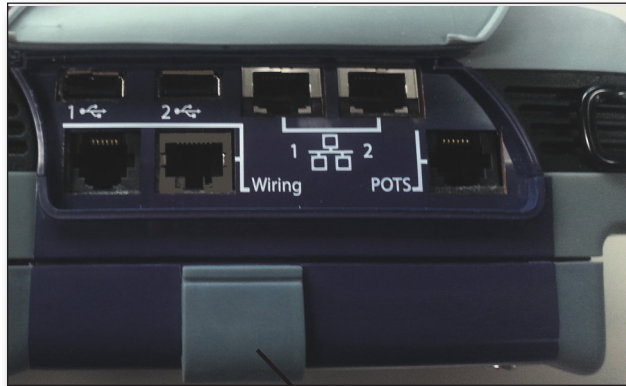
The **Charge** indicator, located next to the charger connector, is a multi-color indicator that shows the charge status.

- **Solid green** – Charging is complete
- **Slow flashing red** – Battery charge is critically low, less than 10%
- **Fast flashing red** – Charging was suspended due to a fault and user intervention is necessary (for example, the wrong charger is attached)
- **Solid red** – Charging was suspended due to overheating. The unit can continue to run, no user intervention necessary
- **Solid amber** – Battery is charging

## Exploring the right side panel

The connector panel, located on the right side of the instrument (under a rubber flap), provides the ports required to connect your OneExpert DSL to the line under test. When the connectors are not being used, close the rubber flap to keep out dust and rain.

### ONX-580 and ONX-580P connector panel



*xDSL / G.fast connector*

### ONX-580A connector panel



*xDSL / G.fast connector*



**NOTE:**

**POTS and wiring ports are not provided on the ONX-580A module.**

## USB connectors



The USB connectors are used for connecting Smart IDs, exporting test results to a flash drive, or for performing firmware upgrades from a flash drive.

## POTS connector

The POTS connector is used on the ONX-580 / ONX-580P modules for POTS testing.

## Network connectors



Two Ethernet/Network ports are used to connect to Ethernet networks to allow testing (such as hub flash, port discovery, and ping), synchronize with StrataSync, upgrade software, and remotely connect to the OneExpert.

## RJ45 Wiring connector

The RJ45 wiring connector is used on the ONX-580 / ONX-580P for:

- RJ45 wire ID
- RJ45 toning
- Wire mapping to smart remote



### **CAUTION: DAMAGE TO INSTRUMENT**

***Never insert an RJ-11 plug into the RJ-45 connector of the OneExpert; doing so may cause permanent damage to the connector.***

## RJ11 Wiring connector

The RJ11 wiring connector is used for:

- RJ11 wire ID
- RJ11 toning
- Wire mapping to smart remote



### **CAUTION: DAMAGE TO INSTRUMENT**

***Never insert an RJ-11 plug into the RJ-45 connector of the OneExpert; doing so may cause permanent damage to the connector.***

## xDSL / G.fast connector

The xDSL / G/fast connector, located on the bottom module, is used to establish connections for testing VDSL, ADSL, or G.fast on twisted pair cable.



### **WARNING: ELECTRICAL SHOCK**

***Electrical shock may result in serious injury or death. Use care when connecting to telecommunications circuits, to be sure that you do not come in contact with exposed conductors or power mains. Connect TNV signals to TNV ports only.***



### **CAUTION: FIRE HAZARD**

***To reduce the risk of fire, use only 26 AWG or larger telecommunications line cord between the DSL connector and the wall.***



### **NOTE: ELECTROSTATIC DISCHARGE IMMUNITY**

***When using an Ethernet crossover cable, VIAVI recommends using a shielded crossover cable for the best immunity to electrostatic discharge (ESD).***

## Rings

The D-rings on the corners of the instrument can be used to attach a carry strap.



## Exploring the ONX-580 / ONX-580P top panel

The upper area of the back panel of the ONX-580 / ONX-580P module houses the connectors for Copper or G.fast/xDSL testing.



These connectors are not provided on the ONX-580A.

The copper connectors are used for:

- Multimeter
  - AC volts
  - DC volts
- TDR
- Opens (distance) and capacitance
- Balance
- Load coil detect
- POTS
- Spectral
- RFL
- Noise
- Impulse Noise
- RX Tones

**CAUTION: INSTRUMENT DAMAGE**



***Connecting to circuits with voltage higher than 300V, compared to ground, may damage the internal components. Connect only to circuits with less than 300V.***

**WARNING: ELECTRICAL SHOCK**



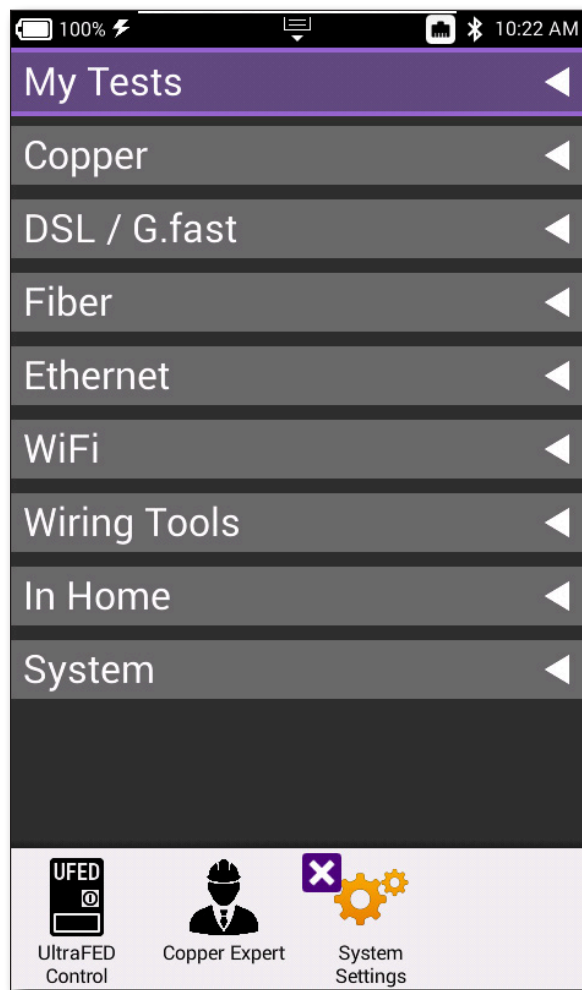
***Electrical shock may result in serious injury or death. Use care when connecting to telecommunications circuits, to be sure that you do not come in contact with exposed conductors or power mains. Connect TNV signals to TNV ports only.***

## Navigating the user interface

The user interface of the OneExpert is designed to be intuitive and easy to use. The LCD is a touchscreen that operates similar to a mobile device (such as an iPad or similar Android device), where you swipe to go to the next page or zoom in/out by pinching or opening your fingers. Using the interface, you can view test results, set up the OneExpert, and configure test parameters.

When you power up the OneExpert, the **Home** screen appears. The Home screen indicates the options enabled on your instrument and may vary depending on the module connected.

The ONX-580 is shown here.



## Battery status and time

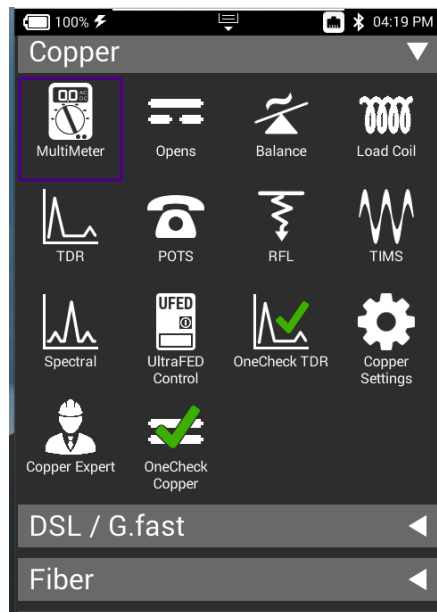
The area at the top of the screen provides the battery status (using a graphic of the battery charge remaining), indicates whether the adapter is plugged in (using a lightning bolt next to the battery), and displays the current time.

## Expanding a menu

Each item on the main menu is a collapsible menu. You can expand each of the collapsible menu items by doing either of the following options:

- Press the triangle on the right.
- Use the arrow buttons to highlight the desired menu item (Copper is highlighted below), and then press **OK**.

The triangle points down to show the menu is expanded.



## Selecting applications

After you expand a collapsible menu, you can select a specific option by doing either of the following:

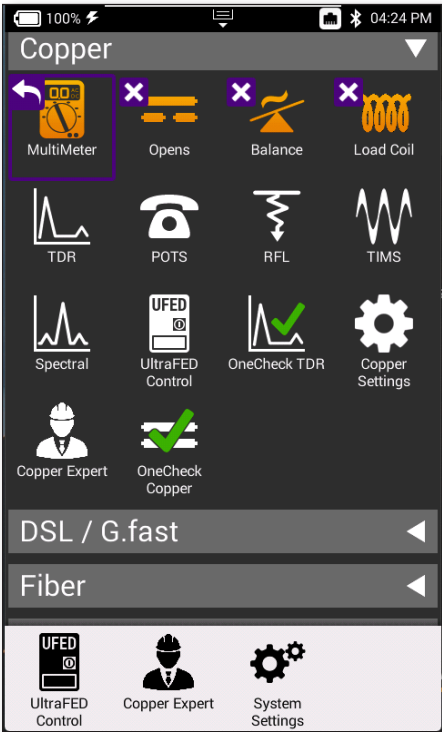
- Press the menu option.
- Use the arrow buttons to highlight the desired menu option, and then press **OK**.

**Running Applications**

Once you start running an application (e.g. MultiMeter), you can return to the home menu (by pressing the home icon in the upper-left corner of the application's screen).

The application will keep running and the icon on the home screen will be highlighted, showing that it's active.

To quit an app, press the **Back** button or back arrow on the icon.



## Entering data

Some menu options may require you to enter text or numbers (for example, test settings or user information). The process is similar to data entry on a mobile device.

1. Press the desired item. A data entry box appears.
2. Tap in the box. A keypad appears on the screen.
3. Use the keypad to enter the data.
  - To switch from letters to numbers, use the **123 or ABC** button.
  - On the alpha keypad, the up arrow is the shift button.
  - On the numeric keypad, the second button (1/2) allows you to move among multiple numeric screens.
  - The left pointing arrow with the X in it is the backspace button.
4. Press the enter/return button on the onscreen keypad or press **OK**. The data is entered and stored.

## Creating or removing a shortcut

If you have a test or function that you use frequently, you can make it a shortcut. You can create up to four shortcuts.

- To create a shortcut, press and hold the icon for the function and then drag it to the bottom of the screen to the shortcut bar.
- To remove a shortcut, press and hold the icon and then drag it off of the shortcut bar.

## Utilities

This chapter describes utilities found in the System menu and the Tray menu. The utilities are used to set up your instrument, upgrade the software, specify user information, generate test reports, capture screenshots, and perform other tasks, including the following:

- "Accessing system utilities" on page 48
- "Setting up your instrument" on page 50
- "Restoring factory defaults" on page 54
- "Establishing network connections" on page 56
- "Updating the instrument's firmware" on page 63
- "Synchronizing to the StrataSync server" on page 65
- "Creating custom OneCheck icons" on page 67
- "OneCheck Profiles" on page 68
- "Generating reports" on page 69
- "Viewing your jobs" on page 72
- "Managing files" on page 78
- "Managing files with StrataSync" on page 79
- "Viewing the User's Guide on your instrument" on page 80
- "Remotely operating the instrument" on page 80
- "SmartAccess Anywhere – Remote Coaching" on page 83

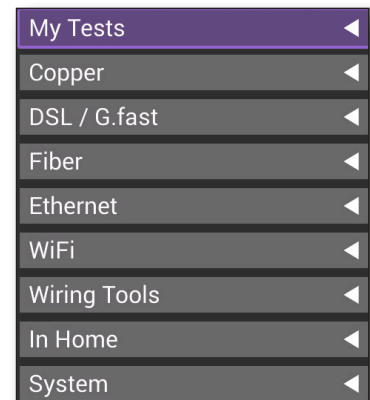
## Accessing system utilities

System utilities are accessed using the **System Settings** or **Tray** menus on your instrument.

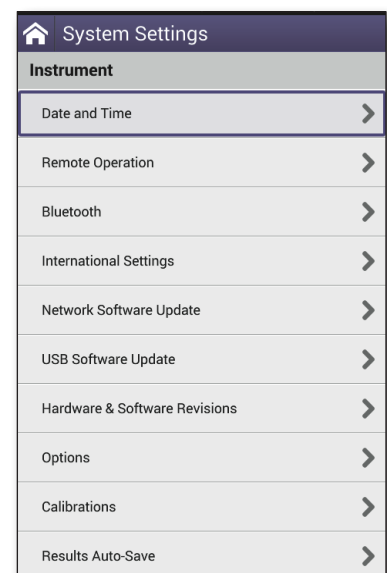
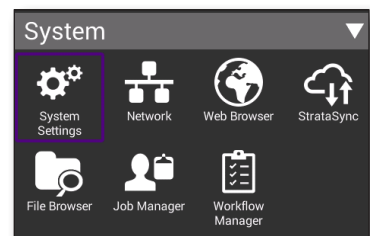
### Displaying the System Settings menu

Using the items provided on the **System Settings** menu, you can turn on remote operation (via VNC Viewer), change screen and power settings, control the volume, view hardware and software versions, view options purchased with your meter, and complete USB software updates.

1. From the Main menu, press the **System** menu item.



2. Press the **System Settings** icon. The **System Settings** menu appears.



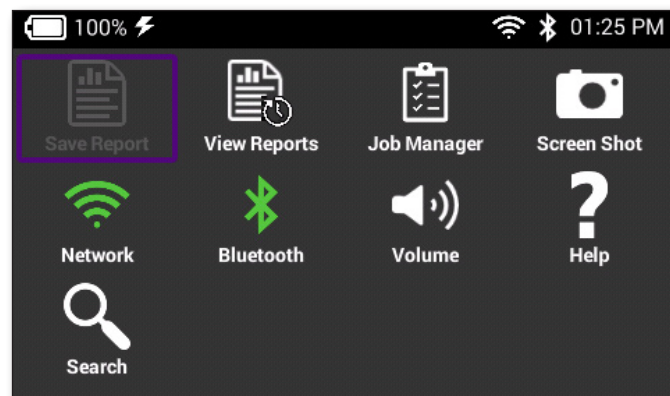


## Displaying the Tray menu

Using the icons provided on the **Tray** menu, you can specify settings required for network, WiFi, and Bluetooth® connectivity, control the volume on your instrument, manage jobs, and manage reports. You can also take screenshots of the user interface and review a PDF of this guide on your instrument.

To bring up the Tray menu, do either of the following:

- Press the **Tray** button
- Swipe downward from the top of the screen



## Setting up your instrument

As mentioned in the previous sections, you can set up your instrument in the System Settings and Tray menus.

### Configuring international settings

The **International Settings** menu is used to select the language, local units of measurement, and other international settings. There are two ways to select international settings:

- Select a preset country. This automatically configures the international settings as appropriate for the selected country.
- Configure each setting individually. If you are not in one of the preset countries, or if the settings aren't appropriate for your situation, you can configure each setting individually.

After selecting a country or configuring each individual setting, you must reboot the instrument for the international settings to take effect. The settings will be retained when you turn your instrument off.

1. Go to the **System Settings** menu, then select **International Settings**. The International Settings menu appears.

2. Optional. Select **Country** to select a preset country.

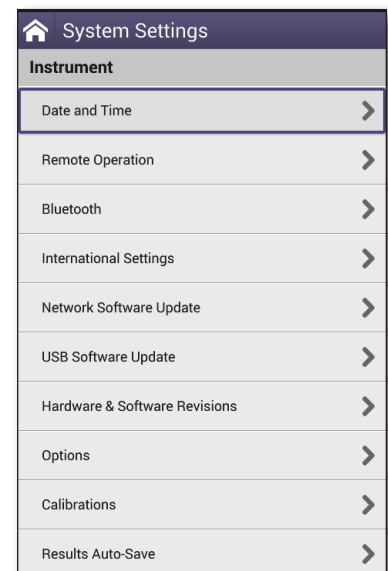
Selecting a specific country will automatically change the settings as appropriate for that country. For example, selecting France will automatically set the language to Francais, the measurement system to metric (e.g. the unit of distance will be expressed in meters and the cable size will be expressed in millimeters), and the unit of temperature to Celsius, the noise filter to CCITT, TDR units to m/us, and the numerical separator to a comma.

3. If necessary, change the settings for Language, Keyboard, Measurement System, Temperature Units, Time Zone, and Cable Terminology by doing the following:

- Press the menu item that corresponds to the setting.
- Select the value for the setting from the list.

4. Press **Back/Cancel** to exit the menu.

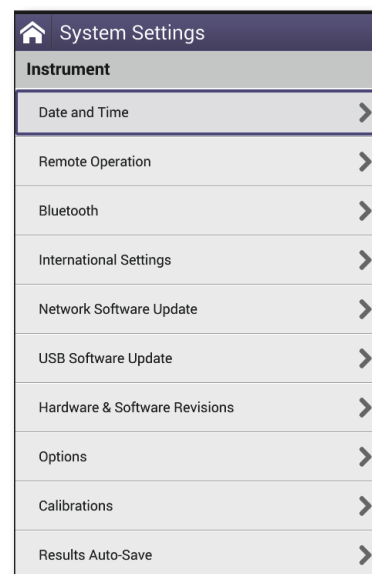
5. Turn off the power, then turn back on to reboot the instrument.



## Setting the date and time

The OneExpert has an internal clock that you can set to provide accurate time stamps for test results.

Go to the **System Settings** menu, then select **Date and Time**. The Date and Time Settings menu appears.



### Set the time

1. Press **Time**.
2. Turn the dials to select the hour, minutes, and AM or PM. Press **OK**.

### Set the date

1. Press **Date**.
2. Use the arrows to set the month and year.
3. Select the day on the calendar.
4. Press **Set**.

### Specify the date format

1. Press **Date Format**.
2. Select MM/DD/YYYY or DD/MM/YYYY.

### Specify the time format

1. Press **Time Format**.
2. Select 12 Hour or 24 Hour.

### Change the time zone

1. Press **Time Zone**.
2. Select the time zone.
3. If Daylight Savings Time (DST) is used in your area, press the **DST Used** checkbox to enable DST. A check mark will appear indicating that DST is enabled.

### Control Time Synchronization

1. Press **Time Synchronization**.
2. If synchronization is required, select **NTP**. If synchronization is not needed, select **None**.

When enabled, Network Time Protocol (NTP) synchronizes your system clock to a central time server.

3. If you enabled NTP, specify the following:
  - **NTP Server Address type** (IPv4 Address, IPv6 Address, DNS Name)
  - **NTP Server** (the address of the server where the instruments gets the time, e.g., 0.us.pool.ntp.org)

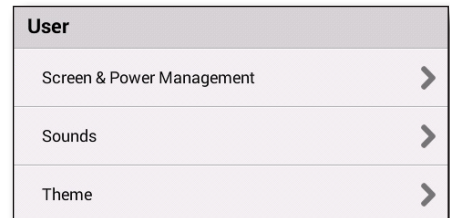
The instrument indicates whether it is synchronized with the NTP server under Synchronization State.

4. Press the **Back/Cancel** button to exit the menu. The date and time are set.

## Changing screen and power settings

The **Screen and Power Management** menu allows you to adjust the brightness of the backlight, set the backlight timeout, and set the amount of idle time to wait before the instrument automatically powers itself off when operating on battery power.

Idle time refers to time during which no keys are pressed and no line activity takes place. So, if you set the Power Off Delay to 5 minutes and then begin a 15 minute test, the unit will not power down during the test because there is activity on the line (as a result of the test).



### **NOTE:**



***The OneExpert will not automatically power down when connected to the AC adapter.***

Go to the **System Settings** menu, then select **Screen & Power Management**.

### **Set the backlight**

1. Press **Backlight**.
2. Either press the + / - buttons on the screen or swipe your finger across the bar to move the line on the bar, adjusting the brightness of the backlight.

### **Set the backlight timeout**

1. Press **Backlight Timeout**.
2. Select the amount of time to wait before the backlight dims.

### **Set the power off delay**

1. Press **Power Off Delay**.
2. Select the amount of idle time to wait before the instrument automatically powers itself off.

Press the **Back/Cancel** button to save and exit. The screen and power management settings are specified.

## Setting the volume

You can control the volume of your instrument using the Volume icon on the **Tray** menu.

1. Display the **Tray** menu, and then press **Volume**. The volume scroll bar appears.
2. Either press the + / - buttons on the screen or swipe your finger across the bar to move the line on the bar, adjusting the volume.
3. Press the **Back/Cancel** button to save and exit the menu. The volume is set on your instrument.

## Specifying the location for saved files

You can set up your instrument to automatically save test results, screenshots, or other files to the instrument's file system, a connected USB drive, or both (if applicable).

1. Go to the **System Settings** menu, then select **Save Location**.
2. Press the circle to the left of **File System, USB device** (when available), or **Both** (when applicable).
3. Press the **Back/Cancel** button to save and exit the menu. Files will be saved to the location (and/or device) specified.

## Automatically saving DSL test results

You can set up your instrument to automatically save DSL and One Check DSL test results, including graphical results in an XML format on the instrument. The XML result output will then be sent automatically the next time you synchronize to the StrataSync server.

If you enable this function, the instrument will save the results whenever you leave the test application, stop a test (using the Stop command), or turn your instrument off.

1. Go to the **System Settings** menu, then select **Results Auto-Save**.
2. Press the **Save DSL Automatically** checkbox.
3. Press the **Back/Cancel** button to save and exit the menu.

When saving the results to an XML file, the StrataSync Tech ID will also be saved. The date and time that the output was generated and the StrataSync Tech ID will also be captured in the XML filename.

### **NOTE:**



***The XML result file will be saved on your instrument for 90 days or until you synchronize the instrument to the StrataSync server. After synchronizing to the StrataSync server, the result file will automatically be deleted.***

## Restoring factory defaults

The following procedure describes how to reset the OneExpert to factory default settings.



**NOTE:**

**Restoring factory defaults resets test application settings and system settings (such as brightness, contrast, and volume), and powers down the unit.**

1. Go to the **System Settings** menu, then select **Restore Factory Settings**. A prompt appears indicating that all settings will be restored to factory defaults.
2. Press **OK** to acknowledge the prompt and restore the factory default settings.  
Settings are restored to their factory default values. You must reboot your instrument for the factory defaults to take effect.

## Powering off and rebooting the unit

Besides pressing and holding the power button to turn off your ONX, you can also power off or reboot from the **Power Off** menu.

Go to the **System Settings** menu, then select **Power Off**. You'll have the option to power off or reboot.

## Specifying user information

The **User Information** menu allows you to enter specific information related to the technician using the OneExpert. This includes the technician name and ID, and the StrataSync account ID. This information is used when synchronizing with the StrataSync server.



**NOTE:**

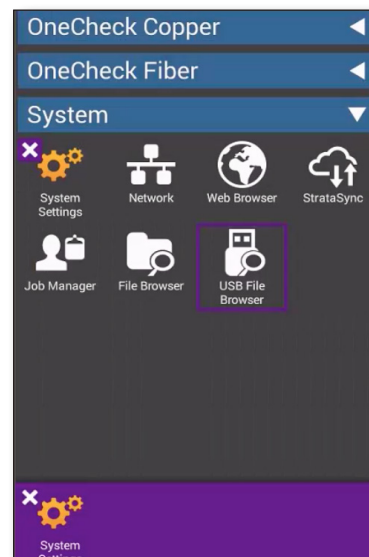
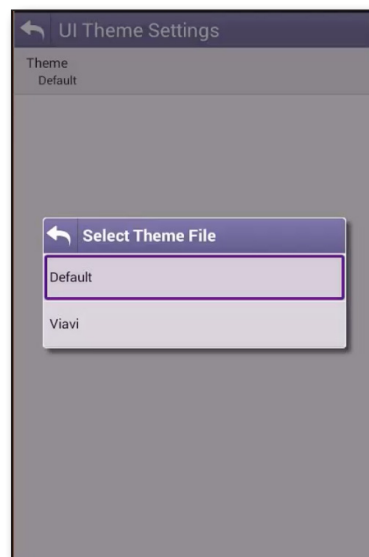
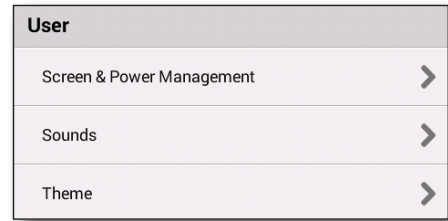
**A valid StrataSync Tech ID/User ID and Account ID must be entered in order to synchronize your instrument to the StrataSync server.**

1. Go to the **System Settings** menu, then select **User Information**.
2. Specify the user's first and last name, workgroup, company, email address, and other information.
3. Press the **Back/Cancel** button to save and exit the menu. The user information is specified.

## Customizing the user interface theme

The **Theme** menu allows you change the user interface theme color.

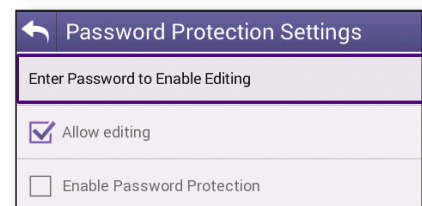
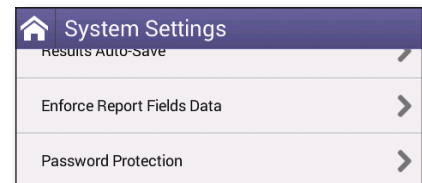
1. Go to the **System Settings** menu, then select **Theme**.
2. From the UI Theme Settings screen, select the default theme and choose a new one.
3. Press the **Back/Cancel** button to save and exit the menu. The user interface is now set to the new theme.



## Enabling password protection

The **Password Protection** menu allows you enable password protection on the unit.

1. Go to the **System Settings** menu, then select **Password Protection**.
2. From the Password Protection Settings screen, select **Enter Password to Enable Editing** and enter a password.
3. Select the checkmarks for **Allow editing** and **Enable Password Protection**, as necessary.
4. Press the **Back/Cancel** button to save and exit the menu.



## Establishing network connections

You can establish wired network and intranet connections, and wireless WiFi connections to your instrument to update the firmware, transfer files, synchronize to the StrataSync server, or control the instrument's user interface remotely.

### Enabling network connectivity

Before you establish a connection to an Ethernet or WiFi network, you must enable network connectivity on your instrument.

1. Go to the **Tray** menu.
2. Press the **Network** icon. The icon will be green when connectivity is enabled. Network connectivity is enabled.

**NOTE:**



***You cannot use Bluetooth when the ONX is acting as a WiFi Access Point (letting other devices connect to the ONX).***

***However, you can use Bluetooth when the ONX is acting as a WiFi Client (when the ONX is connecting to an Access Point).***



## Establishing an Ethernet connection

You must have an Ethernet LAN cable to establish an Ethernet connection to your instrument.

The ONX supports simultaneous usage of System Network access and Data Test access on its two external Ethernet ports.

To enable this feature, select <Reserve Ethernet Port 1 for Remote Access> checkbox in the Remote Operations menu in the System Settings. System Network access will occur in Eth1 jack and Data Testing will take place in Eth2 jack.

If you don't specify the port, either jack can be used for either System Network access or Data Test access.

1. Using an Ethernet cable, connect the instrument to the LAN:
  - Connect one end of the Ethernet cable to the OneExpert Ethernet connector located on the side panel.
  - Connect the other end of the Ethernet cable to the LAN.
2. Verify that network connectivity is enabled in the previous section.
3. Go to the **System** menu, then press **Network**. The System Network menu appears.
4. Select the **Ethernet** button at the bottom of the menu. Items appear that allow you to specify settings that are required to connect to the LAN.
5. Select **Network Mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**. Depending on the Network Mode, you have one or more additional settings to specify.
6. Configure the instrument's IP settings to match the LAN settings by doing one of the following:
  - If you specified IPv4 as your network mode, specify the following settings:

### **IPv4 Address Mode**

#### **DHCP**

**Use Vendor ID** – Enter your Vendor ID if your network requires a Vendor ID.

**Use User Class** – Enter your User Class if your network requires a User Class

**Use Arp Announce** – Enable Arp Announce to have the instrument do the Arp announce after the DHCP request.

### Static

**IPv4 Address** – Enter the instrument’s IP address (which will be used when accessing the provider network).

**IPv4 Netmask** – Enter the netmask address to indicate whether the packets are to be routed to other networks or sub-networks.

**IPv4 Gateway** – Enter the address for the gateway that is used to route packets that are not on the same subnet.

**IPv4 DNS Server** – Enter the address of the DNS server.

**Shared** – Share the IP from another interface (for the multi interface mode).

- If you specified IPv6 as your network mode, specify the following settings:

### *IPv6 Address Mode*

#### DHCPv6

##### **DHCPv6 Request Type**

- Address – Specify the address.
- Prefix – Specify the prefix.

#### Stateless

##### **IPv6 DNS Address Mode**

- DHCPv6 – No additional settings to specify.
- Manual – Enter the IPv6 DNS Server address.

#### Static

**IPv6 Global Address** – Enter the instrument’s IPv6 address to access the global network.

##### **IPv6 Local Address**

- Manual – Enter the IPv6 Local Address.
- Automatic – The address is populated automatically.

**IPv6 Subnet Prefix Length** – Enter the subnet prefix length.

**IPv6 Gateway** – Enter the address for the gateway that is used to route packets that are not on the same subnet.

##### **IPv6 DNS Address Mode**

- DHCPv6 – No additional settings to specify.
- Manual – Enter the IPv6 DNS Server address.
- If you specified IPv4/IPv6 Dual Stack as your network mode, specify the following settings:

### ***IPv4/IPv6 Dual Stack Address Modes***

**Static** – See the IPv4 Address Mode in this section.

**Stateless** – See the IPv6 Address Mode in this section.

7. Display the **Tray** menu, and then press **Network** to establish the connection. The instrument establishes an Ethernet connection to the LAN.

## Establishing a WiFi connection

The WiFi option allows you to establish a WiFi connection to a wireless network to 1) synchronize your instrument to the StrataSync server, 2) export reports, screenshots, or job tickets (using FTP), or 3) update the firmware on your instrument.



**NOTE:**

**Most ONX models support both 2.4 GHz and 5 GHz WiFi. Some earlier ONX-580 models only support 2.4 GHz.**

## Adding a WiFi network profile

If an access point does not broadcast its Service Set Identifier (SSID), you can manually create a profile for a WiFi network. Your instrument will save the profile, then automatically authenticate and establish a connection to the network if 1) network connectivity is enabled, 2) the network's access point is in range, and 3) the network is determined to provide the best available access point (based on signal strength and/or encryption supported).

The instrument can save up to 32 WiFi network profiles.



**NOTE:**

**Your instrument will automatically save a profile after successfully connecting to a new WiFi network.**

1. Verify that network connectivity is enabled (see ["Enabling network connectivity" on page 56](#)).
2. Go to the **System** menu, then press **Network**. The System Network menu appears.
3. Select the **WiFi** button at the bottom of the menu. Your instrument immediately scans for WiFi networks and lists each network as an item.
4. Press **Add Network**. The Add WiFi Network menu appears.
5. Specify the following settings:
  - SSID** – The SSID (Service Set Identifier) of the WiFi network.
  - Password** – The password required to authenticate to the network. A password is not required if Key Management is set to None.
  - Key Management** – Open, WEP, or WPA/WPA2 Personal.

**Network Mode** – IPv4, IPv6, or IPv4/IPv6 Dual Stack. Depending on the Network Mode, you have one or more additional settings to specify. For details, see those areas earlier in this section.

- Return to the **System Network** menu. The network that you created a profile for is listed on the menu.

## Connecting to a WiFi network

You can manually connect to any compatible WiFi network that is within range of your instrument, and for which you have authorized access (and a password for authentication).

- Verify that network connectivity is enabled (see *"Enabling network connectivity" on page 56*).
- Go to **System**, then press **Network**. The System Network menu appears.
- Select the **WiFi** button at the bottom of the menu. Your instrument immediately scans for WiFi networks, and lists each network as an item.
  - A lock indicates that authentication is required to connect to a network.
  - Saved, In Range** – A profile for the network has been saved on your instrument, and a connection can be established to the instrument.
  - Saved, Out of Range** – A profile for the network has been saved on your instrument, but the network is out of range (and therefore, a connection cannot be established).
  - Incompatible** – A connection cannot be established to a network.
  - Connected** – The instrument has already established a connection to the network.

The instrument automatically connects to the network determined to provide the best available access point (based on signal strength and/or encryption supported).

- If you want to connect to a different network, press the **SSID** of the WiFi network. A screen appears with items that allow you to specify advanced settings (profile settings), forget a saved network, or connect to the network.
- Press **Connect**.
  - Messages appear briefly indicating the instrument is performing a four-way handshake, then authenticating to the network.
  - The status of the connection (Network Up), and details concerning the connection (IP address, netmask, gateway, and DNS server) appear at the top right of the menu.

The instrument is connected to the WiFi network.

## Establishing a Bluetooth connection

The Bluetooth® option allows communication with a paired mobile device or SmartID+.

### Enabling Bluetooth connectivity

Before you establish a connection to Bluetooth device, you must enable Bluetooth connectivity on your instrument.

1. Go to the **Tray** menu.
2. Press the **Bluetooth** icon. The icon will be green when connectivity is enabled.

**NOTE:**



***You cannot use Bluetooth when the ONX is acting as a WiFi Access Point (letting other devices connect to the ONX).***

***However, you can use Bluetooth when the ONX is acting as a WiFi Client (when the ONX is connecting to an Access Point).***

### Connecting to a Bluetooth device

You can establish a connection to any Bluetooth device that is within range of your instrument, and for which you have authorized access.

1. Go to the **System Settings** menu, then select **Bluetooth**. The Bluetooth Settings menu appears.
2. Press the box next to **Enabled**. A checkmark appears.
3. Press **Scan for devices**. The instrument scans for Bluetooth devices, then lists the devices on the menu.
4. Select the device to connect.
  - If the instrument successfully authenticates to the device, a message appears indicating that pairing was successful.
  - If the instrument does not successfully authenticate to the device, a message appears indicating that pairing failed.

If pairing was successful, you can use the instrument with the paired device.

**NOTE:**



***You can also pair your mobile device from the Home screen. Follow the instructions on the meter to pair.***

## Updating the instrument's firmware

The OneExpert DSL firmware can be upgraded in the field using 1) a wired network or intranet connection, 2) a WiFi connection, or 3) a USB drive with a copy of the firmware.

### Download the firmware to a USB drive

If you're using a USB drive, you can download the firmware from:

- The VIAVI OneExpert DSL page at: <http://www.viavisolutions.com/enus/products/network-test-and-certification/copper-dsl-WiFi-and-broadband/oneexpert-dsl-modular-field-test-platform>.
- A specific IP or FTP address that your organization uses to provide the firmware. You will need to enter a User Name and Password before downloading the firmware.

### Updating the firmware from a USB drive

Connect the OneExpert DSL to the AC charger adapter to ensure an uninterrupted supply of power during the update. Once your ONX has been updated, you have the option to reboot it.

### Viewing hardware/software versions and options

The following procedure describes how to view the status of available options and the hardware and software versions for your instrument.

1. Go to the **System Settings** menu.
2. Do one of the following:
  - To review hardware and software versions, select **Hardware/ Software Revisions**.  
The revisions of the internal components and the software versions appear. The instrument's unique unit ID number also appears on this screen. You will need the unit ID if you are adding options.
  - To review the status of available options, select **Options**.  
A list of available options appears with the status for each option (Enabled or Upgradeable).

## Installing software options

The following procedures describe how to install software options on your instrument. Options can be installed from a USB stick onto which the options have been stored.

The preferred method of option installation is via StrataSync, as shown in the next section.

1. Before installing options, upgrade to the latest firmware, as shown in the previous sections.  
If you received the option file by email (instead of a USB drive), save the option file to a USB drive.
2. Insert the USB drive into the OneExpert.
3. From the main menu, press the **System** menu item. The collapsible menu opens.
4. Select **USB File Browser**.
5. Highlight the option file on the USB drive.
6. Select **File Option**, and then **Copy to Internal**. The file is copied to the internal file browser.
7. Press the **Home** button.
8. Optional. Press the **System** menu and then select **File Browser** to verify that the option file was copied to the unit.
9. Reboot the instrument (turn off the power, then turn it back on). The option is installed.



## Synchronizing to the StrataSync server

StrataSync® is a hosted, cloud-based software application that provides VIAVI instrument asset, configuration, and test-data management. StrataSync manages inventory, test results, and performance data anywhere with browser-based ease and improves technician and instrument efficiency. This service is provided free for the first year.

Features include the following:

- Tracking ownership of the OneExpert
- Pushing certain configuration settings to the OneExpert
- Pushing work orders to the OneExpert and keeping in sync with the server
- Receiving certain configuration setting from the OneExpert
- Adding and/or removing software options on the OneExpert
- Updating the software on the OneExpert
- Updating the software on the modem
- Cloning a device (create a “golden” unit)
- Uploading and storing of test reports, screenshots, OneCheck profiles, and configurations
- Manage OneExpert homescreen settings via templates

To obtain the latest configuration settings, software options and updates, work orders, and ownership registration information, the OneExpert can synchronize with a VIAVI server via the internet. The synchronization also stores any user files saved on the unit to the StrataSync server.

This procedure should be undertaken immediately upon receipt of the unit and on a regular (daily) basis thereafter to ensure that the unit is as up-to- date as possible and to allow all user information to be backed up. Before attempting to synchronize with StrataSync, please confirm your server settings with your manger or your company's IT organization.

### To sync with StrataSync

1. If you haven't already done so, specify the user information on the User Info menu (see *"Specifying user information" on page 54*). A valid account ID must be entered in order to synchronize with the StrataSync server.
2. Connect the ONX to an active internet connection (Ethernet cable from cable modem or router to ONX port 1 RJ-45 connector).
3. Verify the ONX has a valid IP Address.
  - From the System menu, select Network.
  - Check the IP addresses displayed.
    - The ONX IP address is configured as 192.168.0.\*
    - The Gateway should be configured as 192.168.0.1

4. From the **System** menu, press the **StrataSync** icon. The StrataSync settings menu appears.
5. Specify the following settings:
  - **System Settings StrataSync Account ID** – Enter the account identification number. Only change this if necessary.
  - **StrataSync Tech ID/ User ID** – Enter the technician/user identification number.
  - **Server Address** – Enter the DNS address for the server. The default address is: <https://stratasync.viavisolutions.com>
  - **Server Port** – Enter the server port number. The default port is: 443
6. Press the **Start** button. As the process runs, the sync state is displayed on the screen.
  - Upon synchronization with the StrataSync server, the unit will send to the server the following information:
    - The unit's serial number.
    - The unit's hardware information (constituent assemblies and their revision levels).
    - The unit's MAC address.
    - The unit's user settings - name (user/technician) and ID.
    - The last calibration date of the copper board (if applicable; this is not provided for the ONX-580A, which does not have a copper board).
    - Software update milestones (includes status and warnings, if applicable)

If the configuration information contained on the server is newer than that on the unit, the server will be considered to be the most up-to-date.

- The server will then send any files to the unit being synchronized that it determines are newer than those on the unit.
- The unit will then send any reports, work orders, configuration profiles, XML results, screen shots, etc. that have been saved on the unit since the last configuration.
- The server then applies any applicable options to the unit.
- Copy ("clone") the configuration settings for the base unit, as well as any company-specific configurations such as custom filters, web bookmarks, and FTP passwords. This can be used to create a "golden" unit.

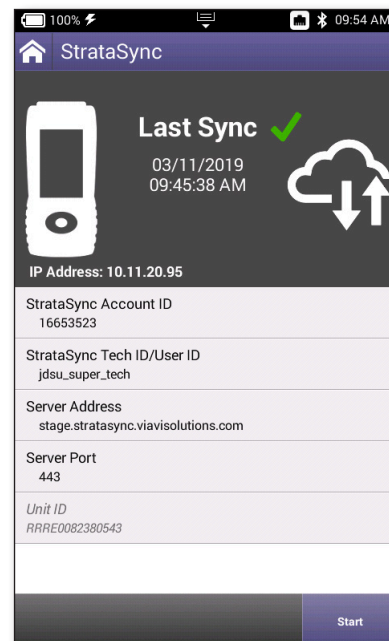


**NOTE:**

***If an Option Code was entered as a part of synchronization, power must be cycled to the unit to complete the process and initialize the option.***

- Lastly, if any upgrades are available, the user will be informed of their availability and asked to verify their desire to receive the upgrade.

When synchronization is complete, the Status will indicate "Sync Complete". The unit may be disconnected from the server.



**NOTE:**



*If StrataSync determines your ONX needs a firmware update, it updates the ONX, then reboots, and autosyncs to StrataSync again to ensure your unit has the latest version.*

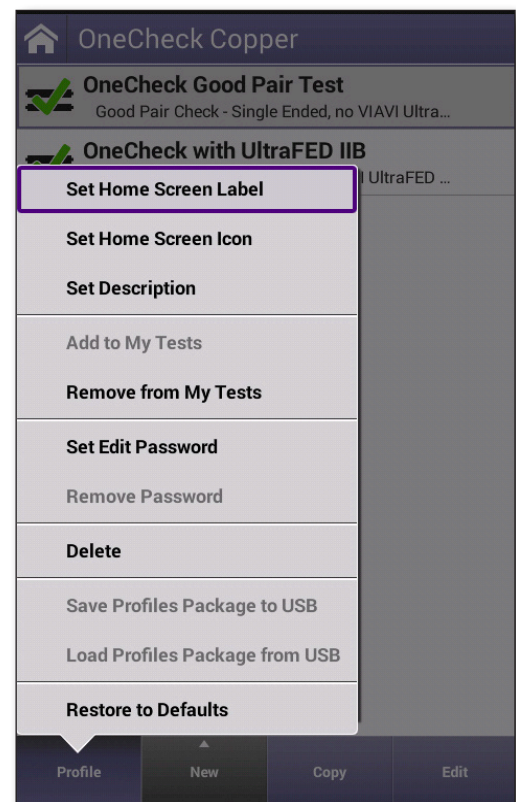
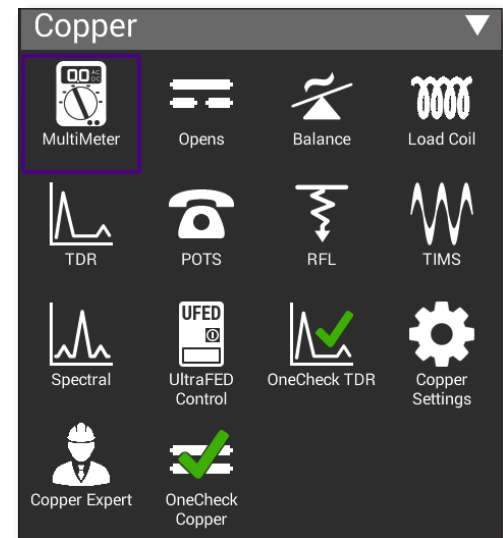
## Creating custom OneCheck icons

1. Create an image and place it in the root directory of a USB drive. The image must be in the .PNG format and have no spaces in the name.
2. Load up a OneCheck profile by selecting an icon under OneCheck Copper, DSL, Fiber, or Ethernet.
3. Insert the USB drive.
4. Press **Icon** to see the available icons.
5. Select an icon, press **Back**, and press **Save** to save your changes and exit.

## OneCheck Profiles

OneCheck Profiles streamline all configuration requirements for Copper, DSL, Fiber, and Ethernet testing. The home screens for each of these testing areas are slightly different but the workflow is shared.

1. Press the **OneCheck** icon for any of the menus on the Home screen.
2. The OneCheck Profiles screen will open, as shown here (OneCheck Copper, in this example).
3. To add new profiles, press the **New** button and follow the instructions in each particular case of the DSL, Copper, Fiber, or Ethernet testing. Refer to the OneCheck section for each of these tests for more information.
4. To edit the existing profiles that are listed on the screen (including the new ones you just created), press the **Profile** button.
5. In the opened **Profile** menu, you can set the following configurations:
  - **Set Home Screen Label** – Sets the name of the test.
  - **Set Home Screen Icon** – Sets the image next to the test name. To set it, you need to have the file named screen001.png on the USB root directory.
  - **Set Description** – Places a short description under the test name, shown in the Editor screen.
  - **Set Edit Password** – Prevents technicians from inadvertently changing or deleting the profiles. You can either assign individual passwords to tests or, to avoid confusion, use one password for all of them. Once you set one or several passwords, you will see little images of a lock next to the affected tests. If you need to edit test profiles and passwords, you will have to use the associated password(s).



- **Save Profiles Packages to USB** – Saves all OneCheck DSL, Fiber, Copper, and Ethernet profiles in one package to a USB drive. This package can be added to StrataSync using the Add Firmware button.
- **Load Profiles Package from USB** – Loads the selected packages from the USB drive. The profiles will be preserved on the ONX unless there is a naming collision and they are overwritten.
- **Restore to Defaults** – Restores default profiles for the selected category (Copper /DSL / Fiber/ Ethernet), removing non-default profiles. This feature is not the same as Restore Factory Defaults. It does not globally affect other configurations.

## Generating reports

The **Save Report** icon (provided on the Tray menu) allows you to create reports based on the configuration settings and test results for the currently active test.



**NOTE:**

**You must be running an active test or the Save Reports icon will be disabled (gray).**

## Saving a report

If you are currently running a test, you can save test results, configuration settings, work order information, and graphs as a report.

1. If you haven't already done so, access the Tray menu and then press **Save Report**. A Save Report screen appears.
2. Enter a new custom name for the report or use the default.

The default file name for any report uses the following format:

**<app name> <date with dashes>T<time with periods>**

For example: **tdr 2020-05-02T12.00.00**

Each time a test is run, the file name increments by 1, 2, 3, etc.

If you reboot the unit, the default file name will be used again until you change it. You can also select **Use Default Name** to reset it.

3. Specify the format (PDF, XML, HTML, or JSON).
4. Do one of the following:
  - To view the report immediately, press **Save and View**.
  - To save the report without viewing it, press **Save**.

The current test results, configuration settings, and, if applicable, graphs and custom report fields are saved as a report. If you indicated that you want to view the report immediately, the report output also appears on your instrument's LCD.



**NOTE:**

***VIAVI offers a proprietary XML schema definition file (XSD) available online (referenced in the XML report).***

## Viewing a report

You can view saved reports on the LCD of your instrument.

1. Access the Tray menu and then press **View Report**. A View Report screen appears, showing all of the saved reports.
2. Select a report to view. The report appears on the screen.



**NOTE:**

***If the View Report icon is disabled (gray), there are no reports saved on your instrument.***

## Enforcing report field entry

You can set up your instrument to require that custom report fields be populated before generating and saving a report.

1. Go to the **System Settings** menu, then select **Enforce Report Fields Data**. The Enforce Report Fields Settings menu appears.
2. Press the box next to **Enforce Report Field Entry**. A checkmark appears.
3. Press the **Back/Cancel** button to save and exit the menu.

Entry of values for the custom report fields will be required before a report is saved.

## Capturing a screen shot

In addition to or instead of a report, you can capture an image of the current

### ***To capture a screen shot***

1. Access the Tray menu and then press **Screen Shot**.
2. Enter a name for the screen shot. The PNG file is saved to the internal file manager.

### ***To capture the tray menu or a popup menu***

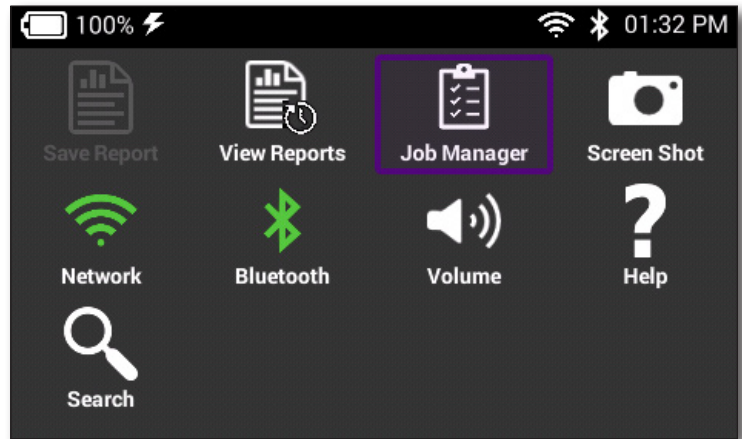
If you wish to capture a screen of the tray menu itself, or if you wish to capture a popup menu, press and hold the **Tray** button for 5 seconds.

## Viewing your jobs

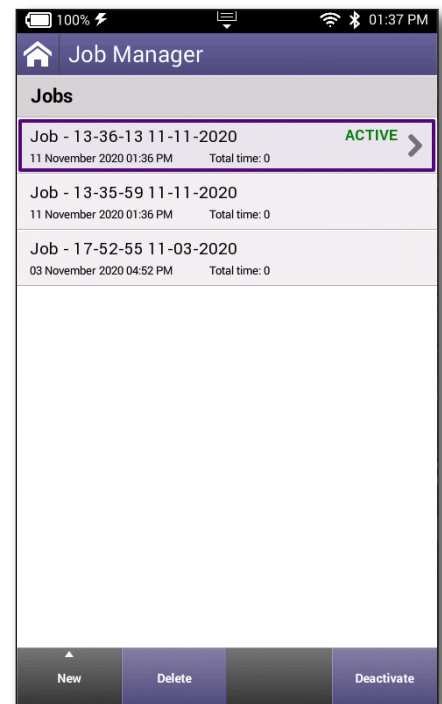
The **Job Manager** icon (provided on the Tray menu) allows you to see all your current jobs.

Tests specified within the jobs can be launched from here. Select a job to view it, and then choose the test to run it.

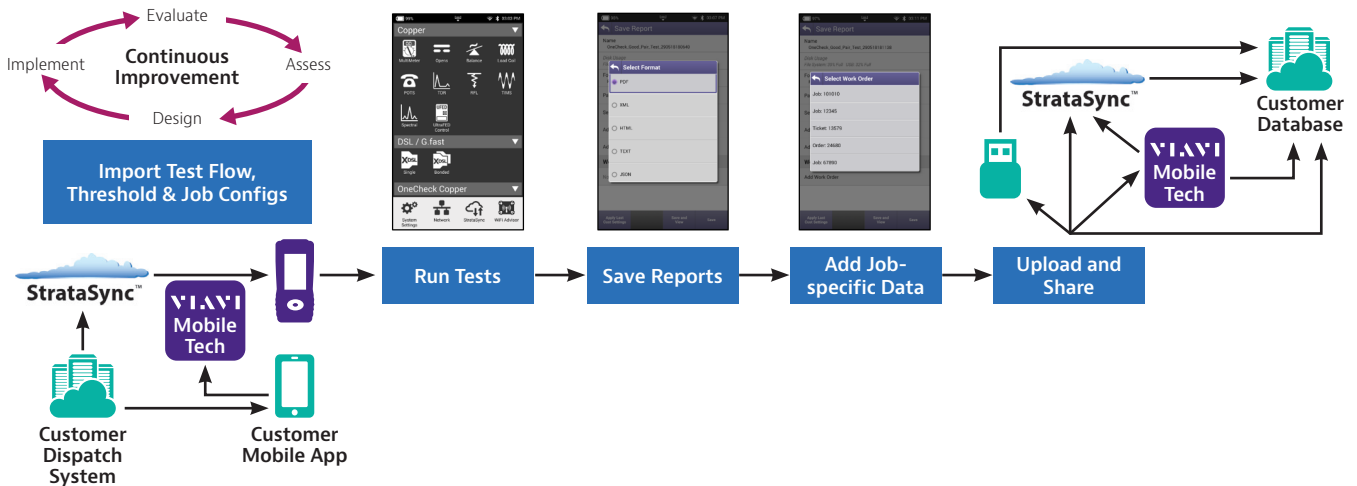
From the System main menu, select **Job Manager**. You can also bring up Job Manager from the Tray menu.



With the workflow option in StrataSync, each tech's meter can be updated with a day's jobs, enabling a tech to choose the job that matches the current task, perform the prescribed tests, and close it out with data uploaded for management – with a smooth, simple process. Get confirmation that techs and contractors have performed the work with geo-tagged test reports uploaded via the Mobile Tech App.

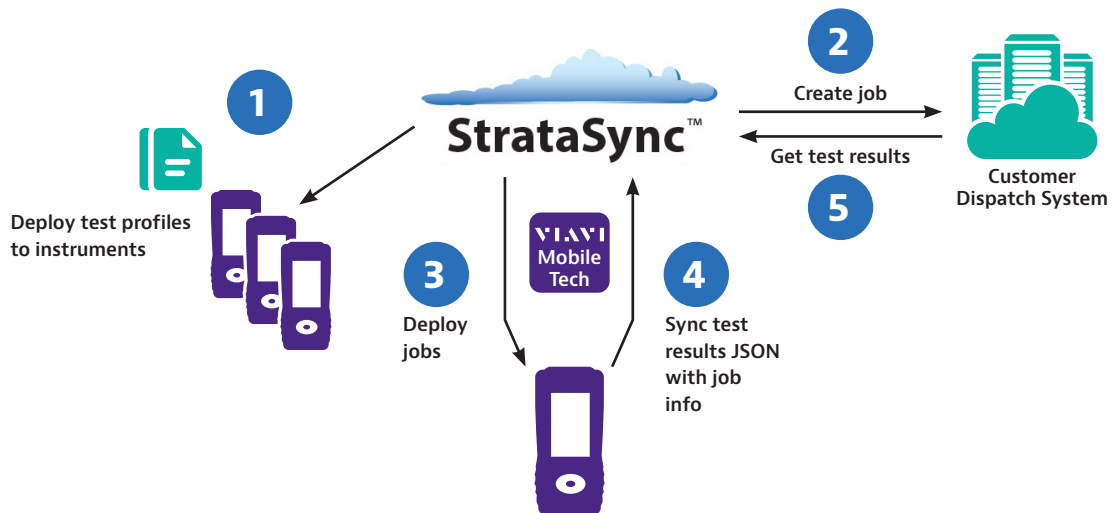




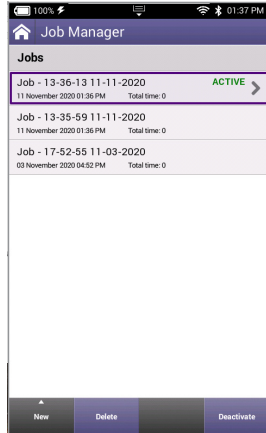


The test process is smoother and easier for techs with workflow enhanced with smooth job integration and closeout. The StrataSync workflow option enables simpler compatibility with service operator and contractor job management systems. This means that test flow, pass/fail thresholds, and jobs can be relayed to the ONX, enabling the tech to select an assigned job and perform tests to prescribed thresholds as guided through the flow. The job-related test data can then be included in a report and uploaded for management.

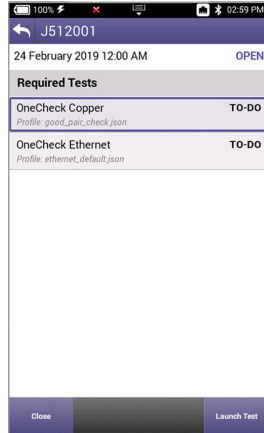
An example workflow is as follows:



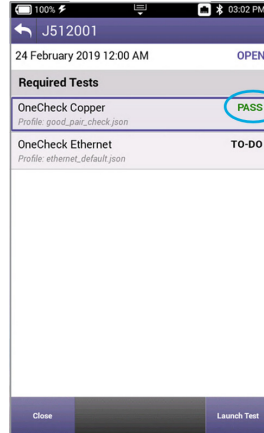
- 1 Deploy profiles/configuration files to instruments via sync (as part of standard procedure)
- 2 Create jobs and reference techId and test profile.
- 3 Deploy jobs to instrument (with test profile reference).
- 4 Sync to StrataSync with job info after testing and saving CDM reports (JSON).
- 5 View test results & associated job on StrataSync and/or (contractor) transfer to customer.



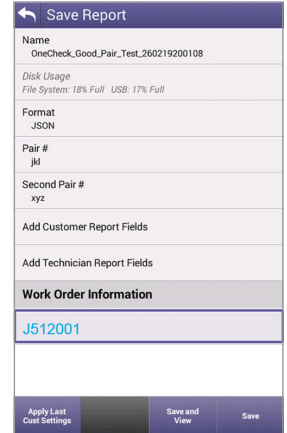
List of assigned jobs



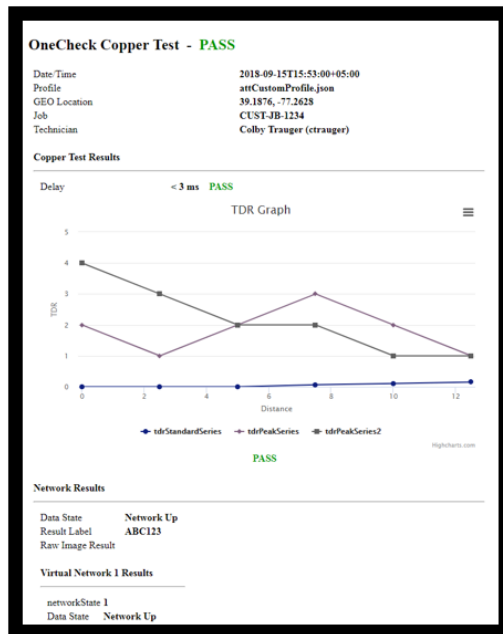
List of required tests for selected job



Test status indicated



Job data report saved



Report example

OneCheck DSL has been enhanced to incorporate an even fuller range of test features, including VoIP, video, and offers variety of speed testing configuration choices. This helps to ensure complete test processes for performance to standards and to minimize return service calls.

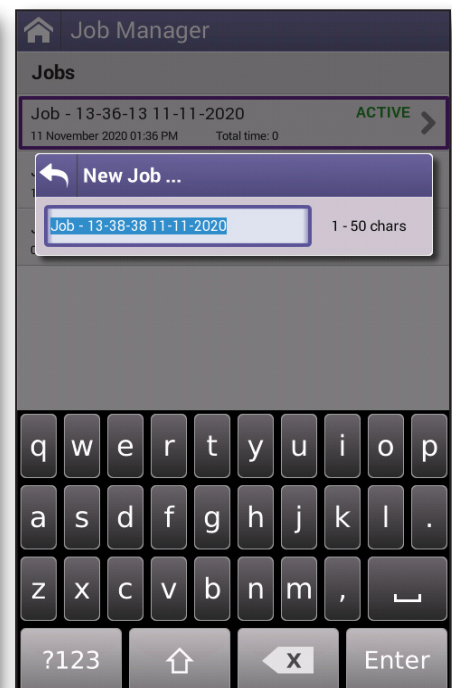
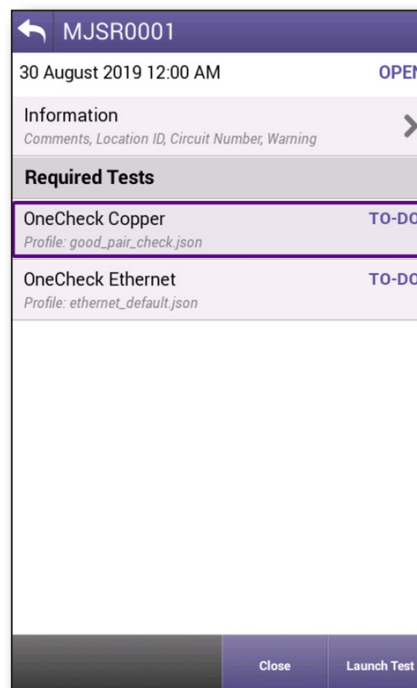
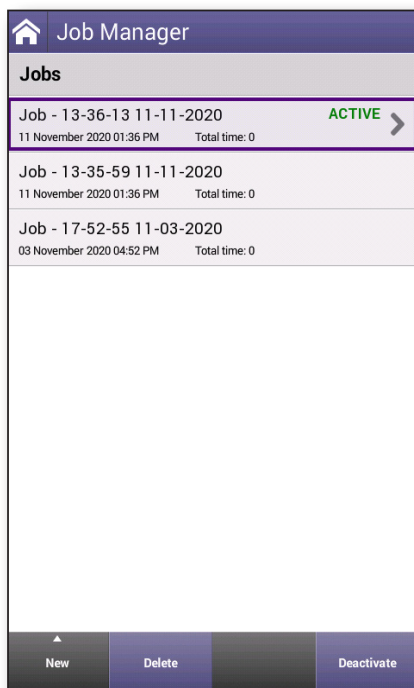
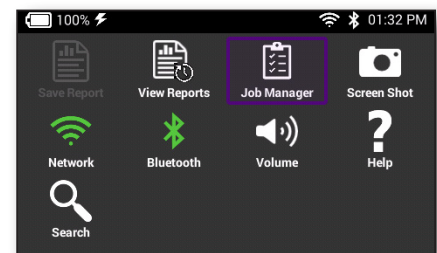
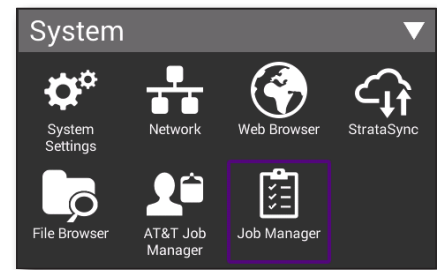
## Editing jobs

You can easily edit and create new jobs.

1. From the System main menu, select **Job Manager**. You can also bring up Job Manager from the Tray menu.
2. From the Job Manager menu, select the job you want to edit.

The job opens and displays information as well as tests to be run that may have been deployed from StrataSync. Some of the information and tests will be grayed out, depending if they are required or how they were set up in StrataSync.

3. To edit information for the job, select **Information** to add comments, location ID, or circuit number, etc.
4. To create a new job, select the **New** button and name the job. Creating a new job automatically activates it.

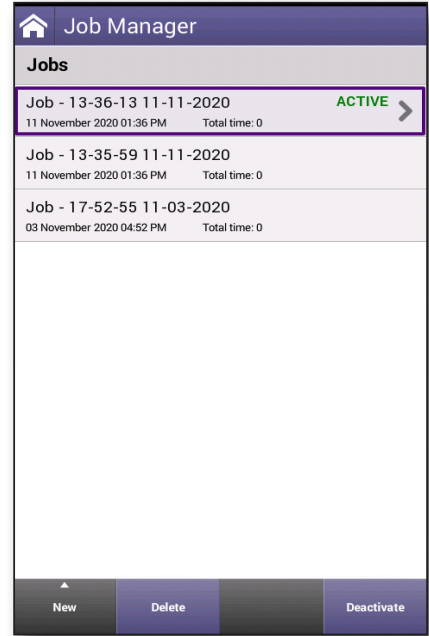


5. To activate a job, use the arrows to select it, then select **Activate**. Similarly, to deactivate one, select **Deactivate**.
6. To close a job, use the arrows to select it, then select **Close**.

Closing jobs is designed to help you organize them and does not affect those that StrataSync considers complete or incomplete.

7. To delete a job, use the arrows to select the job, then select **Delete**. If the job is active, it will be deactivated first.

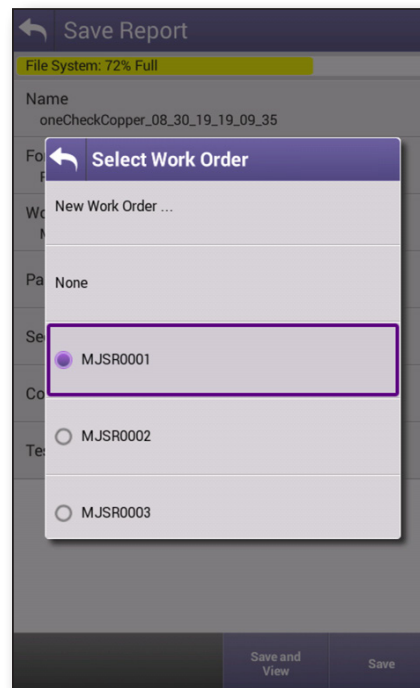
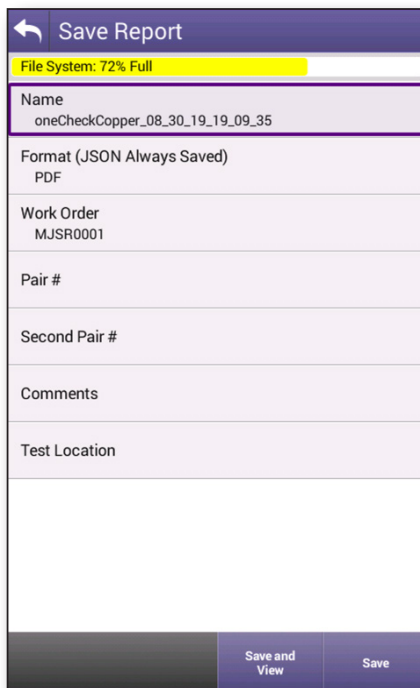
You can also run a test from any configuration screen by pressing the **Launch Test** button. This also automatically activates the job.



## Saving a report to a job

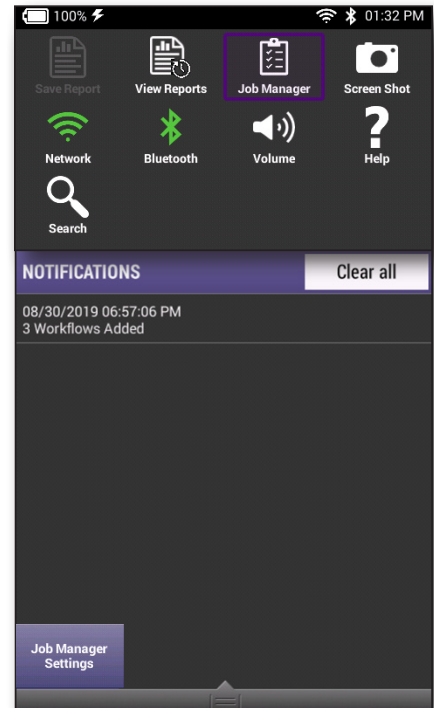
Any reports you create will be saved to the active job, unless you choose otherwise. You can also create a new job or choose to deactivate the current job by choosing **None** when you save it.

See ["Saving a report" on page 69](#) for more information.



## Job notifications

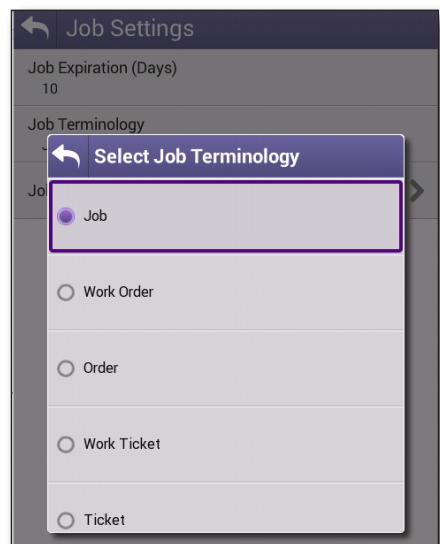
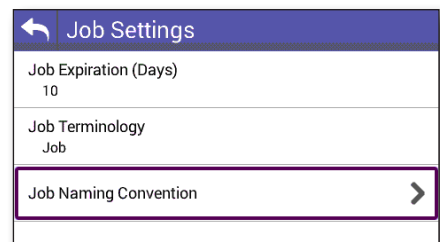
When jobs are added from StrataSync, the Mobile Tech app, or via USB, you'll see a notification in the Tray menu with the details.



## Job settings

You can customize the expiration time for jobs, job terminology, and job naming convention, depending what your company uses.

1. From the Tray menu, select **Job Manager Settings** at the bottom. (Job Manager needs to be running to see this).
2. From the Job Settings screen, select the setting you want to edit and adjust as necessary.



## Managing files

The OneExpert file browser is used to open, rename, copy, or delete saved result files, screen shots, or other files stored on your instrument or on a USB flash drive that is connected to your instrument. Both browsers function in the same manner.

### Accessing the file browser

The File Browser and USB File Browser menus are both accessed from the System menu.

Do one of the following:

- To view and manage files on your instrument, press the **File Browser** button.
- To view and manage files on a connected USB flash drive, press the **USB File Browser** button.

The File Browser menu appears listing all folders (or files).

### Selecting files or folders

1. Go to the file browser.
2. Use the up and down arrow buttons to move among folders or files. to see the contents of a folder, press the folder.
3. Do one of the following:
  - To select a single file or folder, press the checkbox to the left of the file or folder.
  - To select multiple files or folders (for example, if you want to copy multiple files to USB, or upload multiple files using FTP/ HTTP), press the checkbox to the left of each folder.

The files or folders are selected.

### Opening files or folders

1. Go to the file browser and select the file or folder.
2. Press **Open**. The contents of the folder appear or the file is displayed on the screen.

---

## Copying and pasting files or folders

1. Go to the file browser.
2. Select the file or folder.
3. Press the **File Options** system key, and then do one of the following:
  - Select **Copy**, navigate to another folder or drive, press the **File Options** system key, and then select **Paste**.
  - Select either **Copy to USB** if you are using File Browser or **Copy to Internal** if you are using the USB File Browser.

The file is copied and the File Browser menu appears.

## Uploading files using FTP/HTTP

1. Go to the file browser.
2. Select the file or folder.
3. Press the **File Options** system key, and then select **Upload FTP/HTTP**. The upload settings appear.
4. Specify the upload URL, username, and password.
5. Press **Apply**. The upload starts.

When the upload finishes, a message appears stating that the selected files were uploaded. Press **OK** to close the message.

## Managing files with StrataSync

When the OneExpert syncs with StrataSync, various files are uploaded and stored in the StrataSync cloud, such as test reports, screenshots, OneCheck profiles, work orders, and configurations. You can access these files via the StrataSync website.

For more information see *"Synchronizing to the StrataSync server" on page 65*.

## Viewing the User's Guide on your instrument

Using the instrument's PDF viewer, you can view the User's Guide on the instrument. The file must be on a USB stick or copied to the OneExpert.

1. Under the **System** menu, select **File Browser**.
2. Navigate to find the xxxxxxxxr00x\_OneExpertDSL\_Users- Guide.pdf file.
3. Press the file name to open it. The PDF reader application launches with the User's Guide open.

## Remotely operating the instrument

The optional Remote Operation features allows you to access the OneExpert user interface from a PC or laptop through a virtual network connection (VNC), connecting over an Ethernet interface or WiFi network. This is a great way to capture screenshots from your computer for additional troubleshooting, etc.

To use this feature, 1) you must have a VNC viewer program on the PC, 2) the OneExpert must be connected to the same network as the PC or laptop, and 3) you must know the IP address of the OneExpert.

Establishing a VNC connection involves the following tasks:

- Establishing a connection between the instrument and a PC or laptop
  - See *"Establishing an Ethernet connection" on page 57*
  - See *"Establishing a WiFi connection" on page 60*
- Enabling remote operation using VNC
- Control the instrument using a PC keyboard

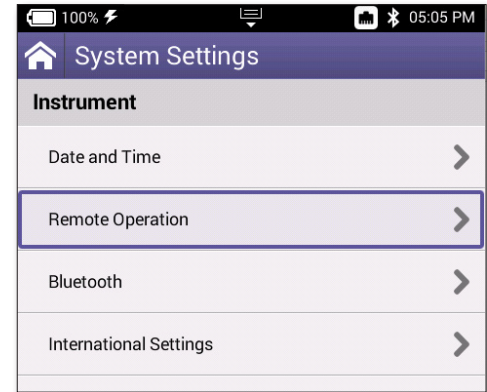
Each of these operations is described in the following sections.



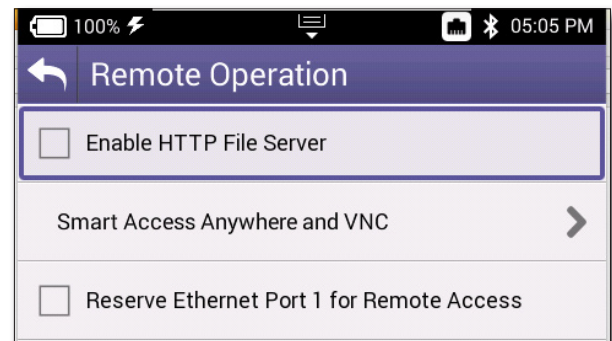
## Setting up the ONX for VNC

In order to use VNC Viewer with your ONX and connect to it remotely, you need to enable VNC in System Settings.

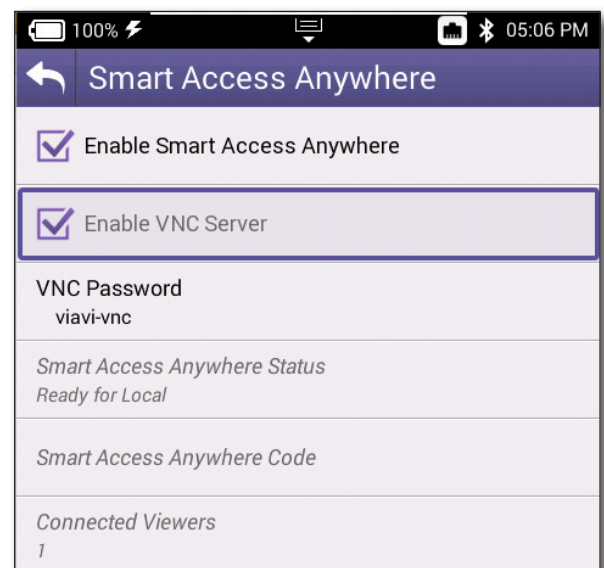
1. Go to the **System Settings** menu, then select **Remote Operation**. The Remote Operation menu appears.



2. Select **Smart Access Anywhere and VNC**. The Smart Access Anywhere menu appears.



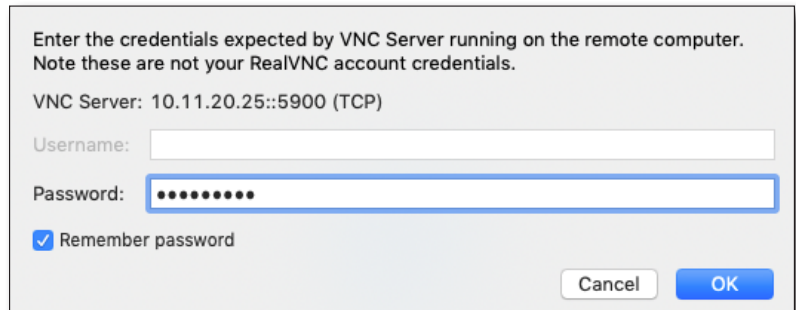
3. Select **Enable VNC Server** and note the VNC password underneath: **viavi-vnc**. You will need it to connect via VNC Viewer.



## Connecting to your ONX via VNC on your PC

After you have established an Ethernet or WiFi connection and set up the ONX for remote operation, you can launch the VNC viewer program to operate the ONX on your computer.

1. Download a VNC viewer application and launch it on the PC.
2. In the viewer's server address field, enter the OneExpert's IP address, and click **OK**. A password entry box appears.
3. Enter the VNC password you noted before, **viavi-vnc** (found in the Remote Operation menu) and then click **OK**. The OneExpert user interface appears in the VNC viewer, and works similarly to using the unit itself. See the next section for details.
4. If the message, "Failed to connect to server" appears, the VNC viewer was not able to communicate with the OneExpert. If this happens, try the following solutions:
  - Make sure you are using the correct IP address for the OneExpert
  - From the PC or laptop, ping the OneExpert IP address to verify the network link is working. If the link is not working, restart the OneExpert and try again..



## Using a PC keyboard

After you have connected to the OneExpert from a laptop or PC using the VNC viewer, you can use the computer's mouse or keyboard to control the OneExpert.

The following table shows how the PC keys map to the OneExpert keypad.

PC key	OneExpert key
F1–F4	Correspond to the OneExpert system keys
F5	Home
F6	Tray menu
F7	AutoTest
Escape	Cancel
Enter	OK

## VNC availability

In Ethernet TE, you can do a ping, trace route, and similar data tests, but *you cannot change* any data settings.

In DSL, you can perform modem emulate tests with Data mode **off**.

## Ending a remote operation session

To end a remote operation session, either exit the VNC session on the PC or turn the OneExpert off and then on again (power cycle).

# SmartAccess Anywhere – Remote Coaching

SmartAccess Anywhere offers remote access and operation of the OneExpert in the field. This capability gives the workforce direct onsite support and coaching by a specialist, fixing issues immediately without additional truck rolls.

The SmartAccess Anywhere client (PC, Android, or Apple) can connect to your device via local area connection or Internet connection.

For client downloads and more information, see:

<https://www.viavisolutions.com/en-us/software-download/smart-accessanywhere-saa>

VIAMI provides links to Android and PC only. You can find the iOS version in the Apple App store.



# Copper Testing

This chapter provides instructions for using the optional OneExpert DSL copper testing features, including the following:

- "About copper testing" on page 86
- "Testing with an UltraFED far end device" on page 88
- "Measuring voltage" on page 90
- "Measuring resistance and leakage" on page 91
- "Measuring the distance to a short" on page 92
- "Measuring resistive balance" on page 93
- "Measuring opens" on page 93
- "Measuring current" on page 96
- "Locating faults using the TDR" on page 97
- "Measuring balance" on page 101
- "Measuring PI (power influence), noise and balance" on page 101
- "Detecting load coils" on page 102
- "Testing voice service and caller ID" on page 102
- "Locating faults using RFL" on page 104
- "Measuring spectral noise" on page 106
- "Testing TIMS" on page 107
- "Running a OneCheck copper test" on page 118
- "Editing profiles" on page 119
- "Copper Settings" on page 122
- "Copper Expert" on page 125
- "Routing the cables through the glove" on page 132

## About copper testing



**NOTE:**

***The copper testing is available on the ONX-580 and ONX-580P but not available on the ONX-580A.***

The copper features provided by the ONX-580 tester allow technicians to quickly turn up and perform basic troubleshooting of the copper local loop. To access the copper tests, select **Copper** from the main menu. The dropdown menu appears.

If your OneExpert is configured and optioned to do so, you can perform specific measurements for the following tests:

- Multimeter
  - AC volts
  - DC volts
  - Resistance
- Opens (distance) and capacitance
- Balance
- Load coil detect
- TDR
- POTS
- RFL
- Spectral
- Wideband TIMS
- Narrowband and wideband Rx tones
- Narrowband and wideband Tx tones
- Narrowband noise



Each of these tests is described in the following sections.



**NOTE:**

***In order to convert capacitance (Opens), resistance, and TDR results to the correct length for your country, make sure your country and type of cable are selected in the System Settings / International menu. See Configuring International Settings on page 50.***



**NOTE:**

***For additional information and tips, See "[Copper testing](#)" on page 302.***

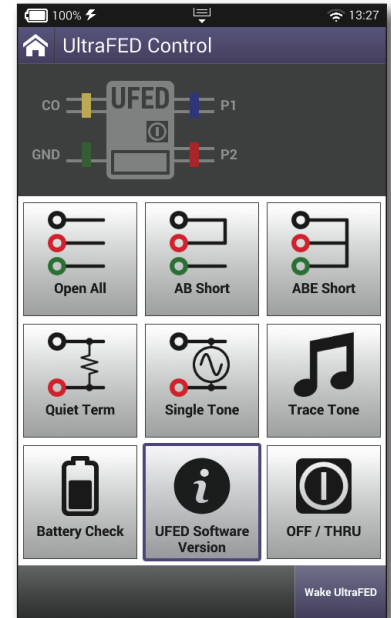
## Testing with an UltraFED far end device

FED controls are implemented on your instrument in two ways:

1. Some commands are embedded in copper test applications, such as the commands used to short the leads while measuring resistance. These commands are documented in their respective applications.
2. Some commands can be issued manually using items provided on the UltraFED Control menu, as shown here.

### About the UltraFED Control menu

Using the UltraFED Control menu, you can control a far-end device (FED) to allow two-ended pair testing with a single piece of test equipment. After a technician connects a VIAVI UltraFED to the far end of the pair under test, and connects your instrument to the near end, your instrument controls the FED using DTMF tones.



### Manually controlling the UltraFED

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. Go to the Copper menu.
3. Press **UltraFED Control**. The UltraFED Control menu appears.
4. Issue one of the following commands by selecting the corresponding menu item:

**Open All** – Tip (A), ring (B), and ground (sleeve) are disconnected from the cable pair under test. This is used to isolate the pair under test.

- Use the plus and minus sign to specify the duration.
- Press **Send** to issue the command.

**TR Short** – Connects tip (A) to ring (B). Also called Strap mode. This is used with the loop resistance measurement or with the RFL measurements.

- Select **Pair 1** or **Pair 2**.
- Use the plus and minus sign to specify the duration.
- Press **Send** to issue the command.

**TRG Short** – Connects tip (A), ring (B), and ground (sleeve - E) to ground. This is used during the resistive balance measurement.

- Select **Pair 1** or **Pair 2**.
- Use the plus and minus sign to specify the duration.
- Press **Send** to issue the command.



**Quiet Term** – Terminates the pair at the UltraFED.

- Select **Pair 1** or **Pair 2**.
- Select the termination value.
- Use the plus and minus sign to specify the duration.
- Press **Send** to issue the command.

**Single Tone** – Connects a tone generator across tip (A) to ring (B). This is used to measure loss.

- Select **Pair 1** or **Pair 2**.
- Select the termination value.
- Press **Frequency** to specify the frequency in Hz.
- Use the plus and minus sign to specify the duration.
- Press **Send** to issue the command.

**Trace Tone** – Connects a tone generator across tip (A) to ring (B) and sends a 577 Hz tone.

- Select **Pair 1** or **Pair 2**.
- Select the cadence (High-Low or Low-Low High).
- Press **Send** to issue the command.

After you press **Send**, a message appears, indicating that your instrument is talking to the UltraFED (UFED).

5. Issue one or all of the optional commands below:

**Battery Check** – Indicates the battery charge remaining on the UltraFED. The UltraFED battery is not rechargeable.

**UFED Software Version** – Displays the software version running on the UltraFED.

**OFF / Thru** – Turns the UltraFED off. If no command is executed, the OFF mode is also the Thru mode.

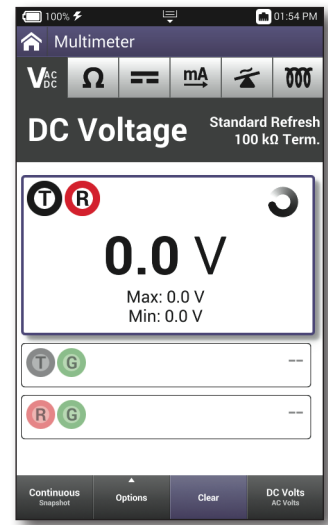
You are manually controlling the UltraFED from your instrument. If a message appears indicating that no response was received from the UFED, do the following:

- Verify that your leads are properly connected to the line under test.
- Verify that the UltraFED is connected at the far end.
- Issue the **Wake UltraFED** command using the button at the bottom right side of the menu.

## Measuring voltage

The multimeter function allows measuring of AC and DC voltage.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, select the **Multimeter** button.
3. Select **AC Volts** in the lower right corner. The AC Voltage menu appears.
4. To specify the connection, press the connection:
  - Tip to Ring (A to B)
  - Tip to Gnd (A to E)
  - Ring to Gnd (Ground) (B to E)



### NOTE:



**Press the up/down arrow buttons to move among the connections.**

5. To specify the termination, select Options, and then select one of the following:
  - **1MEG-ohm Term**
  - **100K-ohm Term**
6. To measure DC voltage, select **DC Volts** in the lower right corner. The DC Voltage menu appears.
7. To switch between continuous and snapshot mode, use the left system keys **Snapshot** or **Continuous**.
8. To save the results to a report, use the **Tray** menu.
9. To learn what your results mean, see ["AC voltage" and "DC voltage" on page 291](#).

## Measuring resistance and leakage

Using the Multimeter, you can measure resistance to identify shorts, grounds, and resistive faults.

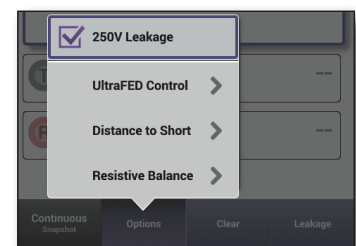
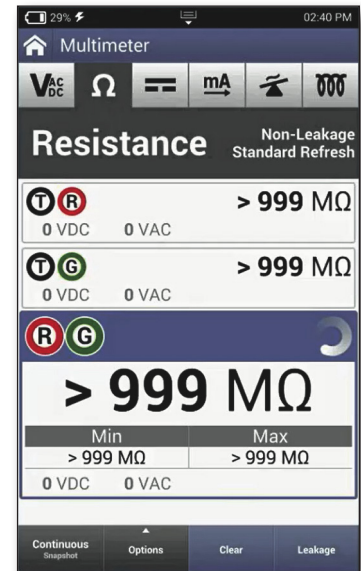
1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, press the **Multimeter** button.
3. Select the  $\Omega$  (**Omega tab**). The Resistance screen appears and the test starts running.

In this example, the tests for Tip (T) and Ring (R) and Tip (T) and Ground (G) are done and the Ring (R) and Ground (G) test is running continuously. DC and AC Volts are listed for each test (these values are available on the 580P instrument only).

4. For greatest accuracy, VIAVI recommends that you compensate the measurement to remove the effects of the test leads. To compensate the opens measurements:
  - Swipe downward on the screen to access the Tray menu.
  - Select the **Compensate Resistance** system key.
  - Follow the instructions on the screen to connect the black, red, and green leads and perform test lead compensation.
  - Press **Compensate**. The compensation stops automatically when finished.
5. To change the resistance measurement, press **Continuous/Snapshot**. The current selection is a larger text size.
6. Press the **Leakage/Non-Leakage** button in the lower right.

The Leakage measurement is basically the high-voltage ohmmeter. The **Leakage** button enables the standard Leakage measurement by default. To enable the 250V Leakage (when available) select Options and then select the **250V Leakage** checkbox.

7. To save the results to a report, use the Tray menu.
8. To learn what your results mean, see ["Resistance" on page 292](#).



## Measuring the distance to a short

The following procedure describes how to measure the distance to a short.



**NOTE:**

**Use this feature only when the resistance is 4 k $\Omega$  or less (4 k $\Omega$  or less is almost always a hard short). If there is no hard short on Tip and Ring (A and B), the measurement will be inaccurate.**

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, select the **Multimeter** button.
3. Press the  $\Omega$  (**Omega**) tab. The Resistance screen appears.
4. Select **Options** and then select **Distance To Short**. The Distance to Short menu appears.
5. Press + or – to change the temperature or wire gauge, if needed.



**NOTE:**

**For the resistive distance to be accurate, it is critical that you enter the correct gauge and temperature.**

## Measuring resistive balance

This feature allows the user to test and compare the resistance of each lead used as a pair with ground as the reference. The result can be used to determine if there are any bad splices. Resistive Balance requires the VIAVI UltraFED or a manual strap to ground at the far end.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, select the **Multimeter** button.
3. Press the  $\Omega$  (**Omega**) tab. The Resistance screen appears.
4. Select **Options** and then select **Resistive Balance**. The Resistive Balance menu appears.
5. Do one of the following:
  - Manually strap Tip (A), Ring (B), and Ground (Earth) leads at the far end of the line under test and select the **Manual Strap** option
  - Connect an UltraFED to the Tip (A), Ring (B), and Ground (Earth) leads at the far end of the line under test and select the **UFED** option
6. Press the **Start** softkey to run the measurement.

## Measuring opens

This feature measures the total electrical (capacitive) length of a pair.

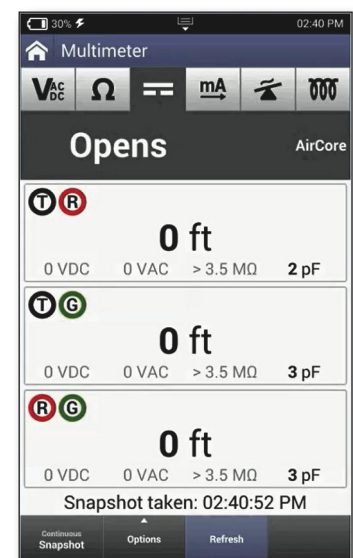
1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, select the **Opens** button. You can also access the Opens feature from the Multimeter screen as part of the MultiMeter test suite by pressing the **Opens** tab.

DC and AC Volts and impedance results are listed for each test (these values are available on the 580P instrument only).

3. To change the cable capacitance, press the **Options** button and then do one of the following:
  - Select a standard cable capacitance.
  - Select **Custom Cable** to specify a custom capacitance:
 

The custom cable menu appears.

    - Enter a name.
    - Specify a value for the mutual conversion factor in  $\mu\text{F}/\text{mile}$  (or other units depending on your configuration). This value is used for Tip-to-Ring (or A-B) capacitance.
    - Specify a value for the ground capacitance, in



$\mu\text{F}/\text{mile}$  (or other units depending on your configuration). This value is used for capacitance between Tip (A) to Ground (E), and Ring (B) to Ground (E).

- Press the **OK** button.
4. To specify the method to test opens/capacitance, press the **Tray** button, select **Opens Method**, and then choose **2-terminal, 3-terminal, Enhanced 2-terminal, or Enhanced 3-terminal**.

The *three terminal* is the default Opens mode that measures the capacitance across the pair or from an earth reference to either wire in the pair using only two connections or terminals

The three terminal method measures the capacitance across the pair in the same way except the way it measures from an earth reference to either wire in the pair. Connect all the other unused pairs, screen (shield) if any, and ground or earth to the unused (not being tested) wire in the pair, using three terminals.

Three terminal mode is useful when testing a pair inside a multi-pair cable since all pairs rotate or change their relative position inside the cable throughout the length of the cable to help control crosstalk.

The enhanced terminal modes are specially designed to perform better in low-parallel or high-series resistance environments, where normal opens meters have difficulty getting accurate results. After selecting an enhanced mode, simply return to the measurement, and test as you normally would. You will get more accurate results in resistive environments.



**NOTE:**

***When using the three terminal method and no earth terminal is connected, you will get a non-zero result from each wire to earth.***

5. For greatest accuracy, VIAVI recommends that you compensate the opens measurement to remove the effects of the test leads. To compensate the opens measurements:
  - Swipe downward on the screen to access the Tray menu.
  - Select the **Compensate OPENS** system key
  - Follow the instructions on the screen to disconnect all test leads to perform test lead compensation.
  - Press **Compensate**. The compensation stops automatically when finished.
6. Press the **Back** button to return to the Opens menu.

7. Do one of the following:
  - If you are on the Snapshot menu, select **Refresh** to restart the test.
  - If you are on the Continuous menu, select **Clear** to restart the test.
8. To save the results to a report, use the Tray menu.
9. To learn what your results mean, see *"Opens/Capacitance" on page 294*.

## Measuring current

Using the Multimeter, you can test for proper loop current for POTS lines.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, press the **Multimeter** button.
3. Press the **mA** tab. The DC Current screen appears with the results.
4. To measure AC Current, press **AC Current**.
5. To measure Current Tip (A) or Ring (B) to Ground (Earth), select the pair.
6. To perform a Ground resistance measurement, press **Continuous/Snapshot**.



This test verifies the presence of adequate station ground at the customer premise. This test requires a connection to a working POTS line served from a grounded battery feed switch, where either Tip (A) or Ring (B) is connected to earth ground. If the switch floats the ground, this measurement will always give a result of "Bad Ground".

This test looks at the ratio of the Tip (A)/Ring (B) current compared to the -48v (Tip or Ring) to Ground current. Based on this ratio the OneExpert gives a result of "Good, Bad or Marginal". The unit automatically looks at both Tip and Ring for the -48v to Ground current results, just in case Tip and Ring are reversed. It shows all results in the upper section of the screen, in addition to the "Good, Bad, Marginal" result.

The good, bad, and marginal results use thresholds that may not agree with all practices. The results of -48v/G current should be  $>$  or  $=$  1.52 times the Tip (A) Ring (B) current for the ground (earth) to be "Good" and if it is  $<$  or  $=$  1.49 times Loop current then it is a "Bad Ground" with everything in between being "Marginal". This lines up well in establishing a site principle ground of 25 ohms or less.

7. To change the current measurement, press **Continuous/Snapshot**. The current selection is a larger text size.
8. To save the results to a report, use the Tray menu.
9. To learn what your results mean, see ["DC current" on page 294](#).



## Locating faults using the TDR

The Time Domain Reflectometer (TDR) feature helps locate cable faults. The TDR identifies bridged taps, wet sections, load coils, shorts, opens, and splices on the span.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, press the **TDR** button. The TDR graph appears.
3. To change the TDR mode, press the **Mode** system key, and then select **Standard TDR**, **In Home TDR** (does not include Pulse Width), **SmartGain TDR**, **OneCheck TDR** or **Crosstalk TDR**.
4. If running **In Home TDR**, twist the cables for more consistent impedance.
5. To change the cable type, select the **Options** system key, and then select **Cable Type**.
6. To add a DC pulse in order to see changes in the graph, select the **Options** system key, and then select **Stress**. The spike or dip will shift when the pulse is applied.



A warning appears during the stress pulse to indicate higher voltage is present.



### **NOTE:**

*The TDR must be running for Stress Mode to be available. It is grayed out when the TDR is stopped.*

7. Using the Peak Hold mode, the OneExpert DSL can display minimum, maximum, and current TDR traces over a test period. This feature is useful for analyzing faults that occur intermittently. To enable Peak Hold mode, select the **Options** system key and then check the **Peak Hold** checkbox.
8. To adjust the **Gain** or **Pulse Width**, either drag the line across the bar or press the + or - buttons to adjust it.

Gain is used to identify small or distant faults. Using the + or - buttons to gain the vertical axis and enhance the reflection of faults. Do not apply excessive gain. This makes a normal condition appear as a fault.

Pulse Width only appears when **Pulse Width** is selected on the Options pop-up menu (from the **Options** system key).

9. To help identify small or distant faults, use the up or down arrow keys to gain the vertical axis and enhance the reflection of faults. Do not apply excessive gain. This makes a normal condition appear as a fault.

10. If you are testing toward a FED, use the Options menu, then select **TDR Helper** to continuously open and short the pair. On a TDR trace, you can then see the end of the copper pair by watching the open trace (slope up) and the short trace (slope down) that will flip flop for the amount of time you specify. This allows you to see where the FED is located.
11. The Options menu has a checkbox for **Dual Trace**. The Dual Trace TDR runs the TDR measurements on both primary and secondary pairs (A1 and B1).
12. The Reference menu contains not only the Save and Load options but also the View modes for the graphs on the screen. **View Offset** is the default and shows both traces. **View Overlap** shows the overlapping traces. **View Difference** highlights the differences between the traces.
13. To save the results to a report, use the Tray menu.
14. You can also view and compare current and saved TDR traces using the Results key. For information on saving your results in graphical form, see "[DSL/G.fast results](#)" on page 270.
15. To learn what your results mean, see "[TDR](#)" on page 296.

## Running a OneCheck TDR test

The OneCheck TDR test is a VIAVI out-of-service pair quality test that examines a copper pair to determine how far out the TDR can see on the pair, identify anomalies (faults) and their approximate location, then graphically show the location of the identified anomalies.

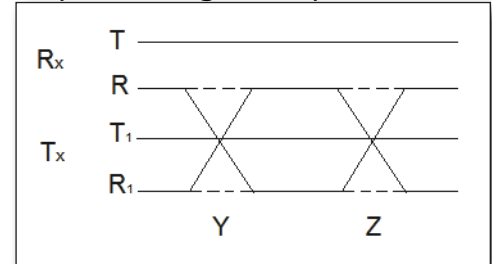
1. Connect the tip (A), ring (B), and ground (earth) leads to the line under test.
2. From the Copper menu, select **OneCheck TDR**. The OneCheck TDR summary screen appears.
3. *Optional:* Press **Options**, then do the following:
  - **Stress** – Select this option to stress the line.
  - **UFED TDR Helper** – Select this option to specify the duration for the TDR helper.
  - **Peak Hold** – Select this option to hold the peak TDR.
  - **Landscape** – Select this option to rotate the display to a landscape orientation.
  - **Continuous Refresh** – Select this option to run this test in a continuous mode.
4. To set, save, or load a reference trace, press **Reference**, then do the following:
  - To save the current trace as a reference, select **Save Reference**, specify a filename, then press **OK**.
  - To load a saved trace to be used as a reference trace, select **Load Reference**; select the filename of the reference trace, then press **OK**.
  - To show the delta between the current trace and a reference trace, select **Show Reference**.
  - To hide the delta between the current trace and a reference trace, select **Hide Reference**.
5. Press the **Start** key if the test is not already running.
  - The enabled tests begin to run.
  - As each test runs, the graph, events (anomalies), and locations (distances) are updated. The summary also provides a simple pass, marginal, or fail indication.
  - To select the correct wire gauge, use the "Fine Tune" slider to select the gauge closest to the line under test.
6. To stop the test, press **Stop**.
7. To learn what your results mean, see ["Test Results" on page 269](#).
8. To save the results to a report, use the Tray menu.

## Running a CrossTalk TDR test

The CrossTalk TDR feature is available only on ONX-580P and is used to check interference between two pairs of wires. This test helps to check if there is any crosstalk between the two lines as a result of corrosion or other problems.

Transmission line problems occur when one of the conductors (Tip/A or Ring/B) is split. The split causes the line to have poor balance and makes the line susceptible to noise. Crosstalk TDR is the best mechanism for finding split lines. In the following illustration, the R and R1 lines are crossed at points y and z.

The crosstalk test transmits a signal on one pair of wires, and measures the received signal on the second pair. This test quickly locates splits along a circuit.



1. Connect the Yellow and Blue leads to the line where you want to send the pulse. Connect the Red and Black leads to the line under test.
2. Select the **TDR** button on the home screen.
3. Use the **Mode** button to select the **Crosstalk TDR**.
4. Press the **Start** button if the test isn't already running.

The test will give you the distance measurement where there is a connection between the two lines.

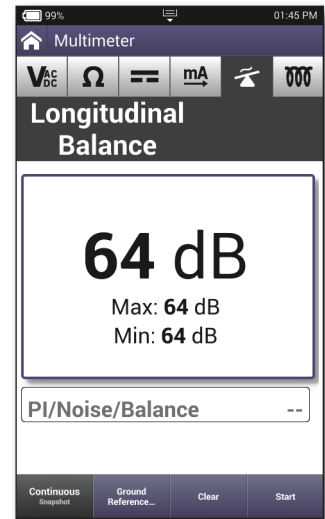
5. To stop, press **Stop**.

## Measuring balance

Balance is a number representing the quality of the telephone circuit and the degree to which the Tip (A) and Ring (B) conductors are electrically the same in their ability to cancel noise. The balance measurement is used to identify poor loop quality or cable bonding and grounding issues that allow excessive loop noise.

Balance is part of the MultiMeter test suite and can be launched both from the Copper screen and from the MultiMeter screen. The **Balance** tab includes Longitudinal Balance and Calculated Balance (Power Influence and Metallic Noise).

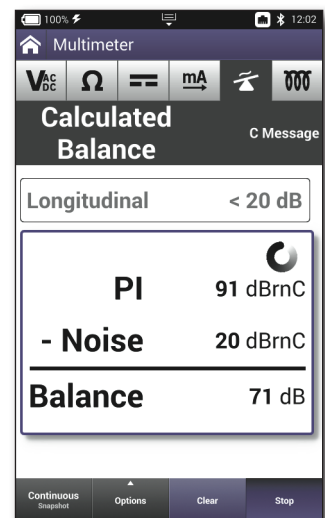
1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu or from the MultiMeter screen, press the **Balance** tab.
3. The test begins automatically. Longitudinal Balance results appear.



## Measuring PI (power influence), noise and balance

Power influence (Tip to Ground [A to E] and Ring to Ground [B to E] noise) is the unwanted current inducted on the pair from power lines and other AC sources. Noise is the unwanted current that the pair has failed to cancel and which the customer hears as noise.

1. Press **PI/Noise/Balance** softkey to start measuring calculated balance.
2. The test starts automatically. It measures the noise and power influence and calculates the balance by subtracting the noise from the power Influence.
3. *Optional.* Press the **Ground Reference** soft key to check the ground reference.
4. Select **Clear** to restart the test.
5. To save the results to a report, use the Tray menu.
6. To learn what your results mean, see *"Longitudinal balance" on page 295.*



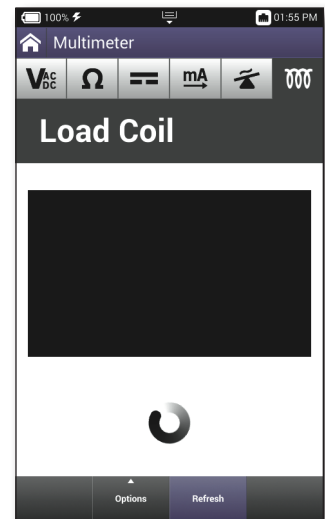
## Detecting load coils

The OneExpert DSL can detect up to five load coils that may exist on the line, out to 27,000 (8,200 meters) feet. It will also report a short, open, or a high noise condition, if detected. For accurate load coil detection, test on a pair without voltage (supplied by a battery). Although the detector will work with voltage on a pair, accuracy will be compromised. In addition, the detector works best when the last coil is followed by 1200 feet (336 meters) of cable. This feature is part of the MultiMeter test suite and can be accessed both from the home menu and from the MultiMeter screen.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu or from the MultiMeter screen, press **Load Coil**. The Load Coil menu appears.

The count appears in the box. If at least one load coil is detected, the distance to the first load appears. If noise, a short, or an open is detected, it appears on this screen.

3. *Optional.* Select **Refresh** to restart the test.
4. To save the results to a report, use the Tray menu.
5. To learn what your results mean, see "[Load coil](#)" on page 295.



## Testing voice service and caller ID

The POTS dialer allows you to place and receive voice calls to verify that the service is working properly. You can also use the dialer for the following tasks:

- Drop battery for opens testing
  - Establish a quiet termination for balance and noise tests
  - Determine if loss at 1004 Hz is acceptable
  - Test incoming caller ID number and name
1. Connect to the line under test using either the RJ-11 POTS connector or the Tip (A), Ring (B), and Ground (Earth) leads.
  2. From the Copper menu, press POTS. The POTS Dialer menu appears.
  3. Press the Options system key and then specify which interface (A/B or RJ-11) is connected to the line under test.

## 4. Place a call.

- Dial the number:
  - Use the keypad to dial manually.
  - Select **Phone Book** to select a saved number.
- To use pulse dialing, press the **Options** system key and then select **Pulse**.
- Press the **Call** button to initiate the call.
- Speak into the microphone located at the bottom, near the power button.
- *Optional.* To mute the microphone, press the **Options** system key, and then select **Mute Microphone** (or **Un Mute Microphone** to return to the call).

The mute feature is only available when off hook.
- Press the **On Hook** system key to end the call.

## 5. Receive a call.

- Request someone to call you.
- When the OneExpert DSL indicates an incoming call, press the **Off Hook** system key.
- For lines that have caller ID, the name and number information appears in the box.
- *Optional.* To mute the microphone, press the **Options** system key, and then select **Mute Microphone** (or **Un Mute Microphone** to return to the call).

The mute feature is only available when off hook.
- Press the **On Hook** system key to end the call.

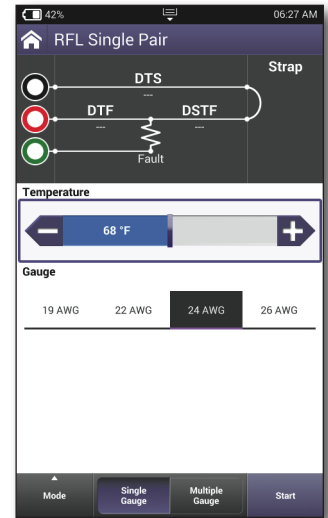
## 6. To save the results to a report, use the Tray menu.

## Locating faults using RFL

The following procedure describes how to locate cable faults using the Single Pair Resistive Fault Locator (RFL), the Separate Pair RFL and the K-Test. Separate Pair RFL is an additional mode available on the ONX580P only.

### Single Pair RFL test

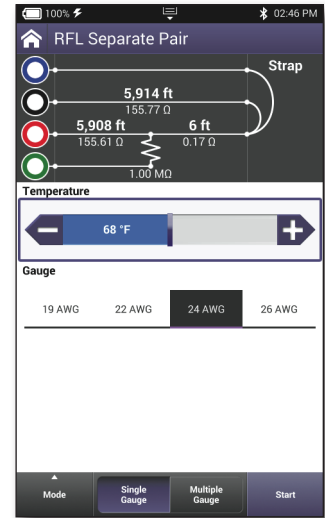
1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, press the **RFL** button. The RFL screen appears.
3. For greatest accuracy, VIAVI recommends that you compensate the opens measurement to remove the effects of the test leads. To compensate the opens measurements:
  - Swipe downward on the screen to access the Tray menu.
  - Select **RFL Compensation**.
  - Follow the instructions on the screen to connect the black, red, and green leads to perform test lead compensation.
  - Press **Compensate**. The compensation stops automatically when finished.
4. To select the cable makeup, press **Single Gauge** or **Multiple Gauge**.
  - If you selected single gauge, specify the temperature and gauge.
  - If you selected multiple gauge, do the following:
    - Enter the length, gauge, and temperature for the cable section and then select **Add**.
    - You can delete an entire line by pressing the **Delete** softkey.
    - Repeat for each gauge of the cable.
5. To change the type of test to run, do the following:
  - Press **Mode**.
  - Select **Single Pair** or **K-Test**. If you have ONX 580P, you can also select the option: **Separate Pair**. If testing toward a UFED, press the checkbox next to **UFED Enabled**.





## Separate Pair RFL test

The Separate Pair RFL (available on the ONX-580P only) works just like the Single Pair RFL except it uses an additional known good wire attached to the blue (A1) lead for improved accuracy.

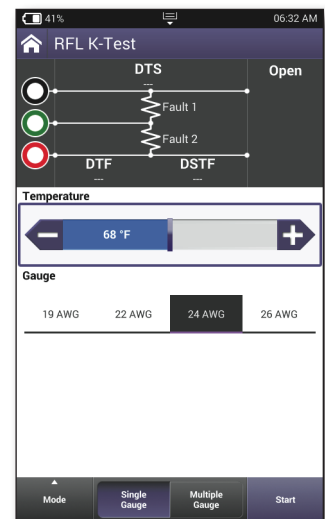


## RFL K-Test

The RFL K-Test is typically used to test for fault location when there is no “known good” (reference) pair.

Use this test to find the approximate distance to faults on a single pair of wires when both wires have a fault on them and there is no known good spare pair or wire to use as a reference (when Single & Separate Pair RFL cannot be used). To get the desired results make sure the following guidelines are met:

- The faults must occur at the same physical point on the pair to the same place or reference. For example both wires are faulted to the shield at the same location.
- The fault ratio is 2:1. The fault size on one wire vs. the fault on the other is twice as large. For example one wire has a 10K ohm fault and the other has a 20K ohm fault.
- The larger fault value should be at least 100 times greater than the loop ohms of the pair under test. For example if the loop ohms is 100 then the larger fault value should be > 10K ohms.



The K-Test is a two step measurement that starts with the far end open and does a series of resistance measurements to determine the faults present and if it is possible to solve the resistance to fault. Then with the far end shorted, the measurement finishes and calculates the results. It can be run manually or use a FED to automatically provide the correct conditions for the test.

1. Press **Start**.
2. The test runs then displays the results. The results for the specific fault appear.

The OneExpert DSL assumes that the fault is on the red lead. If the fault is not on the red lead, it will automatically flip Tip (A) and Ring (B) and run the test again. Thus, your screen may show swapped leads.

3. To save the results to a report, use the Tray menu.
4. To learn what your results mean, see *"RFL" on page 296*.

## Measuring spectral noise

With the spectral test, the OneExpert DSL can detect and measure the existence of noise interference.

1. Connect the Tip (A), Ring (B), and Ground (Earth) leads to the line under test.
2. From the Copper menu, press **Spectral**. The spectral noise graph appears.
3. To specify a technology, press **Technology** and then do the following:
  - Select a technology from the list.
  - Specify a custom technology. Select **Custom** and then specify the range and termination.
4. To zoom in, press the magnifying glass and then use the arrows on the screen to zoom on the x-axis or y-axis. You can also zoom using the arrow keys.
5. To zoom out, do one of the following:
  - Press **Options** and then select **Pull Back**.
  - Use the arrows on the screen or the arrow keys. The graph in the lower area shows the world view.
6. To change the scale of the y-axis, press **Options** and then select a scale: **dBm dBrn**, or **dBm/Hz**.
7. To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.
8. To use the trace as a reference, press **Options** and then select **Set Reference**.  
The reference trace is superimposed on the current trace.  
Compare the traces to troubleshoot anomalies such as impulse noise or large noise spikes.
9. To superimpose a spectral mask for a specific technology, do the following:
  - Press **Options** and then select **Spectral PSD Mask**.
  - Select a technology.
10. To save the results to a report, use the Tray menu.
11. To learn what your results mean, see *"Spectral" on page 296*.

## Testing TIMS

The Transmission Impairment Measurement Set (TIMS) is an optional suite of tests designed to troubleshoot copper problems associated with technologies that use both voice frequencies (narrowband, NB) and above the voice range (wideband, WB). These tests include the following:

- Noise – wideband and narrowband
- SNR (Signal Noise Ratio)
- Impulse noise
- Impulse noise capture
- TX (transmit) Tones – wideband (ONX580P only) and narrowband
- RX (receive) Tones – wideband and narrowband
- Simultaneous Tx/Rx Tones (ONX580P only)
- Loss Sweep (UFED) –wideband and narrowband
- Wideband Balance Sweep
- NEXT (Near-End Cross Talk) Sweep
- FEXT (Far-End Cross Talk) Sweep (UFED)
- Return Loss – wideband (ONX580P only) and narrowband; single frequency and sweep
- Impedance – wideband (ONX580P only) and narrowband; single frequency and sweep



**NOTE:**

***For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).***

From the Copper menu, select **TIMS**. The WB Noise menu appears (or the last test used). The following procedures describe how to use the WB TIMS feature.



**NOTE:**

***For best results, do not use the battery charger while performing WB TIMS measurements, especially when measuring very low amplitudes.***

## Measuring noise

The noise measurement is used to identify interferences that may interrupt signal transmission.

1. Connect the Tip and Ring (A and B) leads to the line under test.
2. Select **Mode** and then select **Noise**. The Noise Power menu appears.
3. To specify a technology, press **Technology** and then do the following:
  - Select a technology from the list. Voice Frequency is narrowband; all others are wideband.
  - Specify a custom technology. Select **Custom** and then specify the termination and filter.
4. If you selected Voice Frequency:
  - Press **Options** and then select **dB** or **dBrn** to specify the measurement in dB (decibels) or dBrn (decibels above the reference noise level)
  - Press **Options** and then select **Notch Filter**, Select either **820 Hz** or **1020 Hz**.
  - To establish a quiet termination for the noise test, select **UFED Quiet Term**. This terminates the pair at the FED.
5. If you selected a wideband technology, do the following:
  - To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.
  - To specify a custom filter, do the following:
    - Press **Options** and then select **Custom Filter Book**.
    - Enter a name for the filter.
    - Enter a start frequency.
    - Enter a stop frequency.
6. To learn what your results mean, see *"Noise" on page 296*.
7. Press the **Results** softkey to save or clear the results. For information on saving your results in graphical form, see *"DSL/G.fast results" on page 270*.
8. Press the **Stop** softkey.
9. To save the results to a report, use the Tray menu.

## Measuring impulse noise

Impulse noise is spurious voltage spikes that can disrupt digital transmissions.

1. Connect the Tip and Ring (A and B) leads to the line under test.
2. Press the **Display** softkey.
3. Select **Mode** and then select **Impulse Noise**. The Impulse Noise menu appears.
4. To specify a technology, press **Technology** and then do the following:
  - Select a technology from the list.
  - Specify a custom technology. Select **Custom** and then specify the termination and filter.
5. To select the type of test, press **Options** and then select **Timed** or **Counter** (untimed).
6. Specify the **Dead Time**. This is how long the OneExpert DSL will wait before attempting to detect the next impulse event.
7. To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.

A count of impulse noise events appears on the Impulse Noise screen.

If an impulse noise "hit" occurs, a log file is generated that includes the date and time and the number of counts that occurred in that second. The log file also includes the termination, filter, threshold, and test start time.

8. To save the results to a report, use the Tray menu.
9. To learn what your results mean, see ["\*Impulse noise\*" on page 296](#).

## Impulse noise capture

Impulse capture works like an oscilloscope. It provides a graphic display of the signal.

1. Connect the Tip (A) and Ring (B) leads to the line under test.
2. Select **Mode**, and then select **Impulse Noise Capture**. The Wideband Impulse Noise Capture menu appears.
3. To specify a technology, press **Technology** and then do the following:
  - Select a technology from the list.
  - Specify a custom technology. Select **Custom** and then specify the termination and filter.
4. To specify the view, press **Options** and then select **Time** or **Frequency**.
5. To specify the duration, press **Options** and then select **Single Capture** or a **Continuous Capture**.
6. To specify the noise threshold, press **Options** and then select **Trigger Threshold**. When this value is exceeded, an impulse noise event is registered.
7. To specify a Capture Trigger, press **Options** and then select **Capture Display**. This specifies the samples to capture relative to the impulse event detection: 10% (before), 50% (during), or 90% (after).
8. To specify dead time, press **Options** and then select **Dead Time**. This is how long the OneExpert DSL will wait before attempting to detect the next impulse event.
9. To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.

As soon as the signal crosses the selected threshold, a time-domain graph will be displayed showing  $\pm 10 \mu\text{s}$  of when the impulse occurred.
10. Use the **Zoom** or **Pan** button to view specific sections of the graph.
11. To save the results to a report, use the Tray menu.

## Receiving wideband and narrowband tones

The OneExpert DSL can receive tones to measure wideband and narrowband loss.

1. Connect the Tip and Ring (A and B) leads to the line under test.
2. Select **Mode**, and then select **RX Tones**. The OneExpert DSL begins measuring the frequency and level of each tone.
3. To specify the range, press **Technology**, and then select:
  - **Wideband** – 25 KHz – 30 MHz ( 25 KHz – 35 MHz for ONX580P only) or 10 KHz – 2.2 MHz
  - **Narrowband** – The Voice frequency (narrowband tones have the frequency of the human voice)
4. To specify the termination, press **Technology**, and then select:
  - **Wideband** – a termination of 100 ohm, 120 ohm, or 135 ohm
  - **Narrowband** – a termination of 600 ohm, 900 ohm, Bridged 600 ohm, or Bridged 900 ohm
5. To change the display view press **Options** and then select **Meter** or **List** (listed by frequency).
6. To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.
7. To save the results to a report, use the Tray menu.
8. To learn what your results mean, see *"RX and TX tones" on page 296*.

## Transmitting wideband and narrowband tones

The OneExpert DSL can transmit tones to measure wideband and narrowband loss. This operation is carried out by two technicians.

1. Connect the Tip and Ring (A and B) leads to the line under test.
2. Select **Mode**, and then select **TX Tones**. The OneExpert DSL begins measuring the frequency and level of each tone.
3. To specify the range, press **Technology**, and then select:
  - **Wideband** – 10 KHz – 35 MHz (for ONX580P only)
  - **Narrowband** – Voice frequency
4. To specify the termination, press **Technology**, and then select:
  - **Wideband** – A termination of 100 ohm, 120 ohm, or 135 ohm
  - **Narrowband** – A termination of 600 ohm, 900 ohm, Bridged 600 ohm, or Bridged 900 ohm
5. To save the results to a report, use the Tray menu.
6. To learn what your results mean, see *"RX and TX tones" on page 296*.

## Simultaneous TX/RX tones

This feature makes the tests more efficient because it checks the two pairs of the line at the same time, measuring wideband or narrowband loss. Two technicians and two ONX machines are required for this test. ONX580 does not support simultaneous tones, nor wideband transmission tones.

1. At one end of the line, a technician connects the Black and Red tips of an ONX machine to one pair of the line. At the other end, the second technician connects Blue and Yellow tips of the second ONX to the same pair of the line.
2. Select **Mode**, and then select **Simultaneous Tx/Rx Tones**.
3. To specify the range, press **Technology**, and then select:
  - **Wideband** – 10 KHz – 35 MHz
  - **Narrowband** – Voice frequency
4. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
5. To select a frequency, press **Tx Frequency**, then enter a value, and press **OK**.
6. To select an amplitude, press **Tx Amplitude**, then enter a value, and press **OK**.



7. To change the display view press **Options** and then select **Meter** or **List** (listed by frequency).
8. To use an external bridge, press **Options** and then select the checkbox for **Use External Bridge**.
9. To save the results to a report, use the Tray menu.
10. To learn what your results mean, see *"RX and TX tones" on page 296*.

## Sweep loss testing

The OneExpert DSL can measure loss (in dBm) of various tones across the supported frequency range, using the UltraFED technology.

1. You need the UltraFED connected to the line before starting the test. Make sure the blue Pair One cable is connected to the line under test at the far end.
2. Connect the Tip and Ring (A and B) leads of the ONX to the near end of the line under test.
3. Select the **Mode** softkey, and then select **Loss Sweep (UFED)**.
4. To specify the technology, press **Technology**, and then select:
  - **Wideband**
    - **ADSL+** – 100 KHz to 2.2 MHz at 100 KHz intervals and 150 KHz
    - **VDSL-** 150 KHz, 300 KHz, 600 KHz, 1 MHz, and at 1 MHz intervals until 30 MHz
  - **Narrowband** – Voice frequency
5. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
6. Press the **Start** softkey.
7. The graph will start populating with incremental results. ADSL2+ takes about 30 seconds, VDSL takes about 45 seconds to complete. You will see the UltraFED messages about the progression of the test. The timer window will show how much time remains for the current part of the test.
8. The **Save Results** button saves the results from a fully or partially completed test to an XML, HTML or PDF files.

## Wideband balance sweep testing

This feature regulates how well a copper pair rejects noise.

1. Connect the Tip and Ring (A and B) leads of the ONX to the line under test.
2. Connect the ground (E) lead of the ONX to ground.
3. Select **Mode**, and then select **Balance Sweep**.
4. Choose the **Number of Averages**. If averaging is enabled, you will see the trace completely painted. Afterwards, it will update to reflect the average.
5. Press the **Start** softkey.
6. The graph will start populating.

## Near-End Crosstalk (NEXT) sweep testing

This test detects coupling from one pair of wires to another at the near end over a range of tone frequencies. The ONX transmits a range of frequencies on T1/R1 (A1/B1) and the crosstalk is measured on T/R (A/B). This allows coupling from one pair to another to be detected. You can specify the range of the sweep by selecting **VDSL** (25 kHz to 35 MHz) or **ADSL2+** (10 kHz to 2.2 MHz) from the **Technology** menu.

An UltraFED IIB may be used to terminate the far end of the line by selecting **Terminate with UFED** from the **Options** menu.

1. Connect both Tip (A) and Ring (B) pairs (T/R and T1/R1 or A/B and A1/B1) to the lines under test.
2. Select **NEXT Sweep** from the **Mode** menu and press the **Start** button.
3. The ONX begins the test. A graph appears in the NEXT Sweep screen.  
The current frequency and NEXT measurement appear at the top of the graph cursor. The graph cursor is a vertical line that shows the position of the current frequency.
4. You can view NEXT results for different frequencies by moving the cursor. Use the left and right arrow keys or press and drag the cursor to move the cursor to different frequencies.

## Far-End Crosstalk (FEXT) testing

The test detects coupling at the far end from one pair of wires to another. Using an UltraFED IIB, a tone is transmitted from the far end on one pair of wires, and the ONX measures crosstalk on another pair of wires at the near end. This allows coupling from one pair to another to be detected.

1. Connect both Tip (A) and Ring (B) pairs (T/R and T1/R1 or A/B and A1/B1) to the lines under test.
2. Connect the UltraFED IIB to the far end of the lines under test, such that Pair 1 on the UltraFED is connected to T/R (A/B) and Pair 2 is connected to T1/R1 (A1/B1).
3. Select **FEXT** from the **Mode** menu.
4. Select the frequency to transmit. Use the left and right arrow keys to cycle through commonly used frequencies or press the **OK** key to enter a custom frequency.
5. Press the **Start** key. The ONX will configure the UltraFED to transmit the selected frequency and measure the crosstalk.

## Return loss testing

This test measures return loss caused by impedance mismatches for a user-specified frequency.

1. Connect the Tip and Ring (A and B) leads of the ONX to the line under test.
2. Connect the ground (E) lead of the ONX to ground.
3. Select **Mode**, and then select **Return Loss**.
4. Select **Options**, and then select **Single Frequency**.
5. An UltraFED IIB may be used to terminate the far end of the line by selecting **Terminate with UFED** from the **Options** menu.
6. To specify the range, press **Technology**, and then select:
  - **Wideband** – 20 KHz – 10 MHz (ONX580P only)
  - **Narrowband** – 200 Hz – 10 KHz (ONX580 only) ; 200 Hz – 20 KHz (ONX580P only)
7. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
8. Press **Frequency** and enter a value or use the arrows.
9. Press the **Start** softkey.
10. To save the results to a report, use the Tray menu.

## Return loss sweep testing

This test measures return loss caused by impedance mismatches over a range of frequencies.

1. Connect the Tip and Ring (A and B) leads of the ONX to the line under test.
2. Connect the ground (E) lead of the ONX to ground.
3. Select **Mode**, and then select **Return Loss**.
4. Select **Options**, and then select **Frequency Sweep**.

An UltraFED IIB may be used to terminate the far end of the line by selecting **Terminate with UFED** from the **Options** menu.

5. To specify the range, press **Technology**, and then select:
  - **Wideband** – 20 KHz – 10 MHz (ONX580P only)
  - **Narrowband** – 200 Hz – 10 KHz (ONX580 only) ; 200 Hz – 20 KHz (ONX580P only)
6. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
7. Press the **Start** softkey. The ONX begins measuring return loss across the frequency range. A graph appears to show the results.
8. To save the results to a report, use the Tray menu.

## Impedance testing

This test measures the impedance for a user-specified frequency.

1. Connect the Tip and Ring (A and B) leads of the ONX to the line under test.
2. Connect the ground (E) lead of the ONX to ground.
3. Select **Mode**, and then select **Impedance**.
4. Select **Options**, and then select **Single Frequency**.

An UltraFED IIB may be used to terminate the far end of the line by selecting **Terminate with UFED** from the **Options** menu.

5. To specify the range, press **Technology**, and then select:
  - **Wideband** – 20 KHz – 10 MHz (ONX580P only)
  - **Narrowband** – 200 Hz – 10 KHz (ONX580 only) ; 200 Hz – 20 KHz (ONX580P only)

6. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
7. Press **Frequency** and enter a value or use the arrows.
8. Press the **Start** softkey.
9. To save the results to a report, use the Tray menu.

## Impedance sweep testing

This test measures impedance over a range of frequencies.

1. Connect the Tip and Ring (A and B) leads of the ONX to the line under test.
2. Connect the ground (E) lead of the ONX to ground.
3. Select **Mode**, and then select **Impedance**.
4. Select **Options**, and then select **Frequency Sweep**.  
An UltraFED IIB may be used to terminate the far end of the line by selecting **Terminate with UFED** from the **Options** menu.
5. To specify the range, press **Technology**, and then select:
  - **Wideband** – 20 KHz – 10 MHz (ONX580P only)
  - **Narrowband** – 200 Hz – 10 KHz (ONX580 only) ; 200 Hz – 20 KHz (ONX580P only)
6. To specify the termination, press **Technology**, and then select:
  - **Wideband** – 100 ohm, 120 ohm, 135 ohm
  - **Narrowband** – 600 ohm, 900 ohm
7. Press the **Start** softkey. The ONX begins measuring impedance across the frequency range. A graph appears to show the results.
8. To save the results to a report, use the Tray menu.

## Running a OneCheck copper test

The OneCheck Copper test is a VIAVI out-of-service pair quality test. It automatically performs a series of enabled tests including: DVOM (AC/DC volts, resistance), Opens/Capacitance, Balance, and Load Coil. It also compares results to user-defined threshold values and provides a pass, marginal, or fail indication. For your convenience, this feature offers two test modes, with and without UltraFed: **OneCheck Good Pair Test** and **OneCheck with UltraFED IIB** respectively.



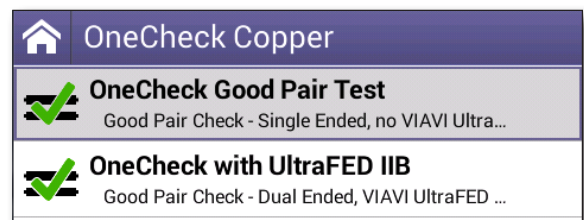
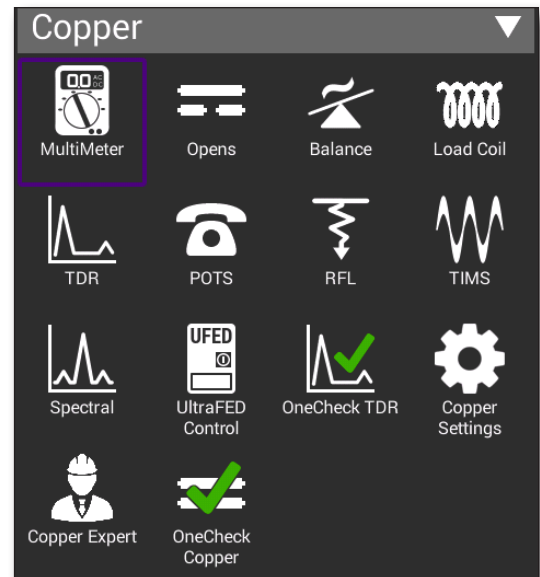
### NOTE:

***In order to convert capacitance (Opens), resistance, and TDR results to the correct length for your country, make sure your country and type of cable are selected in the System Settings / International menu. See "Configuring international settings" on page 50.***

1. Connect the tip (A), ring (B), and ground (earth) leads to the line under test. If the test requires an UltraFED, connect the UltraFED, as well.
2. From the Copper main menu, select **OneCheck Copper**.
3. From the **OneCheck Copper** menu, select **OneCheck Good Pair Test** or **OneCheck with UltraFED IIB**. You can either customize these profiles or use the defaults.

The test starts running and opens the test summary screen. The test will run for the duration you have configured for it, and then display the results with pass or fail marks.

4. To save the report, press the **Save Report** button. It will open the screen where you can specify the format of the saved file. Regardless of the format you chose, there will be also a JSON file saved with the same name. It is accessible on the unit and on StrataSync after syncing.



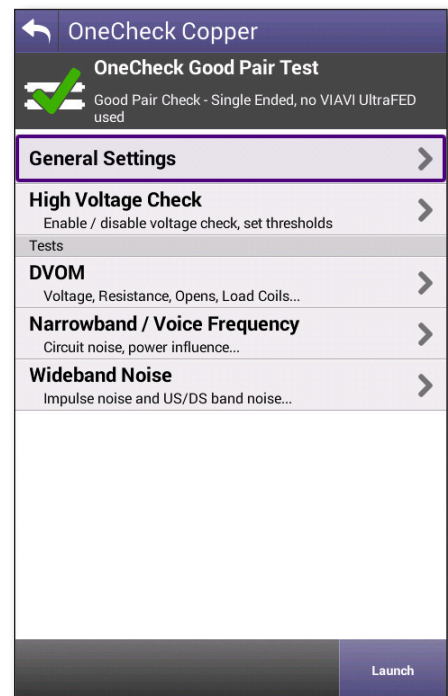
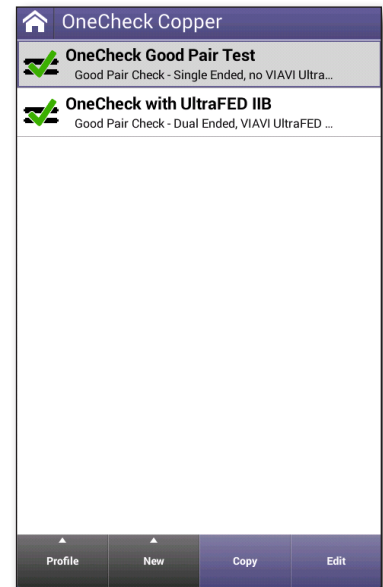
## Editing profiles

You can easily edit and create new OneCheck Cooper profiles.

1. From the Copper main menu, select **OneCheck Copper**.
2. From the OneCheck Copper menu, use the arrow buttons to highlight the profile you want to edit (if you select it, the test will run, instead).
3. To edit a profile, select the **Edit** button to change any settings (General, High Voltage Check, and any tests).
  - The pass/fail thresholds can be customized or disabled on the thresholds pages. If a threshold is disabled, that measurement will still be displayed, but will not affect the pass/fail outcome.
  - **High Voltage Check** – This link is located in the General area and opens the corresponding settings screen where you can enable and disable voltage check and set thresholds.
4. To customize the profile's name, label, description, icon and other values, select the **Profile** button. For more information, see ["OneCheck Profiles" on page 68](#).
  - Any customizations you make will save on the unit, unless you select **Profile** and **Restore to Defaults**, even after a software upgrade.
5. To create a new profile, select the **New** button and choose the type of profile you want to add.
6. To copy a profile and then edit from there, use the arrows to select the profile you want to copy, then select **Copy**.

The following sections detail how to configure and run each test.

You can also run a test from any configuration screen by pressing the **Launch** button.



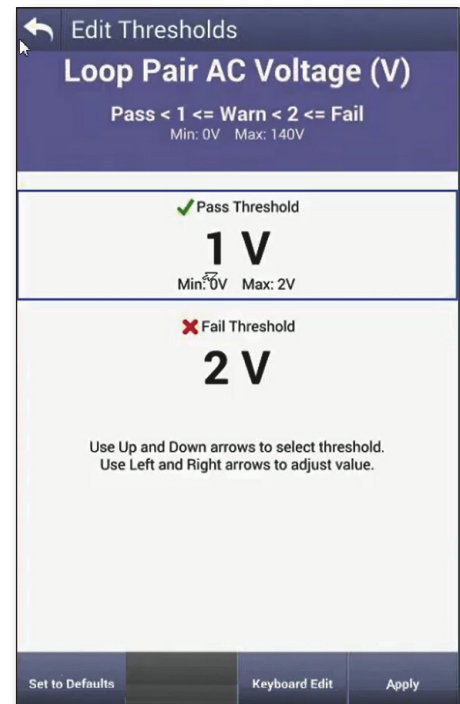
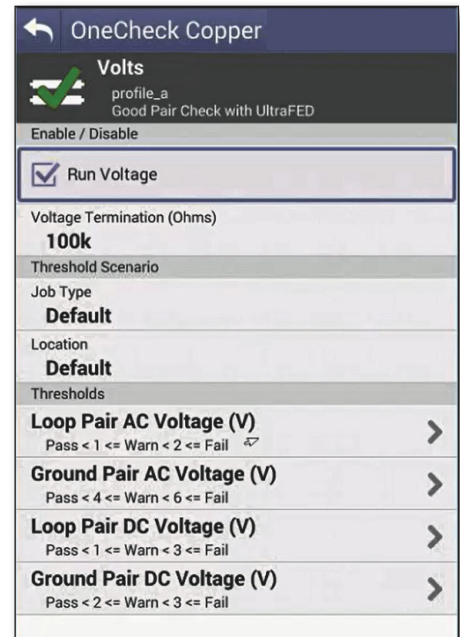
### DVOM

Press **DVOM** on the configuration screen to open the Volts settings screen to edit thresholds.

- Select a threshold (for example **Loop Pair AC Voltage (V)**) to open the thresholds editor. This editor is also accessible from the OneCheck Copper POTS application.
- The Edit Thresholds screen allows you to quickly change the thresholds values by using either the arrow keys or keyboard.
- You can set the thresholds to defaults by pressing the **Set to Defaults** button.
- Press the Back arrow to go back to the DVOM screen.

To edit the settings for other tests (volts, opens, leaking resistance, resistive balance, longitudinal balance and load coil test settings), press the **More Tests** button on the DVOM screen.

You can use the left and right arrow keys to go between the subtests and the **Back** button on the unit to go back to the main categories.





### ***Narrowband / Voice Frequency***

This test checks Circuit Noise and Power Influence for narrowband.

- Press **Narrowband / Voice Frequency** on the configuration screen and edit the entries on the next screen.
- Press the Back arrow to return to the configuration screen.

### ***Wideband Noise***

This test mode measures the impulse noise and Upstream/Downstream band noise for the wideband signal.

- Press **Wideband Noise** on the configuration screen and edit the entries on the next screen.

Press the **More Tests** softkey for additional noise tests, allowing you to check for interference that comes from inside the cable (crosstalk) or from outside the cable (RFI).

- Press the Back arrow to return to the configuration screen.

### ***Loss Tones***

This test mode measures tones for loss using VIAVI UltraFED.

- Press **Loss Tones** on the configuration screen. On the next screen you can add and remove items or edit them by pressing each item and using the thresholds editor.
- Press the Back arrow to return to the configuration screen.

## **Saving the profile and launching the test**

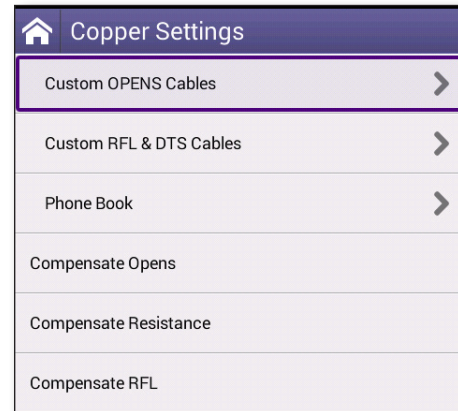
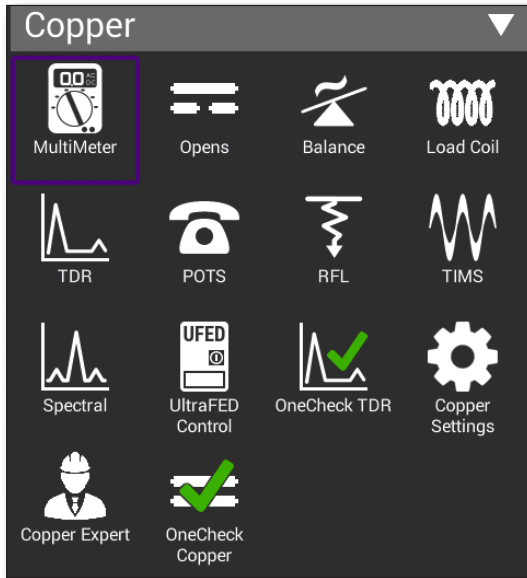
Once you are done editing the profile, press the Back arrow to return to the configuration screen for that profile. Here you have a choice of the **Save**, **Save as New** or **Save and Launch** buttons.

The **Save and Launch** button will save the profile and launch the test. Once the test is launched, you can go back to the profile configuration by pressing the **Thresholds and Settings** button.

## Copper Settings

Copper Settings allows you to customize your Copper testing even further with custom cable configurations, phone book entries, and compensation for opens, resistance, and RFL.

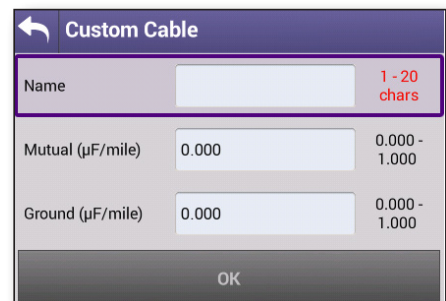
From the Copper main menu, select **Copper Settings**.



### Custom OPENS Cables

You can create a new custom cable, either by calculating the length or by entering manually.

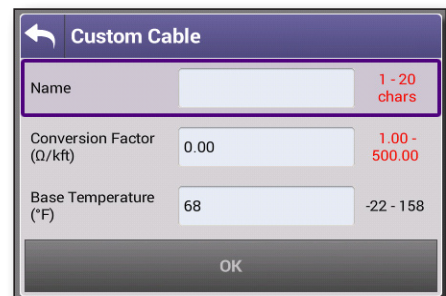
Press **New** to create a new cable, choose Manual Entry or Calculated, and enter the measurements.



### Custom RFL and DTS Cables

You can create new custom RFL and DTS cables, either by calculating the length or by entering manually.

Press **New** to create a new cable, choose Manual Entry or Calculated, and enter the measurements.



## Phonebook

You can create a phonebook to store your most important contacts, including the type of connection (POTS, Quiet Line, Tones, and Drop Batt.).

Press **New** to create a new contact and enter the name, number, and type of connection.

- To Edit, select the contact and press **Edit**, then update the information.
- To Delete, select the contact and press **Delete**.

Phonebook Entry

Name 1 - 50 chars

Number 20 max digits

Type POTS Quiet Line Tones

OK

Phonebook

Plant	Number: 317-555-1234	Type: POTS
Corp	Number: 317-555-4567	Type: Quiet Line
Techs	Number: 317-555-6789	Type: Tones
NOC	Number: 317-555-7654	Type: Drop Batt.

Delete Edit Add

## Compensate Opens

You can compensate for all opens test leads.

Press **Compensate** to get started.

Opens Cord Compensation

Last compensated:  
08/28/2019 01:15:06 PM

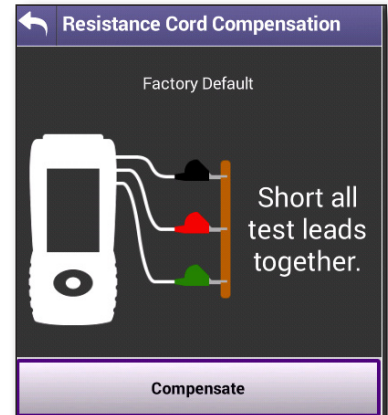
Open all test leads.

Compensate

## Compensate Resistance

You can compensate for resistance on your test leads.

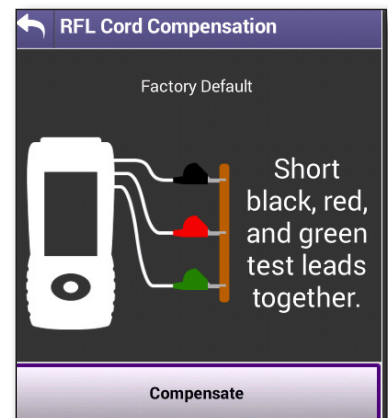
Press **Compensate** to get started.



## Compensate RFL

You can also compensate for RFL on your test leads.

Press **Compensate** to get started.



## Copper Expert

For your convenience, the Copper menu also offers an optional user interactive application, Copper Expert, that runs consecutive testing sessions to check the quality of the copper line. It locates and identifies various problems, helping the user eliminate them in the process.

Copper Expert is a software option. Check with your VIAVI representative for more information.



**NOTE:**

***In order to convert capacitance (Opens), resistance, and TDR results to the correct length for your country, make sure your country and type of cable are selected in the System Settings / International menu. See "Configuring international settings" on page 50.***

1. From the Copper main menu, select **Copper Expert**.

Copper Expert will run a series of tests, identifying problems and providing troubleshooting instructions.

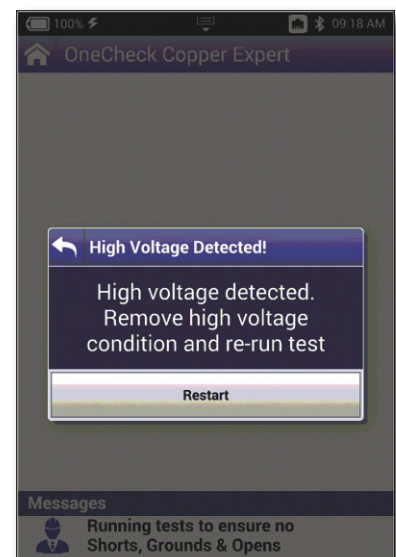
**Note:**

- The UFED is used for best results.
- The TDR option is required to get full functionality.
- There is no testing with a POTS battery. If Copper Expert detects a POTS battery, the user must enter the drop battery phone number so Expert can dial that number and start testing.

## Shorts, Grounds, and Opens

First, the application detects shorts, grounds and opens, using the voltage detection and resistance testing. If it detects the high voltage, it will issue an audio alert and a message.

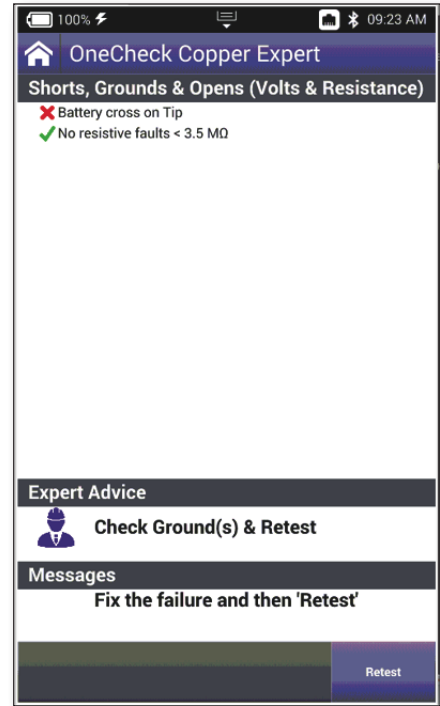
You need to clear the line before retesting. High voltage is defined as DC and AC voltage that is more than 75 Volts.



Copper Expert reports and provides Expert Advice for the following:

- If there is a battery cross (this happens when DC voltage is more than 2.0 Volts) and which lead it's on.
- If there is a battery contact (when DC voltage is more than 2.0 Volts on tip and ring)
- If there is a short (when the loop is less than 3.5 MΩ) and what lead it's on (if the leg is less than 3.5 MΩ).

Once all problems are solved and Copper Expert detects no shorts, grounds, or opens, it proceeds to the next step.

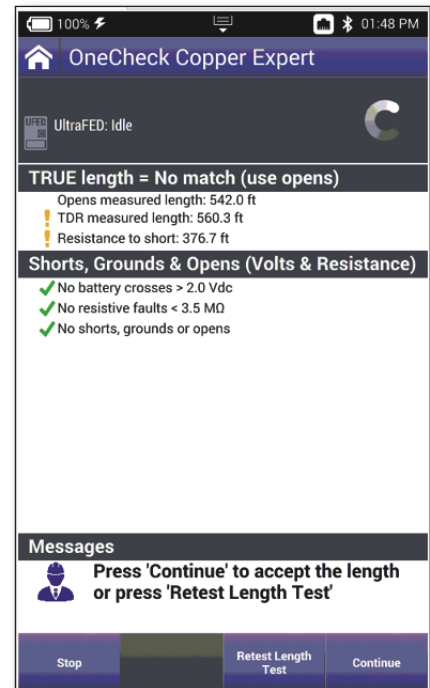


## True Length

This test is a calculation based on the measured opens length, TDR length and resistance to short length. Resistance to short requires a UFED. If TDR detects a bridge tap, the length of the tap is removed from the opens length. You need to enter the temperature and gauge.

If the measured lengths are close enough in value, then a **true length** is calculated and displayed for the user. You can accept the length and proceed to the next step. If the measured lengths are not close in value, Copper Expert does not display the true length but reports that the opens length is the closest to its value. You can either rerun the tests, changing the temperature and gauge values or accept the opens length as the true length and go to the next step.

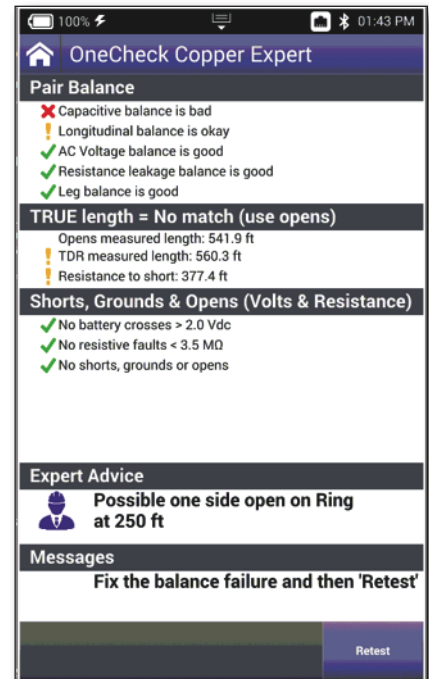
If there are no major faults on the line, and you have accepted the true length, the next step checks whether the copper pair is evenly balanced.



## Pair Balance

Copper Expert runs the following tests to check whether the copper pair is well balanced: capacitive balance, longitudinal balance, AC Voltage balance, resistance leakage balance and resistive leg balance (resistive leg balance requires the UFED).

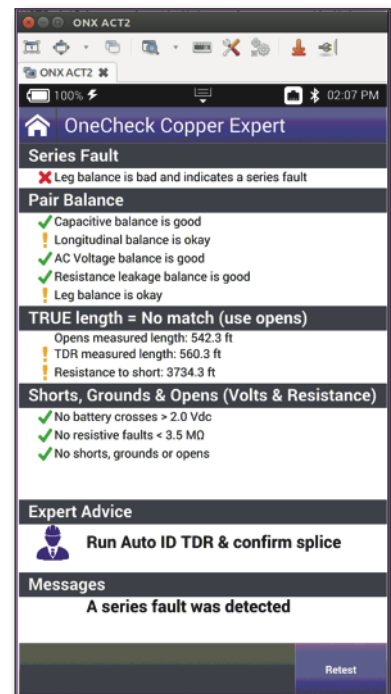
If Copper Expert concludes that one of the tested balances is not passable, it will try to identify the location of the problem so you can fix it before proceeding to the tests. If the results of the tests are marginal, you get a choice of continuing to the next test.



## Series Faults

Copper Expert checks the longitudinal balance difference to a short and to an open, and then compares the results to the resistive balance and uses the TDR to look for splices. UFED is required for best results.

Once the problem is identified and located, you can fix it and run the test again. A good copper line will have all the results with green check marks.

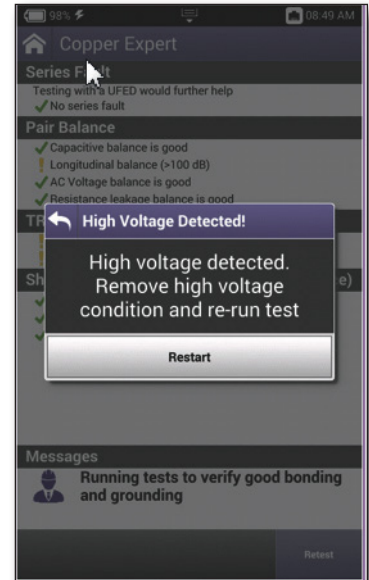


## Bonding and Grounding

Bonding is a term used to indicate that the cable shields are connected across the openings (where a cable is opened or ends, and where cabinets, splices, and enclosures are located). Grounding refers to the cable shield connection to ground at different sections of the cable.

Copper Expert performs tests to ensure good bonding and grounding. It checks ground resistance, impulse noise, and spectral analysis. If a problem is detected, Copper Expert presents possible solutions.

To run this test, follow the instructions on the screen.



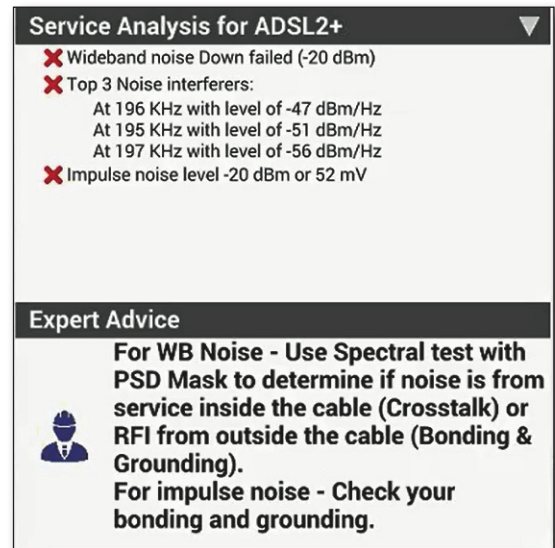
## Service Analysis

The Service Analysis test asks the user what kind of service is to be run on the pair and determines whether this service can run without errors. It examines the frequency bands to be used for that service, checking for any type of noise.

If noise is found, the application will analyse it in more detail, searching for anything that can disturb that band.

In each case, the application provides instructions in the **Expert Advice** section on if and how the problem can be fixed.

An example of a problem and its solution are shown here.





## OneCheck POTS Closeout

This test offers a quick and easy way to check if a line is usable for POTS (5-point closeout). It is accessed via its own icon on the home page under the OneCheck Copper section. The OneCheck POTS Closeout is available to all ONX-580 products and does not require any option.

1. Press the **OneCheck POTS Closeout** icon to open the configuration screen.
2. The **Tone Phone Number** and the **Quiet Line Phone Number** are blank in the beginning. You need to enter them for the test. The **Start** button is grayed out until they are both selected. The **Use Same Number for Tone / Quiet Line** check box is unchecked by default.

When this check box is unchecked, and you change the **Tone Phone Number**, two different numbers will be displayed. If the box is checked, it will assign the tone phone number to the quiet line phone number (phone numbers are numeric only, commas will produce a 1 second pause)

3. Once you selected the phone numbers, press the **Start** button. The next screen displays the running tests.
4. There is a battery check that will be required to pass before the rest of the testing proceeds. The battery check ensures that there is +/- 25 VDC on T/R (or A/B).

If the battery check fails, you will receive a message, offering to retry the battery check or abort the test. Aborting the test will not allow you to save the results.

5. The following test results with pass/fail indicators will be displayed: DC current (mA), narrowband loss (dB), circuit noise (dBr nC), power influence (dBr nC) and balance (dB). Press the **Show Details** button for more information.

## Test default configurations and thresholds

### DC Current

- Pass:  $\geq 23$  mA
- Fail:  $< 20$  mA

### Narrowband Loss

- Tone Number
- Frequency List
  - 1004 Hz (+/- 2 Hz --> 1002 to 1006 Hz)
  - Pass:  $\geq -9.0$  dB
  - Fail:  $< -9.0$  dB

### Power Influence

- North America
  - Filter - C message
  - Pass:  $\leq 80$  dBr nC
  - Fail:  $> 80$  dBr nC
- Other
  - Filter - Psophometric
  - Pass:  $\leq -10$  dBm
  - Fail:  $> -10$  dBm

### Circuit Noise

- North America
  - Filter - C message
  - Pass:  $\leq 20$  dBr nC
  - Fail:  $> 20$  dBr nC
- Other
  - Filter - Psophometric
  - Pass:  $\leq -70$  dBm
  - Fail:  $> -70$  dBm

### Balance

If the Power Influence is  $< 80$  dBrnC ( $-10$  dBm), then Longitudinal Balance is used.

- Balance Pass:  $> 60$  dB
- Balance Margin:  $> 50$  dB

## OneCheck Coax

This test consists of copper testing and SmartID testing. The test requires the SmartID accessory that is also used by the Full Sweep Coax test.

1. Press the **OneCheck Coax** icon.
2. On the next screen select the type of cable for the test.
3. Press the **Start** button.
4. You will see a series of prompts, asking you to connect the copper leads and then the SmartID accessory.

## Routing the cables through the glove

The glove accessory is designed to hold the copper test leads so you don't have to disconnect them from the instrument.

1. Turn the OneExpert DSL over, onto the front panel.
2. Unzip the back flap of the glove.
3. Push the cables through the opening at the bottom and pull them up to the copper connectors.
4. Connect the cable leads to the connectors.
5. Pull the cables with the blue and yellow leads to the right side and use the velcro straps to hold the cables in place, as shown on the left below.
6. Pull the cables with the red, black, and green leads to the left side and use the velcro straps to hold the cables in place.
7. Use the velcro strap in the glove hinge to hold the cables, as shown on the right below. Wind the ends of the cable and fit them into the zippered pocket on the inside of the front of the glove.
8. Close the front of the glove and then pull the strap from the back over the top and into the connector just above the VIAVI logo.



## xDSL / G.fast Testing

This chapter provides instructions for using the OneExpert DSL to gather DSL (VDSL, ADSL2+/2/1, and G.fast) statistics and verify connectivity, including the following:

- "About xDSL and G.fast testing" on page 134
- "Selecting the test mode" on page 135
- "DSL Expert" on page 136
- "Specifying test settings" on page 137
- "Testing the physical layer" on page 147
- "Testing line quality" on page 147
- "Terminating the loop (SELT)" on page 148
- "Running a OneCheck DSL test" on page 148
- "Editing profiles" on page 150
- "Testing the data layer" on page 151

## About xDSL and G.fast testing

The purpose of the DSL tests are to assess the quality of the xDSL signal and to verify the xDSL or G.fast data rates achieved at various points in the network.

The tests involve three main steps:

- Selecting the test mode and specifying test settings
- Connecting to the line
- Running the tests

## Supporting test modules and software options

These test modules are available for xDSL/G.fast testing:

- The ONX-BDCM-DSL-ANXAB test module supports Annex A/B Single testing.
- The ONX580-BONDED test module supports xDSL testing over two pairs. Bonded xDSL testing also requires the ONX580-BONDED software option.
- The ONX-BDCM-GFAST test module supports Annex A Single & Bonded, xDSL testing over two pairs, and xDSL testing over a G.fast line. Bonded xDSL testing also requires the ONX580-BONDED software option. xDSL G.fast testing also requires the ONX580-GFAST software option.
- The ONX-TM-GFAST test module contains two chipsets: Broadcom 63138 and Sckipio 1001. The Broadcom 63138 supports Annex A Single & Bonded, xDSL testing over two pairs, and xDSL testing over a G.fast line. The Sckipio 1001 supports testing over a G.fast line. Bonded xDSL testing requires the ONX580-BONDED software option. VDSL 35b testing requires the ONX580-V35B software option. Broadcom G.fast testing also requires the ONX580-GFAST software option. Sckipio G.fast testing requires the ONX580-GFASTSCKIPIO software option.
- The ONX-TM-BDCM-212 test module contains the Broadcom 63158 chipset. It supports Annex A Single & Bonded xDSL testing over two pairs. It supports Gfast testing, single line (212MHz & 106MHz) and bonded (106MHz) over two pairs. Bonded xDSL & Gfast testing requires the ONX580-BONDED software option. VDSL 35b testing requires the ONX580-V35B software option. Broadcom G.fast testing requires the ONX580-GFAST software option. G.fast 212MHz testing requires the ONX580-GFAST-212 option.



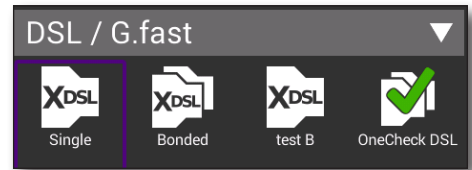
**NOTE:**

***For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).***

## Selecting the test mode

Before running any DSL or G.fast test, you must specify the test mode and test settings. Available test modes vary based on your instrument's configuration and options.

1. From the main menu, select **DSL / G.fast**.  
The DSL / G.fast Menu appears.
2. Select the test mode:
  - Default Single xDSL (one pair)
  - Default Bonded xDSL (two pairs).
  - OneCheck DSL



The Connection Details menu appears.

- If you are running the OneCheck DSL or OneCheck DSL Bonded test, select the corresponding test mode, then proceed to ["Running a OneCheck DSL test" on page 148](#). Also, see ["Specifying test settings"](#) in the next section.

### NOTE:



***If you have the Broadcom chipset selected, and you want to see the DSLAM serial number, scroll to the far right of the Connection Details screen to the Identity tab.***

***Here you will see the Broadcom information, including the xTU-O S/N (DSLAM or DPU serial number).***

### CAUTION:



***The modem has an exposed heat sink on the back of the instrument that must maintain unobstructed contact with ambient air. If the heat sink is blocked in any way it can become extremely hot, and modem performance can suffer. It is recommended that the unit not be operated flat on its back (heat sink down) in any DSL mode, for more than 15 minutes.***

## DSL Expert

When you're running a manual DSL test, you also have the option to use DSL Expert for additional troubleshooting. It locates and identifies various problems, helping eliminate them in the process.

DSL Expert is a software option. Check with your VIAVI representative for more information.

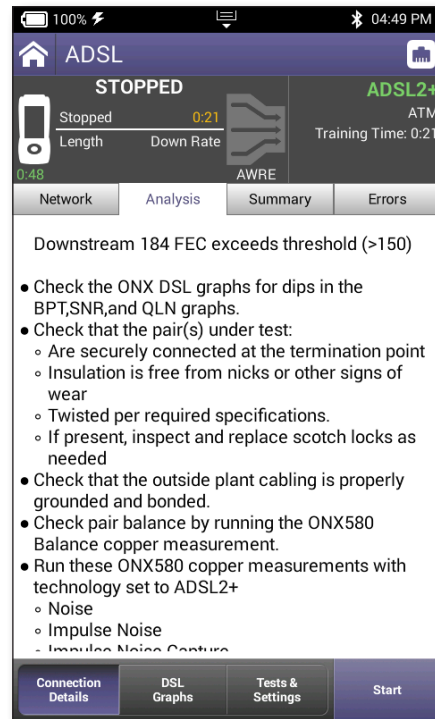
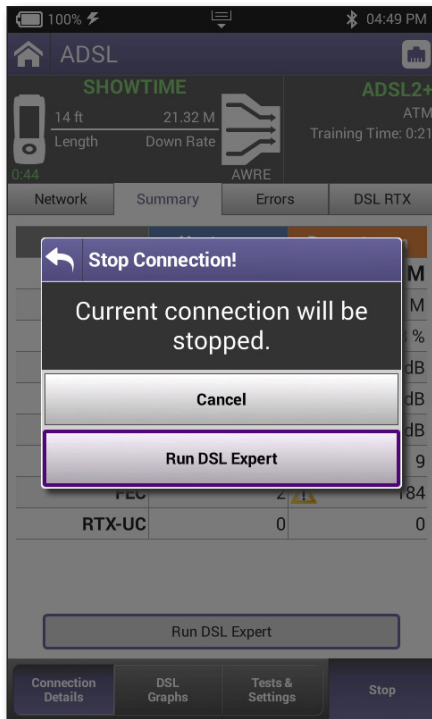
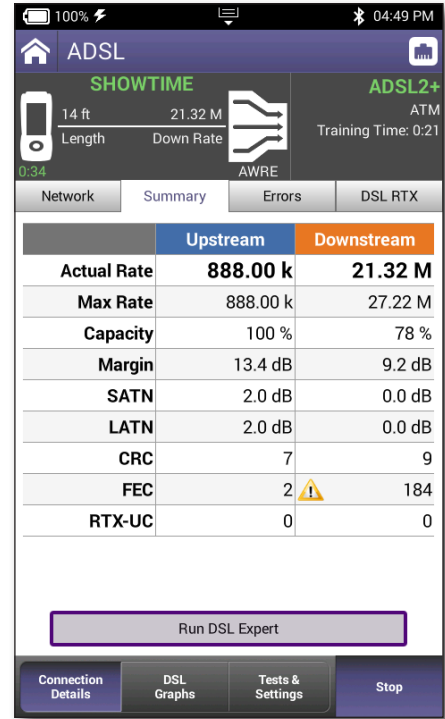
1. From the DSL main menu, select **Single xDSL** or **Bonded xDSL**.

The Connection Details menu appears and the test begins.

2. If there is a problem during testing, **Run DSL Expert** appears at the bottom of the screen. Select it to start DSL Expert. A popup will ask you to confirm you want to stop the connection, select **Run DSL Expert** again.

DSL Expert will run a series of tests, identifying problems and providing troubleshooting instructions.

3. When finished, you can scroll to the **Analysis** tab for more detail.





## Specifying test settings

Before you begin testing, make sure the test settings on the OneExpert DSL match the settings of the line that you are testing.

To access the setup screen, select **Tests & Settings** at the bottom or use the tray menu (swipe down from the top or press the **Tray** and then **Modem Settings** buttons).

### Loading a test profile

If you have previously specified the settings and saved the test profile, you can load that profile so you don't have to specify all of the settings again.

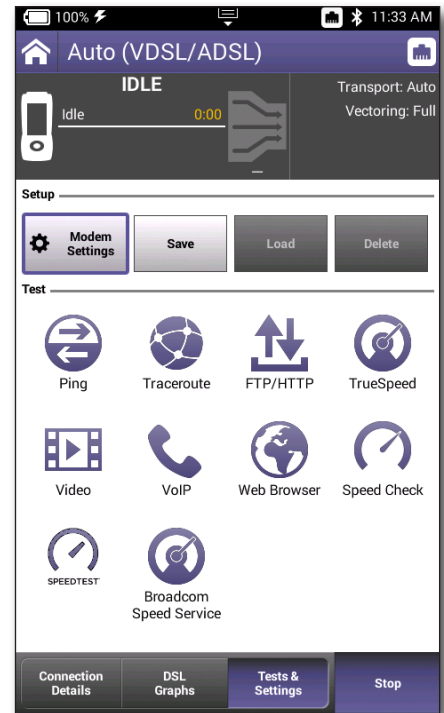
1. Press the **Load** button near the top. A list of modem settings profiles appears. (If no profiles have been saved, the list will be empty.)
2. Select the profile to load. The settings are loaded.

### Saving a test profile

1. Press the **Save** button near the top. The Save Settings screen appears. Use the keyboard to name the profile. You can also choose to save it to the homescreen.
2. When done, press **Save**.

### Deleting a test profile

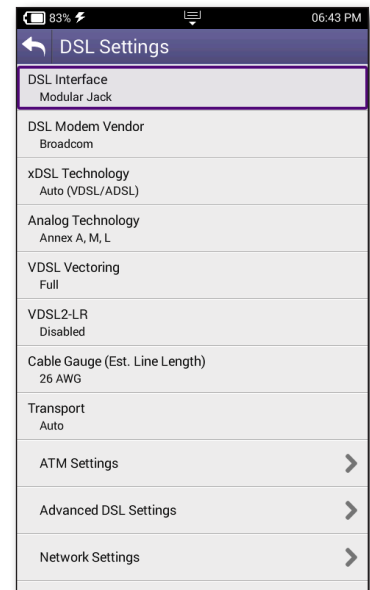
1. Press the **Delete** button near the top. A list of modem settings profiles you created appears.
2. Select the profile to delete. A screen asks you to confirm. Press **OK**.



## Specifying DSL / G.fast settings

After selecting the test mode, if you have not loaded a previously defined test profile, you must specify DSL, and if applicable, G.fast settings to match the settings of the line that you are testing.

- From the Tests & Settings menu, press the **Modem Settings** button.
- Select **DSL Interface** and then specify whether to use the modular RJ-45/RJ-11 connector, T/R/G (Tip/Ring/Ground), or the coax test interface.
- Select the **DSL Modem Vendor**. The available selections are based on the attached module and on the installed options.
  - Broadcom
  - Skypio
- Select **xDSL Technology**, and then select one of the following:
  - VDSL** – Proceed to step 5.
  - ADSL** – Proceed to step 5.
  - Auto (VDSL/ADSL)** – When selected, the Auto setting queries the DSLAM for the technology. Proceed to step 5.
  - G.fast** – Proceed to step 12 to specify advanced settings; the settings in step 5 through step 11 do not apply to G.fast lines.
  - Auto (G.fast/VDSL/ADSL)** – When selected, the Auto setting queries the DSLAM for the technology. Proceed to step 5.
- If you selected VDSL, ADSL, or Auto as the technology, do the following:
  - Select **Analog Technology**.
  - Select **Annex A, M, L**, or **Annex B, J**.
- Do one of the following:
  - If you selected ADSL as the xDSL Technology, select **Standard & Annex** and then specify the ADSL standard and annex (such as Auto + Annex M or ADSL2+ Annex A).
  - If you selected VDSL as the xDSL Technology, specify the **VDSL Profile** (such as 8A, 12B, or 35b).
- If you selected either VDSL or Auto as the Technology, select **VDSL Vectoring**, then specify **Full**, **Friendly**, or **Off**.



**NOTE:**

**Vectoring is applicable to both VDSL and Gfast connections but is only configurable when xDSL technology is set to VDSL or Auto. Vectoring technology is used on VDSL2 and Gfast connections to reduce FEXT from other pairs in a binder group resulting in higher downstream and upstream rates for all the pairs in the group.**

**Vector Friendly mode is suggested when there is a need to emulate CPE that is incapable of full vectoring, but has been designed to synchronize to a vectoring DSLAM without losing sync. It is a special software that is downloaded to the VTU-R modem enabling it to respond to a vectored request from a VTU-O to allocate net data rates across all bearer channels and to minimize excess SNR per channel.**

8. If you selected **VDSL, Auto (VDSL/ADSL)** or **Auto (G.fast/VDSL/ADSL)**, you can choose **VDSL2-LR** and enable or disable Long Reach. This improves the achievable downstream rates on longer copper loops.

**Note:** When updating the ONX software, you may lose previous VDSL2-LR configurations in saved profiles.

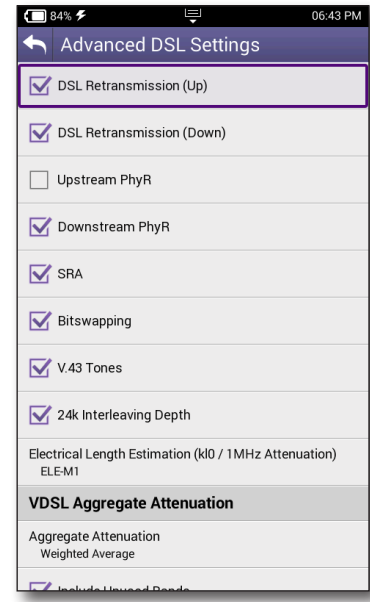
9. Select **Cable Gauge (Est. Line Length)** and then specify the cable gauge to estimate the line length during the test (**24 AWG** or **26 AWG [0.5 mm or 0.4 mm]**).
10. Select **Transport**, and then specify one of the following to indicate whether data is to be transported over Asynchronous Transfer Mode (ATM) or Packet Transfer Mode (PTM):
  - **ATM** – Proceed to step 11.
  - **PTM** – Proceed to step 12; ATM settings are not required when testing in PTM transport mode.
  - **Auto** – The Auto setting queries the DSLAM for the transport mode. Proceed to step 11.
11. If you specified ATM or Auto as the transport mode, specify the **ATM Layer** settings:
  - Select **Encapsulation** and then select **LLC** or **VC-MUX**.
  - Set the **VC Count** between 1 and 4.
  - Specify the VC settings for each virtual channel (VC 1 through VC 4): VPI, VCI, and VC Mode (**Tx Rx** or **Rx only**)

12. Select **Advanced DSL Settings** and then specify the following:

- If you selected G.fast as the xDSL technology, proceed to the SRA step; you do not need to configure DSL retransmission or PhyR settings.
- Specify whether to use DSL Retransmission upstream or downstream.

This indicates whether the unit will advertise upstream or downstream G.INP support to the DSLAM. If the selection is changed, the modem resyncs in order to apply the new setting.

- Specify whether to use **PhyR** (impulse noise protection technology) upstream or downstream. PhyR is not supported if you selected G.fast as the xDSL technology.



**NOTE:**



**Enabling DSL retransmission (adding the check mark) only advertises support to the DSLAM. It does not guarantee the connection will use DSL Retransmission (G.INP) because G.INP is specified in the CO configuration.**

**DSL retransmission is required for G.fast testing; therefore, if G.fast is selected as the xDSL technology, retransmission is automatically enabled and cannot be configured.**

- Specify whether to use **SRA**. Seamless Rate Adaptation changes the data rate while in operation without any interruption to data service.
- Specify whether to perform **Bitswapping**.
- If you selected VDSL or Auto as the DSL technology, select **V43 Tones** and enable or disable V43 tones. This selection is not applicable or available in ADSL or G.fast mode.

V43 tones are typically used during training, but some test requirements may necessitate disabling the tones. For example, if vectoring is enabled, it is recommended that V43 tones be disabled.

- Specify whether to use **24k Interleaving Depth**. Interleaving splits data packets into smaller bits, and then rearranging them so that contiguous data is now spaced further apart into a non continuous stream (and re-assembled by the modem). This is effective for lines susceptible to bursts of noise.

**NOTE:**

**When V43 tones are disabled, all other carrier sets supported by the physical medium remain active.**

- If you selected **G.fast** or **Auto (G.fast/VDSL/ADSL)**, you can choose **B43 Tones** and enable or disable B43 tones
- If you selected VDSL or Auto as the technology, under **VDSL Aggregate Attenuation**, indicate whether you want to use a dominant band or a weighted average method to calculate the SATN and LATN.

**Dominant Band** – Nothing to specify. Your instrument will use the attenuation values from a single band in each direction to calculate signal and line attenuation values

**Weighted Average** – *This setting impacts LATN and SATN calculations:*

**Specify Include Unused Bands** – *This setting only impacts LATN calculations:*

- If you want to factor data from unused bands into the line attenuation calculation, enable Include Unused Bands. Data is available in the unused bands during the discovery phase.
- If you do not enable this setting, only the data available for used bands will be factored into the line attenuation calculation.

**Specify VDSL Tones per Band** – *This setting impacts LATN and SATN calculations:*

- **Use Real Time Data** – With this selected, the calculations will use the band definitions that were determined immediately after the modem reaches Showtime.

As an example, a typical band definition for DS2 is defined as: Start Freq. 5.2MHz End Freq. 8.5MHz.

- **Use Data from Negotiated Band Definitions** – With this selected, the calculations will use the band definitions that were determined during Handshake and Training for both LATN and SATN.

13. Select **Network Settings** and then specify the following:

- Select **Network Type** and then specify one of the following to indicate how IP addressing will be handled:

**Terminate** – The OneExpert DSL replaces the modem and test interface.

**Through-Bridge** – The OneExpert DSL replaces the modem, hub, and test interface. It does not use a DHCP server; therefore, it does not assign an IP addresses to other equipment. The end equipment uses either the service provider-supplied IP address or one that is on the same network (same netmask).

**Through-Router** – The OneExpert DSL replaces the router on the LAN subnet.



***ALERT: FAULTY RESULTS***

***Any time the Network settings are changed, the network layer resets. If you change these settings during a test, you may cause errors in the test. Only change them before you begin a test.***

- Select **Data Mode** and then specify **IPoE (IP over Ethernet)**, **PPPoE (PPP over Ethernet)**, **Multi Interface**, **PPPoA (PPP over ATM)**, or **IPoA (IP over ATM)**. **None** turns the data layer off.
14. If you selected **IPoE**, **PPPoE**, **Multi Interface**, **PPPoA**, or **IPoA** refer to their corresponding Data Mode sections in the following section.

## IPoE Data Mode

If you specified **IPoE** as Data Mode:

1. Select whether to do **Automatic Login**.
2. Select **MAC Address Mode** and specify **Factory Default** or **User Defined**. If you select **User Defined**, specify the MAC Address to be used during the test.
3. Enable the **VLAN** check box if VLANs are used.
4. If VLANS are used, specify the following:
  - Enter the **VLAN ID** and **Priority**.
5. Select **IP mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**. If you selected **IPv4**, choose **Static** or **DHCP** Address Mode.
  - If you chose **Static**, you need to add the IP addresses for:
    - IPV4 Address**
    - IPV4 Netmask**
    - IPV4 Gateway**
    - IPV4 DNS server**
  - If you selected **DHCP**, you need to define:
    - Use Vendor ID**
    - Use User Class**
    - Use Arp announce**
6. Specify the network settings as described in step 6 of *"Establishing an Ethernet connection" on page 57*

## PPPoE Data Mode

If you specified **PPPoE** as Data Mode, do the following:

1. Select whether to do **Automatic Login**.
2. Enable the **VLAN** checkbox
3. Specify the following:
  - **VLAN ID**
  - **VLAN Priority**.
  - Select **IP mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**.
4. Enable the following:

- **Username**
  - **Password**
  - **Use Provider**
  - **Use Service Name**
5. Specify the network settings as described in step 6 of *"Establishing an Ethernet connection" on page 57*.

## Multi Interface Data Mode

If you checked Multi Interface as Data Mode, this option permits you to set Interface Count (the number of interfaces).

1. For each interface you can select:
  - **Interface Mode (PPPoE or IPoE)**
  - **Interface Purpose (Internet, Video, VoIP)**
2. Each interface can be enabled for VLAN. If you disable VLAN, you will proceed to **IP Mode** as the next step. If you enable VLAN, then you need to specify:
  - **VLAN ID**
  - **VLAN Priority**
3. Select **IP Mode** and then specify the network mode: **IPv4, IPv6, or IPv4/IPv6 Dual Stack**.
4. **Default Interface Setting** – The Default Interface Setting will be used by all Ethernet/IP test applications except VOIP and Video, to direct its default traffic to the selected interface.
5. Specify the network settings as described in step 6 of *"Establishing an Ethernet connection" on page 57*.

## PPPoA Data Mode

If you specified **PPPoA** as Data Mode, do the following:

1. Select whether to do **Automatic Login**.
2. Enter **Username** and **Password** or leave the defaults
3. Enable the **Use Provider** checkbox
4. Enter **Provider** name or leave the default.
5. Specify the network settings as described in step 6 of *"Establishing an Ethernet connection" on page 57*.



## IPoA Data Mode

If you specified **IPoA** as Data Mode, do the following:

1. Select whether to do **Automatic Login**.
2. Select **IP mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**. If you selected **IPv4**, choose **Static** or **DHCP** Address Mode.
  - If you chose **Static**, you need to add the IP addresses for:
    - IPV4 Address**
    - IPV4 Netmask**
    - IPV4 Gateway**
    - IPV4 DNS server**
  - If you selected **DHCP**, you need to define:
    - Use Vendor ID**
    - Use User Class**
    - Use Arp announce**
3. Specify the network settings as described in step 6 of "*Establishing an Ethernet connection*" on page 57.

Press the **Back/Cancel** button to return to the main screen.

## Connecting to the line

The method used to connect to the line varies depending on the test mode and line configuration.

### Connecting to a single twisted pair

1. Using the RJ-45 to telco clips cable, connect the **RJ-45 to bed of nails** test lead to the **DSL** connector on the right panel of the OneExpert DSL.
2. Connect the **RJ-45 to bed of nails** test leads to the desired pair, black to tip (A) and red to ring (B).

**NOTE:** If you have the ONX-TM-BDCM-212 module installed, use the RJ-11 jack instead of the RJ-45 jack.

The line is connected.

### Connecting to bonded twisted pairs

1. Using the RJ-45 to telco clips cable, connect the **RJ-45 to telco clips** test lead to the **DSL** connector on the right panel of the OneExpert DSL.
2. Connect the **RJ-45 to telco clips** test leads to the pairs: black to tip (A) and red lead to ring (B) for pair one; blue to T1 and yellow to R1.

**NOTE:** If you have the ONX-TM-BDCM-212 module installed, use the RJ-11 jack instead of the RJ-45 jack.

The line is connected. The modems begin to train on the lines automatically.



**NOTE:**

***You may see both lines sync, drop, and then re-sync again. This is typical for bonded lines. The modems include a test probe that syncs both pairs, drops, and then re-syncs in bonded mode.***

### Connecting to a single pair at the NID/demarc

1. Connect the single end of the test cable to the jack on the side of the OneExpert DSL.
2. Connect the blue end of the cable to Modem on the NID/demarc.

The line is connected.

**NOTE:** The RJ-45 "Y" cable is not used with the ONX-TM-BDCM-212 module.

## Connecting to bonded pairs at the NID/demarc

1. Using the RJ-45 "Y" cable, connect the single end of the "Y" test cable to the jack on the side of the OneExpert DSL.
2. Connect the blue end of the cable to Modem 1 and the orange end of the cable to Modem 2 on the NID/demarc.

The line is connected. The modems begin to train on the lines automatically.

**NOTE:** The RJ-45 "Y" cable is not used with the ONX-TM-BDCM-212 module.



### **NOTE:**

***You may see both lines sync, drop, and then re-sync again. This is typical for bonded lines. The modems include a test probe that syncs both pairs, drops, and then re-syncs in bonded mode.***

## Testing the physical layer

You can use the OneExpert DSL to test the physical layer of the xDSL link.

To perform a basic DSL link test

Connect to the line and allow the unit to train on the line. If the unit achieves sync, you have verified the physical layer.

## Testing line quality

Once connected to the line, the OneExpert DSL gathers statistics for the line. These statistics are used to determine the line quality.

1. Connect to the line. See *"Connecting to the line" on page 146*.

The modem begins the training process automatically. When it reaches Showtime, the OneExpert DSL begins gathering statistics.

2. Use the **Connection Details** and **DSL Graph** buttons to view different types of statistics.

If the unit achieves sync at the desired data rates, noise margins, and attenuation, the DSL link is good.

3. Use the Tray menu to save the results. See *"Saving a report" on page 69*.
4. For more information on the results, see *"DSL/G.fast results" on page 270*.

## Terminating the loop (SELT)

Single End Loop Test (SELT) is used to test a copper loop when there is no equipment installed at the far end. It is typically used for pre-qualification, that is, testing to determine whether a loop is capable of supporting DSL service. In some cases, SELT testing is aided by placing a termination at the far end of the line. This mode allows the ONX modem to terminate the line while not transmitting any signal (provide a quiet termination).

1. On the right panel of the OneExpert DSL, connect one end of the test cable to the **DSL** connector, and the other end to the line under test.
2. From the main menu, select **DSL**, and then select **Single DSL**.
3. Access the Tray menu by either swiping downward from the top to the bottom of the screen or by pressing the **Tray** button.
4. Select the **SELT** button.

After initializing the modem, the SELT verification screen is displayed.

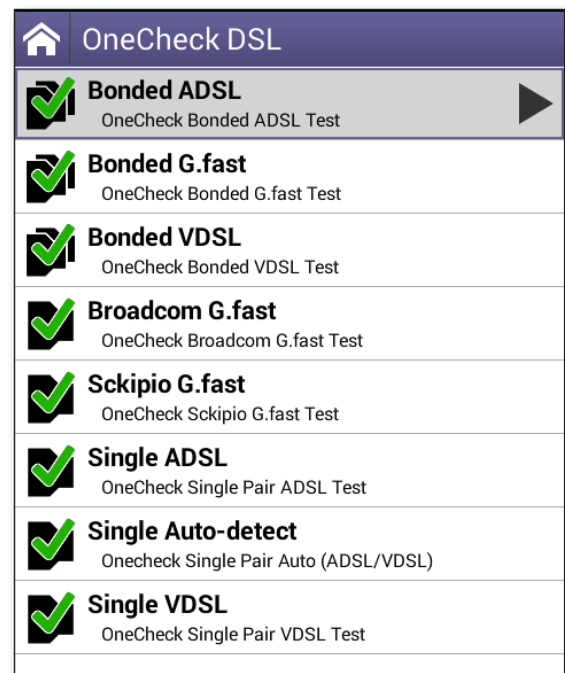
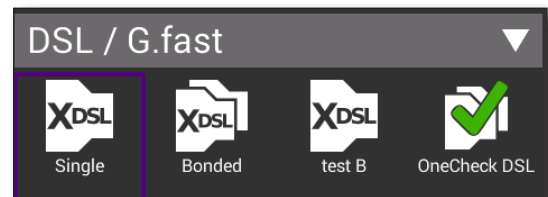
5. The far-end technician can continue testing.

## Running a OneCheck DSL test

The OneCheck DSL test is a VIAVI out-of-service single or bonded pair closeout test. It automatically performs a series of DSL measurements, and compares results to user-defined threshold values and provides a pass, marginal, or fail indication.

Depending what you have enabled in the OneCheck DSL Editor profiles, the following tests are now available: DSL Network, Ping, Ookla Speedtest, Broadcom SpeedService, TruSpeed, VoIP, and Video. See the next section for more details.

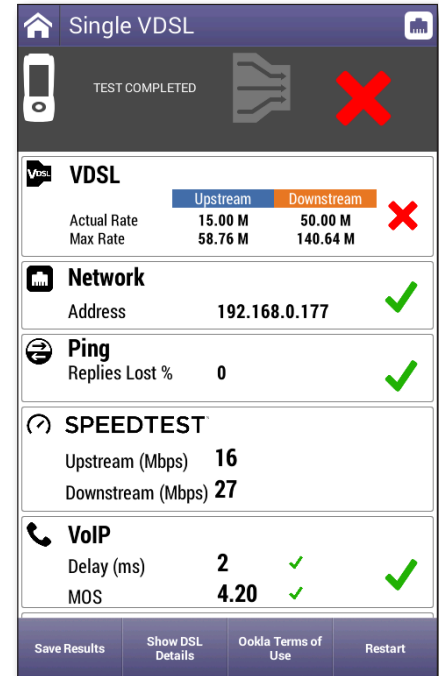
1. Connect your instrument to the line under test.
2. From the DSL / G.fast main menu, select **OneCheck DSL**.
3. From the OneCheck DSL menu, select one of the available profiles: **Bonded ADSL**, **Bonded G.fast**, **Bonded VDSL**, **Broadcom G.fast**, **Skipio G.fast**, **Single ADSL**, **Single Auto-detect**, or **Single VDSL**. You can either customize these profiles or use the defaults.



The test starts running and opens the test summary screen. The test will run for the duration you have configured for it, and then display the results with pass or fail marks.

**Note:** To run the Ookla Speedtest, you need to accept the Terms of Use.

4. To get more information, press the **Show DSL Details** button. It will open a screen with the numbers, graphs and ranges for pass/fail marks.
5. To save the report, press the **Save Results** button. It will open the screen where you can specify the format of the saved file. Regardless of the format you chose, a JSON file will also be saved with the same name. It is accessible on the unit and on StrataSync after syncing.



#### **NOTE:**



***If you have the Broadcom chipset selected, and you want to see the DSLAM serial number when the test is finished, press Show Details and scroll down to the Remote Identity Results section. In the saved report, scroll down to the Overall Results section.***

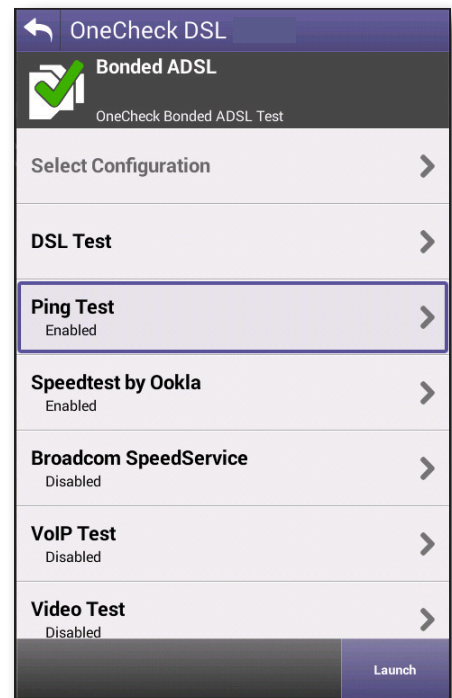
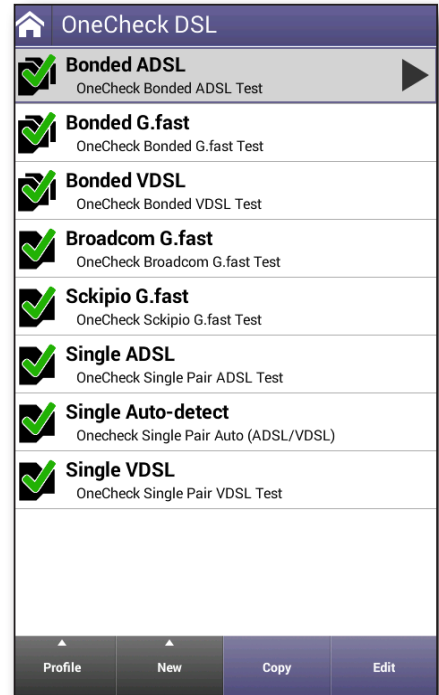
***Here you will see the Broadcom information, including the xTU-O S/N (DSLAM or DPU serial number).***

## Editing profiles

You can easily edit and create new OneCheck DSL profiles.

1. From the DSL / G.fast main menu, select **OneCheck DSL**.
2. From the OneCheck DSL menu, use the arrow buttons to highlight the profile you want to edit (if you select it, the test will run, instead).
3. To edit a profile, select the **Edit** button to change thresholds and the enabled tests (Ping, Speedtest, Broadcom Speed Service, etc).
  - The pass/fail thresholds can be customized or disabled on the thresholds pages. If a threshold is disabled, that measurement will still be displayed, but will not affect the pass/fail outcome.
4. To customize the profile's name, label, description, icon and other values, select the **Profile** button. For more information, see *"OneCheck Profiles" on page 68*.
  - Any customizations you make will save on the unit, unless you select **Profile** and **Restore to Defaults**, even after a software upgrade.
5. To create a new profile, select the **New** button and choose the type of profile you want to add.
6. To copy a profile and then edit from there, use the arrows to select the profile you want to copy, then select **Copy**.

You can also run a test from any configuration screen by pressing the **Launch** button.



**NOTE:**

***To save the profile to a USB, have it inserted in the unit and then save the profile. The application will save it to both the unit and USB.***

## Testing the data layer

Using the data layer tests, you can test for connectivity and throughput. See [Chapter 5 "Data Testing" on page 153](#).

## After running the test

When you finish your test, you can put away the test cables in the glove. Wrap the cable in a circle and put into the pocket on the front of the glove.





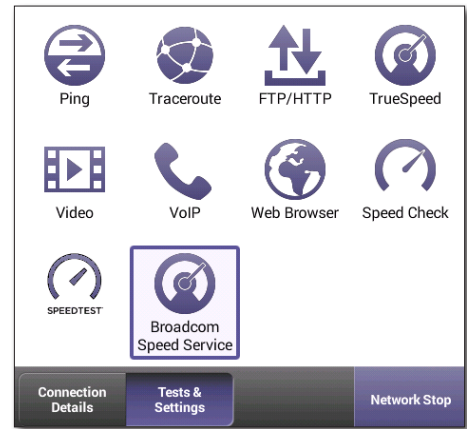
## Data Testing

This chapter provides instructions for using the Data testing features of the OneExpert DSL. The data layer tests allow you to test for connectivity and throughput. These tests can be performed on DSL or Ethernet circuits, including the following:

- "Ping and Traceroute testing" on page 154
- "Testing FTP throughput" on page 155
- "TrueSpeed testing" on page 155
- "Speed Check testing" on page 158
- "Speedtest by Ookla data testing" on page 162
- "Broadcom Speed Service data testing" on page 166
- "Video testing" on page 170
- "VoIP Testing" on page 177
- "Browsing the web" on page 183

## About Data Tests

The Data Tests are available using the **Tests & Settings** button when testing Ethernet or DSL circuits.



## Ping and Traceroute testing

The Ping test sends a ping packet through the modem to an IP address or DNS name (could be a network switch or web address) to test for connectivity.

The Traceroute test sends a packet through the modem to an IP address or DNS name (could be a network switch or web address), then traces each hop from the source (your instrument) to its destination. When running the application, the response time and hops traversed by the packet appear on the Traceroute screen.

1. If you haven't done so, specify the settings for the DSL or Ethernet interface and then connect to the line.
2. Select the **Tests & Settings** button. The Data Tests menu appears.
3. Do one of the following:
  - Press **Ping**.
  - Press **Traceroute**.
4. Press the **Settings** button and then specify the Ping or Traceroute settings.
  - Select **Destination Type** and then select IPv4 Address, IPv6 Address, or DNS Name.
  - Enter the **Destination** IP address or DNS name.
  - If you are specifying settings for a Ping test, specify the **Transmit Count** (how many total ping packets to send), **Transmit Interval** (amount of time between packet transmittals), and **Transmit Size** (how many ping messages are in each packet).
5. Press the **Results** button.

6. Use the Tray menu to save the results. See *"Saving a report" on page 69*.

The Ping or Traceroute test is complete.

## Testing FTP throughput

Using the FTP test, you can perform a file transfer to test the throughput of the circuit.

1. If you haven't done so, specify the settings for the DSL or Ethernet interface and then connect to the line.
2. Select the **Tests & Settings** button.
3. Press **FTP**.
4. Press the **Settings** button and then specify the **Transfer Type, Concurrent Transfers, Repeat Transfer Count, Download Protocol, Download URL, Download Username, Download Password, and HTTP Auth Type**.
5. Press the **Results** button. The File Transfer Results appear on the screen.

See *"File Transfer results" on page 280* for information on interpreting the results.

## TrueSpeed testing

The OneExpert DSL's optional TrueSpeed test provides a repeatable, standards-based test methodology to resolve complaints about poor network performance. With TrueSpeed, you can quickly evaluate the customer experience of their network and provide actionable information to resolve problems.

Based on the IETF RFC 6349 TCP throughput testing methodology, TrueSpeed provides metrics that can be used to tune TCP parameters for obtaining maximum throughput.

1. If you haven't done so, specify the settings for the DSL or Ethernet interface and then connect to the line. TrueSpeed is launched from the **Test & Settings** tab of the Ethernet TE, Single DSL, and Bonded DSL applications.
2. Select the **Tests & Settings** button.
3. Press **TrueSpeed**.
4. Do one of the following:
  - Select an existing test profile.
  - Specify a new test profile.
    - Enter the name of the profile.
    - Specify the up/download CIR (committed information rate). For each direction, this should be configured to either the physical line rate or the provisioned rate, whichever is lower.

The TrueSpeed test screen appears.

5. Select **Server Settings** and then specify the settings.
  - Specify the Destination Type (IPv4 address or DNS name).
  - Enter the server address.
  - Enter the server password.
  - If a fallback server is desired, check the box to enable the server.

Select the **Back** button to return to the TrueSpeed test screen.

6. Press **Start**.

The network diagram at the top of the screen indicates test status. As the test runs, the speedometer moves to indicate the measurement.

Green indicates the ideal rate. Blue indicates the peak rate observed during the current measurement.



**NOTE:**

***The green and blue measurements appear during the test only. The speedometer returns to 0 at the end of the test.***

After the test finishes, the round trip time appears above the speedometer and the actual upload and download speeds appear below the speedometer. For more detailed results, select **Results** (see "[TrueSpeed results](#)" on page 280).

If the test fails, an error message appears (for example, Server Busy or Aborted Due to Excessive Loss).

7. If you wish to test again with a different profile, select the **Profiles** button, select the profile, and then press **Start**.

## Managing TrueSpeed test profiles

When you enter the test, you can select an existing profile or create a new one, as described above. Additional profiles can be added, existing profiles can be edited, and profiles can be deleted.

1. From the TrueSpeed test screen, select the **Profiles** button and then select **More**. A list of profiles appears.
2. To add a profile, select **Add**, and specify the name and CIR.
3. To edit or delete a profile, select the check box next to the profile, and then do one of the following:

### To edit the profile

1. Select **Edit**.
2. Change the profile as necessary.
3. Press **OK**.

### To delete the profile

1. Select **Delete**.

## Speed Check testing

The Speed Check test is used to check downstream and upstream throughput via Ethernet or xDSL/G.fast test interfaces. Its Download/ Upload rate is up to 1 Gbps for Ethernet TE. SpeedCheck uses any IP interface, including IPv4 and IPv6, that you established for testing. Once there is data over WiFi, it will also work over WiFi.

The ONX uses HTTP to perform a Speed Check test and requires access to an HTTP server. This server is a generic HTTP server with minor configuration changes to support high speed throughput. The server needs to be placed in the network in a way that will allow it to deliver very high data rate traffic to the ONX for downstream and upstream throughput testing. VIAVI recommends the Apache HTTP server (v 2.4) that is readily available from Apache and supports multiple operating systems.

### Apache server setup

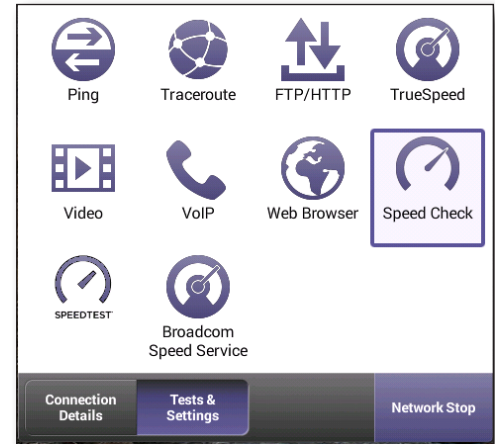
Follow the Apache server installation instructions. To enhance the server's ability to support high bandwidth SpeedCheck tests, the following changes should be made to the server configuration file.

- **File** – C:\Apache24\conf\httpd.conf
- **Modification**
- **EnableSendfile off {default}** – Change the EnableSendfile setting to OFF
- **SendBufferSize 1000000 buffer** – Add a line creating a 1000000 byte send

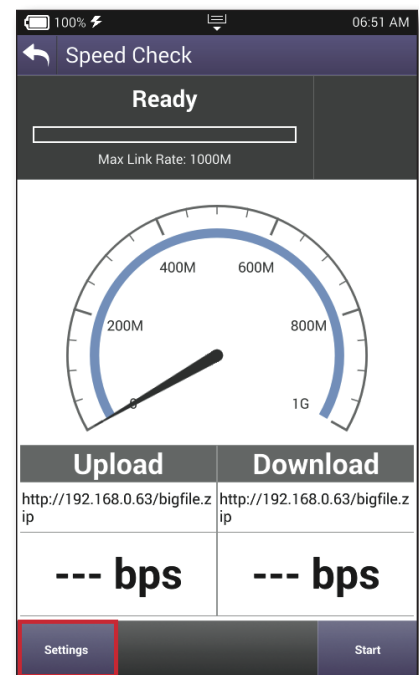
These changes to the configuration file are similar regardless of the operating system that Apache is being run on, but the location of the file may change.

Once the server is configured, a very large file needs to be placed on the server that the ONX will download during the Speed Check test. VIAVI Solutions recommends a throughput file of at least 2 GB. The name of this file is configurable in the ONX instrument. This file is typically located in the Apache htdocs directory.

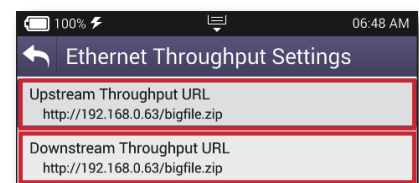
- Once the server configuration is complete, the IP address of the server and filename of the throughput file must be configured in the ONX meter. Speed Check configuration is accessible from within the Speed Check screen. Press the **Speed Check** icon to enter Speed Check or use the arrows to highlight and select it, as shown here.



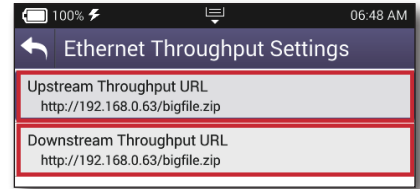
- The download and upload URLs functions are configurable in the settings. Press the **Settings** button or press the softkey to edit these configuration items, as shown here.



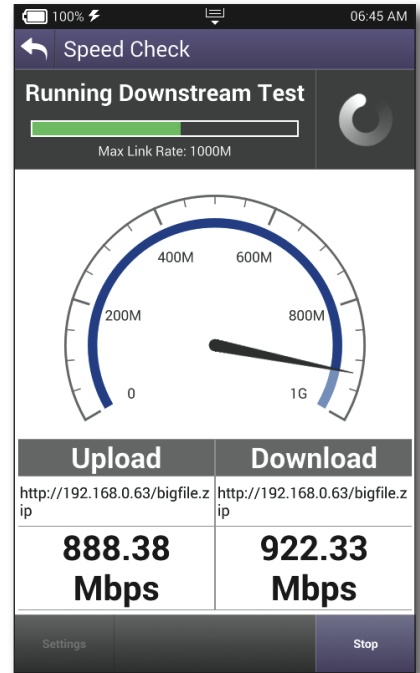
- Press the configuration to edit or use the arrows to highlight and press **Enter**. The upstream and downstream URL settings are configurable from this screen.



- When finished editing the configuration, press the **Back** icon or **Back** button to return to the main Speed Check screen.



- The test can now be performed with the desired configuration, as shown here.





## Server scaling

When configured as recommended above, one server can support multiple simultaneous ONX Speed Check tests. The scaling of this server should be based on two aspects:

1. First, the network connection to the server must be capable of supplying data rates necessary to support the number of concurrent tests. For example, if the server is connected to a 1 Gb/s network link, it could theoretically support up to 10 simultaneous tests of 100 Mb/s. Likewise, if the server is connected to a 10 Gb/s network connection, the server could theoretically support up to 100 simultaneous tests of 100 Mb/s.
2. The second aspect of the scaling algorithm is the processing power and network efficiency of the server. It is difficult for the server to utilize 100% of the theoretical network bandwidth. There are inefficiencies in the HW drivers, network stacks, and protocols, as well as the processing power, that will generally prohibit a server from supporting theoretical network performance.

It is recommended that modern server class machines be used and that the overall expectation of this server is to provide 75%-80% of the theoretical maximum. For instance, assume that a modern-day server connected to a 10 Gb/s link could provide 7.5 Gb/s - 8 Gb/s combined test capacity.

## Server over-provisioning

In most cases the ONX meters will not be performing Speed Check testing at the same time. The Speed Check test runs ~30 seconds and then stops. The probability that a fleet of technicians will be running a large number of tests simultaneously (in the same 30 seconds window) is typically low. Therefore, depending on the workflow of the technicians, we can estimate the number of ONX instruments that can be supported by a single server.

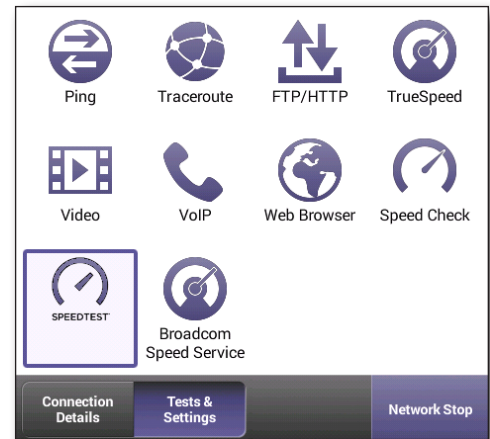
For instance, if the test workflow requires a technician to run the Speed Check test and the overall workflow time (time between tests) is only a few minutes, then the over-provisioning should be relatively low as the workflow time is a small multiple of the Speed Check test time. However, if the workflow time is longer, then the probability of simultaneous tests becomes much lower and the server over-provisioning could be higher.

## Speedtest by Ookla data testing

Speedtest is used to test servers all over the world. It determines the server name and checks downstream and upstream throughput via Ethernet or xDSL/G.fast test interfaces. Its download/upload rate is up to 1 Gbps for Ethernet TE. Speedtest uses any IP interface, including IPv4, that you established for testing. It does not require any additional configuring.

### Before you begin

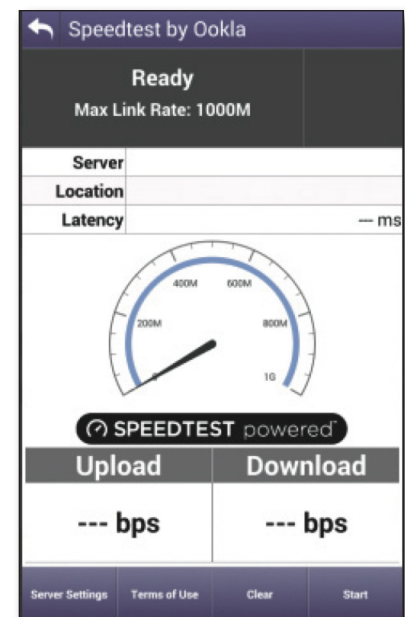
1. The Speedtest application will require you to accept the Terms of Use before allowing to proceed. The Terms of Use must be accepted every thirty to ninety days.
2. The **Speedtest** data test is launched from the **Test & Settings** tab of the Ethernet TE, Single DSL, and Bonded DSL applications. The feature is available when the Speedtest option is enabled. Press the **Speedtest** icon to enter Speedtest or use the arrows to highlight and select it, as shown here.



3. The Speedtest screen is the main display of the Speedtest application. This screen provides the following functions:
  - Access to server settings configurations
  - Access to the Terms of Use page
  - Start and stop controls
  - Display of results
  - Ability to clear results

The screen displays the server name, server location, latency (ping delay), upload rate, and download rate results. The active rate is displayed on a dial. The **Clear** button clears the test results. The **Terms of Use** button displays a scrollable popup window. The **Start** or **Stop** button starts or stops the test.

The **Server Settings** button is used to configure the download and upload URLs in the settings. This button remains active only while the test is stopped. Press the **Server Settings** button or press the soft key to edit these configurations.



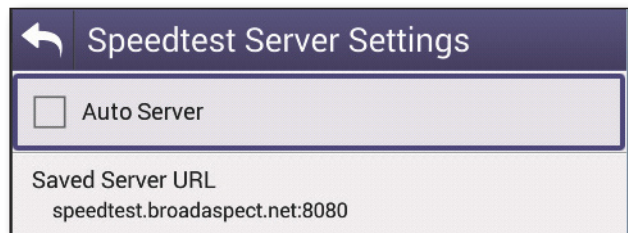
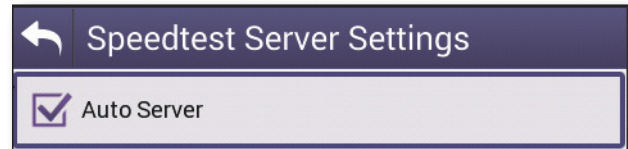
## Server Settings

The Server Settings screen for Speedtest provides the selection of either automatic or user-specified server for the test.

- Select the **Auto Server** checkbox for the automatic server.

The ONX will connect to a default Ookla server in the network, which will select the nearest Speedtest server, and use it for the remainder of the test.

- Leave this box unchecked if you want to connect to a different server and enter a specific **Server URL**, including the address and the port.



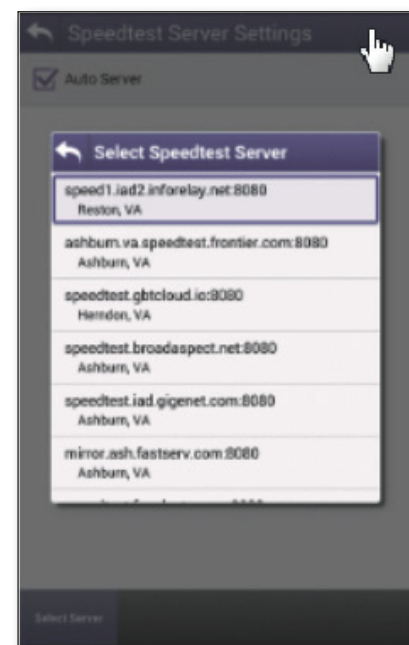
### NOTE:

*This server needs to be present in the list of Speedtest servers known by the local default Speedtest server (speedtest.net). Only servers from that list can be contacted.*

- The **Server Scan** softkey is available to automate the process of changing to a different server. Press the **Server Scan** softkey. Once the scan is completed, a scrollable Select Speedtest Server dialog is displayed showing the list of up to 20 Ookla servers available.

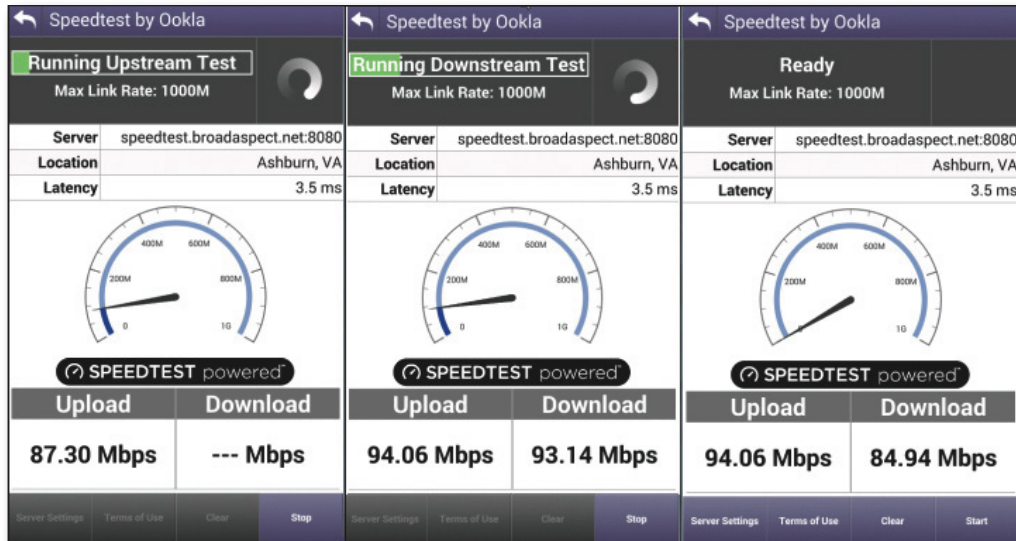
The softkey has changed to **Select Server**. If you select one of the servers from the list, the dialog closes, the Auto Server checkbox is deselected, and the server's information is stored in the **Saved Server URL**, and **Saved Server Location** settings. If the network is not active, then the softkey is not active.

When done, press the **Back** arrow or the **Back** softkey at the top to return to the main Speedtest screen.



## Running Speedtest

Press the **Start** button on the Speedtest screen. As the test progresses, its current state is displayed. A green progress bar is presented when the state takes more than four seconds. An activity spinner indicates that the test is still running.



### *Latency measurement*

The ONX will ping the Speedtest server the number of times specified in the Speedtest configuration. The pings occur at whole millisecond intervals slightly greater than the server connection phase's latency measurement. For example, if the server connection phase's latency measurement for the server was 3.2 milliseconds, then the ping intervals will occur at 4 milliseconds. An average ping delay value and a ping delay jitter value (both in milliseconds) are provided for each ping. The final ping average result (in milliseconds) is then derived.

### *Upload measurement*

The unit opens multiple connections to the Speedtest server. The upload transfer begins, followed by updates of percentage complete and average upload rate (in bytes/sec). Once the upload transfer has completed, the final upload rate measurement is then provided.

### *Download measurement*

The unit opens multiple connections to the Speedtest server. The download transfer then begins followed by updates of percentage complete and average download rate (in bytes/sec). Once the download transfer has completed, the final download rate measurement is provided.

***Measurements upload***

The following final result values are again provided:

- Latency, upload, and download rates
- Total bytes uploaded
- Upload stage duration
- Total bytes downloaded
- Download stage duration

An HTTP connection then opens to the URL: <http://www.speedtest.net/api/embed/api.php>, and the measurements are uploaded.

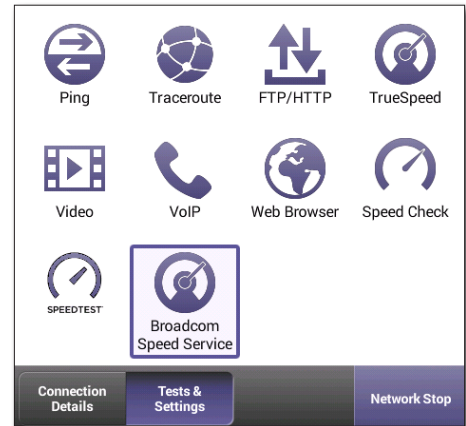
The Speedtest results are also available in all Save Report formats (XML, HTML, and PDF).

## Broadcom Speed Service data testing

Like Ookla, Broadcom Speed Service is used to test the connection speed to your Broadcom Speed Service server. It checks UDP downstream and upstream throughput via Ethernet or xDSL/G.fast test interfaces. Its download/upload rate is up to 1 Gbps for Ethernet TE and uses IPv4. Please note, you need to set up your own Broadcom Speed Service server for this test.

### Before you begin

1. If you haven't done so, specify the settings for the DSL or Ethernet interface and then connect to the line.
2. The **Broadcom Speed Service** is launched from the **Test & Settings** tab of the Ethernet TE, Single DSL, and Bonded DSL applications. The feature is available when the Speed Service option is enabled. Press the **Broadcom Speed Service** icon to enter Speed Service or use the arrows to highlight and select it, as shown here.

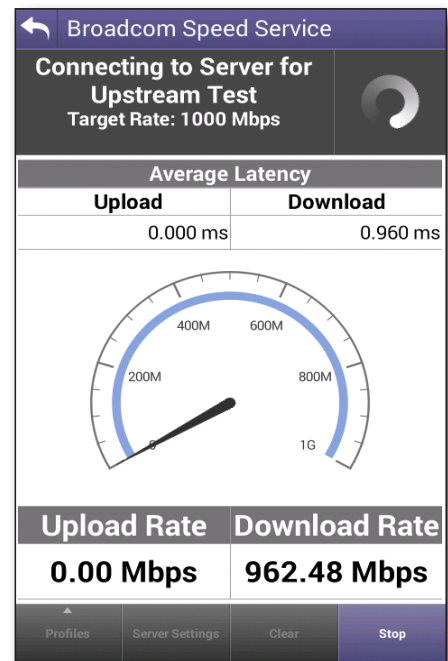


3. The Broadcom Speed Service screen is the main display of the Speed Service application. This screen provides the following functions:
  - Access to test profile management
  - Access to server settings configurations
  - Start and stop controls
  - Display of results
  - Ability to clear results

The screen displays the upload and download average latency (ping delay), and upload rate and download rate results. The active rate is displayed on a dial. The **Clear** button clears the test results. The **Start** or **Stop** button starts or stops the test.

The **Profiles** button allows you to have multiple server profiles for testing.

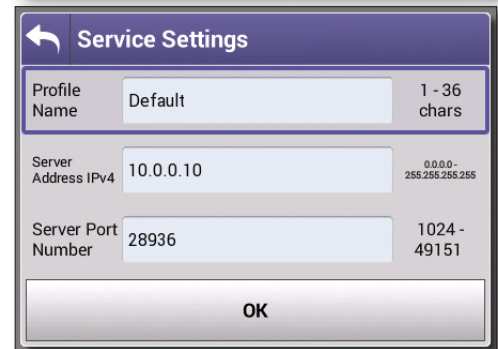
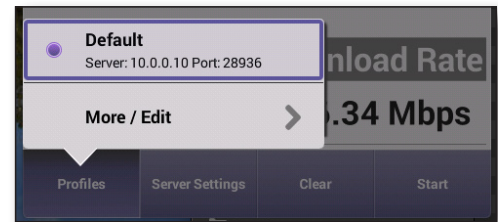
The **Server Settings** button is used to configure the server IP address, port number, or target rate (kbps). This button remains active only while the test is stopped. Press the **Server Settings** button or press the soft key to edit these configurations.



## Managing Speed Service test profiles

When you enter the test, you can select an existing profile or create a new one. Additional profiles can be added, existing profiles can be edited, and profiles can be deleted.

1. From the Broadcom Speed Service test screen, select the **Profiles** button and then select **More/Edit**. A list of profiles appears.
2. To add a profile, select **Add**, and specify the name, server address, and port number.
3. To edit or delete a profile, select the check box next to the profile.
  - To edit the profile, select **Edit**, change the profile as necessary, and press **OK**.
  - To delete the profile, select **Delete**.



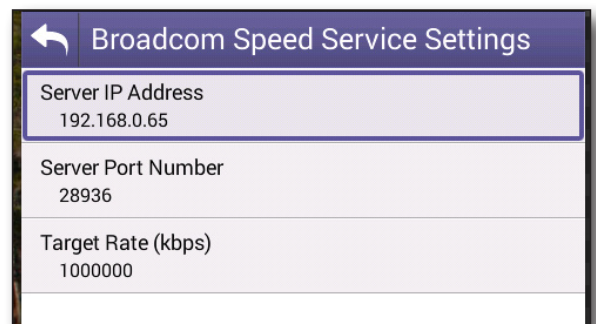
## Server Settings

The **Server Settings** screen allows you to change the default server settings and target rate.

Press the configuration to edit or use the arrow buttons to select and press **OK**.

Use the keypad to change the setting and press **Enter**.

When done, press the **Back** arrow or the **Back** sofkey at the top to return to the main Speed Service screen.



## Running Broadcom Speed Service

Press the **Start** button on the Speed Service screen. As the test progresses, its current state is displayed. A green progress bar is presented when the state takes more than four seconds. An activity spinner indicates that the test is still running.



As the test runs, the speedometer moves to indicate the measurement, and the dial turns dark blue as it measures the speed.

After the test finishes, the round trip average latency upload/download time appears above the speedometer and the actual upload and download speeds appear below the speedometer.

If the test fails, an error message appears (for example, "Failed to get IP address" or "Failed to connect to server").

If you wish to test again with a different profile, select the **Profiles** button, select the profile, and then press **Start**.



***Average latency measurements***

The application sends UDP packets to the Broadcom Speed Service server, providing the timestamp of transmission. The server will use this timestamp and the timestamp at which the packet was received to calculate the average latency.

***Rate measurements***

The ONX opens a TCP connection to the provided server, through which control packets are exchanged. It then sends or receives a burst of UDP packets at a calculated interval (2 ms, by default).

The transfer begins, followed by updates of percentage complete and average upload/download rate (in bytes/sec). Once the transfer has completed, the final upload/download rate measurements are then provided.

The Broadcom Speed Service results can be saved to multiple report formats (XML, HTML, PDF, and JSON).

## Video testing

The OneExpert DSL's optional IP video testing features allow verification of video service. The capabilities of the IP video feature include the following:

- Physical medium test
- IP connectivity test
- Video service verification

### **IP multicast test** – Broadcast video service

Generate IGMP “join” and “leave” requests, verifying stream flows, changing channels, and multi-cast communications are working.

### **IP unicast test** – VOD video service

Generate RTSP client requests for access to VOD media server, verifying that program stream flows and uni-cast communications are working.

### **UT Starcom Rolling Stream service**

The IP Video tests are available if you purchase the IP Video test option:

Option	Description	Part Number
IP Video	Allows testing of IP Video services	ONX580-IPVIDEO



**NOTE:**

***For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).***

## Specifying test settings

Before you begin testing, make sure the test settings on the

OneExpert DSL match the settings of the line and network configuration you are testing.



**TIP:**

**Test configurations can be stored for easy recall and use (see “Saving a report” and “Viewing a report” on page page 69).**

## Specifying Video settings

The video settings specify general parameters.

1. If you haven't done so, specify the settings for the DSL or Ethernet interface.
2. Select the **Tests & Settings** system key.
3. Press **Video**.
4. Access the system tray (swipe down from the top or press the tray system key).
5. Select **Video Settings**.
  - **Analysis Type** – Select Normal or UT Starcom. Use UT Starcom when analyzing Rolling Stream video streams.
  - **IPv4 IGMP Version** – If you are in Terminate mode, specify the version of IGMP signaling being used on the circuit: version 2 or version 3.
  - **RTSP Port** – Enter the RTSP port number. This is the port where RTSP signaling communication takes place in a particular network.
  - **RTSP Interoperability** – Sets various interoperability tweaks for compatibility with certain RTSP servers. In most situations, Normal is used.
  - **FEC Support** – This selection controls whether the OneExpert DSL will try to detect PRO-MPEG FEC error correction for the stream.
  - **IPv6 MLD Version** – What version of MLD to use to join and leave multicast streams over IPv6 networks. Only applicable in terminate mode.
6. Specify **QoS Thresholds**.

The quality of service (QoS) measurement uses two thresholds – good and poor – to produce three quality ratings: good, poor, and fair. If the value is less than the good threshold, it is considered good and is indicated with a check mark. A value between good and poor is considered fair and is indicated by an exclamation mark. If the value is greater than the poor threshold, it is considered poor and is indicated by an X.

Additionally, RFC 2680 and RFC 3357 define enhanced analysis methods that are used to measure the quality of a media stream. There are two main statistics for this: Loss Period and Loss Distance.

- **Leave Latency Pass** – Enter the Pass threshold, in milliseconds.

Leave Latency is the amount of time between sending the “leave” message and receiving the last video packet on the receiver.

- **Leave Latency Fail** – Enter the Fail threshold, in milliseconds.

- **Join Latency Pass** – Enter the Pass threshold, in milliseconds.

Join Latency is the amount of time between sending the “join” message and receiving the first video packet on the receiver.

- **Join Latency Fail** – Enter the Fail threshold, in milliseconds.

- **Jitter Pass** – Enter the Pass threshold, in milliseconds..

- **Jitter Fail** – Enter the Fail threshold, in milliseconds.

- **Loss Rate Pass** – Enter the Pass threshold, in milliseconds.

- **Loss Rate Fail** – Enter the Fail threshold, in milliseconds.

- **Error Indicator Pass** – Enter the Pass threshold.

- **Error Indicator Fail** – Enter the Fail threshold.

- **PID Timeout** – Enter the PID Timeout.

This is the amount of time to wait for a PID that has been declared as having video or audio data for traffic, since the last traffic was received. If this threshold is violated, then the PID Timeout result will increment.

- **PAT/PMT Timeout** – Enter the PAT/PMT Timeout.

This is the amount of time to wait after the last received PAT or PMT packet before declaring a timeout condition (which would then increment the PAT Errors or PMT Errors statistics)

- **Packet Gap** – Enter the packet gap, in milliseconds.

Packet gap is the time interval between subsequent packets in a video stream. When the packet gap exceeds the threshold set here, the “Gap Errors” statistic will increment.

- **Loss Distance** – Enter the Loss Distance threshold, in number of packets.  
This triggers when RTP losses cause a RTP LD Error. “Loss Distance” measures the difference in sequence numbers of two loss events, with a “loss event” being the loss of one or more packets in a row. So for the following stream (1 x 3 4 5 x x 8 9 10) the loss distance between the two events is 4. If the loss distance is less than the configured threshold, then the “Loss Distance Error” statistic will increment.
- **Loss Period** – Enter the Loss Period threshold, in number of packets.  
This triggers when RTP losses cause a RTP LP Error. “Loss period” is the length of a single loss event, that is, the number of lost packets between two successfully received packets. So for the following example stream (1 xxx567xx10x12), there are three loss periods, with lengths of 3, 2, and 1.

## Specifying stream settings

The stream settings allow specifying details for a specific stream.

1. From the Video testing menu, tap on the stream.
2. Specify the following:
  - **Stream Name** – Enter a name for the stream.
  - **Stream Type** – Select the video stream type.
  - **Stream IP Address** – Enter the IP address of the stream.

## Mapping channels

The channel map is similar to the stream settings because you can specify stream names and addresses, but the channel map allows you to customize your channel list using a spreadsheet program, such as Excel.

1. Insert a USB stick in a USB port on the OneExpert.
2. In the System menu, select File Manager.
3. Using the File Browser, locate the ChannelListTemplate.txt spreadsheet in the "documents" directory.
4. Copy the file to the USB stick.
5. Transfer the file to your PC.
6. Open the file from your PC using Excel or OpenOffice.org Calc.
7. Specify the channel information.
  - **Channel** – The channel number.
  - **Short name** – An abbreviated channel name, up to 10 characters in length. Extended (i.e. non-latin) characters are allowed, however all characters are not guaranteed to be in the display font set. If problems are encountered, switch to a latin character set based name.
  - **Long name** – A longer channel name. Extended (ie non-latin) characters are allowed, however all characters are not guaranteed to be in the font set. If problems are encountered, switch to a latin character set based name.
  - **Stream type** – Valid stream types are described below.
    - auto** – Auto discover the stream type, works for all non-rtsp stream types.
    - udp** – An MPEG2-TS stream directly over UDP.
    - rtp** – An MPEG2-TS stream over RTP then UDP.
    - tts** –An MPEG2-TTS (timestamped TS) stream over RTP then UDP.
    - tts-udp** – An MPEG2-TTS (timestamped TS) stream directly over UDP.
    - isma** – A codec mapped directly into an RTP wrapper over UDP (no TS layer).
    - roll** – UT-Starcom rolling stream (Modified MPEG2-TS over RTP).
    - rtsp** – An RTSP negotiated unicast stream using MPEG2 TS-UDP or MPEG2-TS-RTP-UDP for transport.
    - rtsp-tcp** – An RTSP negotiated unicast stream using MPEG2 TS-TCP or MPEG2-TS-RTP-TCP (interleaved) for media transport.
    - rtsp-isma** – An RTSP negotiated unicast stream using ISMA over UDP for transport.
    - rtsp-isma-tcp** – An RTSP negotiated unicast stream using ISMA over TCP for transport.

**Destination IP** – The Destination IP of the stream. In the case of rtsp this will contain the complete RTSP URL.

**Destination Port** – The destination port number of the stream.

For more information on specifying the channel map details, refer to the “Instructions” sheet in the channel map file.

8. Save the channel list.

- If using Excel, do the following:
  - Make sure that the “Channel List” sheet is the active sheet.
  - Save the file in “Text (Tab delimited)” format, with the file name “Channellist.txt”. If prompted, select Ok or Yes.
  - The OneExpert DSL can automatically convert most UTF-16 files, however if you get conversion errors use an external editor (such as jedit) to convert the file to UTF-8 format.
- If using OpenOffice.org Calc, do the following:
  - Make sure that the “Channel List” sheet is the active sheet.
  - Save the file in “Text CSV (.csv)” format, with the file name “Channellist.txt”.
  - In the “Export of text files” dialog that will pop up:
    - Set the Character set to “Unicode (UTF-8)”.
    - Set the Field delimiter to “{Tab}”.
    - Set the Text delimiter to nothing (delete the quote character in the text box).

9. Transfer the Channellist.txt file to the OneExpert DSL’s file system, in the “documents” directory.

10. Launch the Video feature.

11. Tap on a stream.

12. Select **Channel Selection** at the bottom of the screen.

Your saved channels appear in the Channel Map section of the list.

## Connecting to the line

After specifying the test settings, you can connect to the line. The procedure is different depending on the access interface.

- For Ethernet connections, connect as described in *"Connecting to the line" on page 208*
- For DSL connections, connect as described in *"Connecting to the line" on page 146*.

## Analyzing video streams

The OneExpert DSL analyzes the video data packet flow at the packet level. Since the initial video quality is established by the source material and encoding process at the head end, and the decoding quality is established by the receiver, the effects of the transport and access networks on the video streams are the variables requiring analysis. Actual video content decoding is not performed.



**NOTE:**

***The data connection must be established for video streams to be visible to the OneExpert DSL and the video statistics screens to show activity.***

After the OneExpert DSL is setup, it can analyze video performance. Up to three streams can be simultaneously analyzed in Terminate mode. In monitor mode, up to 3 simultaneous streams can be analyzed at one time, with statistics available for up to 10 previous streams. To view statistics on another stream, use the up or down arrow keys.

### Terminate mode

In the terminate mode, you can emulate a set-top-box and request broadcast programs.

1. Verify that the network connection is established.
2. Select a stream.
3. Press the **Play/Stop** button (triangle/square) to request the program material.

This initiates the IGMP signaling protocol sequence. The state of the IGMP messaging is shown on the screen. Typically, the status will change from **Idle** to **Media Wait** to **Stream Up**.

4. To view additional results, do one of the following:
  - Press the right arrow.
  - Press the tab for the desired result (for example, press "Loss" to view the loss results).
5. Use the Tray menu (swipe down from the top or press the tray system key) to save the results. See *"Saving a report" on page 69*.



## QoS Expert

The QoS Expert test compares the quality of service for two streams.

1. From the Video Terminate screen, press **QoS Expert**.
2. In the left channel box, specify the first channel to examine.
3. In the right channel box, specify the second channel to examine.
4. Press the **Play/Stop** box (right-pointing arrow / square box) for each channel.
5. Press Clear Stream 1 and Clear Stream 2 to reset any initial errors.
6. Compare the results.

See "*Video results*" on page 282 to learn what your results mean.

## VoIP Testing

Using the optional VoIP testing features, you can emulate a VoIP phone to place and receive VoIP calls, emulate IP terminal equipment, and trace the route of a call.

You can expand your testing capability by purchasing additional VoIP testing options. The options available for purchase are as follows:

Option	Description	Part Number
<b>VoIP</b>	VoIP application, using SIP signaling	ONX-VoIP
<b>MOS</b>	Mean Opinion Score (MOS) option (requires VoIP option)	ONX-MOS

The VoIP phone test involves the following steps:

- Specifying test settings
- Connecting to the line
- Placing and receiving calls



**NOTE:**

***For additional information about OneExpert DSL options and services, contact your local VIAVI representative or visit [www.viavisolutions.com](http://www.viavisolutions.com).***

## Accessing the VoIP application

Select an interface (Ethernet TE, DSL, or G.fast), and then select **VoIP**.

## Specifying test settings

Before you begin testing, make sure that the OneExpert DSL settings match the settings of the phone you are emulating.

**NOTE:**

**You must specify the interface settings before specifying VoIP settings. For example, you must configure the Network, LAN, and other applicable settings for a xDSL line.**

1. From the VoIP menu, select **Options**.
2. Two common settings are available: Outbound Alias and Auto Answer.
  - Press **Outbound Alias** to change the Alias. Specify whether the Alias is a Phone Number or Name, and then enter the name or number.
  - To automatically answer calls, select the **Auto Answer** box.
3. To specify additional settings, select **Options** and then **More Settings**.
  - **Auto Answer** – Specify whether to automatically answer incoming calls. Yes means all incoming calls are answered automatically. No is the typical setup and means that calls will be answered manually.
  - **Alias (Local and Outbound)** – The phone number or name alias that will be associated with the phone that you are trying to emulate. This is included in the connection request messages that are exchanged with the Gatekeeper/ Proxy or other endpoint devices.

Depending on your network, the alias may specify the registrar. If you have a network that uses one server for registration (the registrar) and another for placing and receiving calls "Alias" specifies the registrar. ("Proxy Address" specifies the server used for placing and receiving calls.)

- **Use Proxy** – If your network uses a Proxy server, check the Use Proxy box.
- **Proxy Address Type** – Only appears if Use Proxy is checked. Select IPv4 Address, IPv6 Address, or DNS Name.
- **Proxy Address** – Only appears if Use Proxy is checked. Enter the IP Address or DNS Name Address of the proxy server.

If you have a network that uses one server for registration and another for placing and receiving calls, the Proxy Address specifies the address for placing and receiving calls ("Alias" specifies the registrar address).

- **Proxy Port** – Only appears if Use Proxy is checked. Enter the port number of the proxy server.
- **Username** – Only appears if Use Proxy is checked. Enter the Proxy User name.
- **Password** – Only appears if Use Proxy is checked. Enter the Proxy Password.
- **Call Control Port** – Enter the Call Control Port number. This is a UDP port that is used for call control messages (for placing and receiving calls).
- **100Rel Supported** – Specify whether 100rel is supported, required, or disabled. 100Rel provides reliable provisional response messages by appending the 100rel tag to the value of the required header of initial signaling messages.
- **SIP Interoperability** – Specify whether standard SIP is used or other SIP interoperability.

NOTE: If you need to configure your unit for IP Multimedia Subsystem (IMS) support, be certain to select **Nortel**.

Press the right arrow next to **Audio/Codec** to specify Audio Codec settings.

- **Audio codec** – This selects which codec will be used.
- **Frame Interval** – Set the speech per frame. This is the number of milliseconds of speech per transmission frame when using a sample based codec (such as G.711).
- **Jitter buffer** – Set the jitter buffer size. This is the number of milliseconds of speech that will be collected before an attempt will be made to play the speech back.

This allows lost, late, or out-of-sequence packets time to arrive and be reassembled before playback.

- **Transmit Source** – Select the source of transmission: Voice conversation (transmits and receives live voice), IP voice announce (the unit repeats a sequence of words including the calling party's IP address), Tone
- **Silence suppression** – To enable, check the Silence Suppression box.
- **RTP IP TOS** – The Type of Service field in the IP header.
- **RTP Port Minimum** – Specify the RTP port minimum number.

The real-time transport protocol (RTP) port number allows you to identify voice traffic versus other traffic. Some systems only accept RTP traffic on certain port numbers. (It must be a factor of 2.)

- **RTP Port Maximum** – Specify the RTP port maximum number. (It must be a factor of 2.)

Press the right arrow next to **STUN** to specify STUN settings.

STUN (Simple Transversal of UDP [User Datagram Protocol] Through NATs [Network Address Translators]) allows VoIP calls across a NAT router. These settings should only be changed if necessary.

- **STUN Enabled** – To enable, check the STUN Enabled box.
- **Server Address Type** – Select the type of server address: IP Address or DNS Name.
- **Server Address** – Enter the server IP address or DNS Name.
- **Server Port** – Enter the port number of the stun server.
- **Client Port** – Enter the client port number.
- **NAT Refresh** – Specify the NAT refresh rate. This is the number of seconds between messages to the STUN server to keep the NAT mapping alive.



**NOTE:**

***If STUN is enabled, the VoIP network will not come up until the STUN client on the OneExpert DSL has determined the type of NAT used between the OneExpert DSL and the STUN server.***

Press the right arrow next to **Quality of Service**, and then specify the QoS settings.

The quality of service (QoS) measurement uses two thresholds—good and poor—to produce three quality ratings: good, poor, and fair.

The following section describes the settings. Press each entry on the screen of your device or select a keypad button to populate it with alphanumeric values.

- **Loss Good Threshold** – Enter the Pass threshold, in milliseconds.
- **Loss Poor Threshold** – Enter the Fail threshold, in milliseconds.
- **Jitter Good Threshold** – Enter the Pass threshold, in milliseconds.
- **Jitter Poor Threshold** – Enter the Fail threshold, in milliseconds.
- **Delay Good Threshold** – Enter the Pass threshold, in milliseconds.
- **Delay Poor Threshold** – Enter the Fail threshold, in milliseconds.
- **MOS Scale** – Select the scaling method. This selection affects the scaling of the CQ-MOS and LQ-MOS results (on the “Call Scores” result screen). This selection is only available if your unit is equipped with the MOS option.
- **SIP IP ToS** – Session Initiation Protocol (SIP) Type of Service (ToS). Select the SIP type of service for VoIP signaling.

- **SIP VLAN Priority** – Select the SIP priority for VoIP signaling.
- **RTP IP ToS** – Real-time Transport Protocol (RTP) IP Type of Service. Select the RTP IP type of service for VoIP signaling.
- **RTP VLAN Priority** – Select the RTP priority for VoIP signaling.

The test settings are specified.

## Connecting to the line

After specifying the test settings, you can connect to the line. The procedure is different depending on the access interface.

- For Ethernet connections, connect as described in *"Connecting to the line" on page 208*.
- For DSL connections, connect as described in *"Connecting to the line" on page 146*.

## Placing and receiving calls

After specifying test settings and connecting to the line, you are ready to place and receive calls.

By placing and receiving calls you can do the following:

- If you can successfully register with the Gateway (or Call Agent/TPS/ Proxy/etc.) you have verified the provisioning.
- If you can successfully place and receive calls from internal and external networks, you have verified connectivity.
- During an active call, you can view statistics such as MOS, Loss, and Jitter, to measure the call quality.

### ***Placing a call***

1. Select **Options** and then **Outbound Alias**. This is the number that you are calling.
2. If this is not the desired phone number or name, enter the number or name.
3. Press **OK**. The telephone receiver icon becomes available after registering with the server.
4. Select the telephone receiver. The unit goes off hook and places the call.

The Summary results appear. Additional results are available on other tabs. To view additional results, press the tab or swipe right or left.

5. *Optional*. To save a report, use the **Save Report** button or Tray menu. See *"Saving a report" on page 69*.

6. Use the telephone receiver to hang up. The unit goes back on hook and ends the call.
7. To clear the call log, select the **Action** function key and then press **Clear**.

See "[VoIP results](#)" on page 280 to learn what your results mean.

### ***Receiving a call***

1. When the OneExpert DSL signals an incoming call, press the telephone receiver. The unit goes off hook and answers the call. After the call is connected, the results appear.
2. Additional results are available on other tabs. To view additional results, press the tab or swipe right or left.
3. *Optional.* To save a report, use the **Save Report** button or Tray menu. See "[Saving a report](#)" on page 69.
4. Use the telephone receiver to hang up. The unit goes back on hook and ends the call.

See "[VoIP results](#)" on page 280 to learn what your results mean.

### ***Answering calls automatically***

The Auto Answer feature allows you to verify incoming service as well as caller ID service. When the OneExpert DSL OneExpert DSL answers a call, it logs the following information: time the call was answered, caller's IP address, time the call ended.

1. Select the Options function key, and then check the Auto Answer box.
2. Place a call to the OneExpert DSL from a VoIP phone (or a second OneExpert DSL). The OneExpert DSL answers the call with a voice announcement, and then basic call statistics are provided.

## Browsing the web

With the web browser feature, you can provide visual proof to customers that a circuit is correctly provisioned all the way to the Internet. The browser works over both DSL and Ethernet interfaces, allowing you to surf the web from the customer's NID or demarcation point using only the OneExpert DSL. For DSL applications, the browser is a separate mode that allows you to connect to any public web site on the Internet through an internet service provider. The browser can also be purchased as a general global application for use with the Ethernet port.

Because the browser's primary purpose is to demonstrate connectivity, it does not have all the capabilities of typical web browsers, such as Internet Explorer. The web browser has the following limitations:

- The browser does not cache web pages. The OneExpert DSL does not have sufficient memory to cache web pages. Each time a page is selected, the OneExpert DSL re-loads the page.
- The browser does not currently support data entry through the browser. For example, you cannot log into a web mail account. The browser does not currently support Java applets, and will not display web pages written in Java. Sites optimized for quick downloads, such as DSLReports.com, are not supported because they are based on Java.

The following sections in this chapter describe how to access and use the web browser.

### Accessing the web browser

Like IP ping, you must have an established underlying network connection, such as PPP over Ethernet, before you can use the browser. After you have a successful network connection, the OneExpert DSL's Network LED illuminates green. If the LED is red, the underlying connection is not ready, and the web browser (and IP ping) will not work.

Press the **Web Browser** button. The web browser display appears.

### Navigating the browser

You can navigate the browser as you would with a mobile device, with tapping in text boxes to display the keypad and enter the data, swiping your fingers to scroll, pressing links to select them, and so on. In addition, you can connect a USB mouse or a USB keyboard/mouse combination to the OneExpert DSL to navigate the web browser as you would with a desktop computer. Going back or forward one page

### Opening a web page

There are two ways to open a web page:

- **Enter the address** – Tap the address box, and then use the keypad on the screen to enter the address.
- **Use a bookmark** – Press the **Bookmarks** button and then select a bookmark.

## Adding bookmarks

If there is a specific page that you would like to view or if you visit a site frequently, you can bookmark it. There are six bookmark slots available: one for your Home URL and five others.

1. On the main Web Browser page, press the **Bookmarks** button.
2. Select a bookmark and then enter the URL.

## Exiting the browser

When you are finished demonstrating internet access to the user, you should exit the browser.

Press the **Home** function key or tap the home icon on the browser menu. The browser closes.



## Fiber Testing

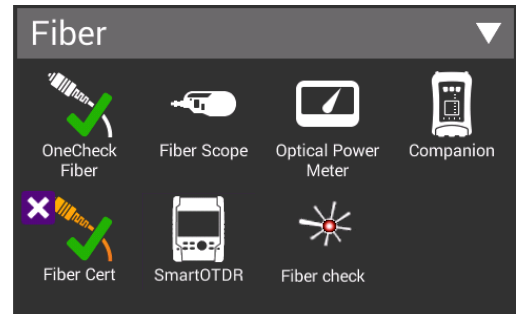
This chapter provides instructions for using the optional OneExpert Fiber testing features, including the following:

- "About the optical tools" on page 186
- "Inspecting fiber" on page 186
- "Measuring optical power" on page 188
- "About fiber testing" on page 189
- "OneCheck Fiber" on page 190
- "Running a OneCheck Fiber test" on page 191
- "Editing profiles" on page 192
- "Saving the profile and launching the test" on page 194
- "Fiber Certification" on page 195
- "SmartOTDR" on page 198
- "NSC-100 Companion" on page 200

## About the optical tools

The following USB optical accessories can be used with the OneExpert DSL from the **Fiber** menu.

- Fiber Microscope
  - Inspect both the bulkhead (female) and patch cord (male) sides of fiber interconnect.
  - Inspect both simplex connectors.
  - Use with a comprehensive selection of precision FBPT tips.
- Optical Power Meter
  - Takes power measurements for all single-mode and multimode connectors via USB 2.0 connection.
  - Measures optical power with multiple pre-calibrated wavelengths (850, 980, 1300, 1310, 1490, 1550 and 1625 nm).
  - Integrates digital power measurements, fiber inspection, and analysis into a single, unified work sequence.



**NOTE:**

***The Fiber menu is not viewable until one of these tools is connected to the OneExpert USB Connector.***

## Inspecting fiber

The optional VIAVI microscope accessory is used to view a live video of a simplex fiber to determine if the fiber is clean. It can also capture a snap-shot and provide pass/fail analysis.

1. Connect the fiber microscope to the USB connector on the side of the instrument.
2. Connect the microscope to the optical patch cord or bulkhead.
3. Press **Fiber Scope**. The Fiber Microscope screen appears, as shown here, showing live video of the fiber.



**NOTE:**

***Although some microscopes can inspect multi-fiber or ribbon fiber (depending on the microscope and the tip used), the OneExpert's microscope application supports simplex fiber only.***

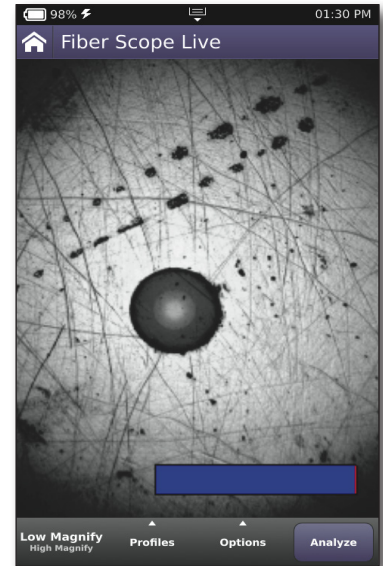
4. To change the magnification level, press **Low Magnify/High Magnify**. The current selection is a larger text size.
5. To select the inspection profile, press **Profiles**.

If you have a custom profile, you can use it on the OneExpert by putting the file into the *configs/Microscope* folder. For more information on copying or transferring files using the file manager, see *"Managing files" on page 78*.

6. Press **Options** and then select any of the following:
  - **About Scope** – Provides view details about the microscope, such as model number, firmware version and serial number.
  - **Run Analysis** – Specify whether to perform an analysis on the fiber or simply take a snapshot without an analysis (Freeze).
  - **Auto-center live** – When checked, the live picture automatically centers on the fiber center. If not checked, the picture will center at the last location of a fiber center following an analysis. High magnification is always automatically centered.
  - **Show Focus Meter** – Specify whether to show the focus meter (the blue and white bar that appears on the right side of the screen).
  - **Tip** – Specify which tip is being used on the microscope: Standard Tips (with BAP1) or Simplex Long Reach (-L) Tips.
7. Do one of the following:
  - Manually inspect the fiber.
    - On the **Options** pop-up, verify that the **Run Analysis** checkbox is *not* checked. The **Analyze** button changes to Freeze.
    - Press **Freeze**. This captures a still image of the fiber.
  - Analyze the fiber.
    - On the **Options** pop-up, verify that the **Run Analysis** checkbox is checked. The **Freeze** button changes to Analyze.
    - Press **Analyze**.

The test automatically centers the view (if specified to do so), captures an image, and then analyzes it. The test result shows defects and scratches.

8. To save the results, press **Save** and then specify the file name for the still image. The filename can be up to 50 characters, so if desired, details such as the company name, technician, and location could be included.



**NOTE:**

**If you have not yet moved the report file, you can view the screen capture portion of the result file using the File Manager. If the file has been moved — even if it was put back in the original spot on the OneExpert — you can no longer view the file because there is a temporary capture file included with the save that goes away when the file is moved.**

## Measuring optical power

The Optical Power Meter is a VIAVI accessory used to measure optical power.

- The MP-60 meter measures 850, 1300, 1310, 1490, and 1550 nm wavelengths
  - The MP-80 meter measures 980, 1310, 1480, and 1550 nm wavelengths
1. Connect the Optical Power Meter to the USB connector on the side of the instrument.
  2. Connect the optical patch cord to the power meter.
  3. Press **Optical Power Meter**. The Fiber Power Meter screen appears.

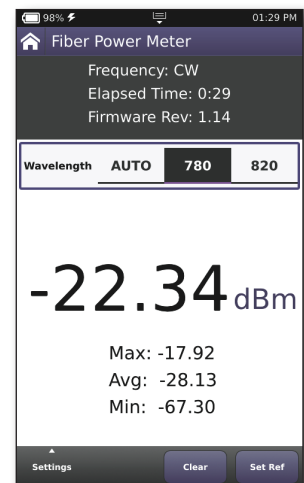
The measurement begins as soon as the test is launched.

4. To measure a specific wavelength, choose the wavelength (in the Wavelength bar, swipe left or right). AUTO automatically detects the wavelength.
5. Press **Settings** and then navigation key to display the Power Meter Settings, and then specify the settings.

- **LED Threshold** – Specify the LED threshold (in dBm). This specifies the threshold for the power LED on the Optical Power Meter.

Solid indicates the power is below the threshold (low power), flashing indicates the power is above the threshold.

- **Pass/Fail Thresh.** – Specify the pass/fail threshold (in dBm) for the test. If the measured power is below the threshold, it fails.
  - **Pass/Fail Enable** – Specify whether to run the pass/fail test.
  - **dBm** – Absolute mode, displayed as dBm. The default setting.
  - **mW** – Absolute mode, displayed as mW.
6. Press **Set Ref** to use the current power level as the reference value.
  7. To save results, press the **Save Report** button or use the Tray menu **Save Report** icon.



## About fiber testing



**NOTE:**

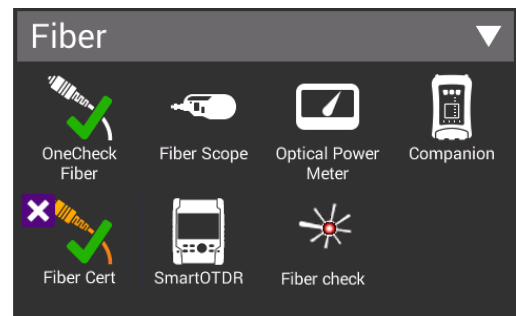
**Fiber testing is available on the ONX-580 and ONX-580P, but not the ONX-580A.**

The fiber optic features provided by the ONX-580 tester allow technicians to quickly turn up and perform basic troubleshooting of the fiber local loop. To access the fiber tests, select **Fiber** from the Main menu. The dropdown menu appears.

If your OneExpert is configured and optioned to do so, you can perform specific measurements for the following tests:

- Fiber Check
- Fiber Cert
- SmartOTDR
- NSC-100 Network and Service Companion

Each of these tests is described in the following sections.



## OneCheck Fiber

These tests check whether the fiber connectors are clean, monitor the power of the fiber connection, and can run tests on your VIAVI Smart OTDR E126A or SL. The tests require these accessories:

- VIAVI fiberscope P5000i (USB)
- VIAVI FiberChek



- VIAVI optical power meter MP60 (USB)



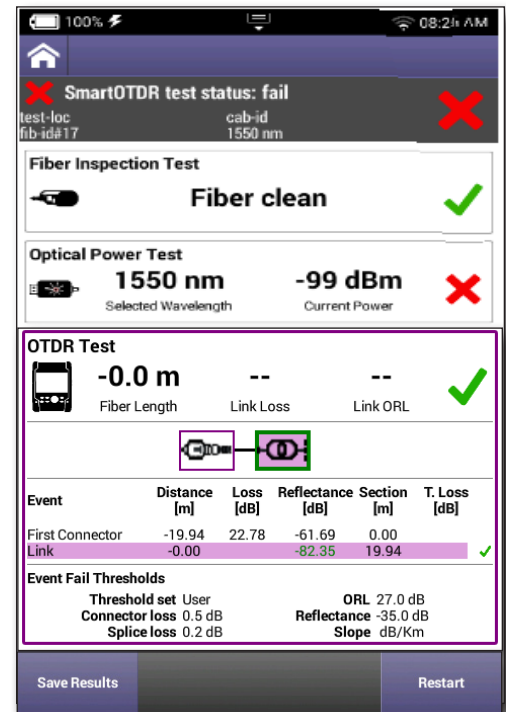
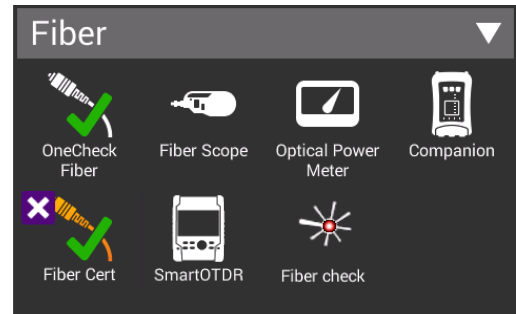
- VIAVI SmartOTDR meter



## Running a OneCheck Fiber test

The OneCheck Fiber tests automatically perform a series of fiber measurements, and compare results to user-defined threshold values and provides a pass, marginal, or fail indication.

1. Connect your instrument to the fiber line under test using a VIAVI optical power meter MP60. Attach the MP60 and fiber scope to the USB jacks on the right side of the unit.
2. From the Fiber main menu, select **Fiber Cert** or **SmartOTDR**. You can customize these profiles or use the defaults.
3. The OneCheck Fiber screen will open and start testing. The tests you have configured will run for and display the results with pass or fail marks.
4. To save the results, press the **Save Results** button. A screen comes up where you can specify the format of the saved file. Regardless of the format you chose, there will be also a JSON file saved with the same name. It is accessible on the unit and on StrataSync after syncing.



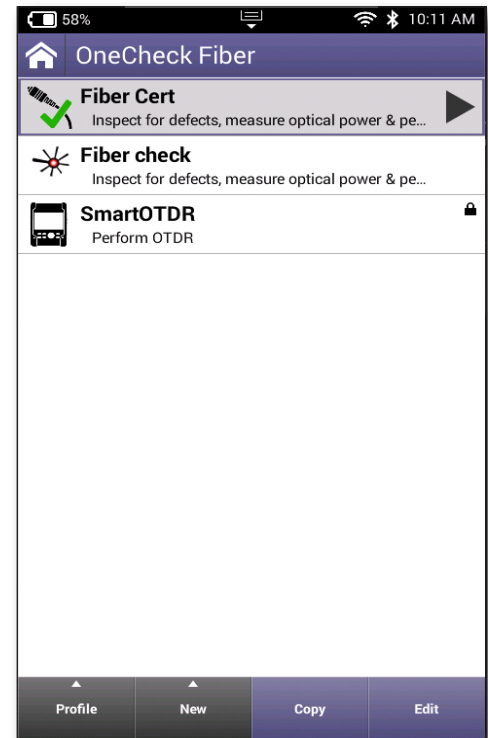
## Editing profiles

You can easily edit and create new OneCheck Fiber profiles.

1. From the Fiber menu, select **OneCheck Fiber**.
2. From the OneCheck Fiber menu, use the arrow buttons to highlight the profile you want to edit (if you select it, the test will run, instead).
3. To edit a profile, select the **Edit** button to change thresholds and the enabled tests.
  - The pass/fail thresholds can be customized or disabled on the thresholds pages. If a threshold is disabled, that measurement will still be displayed, but will not affect the pass/fail outcome.
4. To customize the profile's name, label, description, icon and other values, select the **Profile** button. For more information, see *"OneCheck Profiles" on page 68*.
  - Any customizations you make will save on the unit, unless you select **Profile** and **Restore to Defaults**, even after a software upgrade.
5. To create a new profile, select the **New** button and choose the type of profile you want to add.
6. To copy a profile and then edit from there, use the arrows to select the profile you want to copy, then select **Copy**.

The following sections detail how to configure and run each test.

You can also run a test from any configuration screen by pressing the **Start Test** button.



### NOTE:



**To save the profile to a USB, have it inserted in the unit and then save the profile. The application will save it both to the unit and to the USB.**

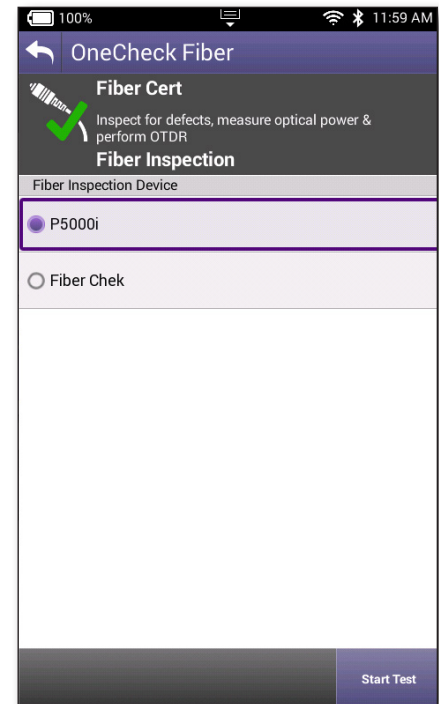


### ***Fiber Inspection***

Select **Fiber Inspection** on the configuration screen to enable this test. It's enabled by default.

Here you can choose the inspection device, **P5000i** or **FiberChek**.

When finished, press the Back arrow to go back to the configuration screen.



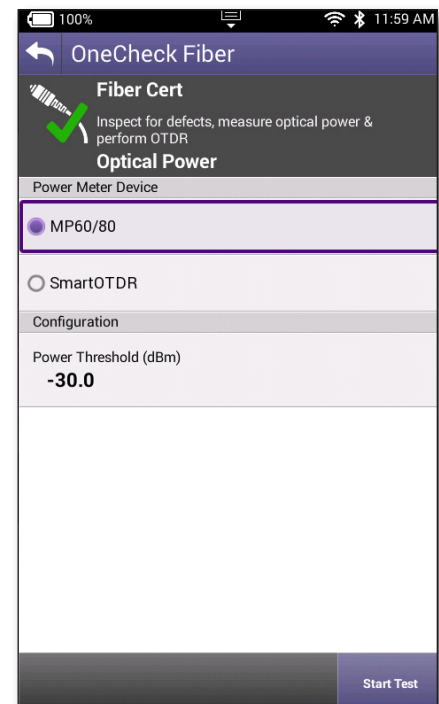
### ***Optical Power***

Select **Optical Power** on the configuration screen to enable this test. It's enabled by default.

Here you can choose the power meter device, **MP60/80** or **SmartOTDR**.

To change the power threshold, select it and adjust using the keyboard.

When finished, press the Back arrow to go back to the configuration screen.



### OTDR Test

Select **OTDR Test** on the configuration screen to enable this test. It's enabled by default.

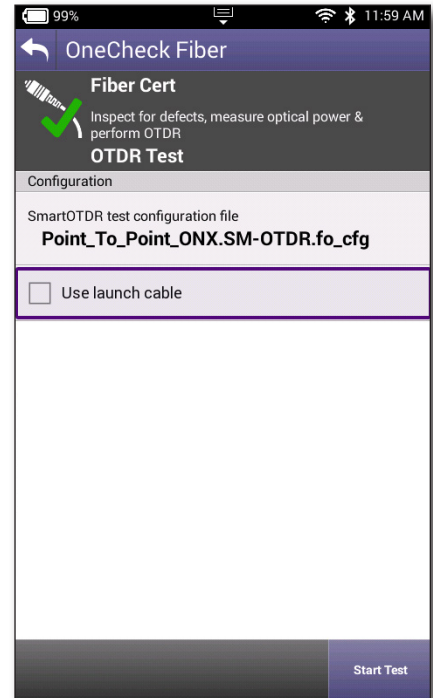
Here you can configure the following:

**SmartOTDR configuration file** – Point\_To\_Point or Short\_Link\_1km

**Launch Cable** – Launch fiber patch is being used

**Launch Cable Length** – Cable length, if launch fiber patch is being used (20m min)

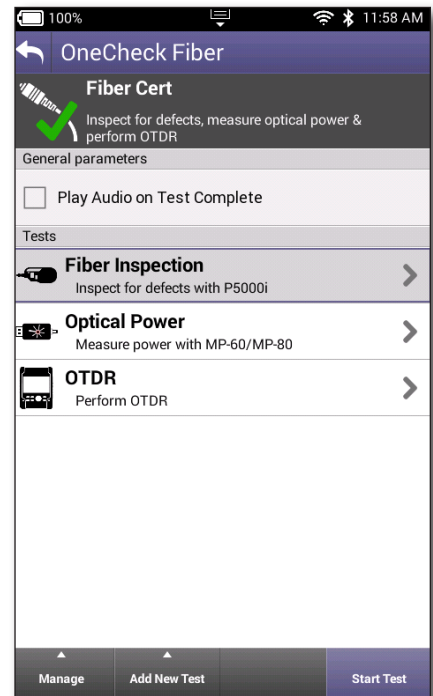
When finished, press the Back arrow to go back to the configuration screen.



## Saving the profile and launching the test

Once you are done editing the profile, press the Back arrow to return to the configuration screen for that profile. Here you have a choice of the **Manage**, **Add New Test**, or **Start Test** buttons.

The **Start Test** button will save the profile and launch the test. Once the test is launched, you can go back to the configuration screen by pressing the **Thresholds and Settings** button.



## Fiber Certification

These tests check whether the fiber connectors are clean and monitor the power of the fiber connection.

1. From the Fiber menu, select **OneCheck Fiber**.
2. From the OneCheck Fiber menu, select **Fiber Cert**.
3. Next, set the fiber parameters. These settings will be saved for your next test.

**Cable ID** – Name for the cable, required (42 characters max)

**Test Location A** – Name for the test location, required (29 characters max)

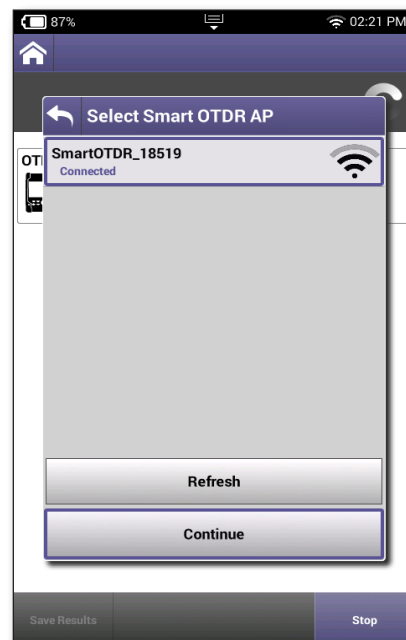
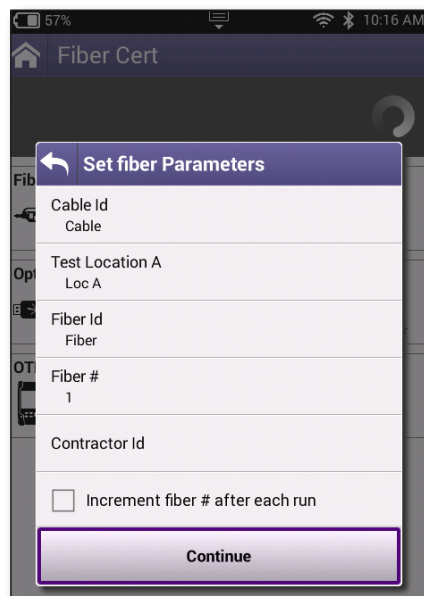
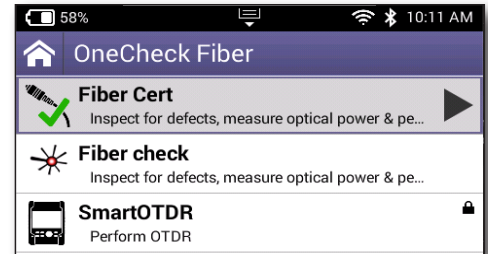
**Fiber ID** – Name for the fiber, required (42 characters max)

**Fiber Number** – Number for the fiber (4 digits max)

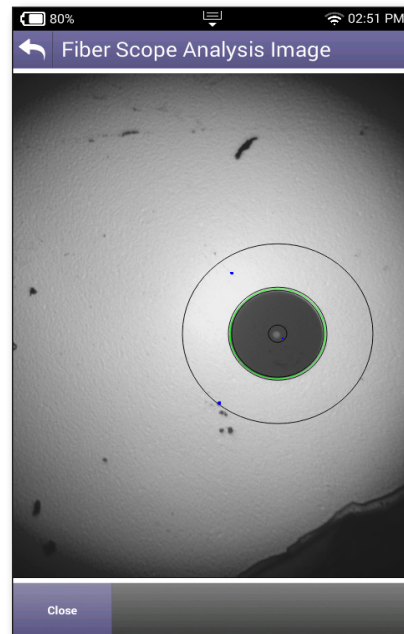
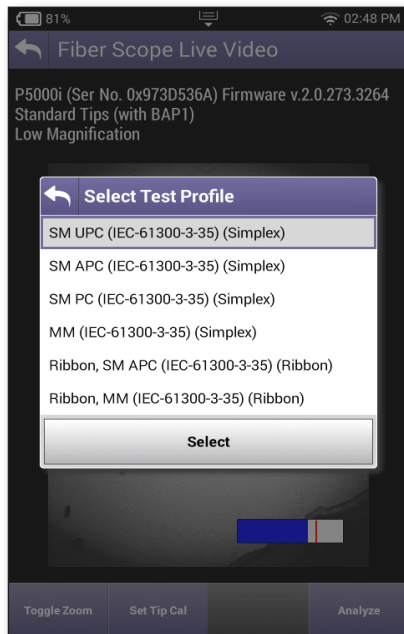
**Contractor ID** – Contractor ID (27 characters max)

**Increment fiber # after each run** – Automatically increments the fiber # for you

4. Make sure your SmartOTDR is turned on. It will create a WiFi network that you can connect your ONX shortly.
5. The OneExpert will need to connect to the SmartOTDR via WiFi. Follow the prompts to connect.
6. You will be prompted to enter the password for your SmartOTDR. See your SmartOTDR's user's guide for more information.



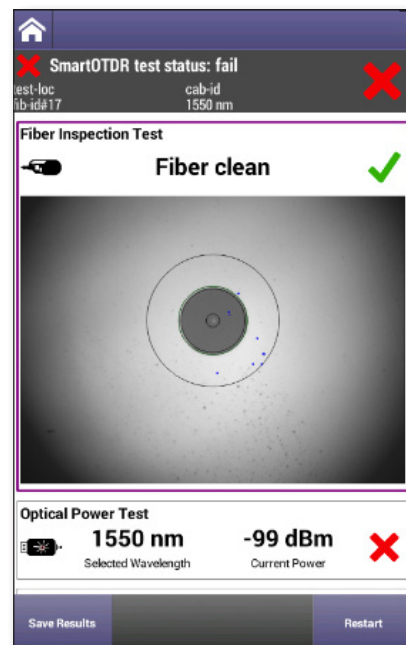
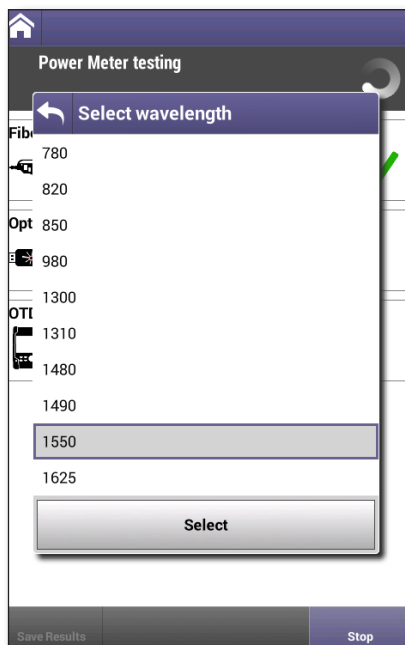
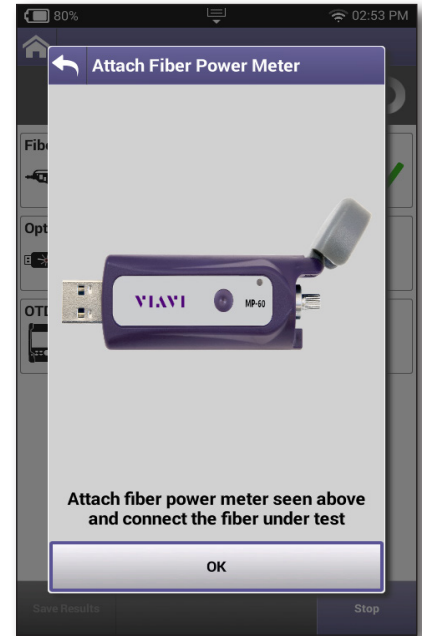
7. You will be prompted to attach the fiber scope to the USB port and select **OK**.
8. Next, select the test profile you want to use, and select **Analyze**.
9. The Fiber Scope Live video will open on the next screen, showing the connectors under microscope and the status of the test.
10. During the test, you can use the little wheel on the microscope to focus on the image. You can also press the **Toggle Zoom** button to zoom in on the image.
11. If the test detected a dirty fiber connection, you will need to clean it and retry the test before proceeding to the next step.



12. Once the fiber is clean, the next step will prompt you to attach the fiber power meter to monitor the power over the fiber connection.
13. Select the wavelength you want to use.

When finished, the tests for both the fiber certification and power meter will show if they passed or failed.

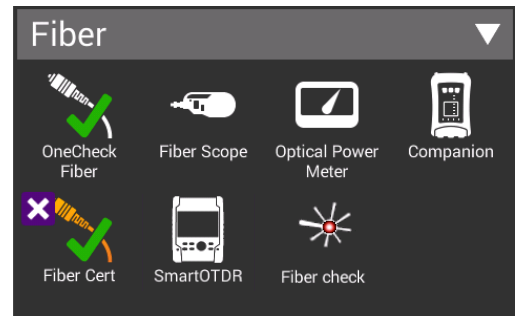
14. The test results can be saved in PDF, SOR, JSON, or XML formats.



## SmartOTDR

These tests can run fiber measurements on your VIAVI Smart OTDR E126A or SL.

1. Make sure your SmartOTDR is turned on. It will create a WiFi network that you can connect your ONX shortly.
2. From the Fiber menu, select **SmartOTDR**.
3. You will be prompted to enter the password for your SmartOTDR. See your SmartOTDR's user's guide for more information.



4. Next, the OneExpert will need to connect to the SmartOTDR via WiFi. Follow the prompts to connect.



- Once connected, set the fiber parameters. These settings will be saved for your next test.

**Cable ID** – Name for the cable, required (42 characters max)

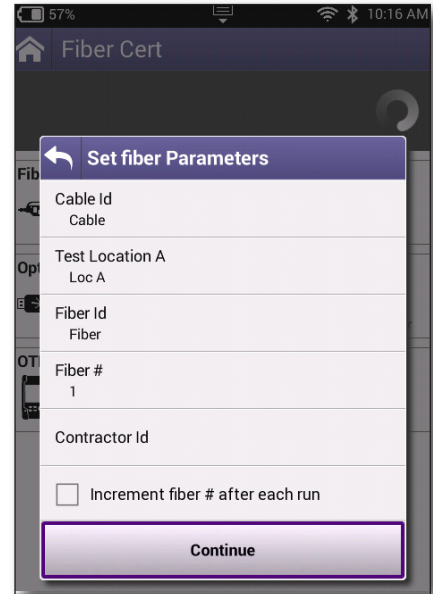
**Test Location A** – Name for the test location, required (29 characters max)

**Fiber ID** – Name for the fiber, required (42 characters max)

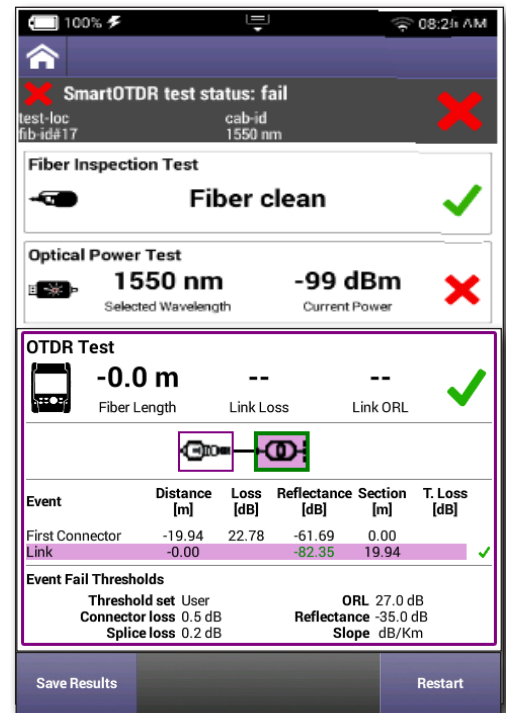
**Fiber Number** – Number for the fiber (4 digits max)

**Contractor ID** – Contractor ID (27 characters max)

**Increment fiber # after each run** – Automatically increments the fiber # for you



- When the test is complete, you can use the arrow buttons to navigate through the test and show more detail.
- The test results can be saved in PDF, SOR, JSON, or XML formats.



## NSC-100 Companion

If you have a VIAVI Network & Service Companion™, you can connect to it from your ONX via Bluetooth to run all of your tests and advanced setup.

The user interface is very similar to the Mobile Tech app, including all of the OneCheck tests, profiles, jobs, file management, reports, and testing locations.

With the Companion's OneCheck applications, you can connect to a customer's network to easily test connectivity and throughput.

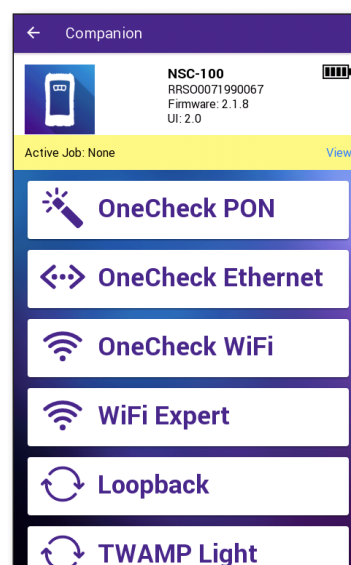
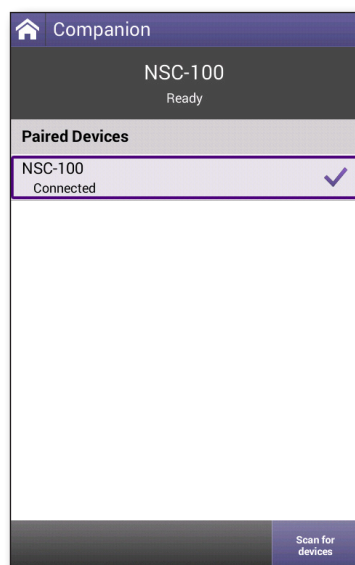
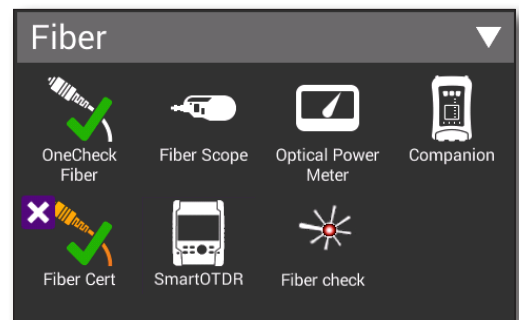
You can also ping through the modem to a network switch or web address to test for connectivity and run Traceroute to record and observe the route of traffic through the network.

1. Make sure your Companion is turned on. Your ONX will pair to it shortly via Bluetooth.
2. From the Fiber menu, select **Companion**.

The Paired Devices screen will appear and search for your Companion. Follow the prompts to connect.

Once connected, the Companion main menu appears.

3. Select a test to run it remotely on the Companion.

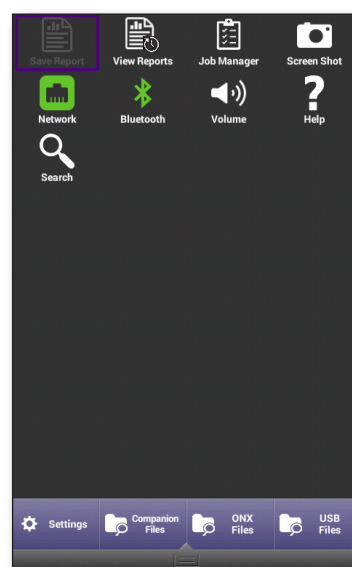
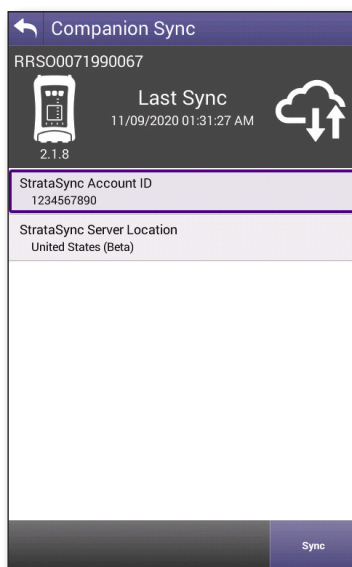
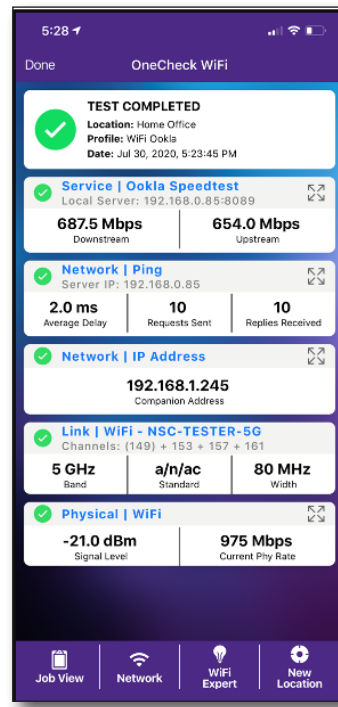
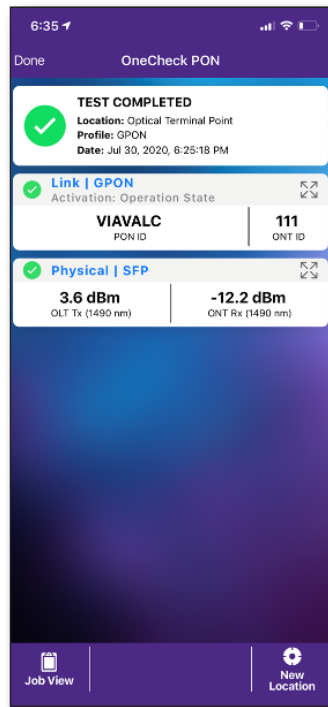




Like similar full functionality in the Mobile Tech app, you can also sync to StrataSync and update the Companion firmware from your ONX.

Use the Tray menu to manage your files for both the ONX and Companion.

For more details, see the *NSC-100 Companion User's Guide*.





## Ethernet Testing

This chapter provides instructions for using the Ethernet testing features of the OneExpert DSL, including the following:

- "About Ethernet testing" on page 204
- "Specifying Ethernet settings" on page 204
- "Connecting to the line" on page 208
- "Viewing results" on page 208
- "Running a OneCheck Ethernet test" on page 209
- "Editing profiles" on page 210
- "Testing the data layer" on page 211

## About Ethernet testing

In Ethernet mode, you can use the OneExpert DSL to emulate Ethernet terminal equipment by connecting to an Ethernet LAN or to the Ethernet port on the customer's modem. After connecting to the circuit, you can then test for connectivity and throughput.

You can also ping through the modem to a network switch or web address to test for connectivity and run Traceroute to record and observe the route of traffic through the network.

From the Main menu, select **Ethernet**.

The Ethernet tests involve the following steps:

- Specifying test settings
- Connecting to the line
- Performing tests
- Viewing results

## Specifying Ethernet settings

Before you begin testing, make sure the test settings on the OneExpert DSL match the settings of the line that you are testing.

- To access the setup screen, select the **Tests & Settings** system key or use the tray menu (swipe down from the top or press the tray system key).

**CAUTION: FAULTY RESULTS**

*Any time the Network settings are changed, the network layer resets. If you change these settings during a test, you may cause errors in the test. Only change them before you begin a test.*

## Loading a test profile

If you have previously specified the settings and saved the test profile, you can load that profile so you don't have to specify all of the settings again.

1. Press the **Load** button. (If no profiles have been saved, the button is grayed out.) A list of Setting profiles appears.
2. Select the profile to load. The settings are loaded.

## Specifying Ethernet and data mode settings

1. From the Tests & Settings menu, press the **Ethernet Settings** button.
2. Select **Data Mode** and then specify **IPoE**, **PPPoE**, or **Multi Interface**. None turns the data layer off.
3. If you selected IPoE, PPPoE, or Multi Interface, refer to their corresponding **IPoE**, **PPPoE**, or **Multi Interface** data mode sections below.

### **IPoE data mode**

1. If you specified **IPoE** as data mode, select whether to do **Automatic Login**.
2. Select **MAC Address Mode** and specify factory default or user defined.
3. Specify whether VLANs are used (a check mark indicates they are used).
4. If VLANS are used, specify the following:
  - Enter the **VLAN ID** and **Priority**.
5. Select **IP mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**. If you selected **IPv4**, choose **Static** or **DHCP** address mode.
  - If you chose **Static**, you need to add the IP addresses for:

**IPV4 Address**

**IPV4 Netmask**

**IPV4 Gateway**

**IPV4 DNS server**

- If you selected **DHCP**, you need to define:
  - Use Vendor ID**
  - Use User Class**
  - Use ClientID**
  - Use Arp announce**
- 6. Specify the network settings as described in step 6 of "*Establishing an Ethernet connection*" on page 57.

### ***PPPoE data mode***

1. If you specified PPPoE as data mode, select whether to do automatic login.
2. Enable the **VLAN** check box
3. Specify the following:
  - **VLAN ID**
  - **VLAN Priority.**
  - Select **IP mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**.
4. Enable the following:
  - **Username**
  - **Password**
  - **Use Provider**
  - **Use Service Name**
5. Specify the network settings as described in step 6 of "*Establishing an Ethernet connection*" on page 57.

### ***Multi Interface data mode***

1. If you specified **Multi Interface** as data mode, this option permits you to set **Interface Count** (the number of interfaces).
2. For each interface you can select:
  - **Interface Mode (PPPoE or IPoE)**
  - **Interface Purpose (Internet, Video, VoIP)**
3. Each interface can be enabled for VLAN. If you disable VLAN, you will proceed to **IP Mode** as the next step. If you enable VLAN, then you need to specify:
  - **VLAN ID**
  - **VLAN Priority**

4. Select **IP Mode** and then specify the network mode: **IPv4**, **IPv6**, or **IPv4/IPv6 Dual Stack**.
5. **Default Interface Setting** – The default interface setting will be used by all Ethernet/IP test applications except VOIP and Video, to direct its default traffic to the selected interface.
6. Specify the network settings as described in step 6 of *"Establishing an Ethernet connection" on page 57*

## Saving test profiles

After specifying the test settings, you can save them as a test profile.

1. Press the **Save** button.
2. Enter a name for the profile.
3. Specify whether the profile will be shown on the Home screen.
4. Press **Save**. The profile is saved.

## Connecting to the line

After specifying the test settings, you can connect to the line.

The ONX supports simultaneous usage of System Network access and Data Test access on its two external Ethernet ports. To enable this feature, select <Reserve Ethernet Port 1 for Remote Access> check box in the Remote Operations menu in the System Settings. System Network access will occur in Eth 1 jack and Data Testing will take place in Eth 2 jack. If you don't specify the port, either jack can be used for System Network Access.

**NOTE:**

*The jack closer to the top of the device is designated in this manual as Eth 2, and the other jack is referred to as Eth 1.*

1. Connect one end of an Ethernet cable to the Ethernet jack on the right side of the unit.
2. Connect the other end of the cable to an Ethernet jack.

## Viewing results

After specifying test settings and connecting to the line, you can view results.

1. Press the **Connection Details** button. Do one of the following:
  - Press **Cancel** to return to the Network menu, and then select **Network Status** or **LAN Stats**.
  - From the Network Setup menu, press the left arrow to move to the LAN Results menu, and then the left arrow again to move to the Network Status menu.
2. To save a test report, press either the **Save Report** button or the utility (i) key and then select **Save Report**. Next, specify the report settings such as report name, report format, technician ID, location, work order information, and other settings as needed.
3. To clear the results, use the asterisk (\*) key.

See [Chapter 15 Test Results](#) to learn what your results mean.



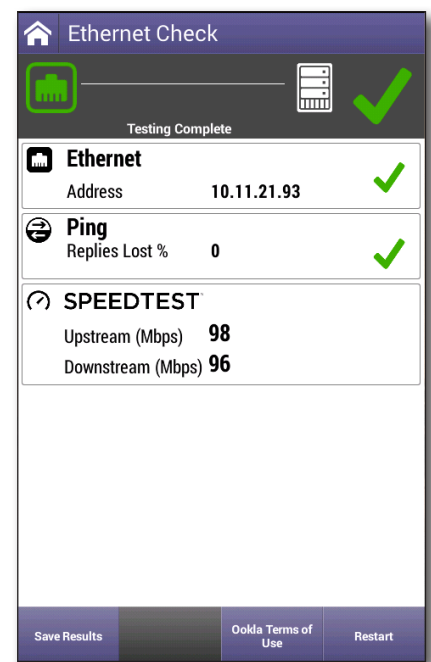
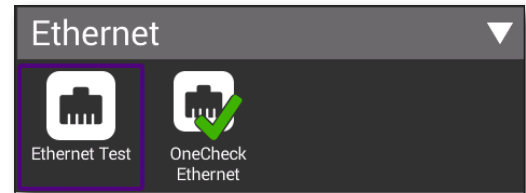
## Running a OneCheck Ethernet test

The OneCheck Ethernet test automatically performs a series of Ethernet measurements, and compares results to user-defined threshold values and provides a pass, marginal, or fail indication.

1. Connect your instrument to the line under test.
2. From the **OneCheck Ethernet** menu, select **Ethernet Check**. You can either customize this profile or use the default.
3. The Ethernet Check screen will open and start testing. The test will run for the duration you have configured for it, and then display the results with pass or fail marks.

**Note:** To run the Ookla SpeedTest, you need to accept the Terms of Use.

4. When finished, the test will show if it passed or failed.
5. To save the results, press the **Save Results** button. A screen comes up where you can specify the format of the saved file. Regardless of the format you chose, there will be also a JSON file saved with the same name. It is accessible on the unit and on StrataSync after syncing.

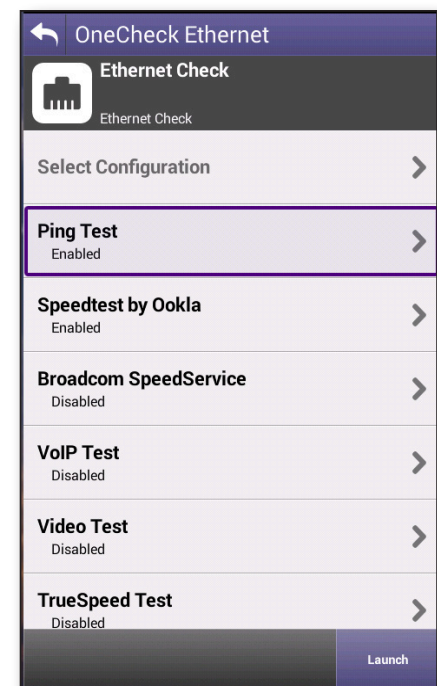
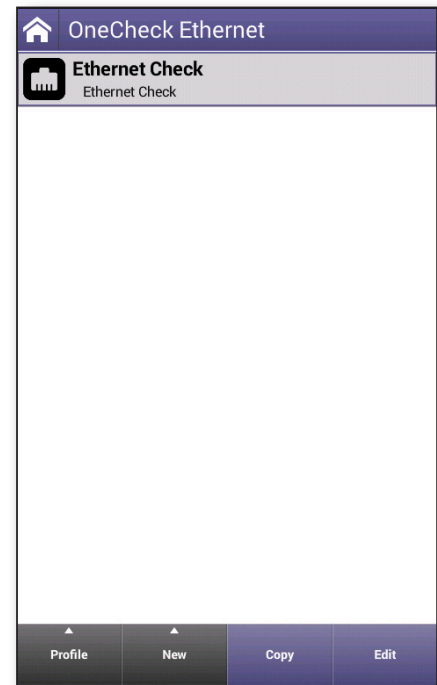


## Editing profiles

You can easily edit and create new OneCheck Ethernet profiles.

1. From the Ethernet main menu, select **OneCheck Ethernet**.
2. From the OneCheck Ethernet menu, use the arrow buttons to highlight the profile you want to edit (if you select it, the test will run, instead).
3. To edit a profile, select the **Edit** button to change thresholds and the enabled tests (Ping, Speedtest, Broadcom Speed Service, etc).
  - The pass/fail thresholds can be customized or disabled on the thresholds pages. If a threshold is disabled, that measurement will still be displayed, but will not affect the pass/fail outcome.
4. To customize the profile's name, label, description, icon and other values, select the **Profile** button. For more information, see *"OneCheck Profiles" on page 68*.
  - Any customizations you make will save on the unit, unless you select **Profile** and **Restore to Defaults**, even after a software upgrade.
5. To create a new profile, select the **New** button and choose the type of profile you want to add.
6. To copy a profile and then edit from there, use the arrows to select the profile you want to copy, then select **Copy**.

You can also run a test from any configuration screen by pressing the **Launch** button.



**NOTE:**

***To save the profile to a USB, have it inserted in the unit and then save the profile. The application will save it both to the unit and to the USB.***

## Testing the data layer

Using the data layer tests, you can test for connectivity and throughput. See [Chapter 5 Data Testing](#).



## WiFi Testing

This chapter provides instructions for using the optional WiFi testing features, including the following:

- "About the WiFi tests" on page 214
- "Scanning for WiFi networks" on page 215
- "Running Receiver Diagnostics" on page 215
- "Verifying IP connectivity" on page 216
- "Providing WiFi hotspot access" on page 216
- "WiFi Coverage Expert" on page 217
- "WiFi Troubleshooting using WiFi Coverage Expert" on page 218
- "Managing WiFi Advisor Devices" on page 220
- "NSC-100 Companion" on page 222
- "Running a OneCheck WiFi test" on page 224
- "Editing profiles" on page 225

## About the WiFi tests

The WiFi testing features of the OneExpert include the following:

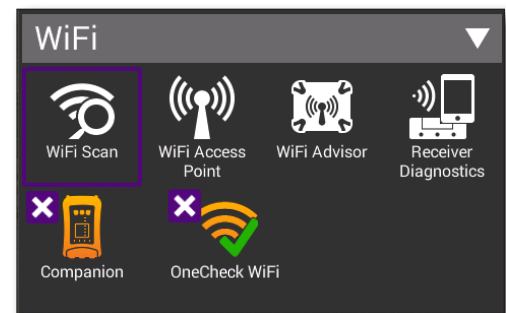
- **WiFi Scan** – Quickly determine the available SSIDs, level and channel of WiFi networks visible from any location. The test set can attach to a customer's network and provide assessment of the signal strength throughout the premises.
- **WiFi Access Point** – Provides a WiFi access point to verify IP connectivity or access to the internet.
- **WiFi Advisor**
  - SmartChannel Wizard** – Examine the surrounding 802.11 environment using a single test device. See *"WiFi Troubleshooting using WiFi Coverage Expert" on page 218.*
  - Device Management** – Register devices, view device status, and manage firmware updates.
  - Site Assessment Assistant** – Evaluate WiFi performance at critical locations within a site installation. See *"Site Assessment" on page 219.*

The Bluetooth Option is required in order to communicate with the WiFi Advisor.

- **Receiver Diagnostics** – Provides a network bridge to allow the receiver to access a mobile device for running diagnostics.
- **Companion** – If you have an NSC-100 Companion, allows you to connect and run tests remotely. See *"NSC-100 Companion" on page 222.*
- **OneCheck WiFi** – Evaluate the health and speed of your WiFi network at multiple locations. See *"Running a OneCheck WiFi test" on page 224.*

### To access the WiFi tests

On the Main menu, select **WiFi**. The WiFi menu appears.



#### NOTE:



**You cannot use Bluetooth when the ONX is acting as a WiFi Access Point (letting other devices connect to the ONX).**

**However, you can use Bluetooth when the ONX is acting as a WiFi Client (when the ONX is connecting to an Access Point).**

## Scanning for WiFi networks

The WiFi Scan is used to determine whether any WiFi networks are available, and provides the SSIDs, level and channel of any networks detected.

1. From the WiFi menu, select **WiFi Scan**. The test searches for active WiFi networks. The WiFi search process may take a few minutes. After WiFi search is finalized, results are gathered and displayed.

The WiFi access points (AP) are listed, along with the following:

- The MAC address of the access point
  - The type of encryption used (WPA-EAP, WPA-PSK, Open)
  - Security status of the WiFi network, indicated by an open or closed padlock
  - WiFi channel being used by the specific network
  - The power level of the selected WiFi Network, indicated by the signal strength (in dBm) and a colored bar graph
2. Select the APs you are interested in by selecting the corresponding checkbox or Graph All at the top of the screen.
    - To see a graph of the channels on the selected APs, press the **Channel Graph** button.
    - To see a graph of signal strength over time on the selected APs, press the **Time Graph** button.

## Running Receiver Diagnostics

If your unit is optioned and equipped to do so, the Receiver Diagnostics modes allow connection from a mobile device through the OneExpert DSL to the receiver for running a diagnostics application, such as MotoPLYR™.

In this setup, the OneExpert is providing a network bridge between the 802.11 interface and the Ethernet interface.

1. Connect the OneExpert to the receiver using an Ethernet cable.
2. From the WiFi menu, select **Receiver Diagnostics**.
3. Specify the manufacturer of the receiver: Motorola, Cisco, Other. If you select Other, enter the mobile device IP address.
4. Configure the mobile device's WiFi connection, and then wait for a wireless connection to be established between the OneExpert DSL and the mobile device. You must enter "jdsu" in the Client ID field for the WiFi connection in order for the mobile device to receive the correct IP address to run the diagnostic application.
5. Run the diagnostics application from the mobile device. The receiver can now be power cycled per the receiver instructions to initialize the file transfer.

## Verifying IP connectivity

The WiFi Access Point is used to provide a network bridge to the receiver or residential gateway (RG) and allow wireless access to the network. This allows you to ping or surf the web to verify IP connectivity behind the RG in the customer premise.

1. Connect the OneExpert to the receiver or residential gateway using an Ethernet cable.
2. From the WiFi menu, select **WiFi Access Point**.
3. Configure the WiFi connection on the other instrument (for example, a mobile device, a PC, and so on). The instrument will acquire an IP address from the receiver or residential gateway.
4. Run a ping or surf the web.

## Providing WiFi hotspot access

The WiFi Access Point is an Ethernet-to-WiFi bridge mode to create a WiFi hotspot for mobile devices such as smart phones, tablets, and laptops, etc. Connection to the internet comes from the broadband service behind the RG or router. This mode allows the mobile devices to verify internet connectivity without hunting for CPE passwords, running tests to the CO, or even configuring (or reconfiguring) the RG as required.

1. Connect an Ethernet cable from either of the OneExpert's Ethernet jacks to the broadband access point.
2. If you haven't already done so, configure the WiFi connection on the mobile device.
3. From the **WiFi** menu, select **WiFi Access Point**. The WiFi Access Point screen appears.
4. If you're not already connected to the network, select your connection method at the bottom of the screen (e.g Ethernet). The OneExpert will then connect with that method.

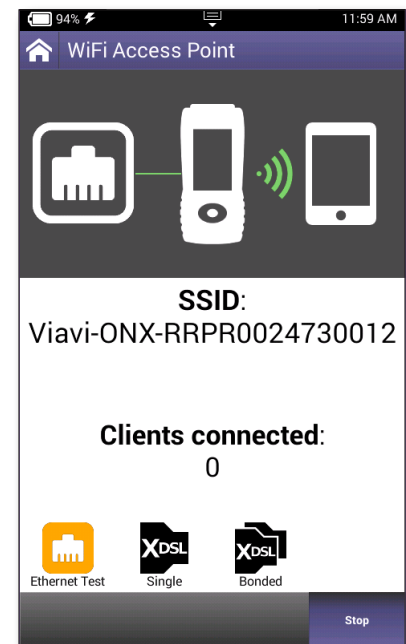
The internet connection icon will show as connected to the OneExpert:

**Green** – IP address is ready

**Gray** – IP address is not ready

**Gray with red X** – Connection lost; wire is unplugged or application error

5. On the WiFi Access Point screen, select **Start** to enable the hotspot. The WiFi signal icon will turn green between the OneExpert and your device.
6. On your device or laptop, open your WiFi settings and connect to the OneExpert's hotspot. It will appear in the list as the serial number on the side of the unit.





Once connected, the SSID of the device and the number of clients connected to the WiFi will appear. The mobile device is now connected to the internet, using the OneExpert as the WiFi access point.

**NOTE:**

***When you switch from one internet connection method to another, a popup appears to confirm you want to change the method.***

## WiFi Coverage Expert

The WiFi Coverage Expert allows you to build a report about a site by marking locations around the site. Then the application builds a report based on air time availability, number of discovered legacy (a/b/g) devices and signal strength.

You can generate, save, and review the report.

After you choose to generate a report, WiFi Coverage Expert offers to find the device. If the application detected a legacy device, it suggests you either upgrade or remove it. If either action is impossible, the application issues a warning to add an extender for the areas that have low signal strength.

## WiFi Troubleshooting using WiFi Coverage Expert

The WiFi Coverage Expert test includes the following:

- Quick, visually intuitive assessment of networks and channels used on WiFi bands
- Detailed insight of devices and other activity on a selected network to identify causes of reduced performance.

The following procedure describes how to troubleshoot a single connection on a network. This test is typically run if the service is not working properly.

1. Bring the WiFi Advisor and OneExpert to the location experiencing problems.
2. From the WiFi menu, select **WiFi Advisor**. If you have previously used a WiFi Advisor device with this OneExpert, it appears in the list of devices.

If your connected WiFi Advisor is not detected or you have not previously connected one, you will be prompted to fill out the registration page to connect one. See ["Registering and unregistering devices" on page 220](#).

3. Select a result tab at the bottom: **BSSID**, **Channel**, or **Spectral**.

These results are available for both 2.4 GHz and 5 GHz bands. Use the far right button to switch between bands. The three buttons on the top can be used to sort the results by channel number, alphabetically or by signal strength.

4. To start the WiFi Coverage Expert for a particular network, select the network from the BSSID result list. The WiFi Coverage Expert screen appears.
  - To mark an Access Point location, select **Mark Location** to bring up the Location Selection screen. Here you can choose one of the default room locations or create your own using the **Add**, **Edit**, and **Delete** buttons at the bottom.
  - To see the SmartChannel Wizard Details, select the **SCW Details** button at the bottom of the screen. The SmartChannel Wizard Details screen appears.
 

Then, select the **Summary**, **Devices**, or **Trend** buttons at the bottom.
  - To bring up the Actions screen to find problem devices, press **Done** (or **Back** if you are on the SmartChannel Wizard Details screen).

Select the problem device to have the WiFi Coverage Expert find the device and show details to help troubleshoot, such as MAC address and signal strength.

5. To save results, press the **Save Report** button or use the Tray menu **Save Report** icon.

For more detail on the results, see ["WiFi Advisor results" on page 297](#).

### NOTE:



**To change the thresholds that determine Pass or Fail for the items on the SmartChannel Wizard summary tab, return to the WiFi Advisor Home screen. The settings can be accessed by pulling down the drawer located on the top of that screen.**

---

## Audible Finders

The Audible Finders enable you to locate areas of strong audio signal for your transmitting devices and find the devices that create problems.

1. Access the audible finders via the SmartChannel devices page or Top Talkers page. You can only find the devices that are actively transmitting because otherwise you can't hear them.
2. Select the device in the Top Talker list.
3. A dialogue box will open. Use it to find the transmitting device by moving around and checking where the signal strength for the transmitting device is higher. As you walk closer to the strong signal, the device will beep faster and louder.

## Site Assessment

The Site Assessment Assistant provides connectivity through the access point for assessing WiFi performance. A WiFi Advisor and the WiFi Advisor mobile application are required for this test.

1. Take a WiFi Advisor and mobile device to the location where WiFi performance is to be assessed.
2. Connect the OneExpert DSL to the residential gateway using an Ethernet cable.
3. Follow the procedure "[\*Assessing WiFi performance throughout a site\*](#)" in the [\*WiFi Advisor User's Guide\*](#).

## Managing WiFi Advisor Devices

This section describes the WFED Management menu which is used to register WiFi Advisor devices, view device status, and manage firmware updates.

### Registering and unregistering devices

After pairing the device(s) with the OneExpert, the device must be registered in the OneExpert's WiFi Advisor application.

#### *To register WiFi Advisor devices*

1. From the WiFi menu, select **WiFi Advisor**, access the pull-down tray and select **WFED Management**. The Device Management screen appears.
2. Find the desired "WFED300AC" WiFi Advisor device.
3. If no devices are detected, scan and pair the device(s).
  - Verify that the WiFi Advisor is on and ready to pair. If it is, the blue indicator will blink; if not, long press the blue button until the light blinks.
  - Press **Scan for devices**. Any found devices are listed.
4. Enter the device label (A-Z)
5. Repeat steps 2–4 for each WiFi Advisor. The registered devices appear in the Device Management screen.

#### *To unregister WiFi Advisor devices*

1. From the WiFi menu, select **WiFi Advisor**, access the pull-down tray and select **WFED Management**. The Device Management screen appears.
2. Select the WiFi Advisor with the label (or serial number) of your device.
3. In the pop-up menu, select **Unregister Device**. A verification screen appears.
4. Do one of the following:
  - If you do not wish to unregister the device, press the **Back** arrow button (either on the screen or the physical key on the OneExpert).
  - Select **OK** to unregister your device. The device is unregistered and no longer appears in the Registered Devices list.

## Changing the power off delay

The power off delay values associated with each registered WiFi Advisor are shown within the Registered Devices section of the Device Management screen. These values define the amount of idle time that must transpire before the test device will automatically power down.

1. From the WiFi Advisor application, access the pull-down tray and select **WFED Management**. The Device Management screen appears.
2. Select the WiFi Advisor with the label (or serial number) of the desired device.
3. In the pop-up menu, select **Change Auto-Off Delay**.
4. Select the auto-off delay.

*Disabled* means it will not automatically power down regardless of expired time.

To cancel without changing the setting, press the **Back** arrow.

## Updating the WiFi Advisor firmware

The firmware on the WiFi Advisor can be upgraded over Bluetooth using the OneExpert DSL. The WiFi Advisor must be paired and registered with the OneExpert first.

1. From the WiFi menu, select **WiFi Advisor**, access the pull-down tray and select **WFED Management**. The Device Management screen appears.
2. Select the WiFi Advisor with the label (or serial number) of the desired device.
3. In the pop-up menu, select **Update Firmware**. A confirmation screen appears.
4. Do one of the following:
  - If you do not wish to update the device, press the **Back** arrow.
  - Select **OK** to update the firmware.
5. Select **Yes**. The update begins. The status bar at the top indicates the update progress.

## NSC-100 Companion

If you have a VIAVI Network & Service Companion™, you can connect to it from your ONX via Bluetooth to run all of your tests and advanced setup.

The user interface is very similar to the Mobile Tech app, including all of the OneCheck tests, profiles, jobs, file management, reports, and testing locations.

With the Companion's OneCheck applications, you can connect to a customer's network to easily test connectivity and throughput.

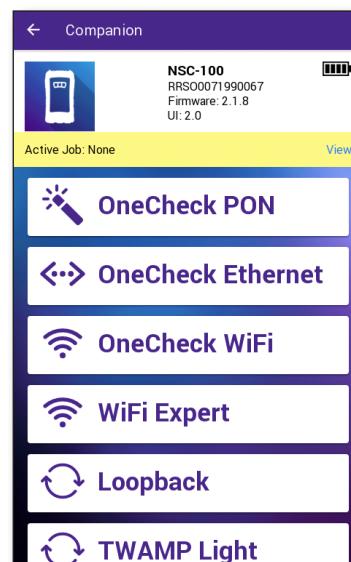
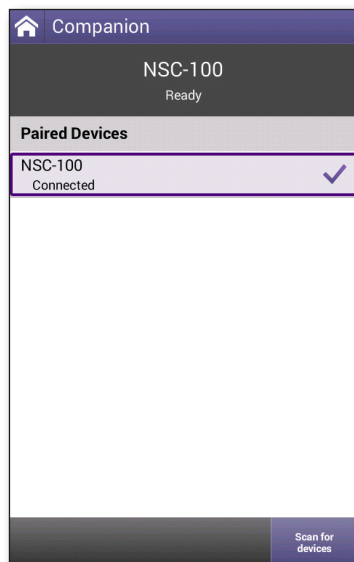
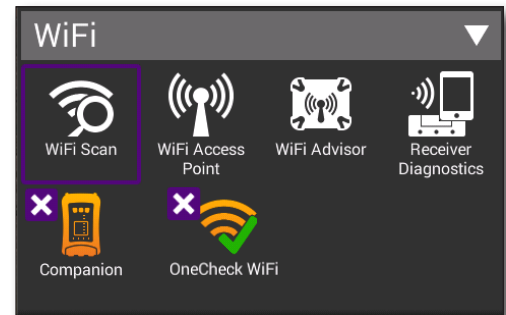
You can also ping through the modem to a network switch or web address to test for connectivity and run Traceroute to record and observe the route of traffic through the network.

1. Make sure your Companion is turned on. Your ONX will pair to it shortly via Bluetooth.
2. From the WiFi menu, select **Companion**.

The Paired Devices screen will appear and search for your Companion. Follow the prompts to connect.

Once connected, the Companion main menu appears.

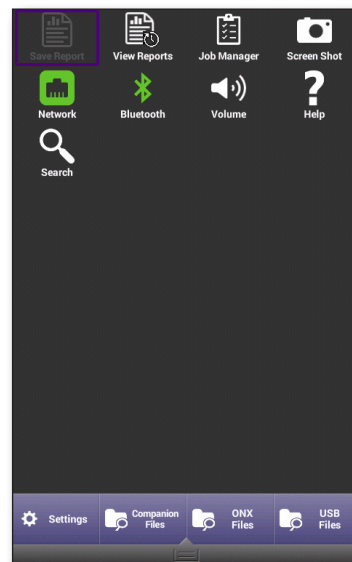
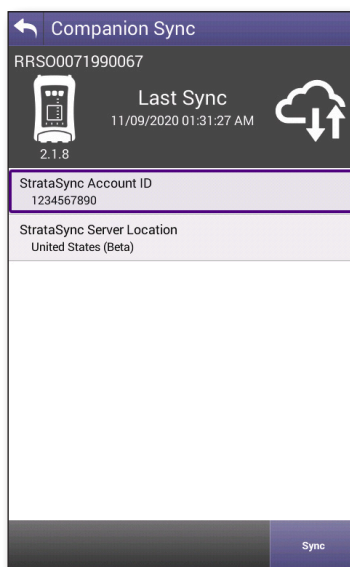
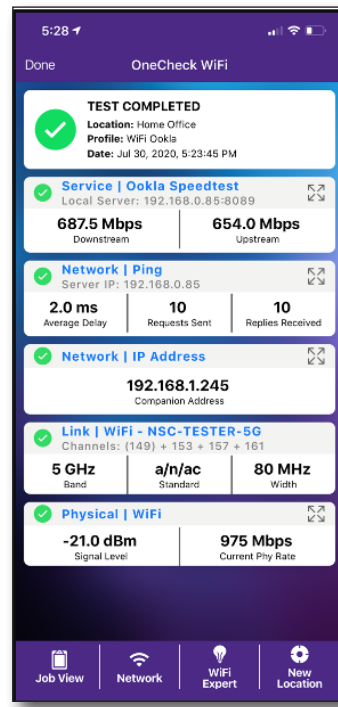
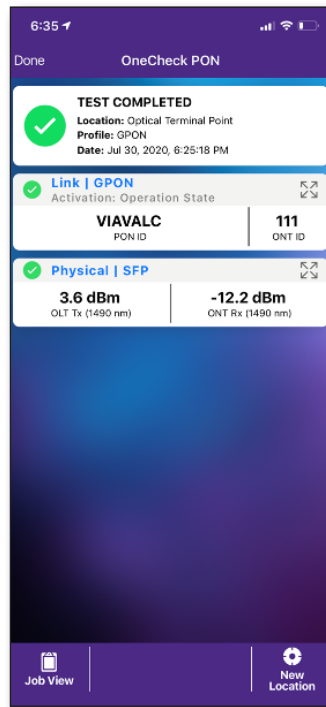
3. Select a test to run it remotely on the Companion.



Like similar full functionality in the Mobile Tech app, you can also sync to StrataSync and update the Companion firmware from your ONX.

Use the Tray menu to manage your files for both the ONX and Companion.

For more details, see the [NSC-100 Companion User's Guide](#).



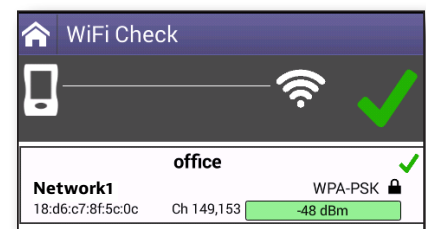
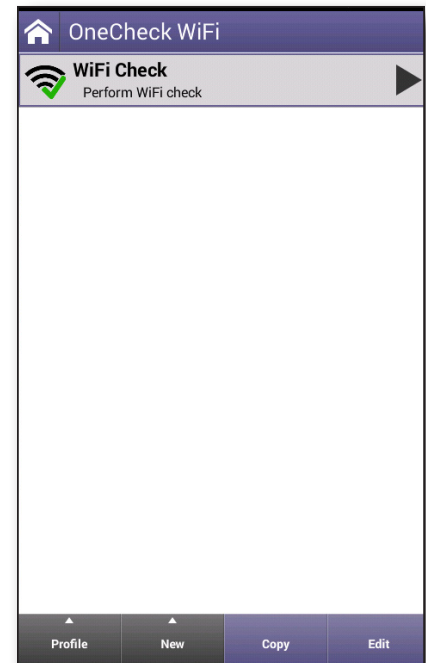
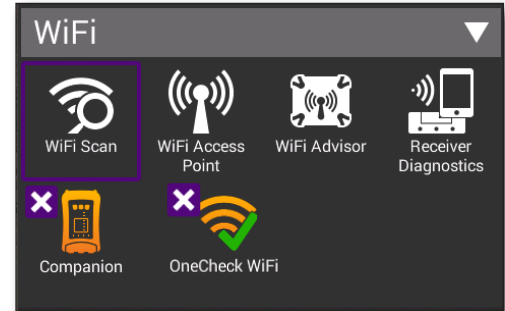
## Running a OneCheck WiFi test

The OneCheck WiFi test automatically performs a series of WiFi measurements, and compares results to user-defined threshold values and provides a pass, marginal, or fail indication.

1. From the WiFi menu, select **OneCheck WiFi**. The OneCheck WiFi screen appears.
2. Select a profile for the test, or create a new one. You can either customize this profile or use the default.

If you are already connected to the WiFi network, a pop-up will ask you to confirm you want to disable WiFi to run the test. Select **Disable WiFi** to continue.

3. Select a pre-defined location for the test or create your own. Select **Continue** again when you are ready to test the location.
4. Select the WiFi network you want to test, and press **Continue**.
5. The WiFi Check screen will open and start testing. The test will run for the duration you have configured for it, and then display the results with pass or fail marks.
6. To add another location, select **Continue** and add a new location.
7. When finished, select **Done** and the test will show if it passed or failed.
8. To save the results, press the **Save Results** button. A screen comes up where you can specify the format of the saved file. Regardless of the format you chose, there will be also a JSON file saved with the same name. It is accessible on the unit and on StrataSync after syncing.



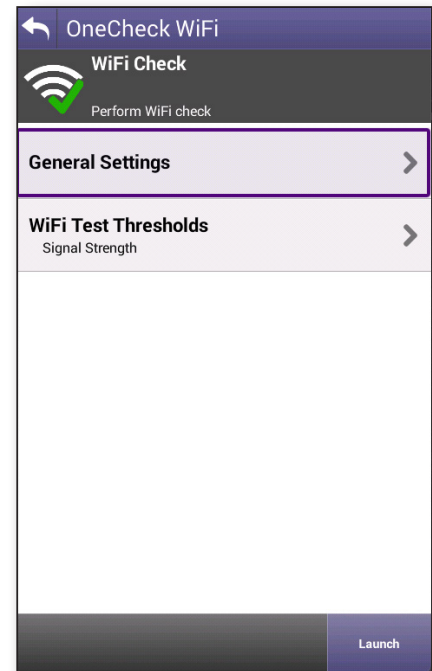
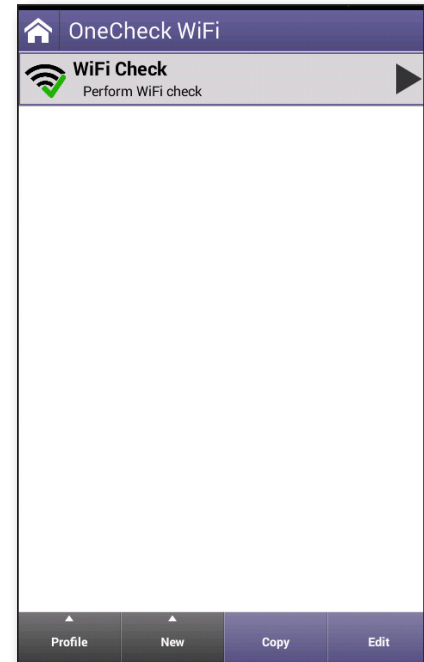


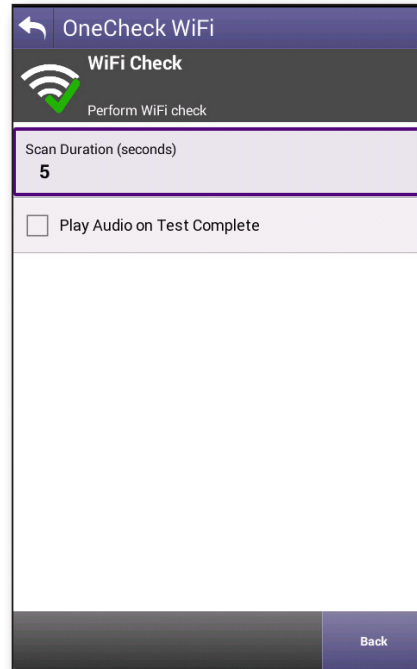
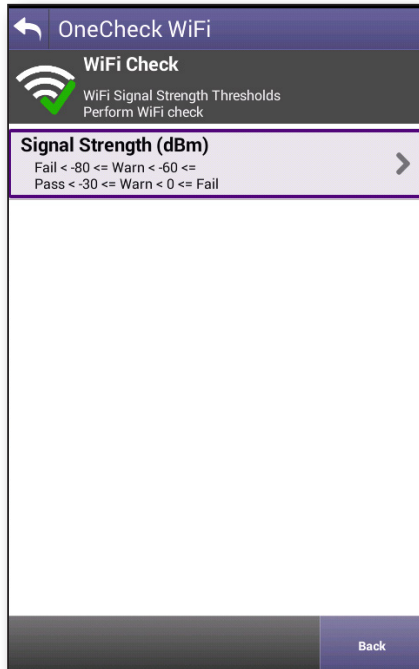
## Editing profiles

You can easily edit and create new OneCheck WiFi profiles.

1. From the WiFi main menu, select **OneCheck WiFi**.
2. From the OneCheck WiFi menu, use the arrow buttons to highlight the profile you want to edit (if you select it, the test will run, instead).
3. To edit a profile, select the **Edit** button to change thresholds and the duration.
  - The pass/fail thresholds can be customized or disabled on the thresholds pages. If a threshold is disabled, that measurement will still be displayed, but will not affect the pass/fail outcome.
4. To customize the profile's name, label, description, icon and other values, select the **Profile** button. For more information, see *"OneCheck Profiles" on page 68*.
  - Any customizations you make will save on the unit, unless you select **Profile** and **Restore to Defaults**, even after a software upgrade.
5. To create a new profile, select the **New** button and choose the type of profile you want to add.
6. To copy a profile and then edit from there, use the arrows to select the profile you want to copy, then select **Copy**.

You can also run a test from any configuration screen by pressing the **Launch** button.





**NOTE:**

***To save the profile to a USB, have it inserted in the unit and then save the profile. The application will save it both to the unit and to the USB.***

## Wiring Tools

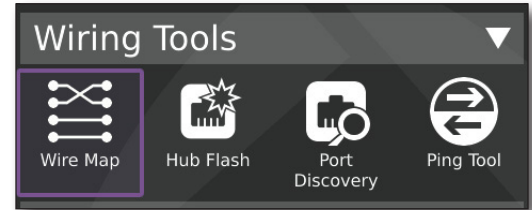
This chapter provides instructions for gathering test statistics and verifying connectivity, including the following:

- "About the Wiring Tools" on page 228
- "Wire Mapping" on page 228
- "Hub Flash" on page 230
- "Port discovery" on page 231
- "Ping Tool" on page 231

## About the Wiring Tools

The purpose of the Wiring Tools tests are to test and map CAT3 (POTS) and CAT 5/6 (Ethernet) cables/wires.

From the main menu, select **Wiring Tools**.



## Wire Mapping

These tests are used to test and map cables/wires. These tests require the use of the smart remote on the far end of the cable.

There are two wire mapping tests:

- **Mapping** – Calculate cable length based on measured capacitance, using the user-specified length constant setting. This test also shows the wire mapping between any two pairs in the cable.
- **Toning** – Mapping the wires by sending a tone across the cable.

### Mapping

1. Do one of the following:
  - If testing a telephone cable, connect RJ-11 cable to the RJ-11 **Wiring** connector on the right panel of the unit.
  - If testing a network cable, connect RJ-45 cable to the RJ-45 **Wiring** connector on the right panel of the unit.
2. From the Wiring Tools menu, select **Wire Map**. The **Wiremap - Pin Mapping** screen appears. If Trace Toning appears, select either the **Cat3** or **Cat5/6** function key.
3. To adjust the Length Constant setting, either drag the line across the length constant bar or press the + or - key.

If the Length Constant bar is not displayed, swipe down on the screen to view the tray menu. Select **Show Length....** To reset the Length Constant to the default, swipe down on the screen to view the tray menu. Select **Reset Length....**

To hide the Length Constant bar, swipe down on the screen to view the tray menu. Select **Hide Length Constant**.

Cable type	pF/ft	pF/m
Data cable		
Cat3	19.0	62.5
Cat5, Cat5eCat, Cat6	15.0	49.0
Coaxial cable		
RG58	27.5	90.0
RG6, RG11, RG59.	16.25	53.0
Security wire		
22AWG, Jacketed	24.0	78.5
22AWG, Unjacketed	14.0	46.0
20AWG, Unjacketed	16.0	52.5
18AWG, Unjacketed	17.0	55.5

4. For greatest accuracy, VIAVI recommends that you perform a wiring compensation to remove the effects of the test leads.
  - Swipe down on the screen to view the tray menu
  - Select **Wiring Compensation**.
  - Follow the instructions on the screen to connect or disconnect the leads to perform the compensation.
  - Select **Compensate**.
  - After the compensation stops, press **Exit**.
5. Press the **Start** system key to begin the test. The following table describes the Wiremap test results.

The test is complete.

Results	Description	Units	Range/ Values
Length Constant	This is the current SET length constant used to calculate cable length based on measured capacitance	pF/ft	
Results	This shows the wire mapping between any two pairs in the cable		
Length	Cable length calculated based on Length constant.	ft	10.1 – 39.3

## Sending tones

The purpose of this test is to send a tone on a network cable. By default, the OneExpert DSL sends tone on all the wires of a cable.

1. Do one of the following:
  - If testing a telephone cable, connect RJ-11 cable to the RJ-11 **Wiring** connector on the right panel of the unit.
  - If testing a network cable, connect RJ-45 cable to the RJ-45 **Wiring** connector on the right panel of the unit.
2. From the Wiring Tools menu, select **Wire Map**.
3. Select the **Toning** function key. The Trace Toning screen appears.
4. To start toning the cable, select one of the following:
  - **High-Low** – Sends a high tone follow by a low tone on all leads of the connected cable.
  - **Low Short High** – Sends a low tone followed by a short high tone on all leads of the connected cable.
  - **High** – Sends a continuous high tone on all leads of the connected cable.
  - **Low** – Sends a continuous low tone on all leads of the connected cable.
5. After you finish the test, select **Off**.

## Hub Flash

The hub flash function is used to send an intermittent link signal to flash the link status light on the Ethernet hub. Using this test, you can locate which port on the hub is being used. This is useful for troubleshooting when the test access port is in a different physical location than the hub.

1. Connect an Ethernet cable from the Residential Gateway port to an **Ethernet** connector on the side of the OneExpert DSL.
2. From the Wiring Tools menu, select **Hub Flash**.
3. If needed, change the settings for **Cadence**, **Rate**, **Duplex**, or **NIC Wiring** by either pressing the setting or using the arrow keys to highlight a setting and then press the **OK** button.
4. Select **Start** to begin the test.
5. Go to the location of the hub and observe the link activity LEDs. The port that is connected to the instrument will blink.
6. To end the Hub Flash test, press the **Stop** softkey.

## Port discovery

The port discovery feature determines the capability of the port and established connection speed. In case of mismatch ensure the proper pin out or usage of cat 5/6 pair.

1. Connect an Ethernet cable from the Residential Gateway port to an **Ethernet** on the side of the OneExpert DSL.
2. From the Wiring Tools menu, select **Port Discovery**.
3. Select **Start** to begin the test.

The Capability is displayed on the left side of the screen, the Established Link is displayed on the right side of the display.

The table displays the Pair, Skew, and Polarity.

## Ping Tool

The Ping Tool is used to verify connectivity to various network resources, and selected IP addresses.

1. Connect an Ethernet cable from the Residential Gateway port to an **Ethernet** connector on the side of the OneExpert DSL.
2. From the Wiring Tools menu, select **Ping Tool**.
3. If the unit is set up to DHCP, it automatically receives an IP Address and displays the Gateway and DNS.
4. To set a Ping Target, do the following:
  - Select **Ping Target**.
  - Select a target.
  - Enter an address such as [www.yahoo.com](http://www.yahoo.com)
  - Select **OK**.
5. Press **Start**.

The OneExpert DSL pings the Gateway, DNS and any specified Ping Targets.





## In Home Testing

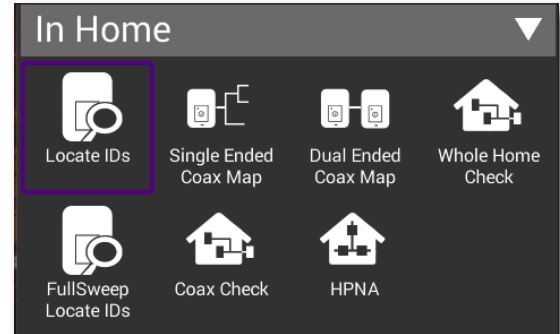
This chapter provides instructions for using the Smart IDs, Full Sweep Coax, and optional HPNA testing features, including the following:

- "About SmartID tests" on page 234
- "Locating SmartIDs" on page 234
- "Coax Map test" on page 236
- "Whole-Home Check" on page 239
- "About the Full Sweep Coax Test" on page 242
- "Locating SmartIDs" on page 242
- "Coax Check" on page 244
- "About HPNA Testing" on page 247
- "Monitoring the HPNA network" on page 248

## About SmartID tests

The purpose of SmartID tests are to test and map cables/wires, verify that the HPNA links and devices are installed and fully provisioned, and to verify that the entire HPNA network is operating correctly

From the Main menu, select **In Home**.



## Locating SmartIDs

The purpose of this test is to identify up to 16 SmartIDs on the network, as shown here. The SmartIDs will work through splitters, and multiple SmartIDs can be detected simultaneously.

### 1. Register the SmartIDs.

If this is the first test with the SmartIDs, a warning message appears asking you to register the SmartIDs.

- If using the Bluetooth SmartID Plus, pair it with the OneExpert and then connect to the SmartID Plus. (For more information, refer to the *SmartID Plus Quick Start Guide* that shipped with the SmartIDs.) The other SmartIDs need to be registered as described below.



### **NOTE:**



**The registration applies to the SmartID that the OneExpert is physically connected to. You will need to repeat the procedure for each SmartID, connecting it directly to the OneExpert.**

- If the Registration doesn't automatically come up, select **Actions**, and then press **SmartID Registration**.
- Do one of the following:
  - Use the up and down arrows to highlight the label letter for the SmartID and then press **OK**.
  - Press the letter for the SmartID.

- Plug in the SmartID or enter the serial number (if the SmartID is plugged in, it will advertise its serial number to the OneExpert).
  - Repeat these steps for each SmartID. The SmartIDs are registered.
2. Connect a master probe. Do one of the following:
    - If using the Bluetooth SmartID Plus, verify that it is paired and connected to the SmartID Plus. (For more information, refer to the *SmartID Plus Quick Start Guide* that shipped with the SmartIDs.)
    - If using the USB SmartIDs, connect the USB cable from OneExpert to one of the SmartIDs.
  3. Connect SmartIDs (including the master probe) to the coax at any location in the home where network qualification or troubleshooting is desired, such as set-top boxes or residential gateways. See "[Whole-Home Check](#)" on page 239.
  4. On the In Home menu, select **Locate IDs**.
  5. If the test doesn't automatically start, press **Start**. The test runs and then displays the IDs found.
  6. Use the **Save Report** button or Tray menu to save a report.

**ALERT!**

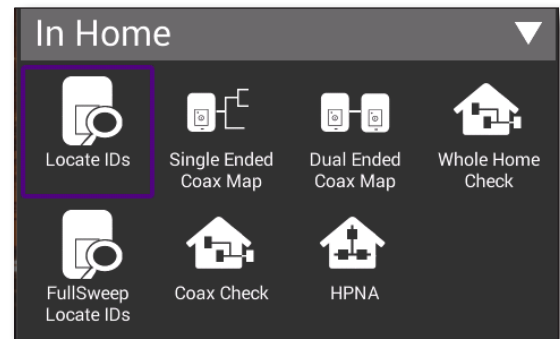
***The OneExpert should not be moved while a SmartID test is running. It needs to stay within a reasonable distance of the Bluetooth master probe while the test remains active (10 feet or less preferred, no more than 15 to 20 feet).***

***If testing with a mobile device, it does not affect the connection; you can move around with the mobile device. Similarly, if the mobile app loses connection to the OneExpert, it will not affect the SmartID test in progress.***

## Coax Map test

The purpose of this test is to map out the topology of a coax network, from a single point, without having to perform a two ended test using far end devices. This measurement can be used to locate devices in a coax cable such as barrels, splitter, and splices.

1. Connect to a SmartID Plus using Bluetooth.
2. On the In Home menu, select **Single Ended Coax Map**. The Coax Map screen is displayed.
3. Select **Mode** and specify a Map Mode:
  - Single-Ended Coax Map
  - Dual-Ended Coax Map
  - VDSL Home Run Check
  - Whole-Home Check (no diplexer)
  - Whole-Home Check (through diplexer)



The table below describes the Coax Map results.

Results	Description	Range/Values
Length (ft.)	Total length of the coax leg from test instrument.	0-500
dBrI	Return loss of the coax leg.	
Comment	Description of the event that was detected in the coax cable.	Unknown, Open, Splitter, Barrel/Splice, Splitter*, and Low-Quality Splitter (see below for descriptions)

**Unknown** – This label is used as a last resort when no other signatures can be identified.

**Open** – Indicates an event that has high return loss.

- A home-run cable with no passive devices should indicate an open at close to 0 dBrI
- A cable with a 2-way splitter may have two opens at close to -7 dBrI.
- A cable with a 3-way splitter may have two opens at -14 dBrI and one open at -7 dBrI

**Splitter**– Indicates a passive splitter may be present at this length in the cable under test.

**Low-Quality Splitter** – Indicates a low-quality splitter may be present at this length. Low-quality splitters can induce standing waves and cause poor performance. These low-quality splitters can also cause conventional cable ID to function incorrectly since many are DC coupled, causing the ID resistive values to be placed in parallel.

**Splitter\*** – Indicates an assumed splitter. The instrument has not detected a splitter signature. However, based on the data signature the instrument has deduced that a splitter is likely present.

**NOTE:** If the length to the splitter\* and the first open are the same, it is likely a splitter with an open port.

**Barrel/Splice** – Indicates an event was detected followed by a single low loss open event. This can be caused by barrel splices, low-quality splitter with an open port, severely kinked or crimped cable (stables), poor connector, etc.

The return loss of the barrel/splice event should be considered when determining what action, if any, is required. Lower return loss (around -20 dBrl) values may not require action, but high values indicate an event that may be effecting cable performance.



**NOTE:**

***In the unlikely event that the legs of a splitter are the same length, the instrument will report a single event with a return loss value that approximately equals the sum of the events.***

A cable ID is displayed above the system keys. The OneExpert will only find an ID if it's connected to a single cable with an ID on the other end. The RFIDs, however, will work through splitters and multiple tags can be detected.



**NOTE:**

***The cable ID won't work properly if there's a cable plugged into the side of the unit (you must only use the coax connector on the top).***

For any given coax cable, the coax map test locates each item and presents the results in an easy to read table. The table indicates the location of items in terms of a length in feet, from the test instrument. The table also indicates the return loss at each item in dBrl.

If possible, the OneExpert will also identify items such as opens, splitters, barrels, or splices based on TDR measurements performed on the cable. In some cases, based on reflection characteristics, the test set will indicate the presence of bad splitters. If unusual cable characteristics are measured, the OneExpert will indicate an "unknown" item in the cable.

If the number of legs on a splitter are different than the number of RFIDs, a warning appears.

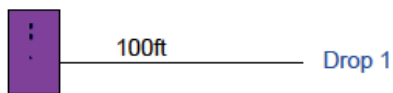
If the OneExpert is used to measure a home-run cable, it will indicate an 0 dBrl open, and the full length of the cable.

**TROUBLESHOOTING TIP:**

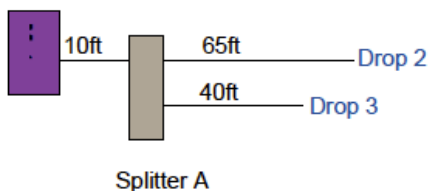


***If the results table indicates four or more events, it may indicate a situation where a complex cable topology is causing multiple reflections. In this case, measurement accuracy can be improved by performing step by step sectionalization starting with the first item in the table.***

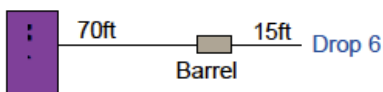
The following shows several cable topologies on the left and the corresponding coax map table on the right. The dBrl level at each splitter will be relatively low and depend on the quality of the splitter. Lower return loss indicates a better splitter.



Length (ft)	dBrl	Comment
100	0	Open



Length (ft)	dBrl	Comment
10	-20	Splitter
50	-7	Open
75	-7	Open



Length (ft)	dBrl	Comment
70	-20	Barrel/Splice
85	-3	Open

## Whole-Home Check

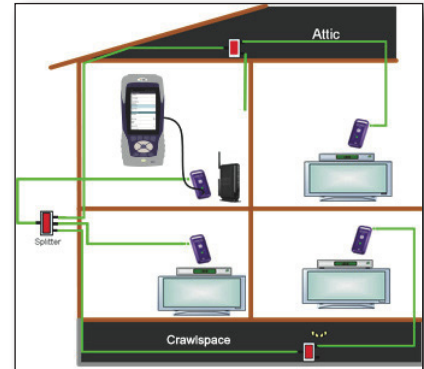
SmartIDs allow the technician to connect the OneExpert directly to any single SmartID device which then communicates with any other connected SmartID devices in order to certify an in-home network and provide distances to found impairments, as shown here.

If a diplexer is on the network, disconnect the VDSL connection.

The difference in the SmartIDs versus the other terminators is that the terminators only indicate their location; whereas the SmartIDs each also are used to identify their location, but also each SmartID does a broadband noise ingress measurement, dual-ended FDR for coax mapping and frequency sweeping to locate impairments.

There are three test modes:

- **Locate SmartIDs** – Finds and identifies all SmartIDs currently connected to the network.
  - **Home Run Check** – A two-point (two SmartIDs) test across the cable connecting at the residential gateway and the diplexer locations.
  - **Whole-Home Check** – Tests a complex cable network that may or may not include a diplexer. It is intended to qualify the network for HPNA. It maps a coax network and provide distances to found impairments.
1. Disconnect the cable or DSL feed. If using a diplexer, disconnect the feed to the diplexer (and leave it open).
  2. Connect a SmartID at the point of entry and use the USB cable to connect the



**NOTE:**

***All live network signals must be disconnect from the coax network under test.***

OneExpert to the SmartID.

In order to map the network accurately, make sure that you connect to the primary SmartID (connected to the OneExpert with a USB cable) on the main side of the residential gateway or splitter and not on a branch leg.

3. Place other SmartIDs at any location in the home wherever network qualification or troubleshooting is desired, such as TVs, set top boxes or cable modems.

There are three possible test configurations:

- **NID without diplexer** – The primary SmartID (connected to the SCH with a USB cable) should be connected at the RG (in place of the RG), and the remaining SmartID probes should be connected at the receivers (in place of the receivers).
- **NID with diplexer** – The primary SmartID (connected to the SCH with a USB cable) should be connected at the RG (in place of the RG), and the remaining SmartID probes should be connected at the receivers.

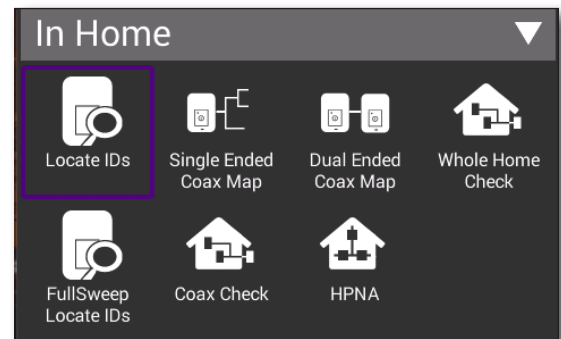
When a diplexer is on the network, the VDSL connection must be disconnected.

- **INID** – The primary SmartID (connected to the SCH with a USB cable) should be connected at the INID coax connection feeding into the home (disconnected from the INID), and the remaining SmartID probes should be connected at the receivers.

When connecting a SmartID to a wall plate, it is recommended to use a coax jumper cable of at least 3 feet in length.

Ensure that all devices except SmartIDs are disconnected from the network.

4. On the In Home menu, select **Whole Home Check**.
5. On the Select SmartID Test Plan screen, select whether to test through a diplexer (**RG - Through Diplexer**) or not (**RG - No Diplexer**).
  - For the NID without diplexer configuration, select **RG - No Diplexer**.
  - For the NID with diplexer configuration, select **RG - Through Diplexer**.
  - For the INID configuration, select **RG - No Diplexer**.



6. Begin the test. During the test, a pop-up message appears if any of the following is detected:
  - Near-end connection issue (e.g. open, short, loose connection, poor fitting, poor barrel on SmartID)
  - Far-end connection issue (e.g. poor connection, fitting barrel, etc; partial short)
  - SmartID(s) detected but not mapped issue
  - SmartID mapping placement questionable (due to processed FDR data producing ambiguous length/location data for the particular SmartID probe)
  - Excessive noise ingress measured
  - Network Map obscured message warning for diplexer, filter, amplifier, etc.
  - Test fails if there is filter(s) or amplifier(s) present in the network

Note that the "RG – Through Diplexer" test allows a diplexer in the network.

After the test completes, the result test summary appears.



The test summary displays the paths between SmartIDs and indicates whether the quality of the path between the two points is passing or failing based on pre-set limits.

The upper right area shows how many SmartIDs were detected and how many were mapped; it will be red if the numbers don't match.

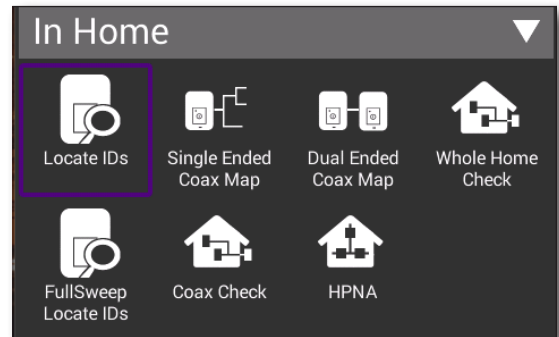
The left side of the screen will show the frequency sweep and noise ingress measurement results for each highlighted box, which corresponds to the two points between SmartIDs in the coax network.

7. To save the results to a report, use the Tray menu.

## About the Full Sweep Coax Test

Full Sweep Coax test checks noise levels and downstream/upstream loss in a network. This test is similar to the Whole Home Check without diplexer, but covers the frequency range beyond the HPNA specification to test non-HPNA networks. The application conducts sweep tests between 2 MHz and 1.6 GHz, maps networks and implements several pass/fail criteria to evaluate the network when no diplexer is present. It conducts measurements at all end points, using 2 or more SmartIDs, and checking noise ingress and physical impairment location.

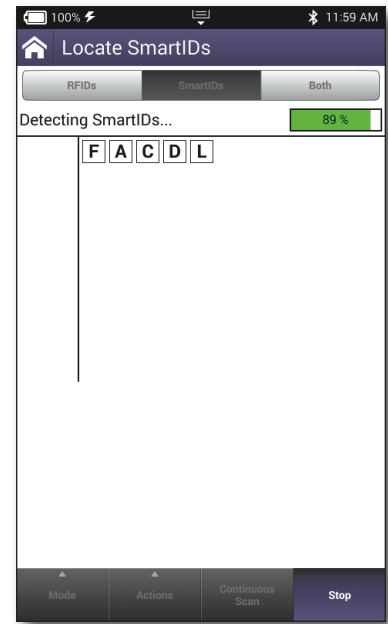
Full Sweep Coax test contains two applications: **Locate IDs** and **Coax Check**.



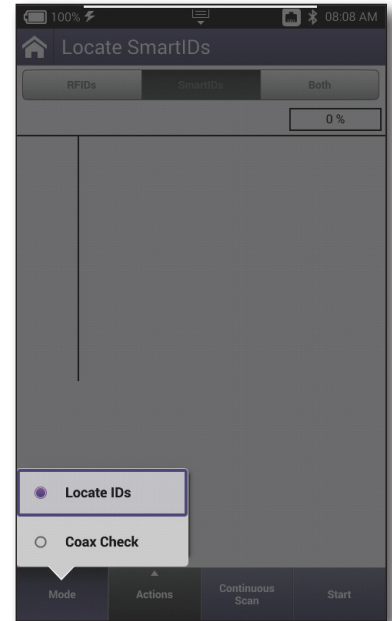
## Locating SmartIDs

The **Locate IDs** application helps identify the presence of SmartIDs in a network. Similar to the **HPNA Locate IDs** application (found under the **HPNA Coax - SmartID** category on the home screen), the Full Sweep Coax Locate IDs allows the user to register SmartID or SmartID Plus probes, update the firmware on any probe connected to the ONX 580 via mini-USB, and load test files. It may also be used to locate RFIDs in the network.

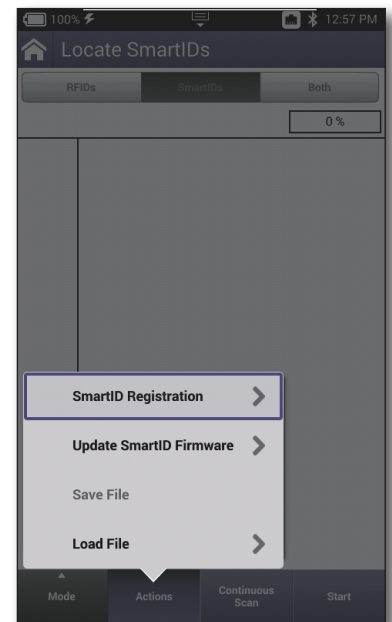
The application opens to the default tab **Locate SmartIDs**.



Press the **Mode** softkey to navigate between the **Locate IDs** and the **Coax Check** applications, as shown here.



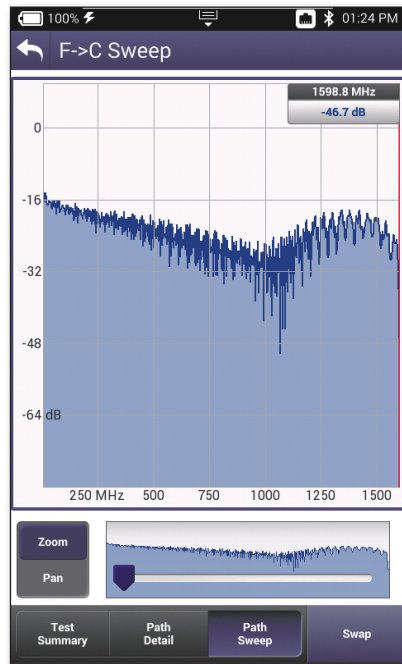
The **Actions** softkey allows the user to register new SmartID and SmartID Plus probes as well as update the firmware on any probe. The user may also load an existing test file to view the past results. These functions are the same as *"Locating SmartIDs"* on [page 234](#).



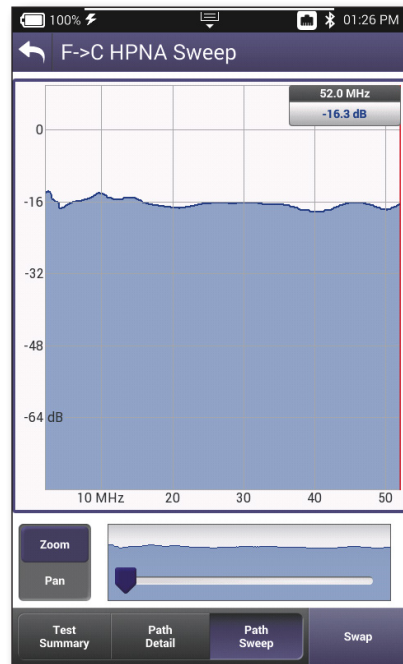
## Coax Check

Full Sweep Coax Check is similar to the Whole Home Check (No Diplexer) application we discussed earlier in the chapter, with a few key differences.

Firstly, the frequency sweep is conducted between 2 MHz and 1.6 GHz, unlike the Whole Home Check application that sweeps from 2 MHz to 52 MHz.

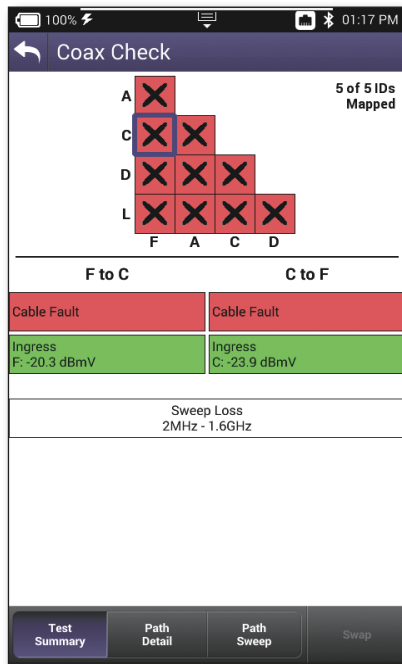


**Full Sweep Coax Check**

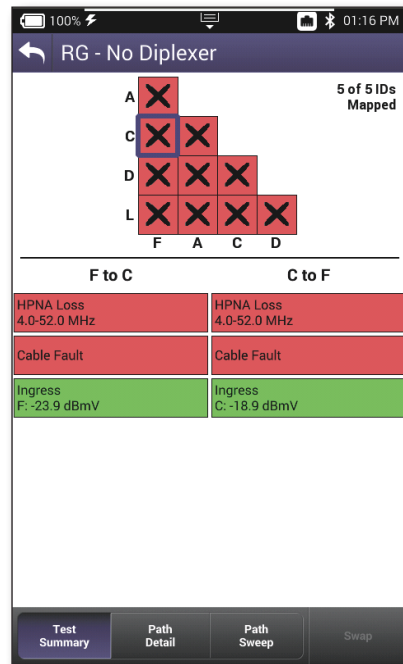


**Whole Home Check**

There are no pass/fail limits in the frequency sweep (RG-STB, STB-STB, and maximum delta limits between frequency bins of 4, 8 and 12 MHz wide). Therefore, the **Sweep Loss** result card in the **Test Summary** page is white. However, **Cable Faults** and **Ingress** pass/marginal/fail limits have been preserved, similar to the Whole Home Check application.

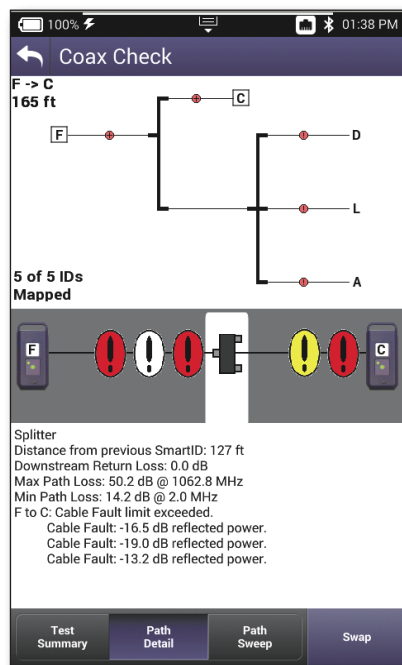


**Full Sweep Coax Check  
Test Summary Page**

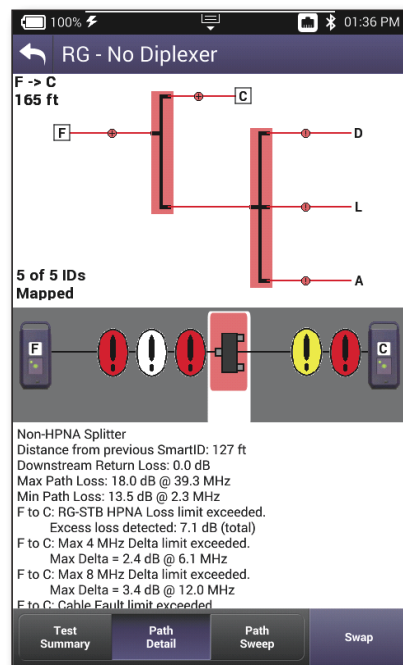


**Whole Home Check  
Test Summary Page**

The naming convention for splitters in the network has been updated in Coax Check. While an HPNA splitter is identified as **HPNA-Splitter**, similar to Whole Home Check, a non-HPNA splitter is identified as a more generic term, **Splitter** in Coax Check.



Full Sweep Coax Check Path Detail Page



Whole Home Check Path Detail Page

Note the difference in the results section. The pass/fail limits for the frequency sweep have been removed, and the results generated for each network element are more generic and simple. Any filter in the network, be it low-pass, high-pass or MoCA, is now identified in the Path Detail results as **Filter**.

## About HPNA Testing

If your OneExpert is optioned and configured to do so (and CPE support the HPNA protocol over an Ethernet port), you can use your instrument to verify that HPNA networks are operating within expected service quality metrics and users can set up pass/fail limits to help simplify testing.



**NOTE:**

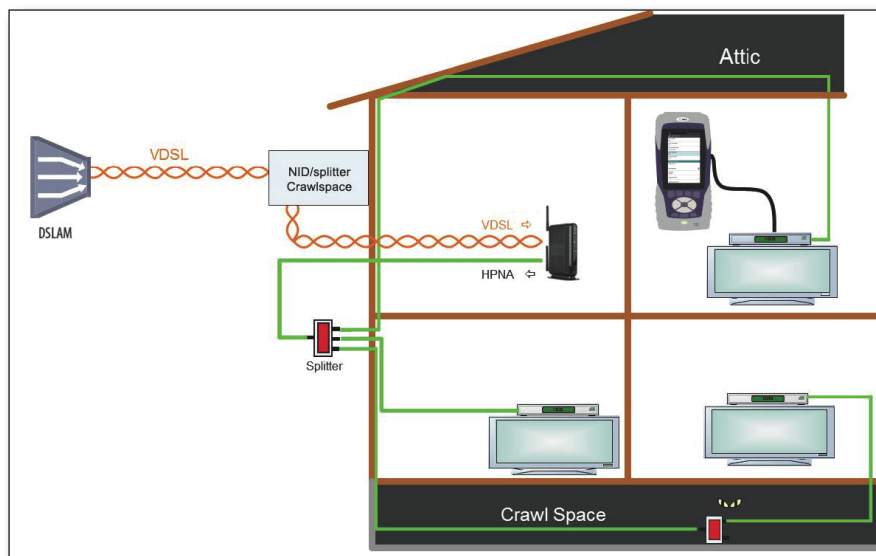
**Some STBs (set-top-boxes) or RGs (residential gateways) do not support HPNA traffic over the Ethernet port.**

In the HPNA test, OneExpert connects to the HPNA network via CPE and communicates with the HPNA network host to initiate the test. Each communication path between all HPNA network nodes will be tested, letting users segment problem node paths, node-to-node communication issues, and verify that the whole network is functioning correctly.

The capabilities of the OneExpert DSL OneExpert DSL's optional HPNA testing features include the following:

- **Operational mode** — This mode monitors the active network during its normal operation and periodically updates statistics.
- **Network test mode** — This transient mode performs a disruptive network test that transfers a configurable number of packets across each unidirectional logical link in the network and gathers statistics.

These features are available if the HPNA software option is enabled.



## Connecting to the line

After specifying the test settings, you can connect to the line.

1. Connect one end of an Ethernet cable to the Ethernet jack on the right side of the unit.
2. Connect the other end of the cable to the Ethernet port of the CPE that is on the HPNA network (such as a set-top-box or residential gateway).

## Monitoring the HPNA network

1. On the Main Menu, select HPNA. The Station List screen appears. See *"Node list" on page 287*.
2. If desired, use the arrow keys to highlight a specific node and then press the **OK** button to view more detailed statistics for that node.

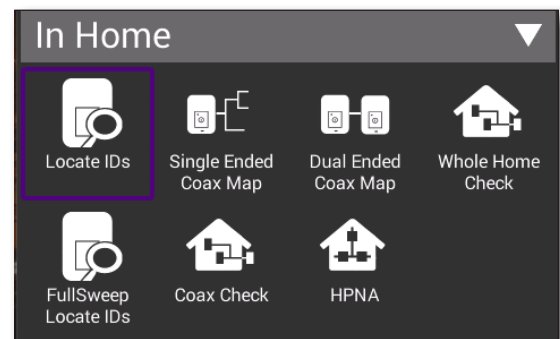
## Testing the HPNA network

This test verifies that all installed devices are operating correctly.

1. On the Main Menu, select **HPNA**. A list of HPNA nodes appears.

Verify that all HPNA devices are present on the network before proceeding.

2. To specify the HPNA settings, press the **Tray** system key and then select Settings (the soft key in the lower left).
  - **Quick Test Payload Length** – The size of the packet being used for the Quick Test.
  - **Chronic Test Payload Length** – The size of the packet being used for the Quick Test.
  - **QuickTest Packet Count** – The number of packets to use for the Quick Test - typically around 5,000.
  - **Chronic Test Packet Count** – The number of packets to use for the Chronic Test - typically 100,000 packets or more.
  - **Minimum Rate** – The minimum rate, in Mbps, that will pass.
  - **Minimum SNR** – The minimum SNR, in dB, that will pass.
  - **Quick Max Packets Lost** – The maximum packet loss, in number of packets, allowed for the Quick Test.





- **Chronic Max Packets Lost** – The maximum packet loss, in number of packets, allowed for the Chronic Test.
3. Select the **Start** softkey to select the type of test to run:
    - **Quick** – Used to quickly test the HPNA network for common issues (a small number of packets).

**NOTE:**

***The size and number of packets may be adjusted from the default settings for each Quick or Chronic test prior to proceeding.***

- **Chronic** – Used to exhaustively test the HPNA network for chronic trouble (a large number of packets).

After the network test finishes, the screen updates to report the data rate, modulation, packet error rate, and signal to noise ratio on the current link.

If the packet error rate is zero and the data rate is over 112Mb, the screen will indicate a pass. If the packet error rate is non-zero, SNR is less than -34 dB, or the data rate is less than 112Mb, the screen will indicate a failure in red.

4. Use the up/down arrow buttons to view the results.
5. Highlight a specific node and then press the **OK** button to view node-to-node link information, such as the MAC addresses and the received power.
6. Select the **Node Details** softkey to view live statistics between the selected HPNA nodes.
7. To save a test report, press the **Save Report** button or the Tray system key and then select **Save Report**. Next, specify the report settings such as report name, report format, technician ID, location, and other settings as needed.

For more information on the results, see ["HPNA results" on page 287](#).



## Using the OneExpert with a Mobile Device

This chapter provides steps for using the VIAVI Mobile Tech app, including the following:

- "VIAVI Mobile Tech app" on page 252
- "Connecting to StrataSync" on page 252
- "Using the Mobile Tech app" on page 253
- "Connecting to your OneExpert via Remote Display" on page 258
- "Updating the firmware from StrataSync" on page 259
- "Syncing to the StrataSync server" on page 261
- "Managing files" on page 264
- "Managing files with StrataSync" on page 268

## VIAVI Mobile Tech app

The OneExpert is designed to be paired with a mobile device or tablet (such as an iPhone, iPad, or similar Android device), and leverages the user interface of those devices along with the **VIAVI Mobile Tech App** to provide a smooth user experience.



Mobile Tech

You can view test results, set up the OneExpert, sync files, update the meter, and configure test parameters from the app.

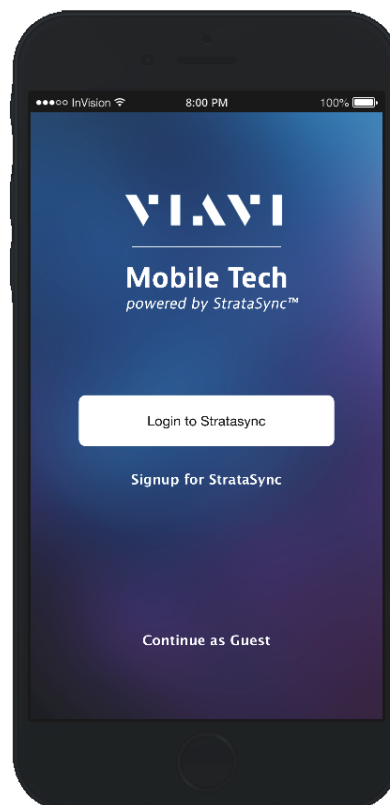
To get started, download the VIAVI Mobile Tech app from your App Store or available from your VIAVI representative.

## Connecting to StrataSync

You can connect to StrataSync using your smart phone or tablet anytime, anywhere using the VIAVI Mobile Tech app.

Once your instrument is connected to the Mobile Tech app via Bluetooth, geo location information can be added to reports and files when syncing to StrataSync. If configuration files or work orders are set to be deployed from StrataSync to your meter, you can check those here, as well as browsing files from the unit itself.

Once you download the application, log in to StrataSync just as you do on the website. To operate the tests, follow the instructions on the application screens.

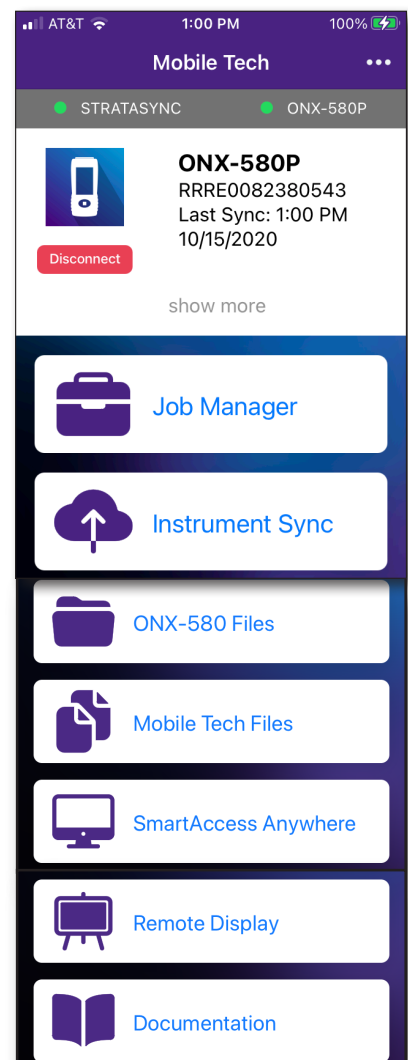
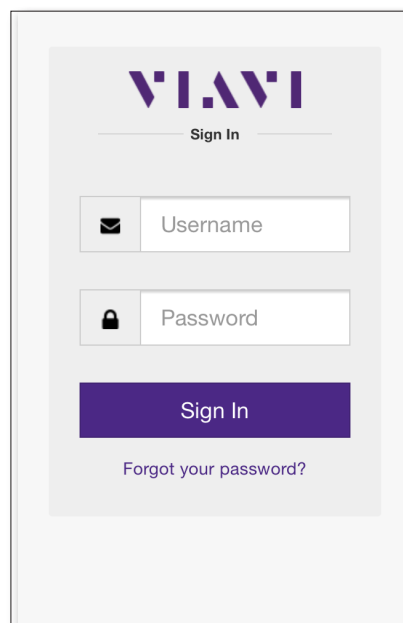
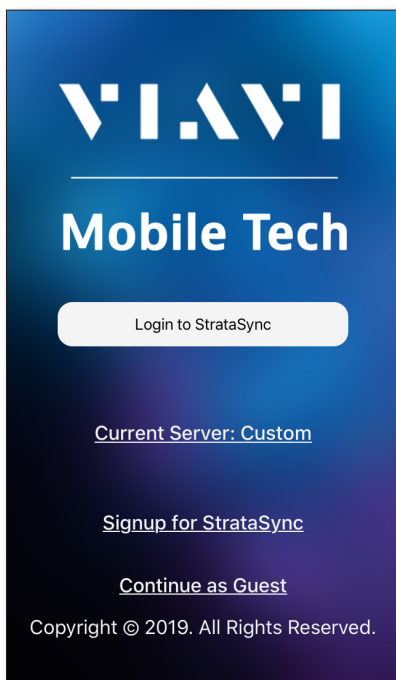


## Using the Mobile Tech app

### Logging in to StrataSync

To get started using the Mobile Tech app, you need to log in to StrataSync.

1. Launch the **Mobile Tech app** on your mobile device.
2. Press the **Login to StrataSync** button. The Login screen will be displayed.
3. Enter your Username and Password, then press the **Sign In** button. The Mobile Tech **Main menu** will be displayed.



## Pairing the OneExpert to your mobile device

To interact with your OneExpert, the mobile device must be paired with the unit over Bluetooth.

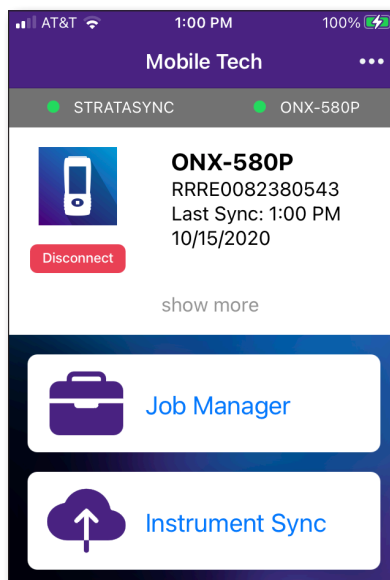
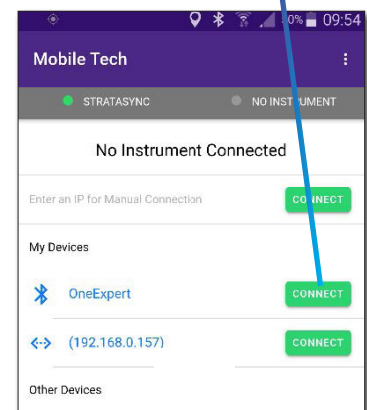
1. On the OneExpert, make sure Bluetooth is on by pressing **Bluetooth** in the tray menu to enter pairing mode.
2. On the mobile device, do the following:
  - Go to the **Settings** menu, then select **Bluetooth**.
  - Verify that the device is not paired with **any** OneExpert unit.
3. From the Mobile Tech Main menu, under **My Devices**, find the Companion, shown as "OneExpert", and select **Connect**.

If you don't see the device, you may need to press **Discover Devices**.

4. Select the OneExpert you want to connect to and the devices will begin pairing.
5. When connected, your ONX-580 should appear in the Mobile Tech app.

You can now transfer files and sync your OneExpert to StrataSync through the Mobile Tech App.

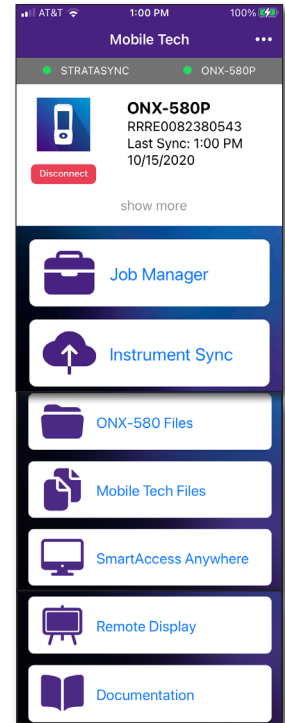
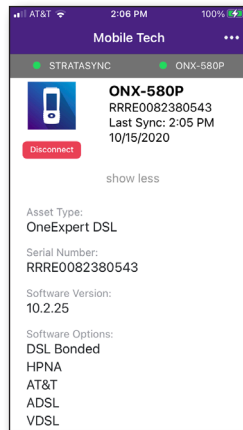
**Connect button**



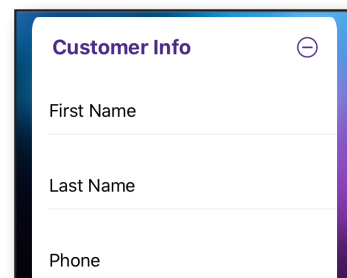
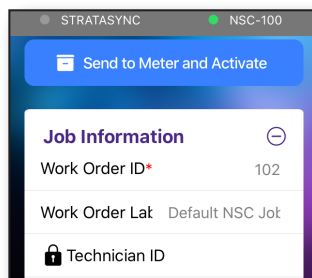
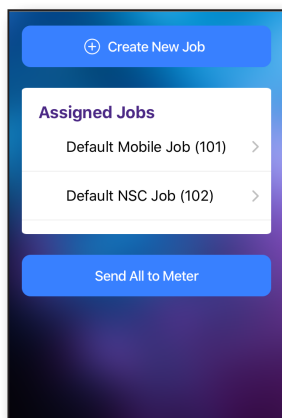
## Mobile Tech Main Menu

Once you log into StrataSync, you will see the Main menu. Here you can see details of the instrument, sync to StrataSync, manage files on the unit, view documentation, and even contact product support for more information or to request a repair or calibration.

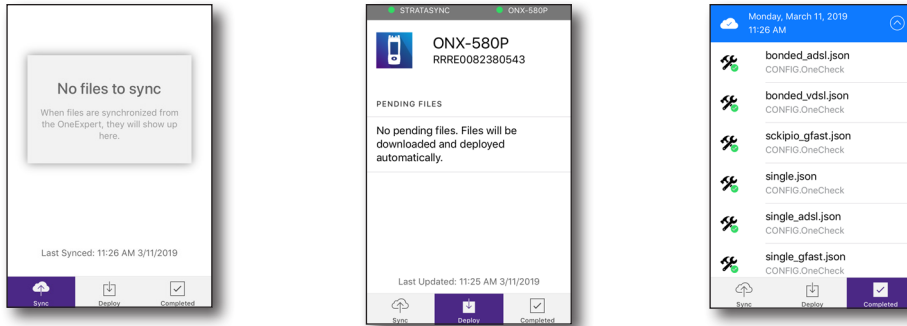
Near the top of the Main menu, you can click **Show more** to see details on your instrument, including all of the installed options.



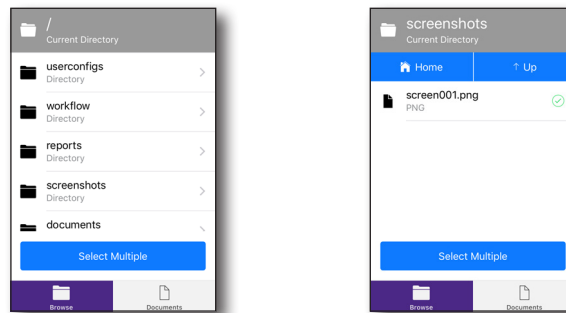
- **Job Manager** – Attach jobs to tests, including customer info and work orders, and track test results



- **Instrument Sync** – Sync your instrument to StrataSync and deploy configuration files

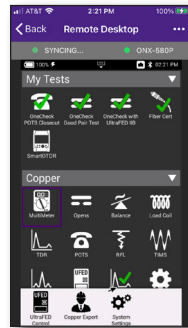


- **ONX-580 Files and Mobile Tech Files** – Manage files on the unit that you can save to your phone or tablet. Use the **ONX-580 Files** menu to manage files stored on your meter, use the **Mobile Tech Files** menu to manage those stored on your mobile device.

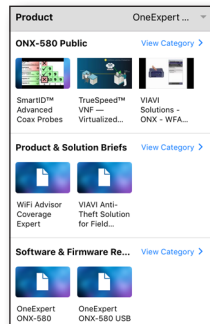




- **Remote Display** – Connect directly to the OneExpert remotely to configure your unit and run tests



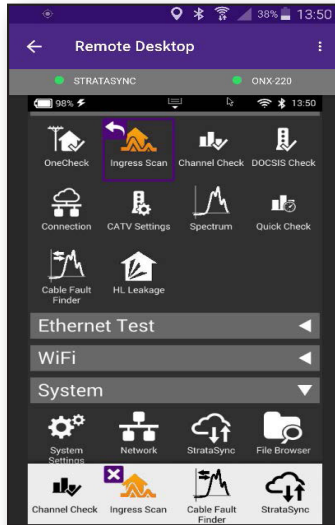
- **Documentation** – View and download various documentation for your instrument, including applications notes, software release notes, and quick reference guides



## Connecting to your OneExpert via Remote Display

Once your OneExpert is paired to the Mobile Tech app, you can connect to it remotely to configure and run tests. See *"Remotely operating the instrument" on page 80* and *"Pairing the OneExpert to your mobile device" on page 254* for more details.

From the Main menu, select **Remote Display** to get started.



**NOTE:**



**You need to enable Remote Operation to remote control the meter through the VIAVI Mobile Tech app. See *"Remotely operating the instrument" on page 80.***

## Updating the firmware from StrataSync

Once you are logged into StrataSync, you can update the firmware of your unit via Ethernet.

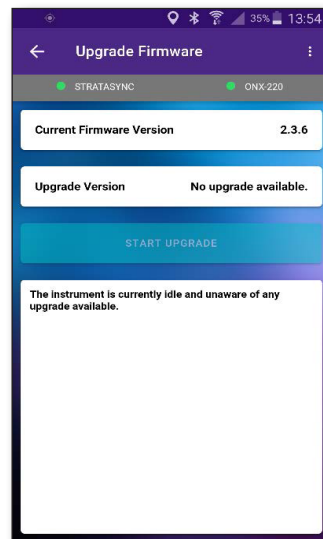
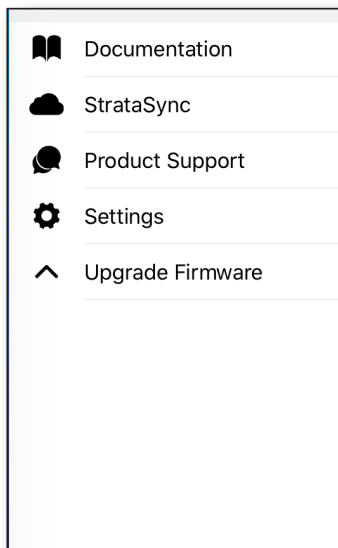
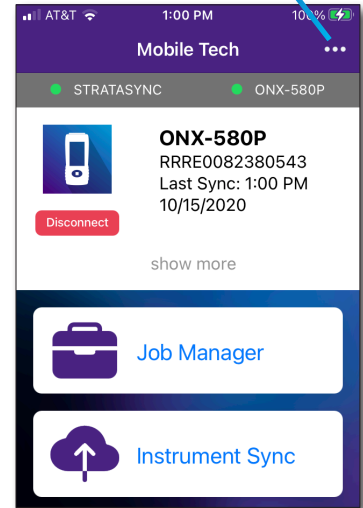
1. Connect the OneExpert to the AC charger adapter to ensure an uninterrupted supply of power during the update.
2. Connect the OneExpert to your network via wired Ethernet.
3. Go back to the Main screen and select the **Options** menu in the upper right. The Options menu appears.
4. Select **Upgrade Firmware**. The Upgrade Firmware screen appears, showing the current firmware version and if an update is available.

You can also get to the Upgrade Firmware screen from the Main menu and selecting **Show More**.

5. If an update is available, select **Start Upgrade** to update the unit.

The update will begin and the meter will power off when finished. Please wait as this could take 10-15 minutes, based on the size of the update file and connection speed.

### Options menu



### NOTE:

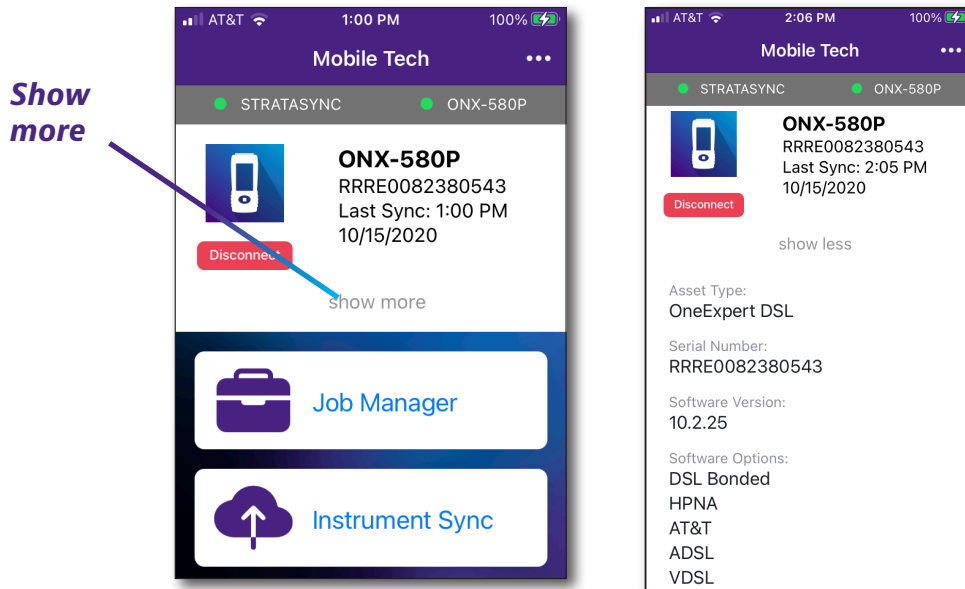


**You need the appropriate permissions in StrataSync to update the firmware.**

## Viewing hardware/software versions and options

You can easily see more detail about your OneExpert, including the software version, serial number, Tech ID, and installed software options.

From the Main menu, select **Show More** near the top of the screen. Scroll down to see more details.

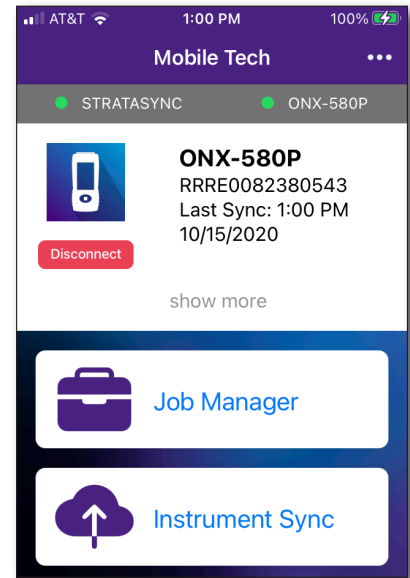


## Syncing to the StrataSync server

StrataSync® is a hosted, cloud-based software application that provides VIAVI instrument asset, configuration, and test-data management. StrataSync manages inventory, test results, and performance data anywhere with browser-based ease and improves technician and instrument efficiency.

Features include the following:

- Tracking ownership of the unit
- Pushing certain configuration settings to the unit
- Pushing work orders to the unit and keeping in sync with the server
- Receiving certain configuration setting from the unit
- Adding and/or removing software options
- Updating the software on the unit
- Updating the software on the modem
- Cloning a device (create a "golden" unit)
- Uploading and storing of test reports, screenshots, OneCheck profiles, and configurations



To obtain the latest configuration settings, software options and updates, and ownership registration information, the OneExpert can sync with a VIAVI server via the internet. The synchronization also stores any user files saved on the unit to the StrataSync server.

You should sync immediately upon receipt of the unit and on a regular (daily) basis thereafter to ensure that the unit is as up-to-date as possible and to allow all user information to be backed up. Before attempting to synchronize with StrataSync, please confirm your server settings with your manger or your company's IT organization.

ASSIGN SOFTWARE OPTIONS - NSC-100 - UID: RRS00071990071  
Please select options to deploy and press next

Option	Type	Description	Organization Name	Available	Assign	Option Expiration Date	Quantity	Status	Email Again
NSC-OC-ETHERNET	PERMANENT	OneCheck Ethernet	NSC Engine...	4949 of 5...	<input checked="" type="checkbox"/>		1	Pending Confirma...	
NSC-OC-GPON	PERMANENT	OneCheck GPON	NSC Engine...	4949 of 5...	<input checked="" type="checkbox"/>		1	Pending Confirma...	
NSC-OC-WIFI	PERMANENT	OneCheck WIFI	NSC Engine...	4948 of 5...	<input checked="" type="checkbox"/>		1	Pending Confirma...	
NSC-SPEEDCHECK-U1	PERMANENT	SpeedCheck	NSC Engine...	998 of 10...	<input checked="" type="checkbox"/>		1	Pending Confirma...	
NSC-TRUESPEED	PERMANENT	TrueSpeed Test	NSC Engine...	4950 of 5...	<input checked="" type="checkbox"/>		1	Pending Confirma...	
NSC-LOOPBACK-10G	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	
NSC-LOOPBACK-1G	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	
NSC-SPEEDCHECK	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	
NSC-SPEEDSERVICE	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	
NSC-SPEEDTEST	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	
NSC-TWAMP-REFLECTOR	PERMANENT			0 of 0	<input checked="" type="checkbox"/>			Deployed	

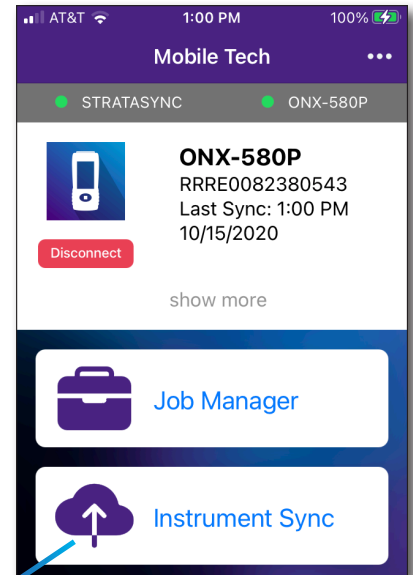
Next  Cancel

Software options in StrataSync

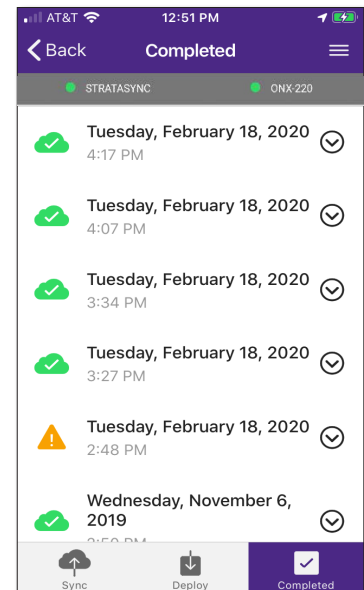
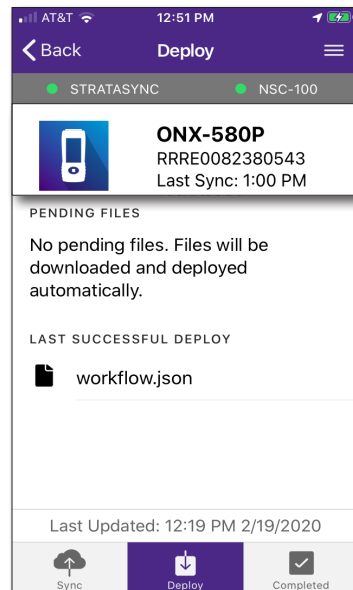
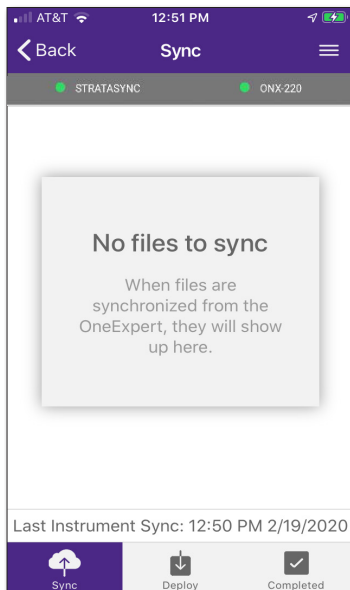
## Syncing with StrataSync

1. From the Main menu, select **Instrument Sync**. The StrataSync Sync menu appears.
2. Select **Sync**, **Deploy**, or **Completed** at the bottom of the screen.:

- **Sync** – Shows any files ready to sync to StrataSync
- **Deploy** – Shows any files from StrataSync that are ready to be deployed to the unit
- **Completed** – Shows files that have been synced or deployed. Select the arrow to the right for more detail



*Instrument Sync*



- Upon synchronization with the StrataSync server, the unit will send to the server the following information:
  - The unit's serial number
  - The unit's hardware information (constituent assemblies and their revision levels)
  - The unit's MAC address
  - The unit's user settings – Name (user/technician) and ID
  - Software update milestones (includes status and warnings, if applicable)

If the configuration information contained on the server is newer than that on the unit, the server will be considered to be the most up-to-date.

- The server will then send any files to the unit being synchronized that it determines are newer than those on the unit.
- The unit will then send any reports, configuration profiles, XML results, screen shots, etc. that have been saved on the unit since the last configuration.
- The server then applies any applicable options to the unit.
- Copy ("clone") the configuration settings for the base unit, as well as any company-specific configurations such as custom filters, web bookmarks, and FTP passwords. This can be used to create a "golden" unit.
- Lastly, if any updates are available, you will be prompted that you can update

When synchronization is complete, the Status will indicate "Sync Complete".

## Managing files

The OneExpert's file management is separated into 2 menus, **ONX-580 Files** and **Mobile Tech Files**. Use the ONX-580 Files menu to manage files stored on your meter, while the Mobile Tech Files menu is used to manage those stored on your mobile device, deploy to the OneExpert, or upload to StrataSync.

### ONX-580 Files

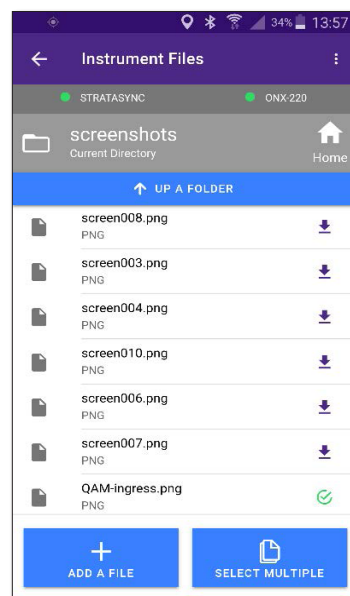
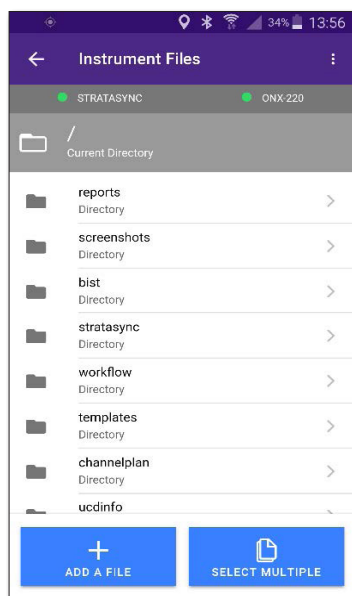
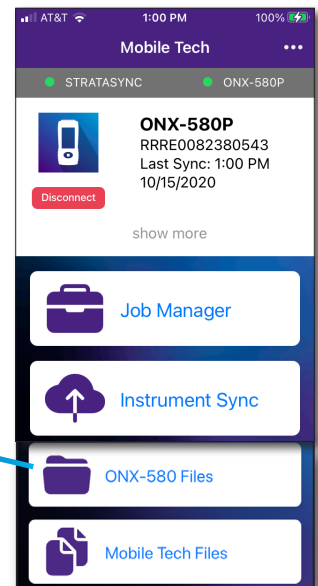
Use the **ONX-580 Files** menu to manage the files on the OneExpert and download to your mobile device.

1. From the Main menu, select **ONX-580 Files**. The File Manager screen appears, showing the Files directory.

Here you will see the following directories:

- User configs
- Workflow
- Smart ID
- Reports
- Screenshots
- Documents
- Templates

*ONX-580 Files*





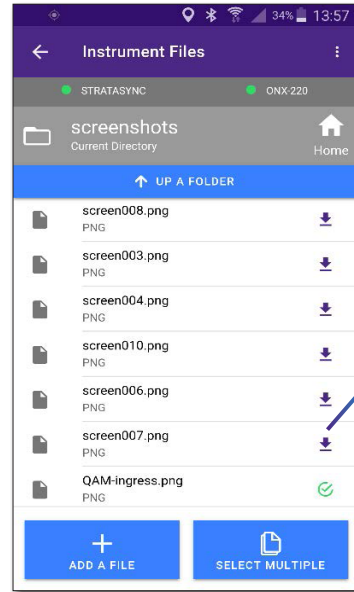
- Select the directory you want to open. The directory will open and show a list of files.

To return to the main menu at any time, select **Home** in the upper right. You can also go up a folder directory by selecting **Up a Folder**.

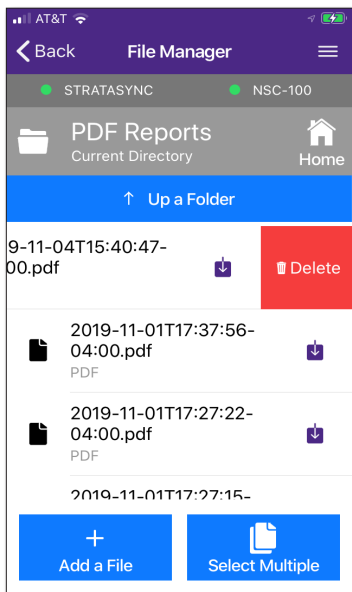
- To download a file to your mobile device, press the purple download arrow. Once it is downloaded, it will change to a green checkmark.

Files and reports will then be saved to the **Mobile Tech Files** menu. For more info, see the next section.

- To delete a file, select the file and swipe to the left. Then select **Delete**.
- To add a file to the meter, press the **Add a File** button at the bottom, then choose which file from the local files on your mobile device you want to send to the meter.
- To select multiple files, press the **Select Multiple** button at the bottom, and then select the files to download or delete. Then select **Download** or **Delete**.



Purple download arrow



## Mobile Tech Files

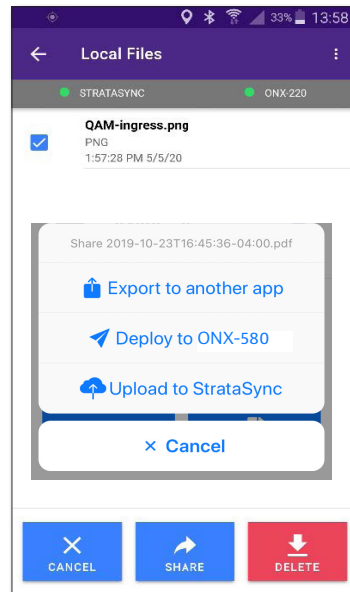
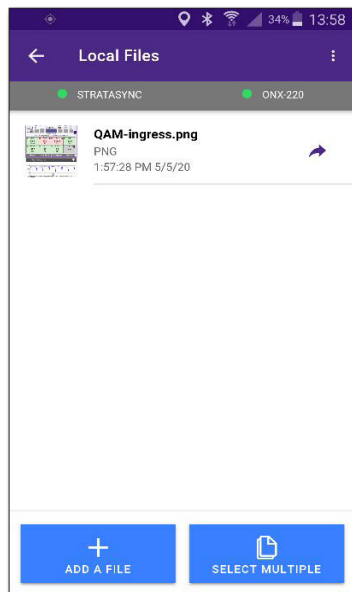
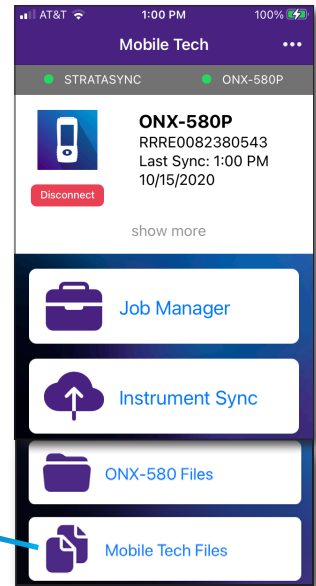
Use the **Mobile Tech Files** menu to manage the files on your mobile device, deploy to the OneExpert, upload to StrataSync, or export to another app on your device, such as text or email.

When you download files and reports from the OneExpert to save to your device, they will appear here.

To view PDF files, you may need to download a PDF reader app, such as Adobe PDF Reader.

1. From the Main menu, select **Mobile Tech Files**. The Mobile Tech Files screen appears, showing the list of files on your mobile device.

*Mobile Tech Files*

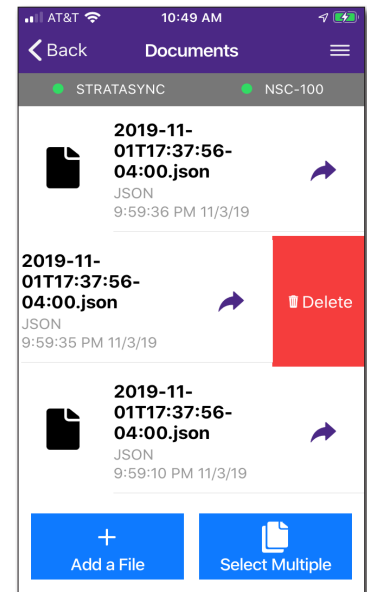
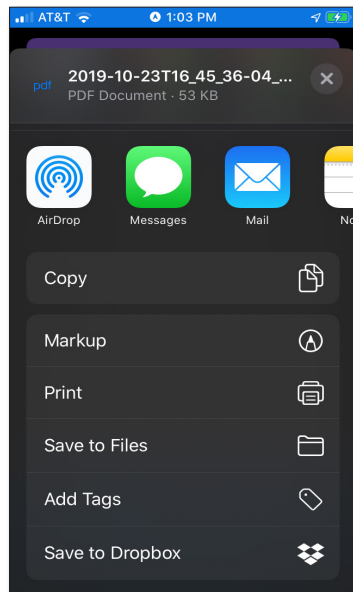
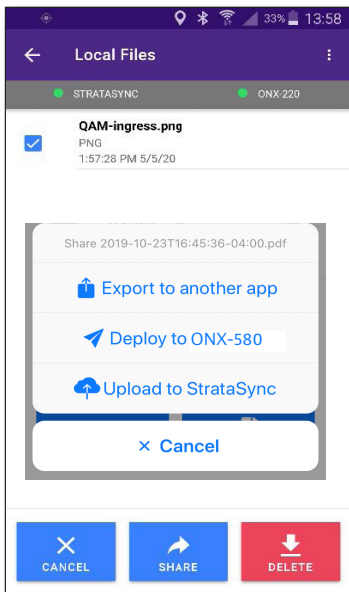
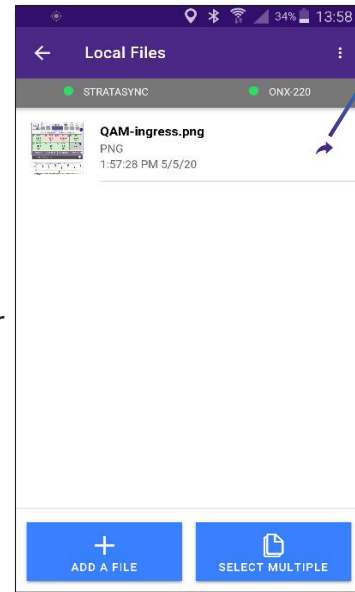


1. Select the purple share arrow to the right of the file you want to send. A pop-up will appear with the following options:
  - Export to another app
  - Deploy to OneExpert
  - Upload to StrataSync

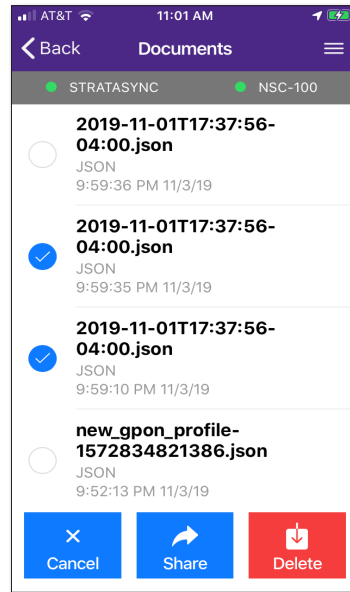
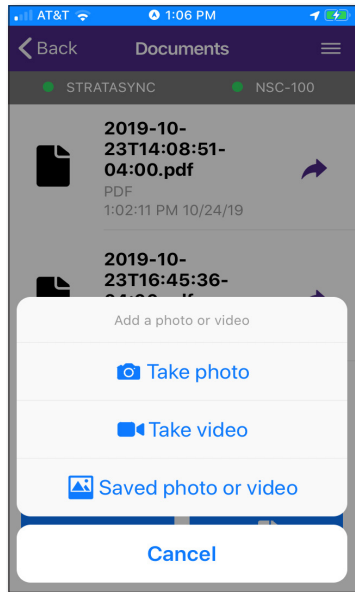
To return to the Main menu at any time, select **Back** in the upper left.

2. Choose the option you want. To export to another app, choose the app you want from the pop-up. The file will also be deployed or uploaded to StrataSync, if selected.
  - To delete a file, select the file and swipe to the left. Then select **Delete**.

*Purple share arrow*



- To add a photo or video to the meter, press the **Add a File** button at the bottom, then choose **Take photo**, **Take video**, or **Saved Photo or video**.
- To select multiple files, press the **Select Multiple** button at the bottom, and then select the files to share or delete. Then select **Share** or **Delete**.



## Managing files with StrataSync

When the OneExpert syncs with StrataSync, various files are uploaded and stored in the StrataSync cloud, such as test reports, screenshots, work orders, and configurations. You can access these files via the StrataSync website. For more information see *"Syncing to the StrataSync server" on page 261.*

Ethernet	
Geolocation	39.71, -86.07
Timestamp	2019-10-23 / 16:42
Service I Ookla Speedtest	
Delay (ms)	20.0
Upstream (Mbps)	99.9 X
Unknown (Mbps)	850.0
Downstream (Mbps)	91.0 X
Unknown (Mbps)	950.0
Host	ind.speedtest.sbcglobal.net.8080
Server Location	Indianapolis, IN
Service I TrueSpeed	
Server	
Upstream (Mbps)	0.0 X
Unknown (Mbps)	850.0
Downstream (Mbps)	0.0 X
Unknown (Mbps)	950.0
RTT (ms)	0.0
MSS	0.0
Service I SpeedCheck	
Upstream (Mbps)	71.8 X
Unknown (Mbps)	850.0
Downstream (Mbps)	0.0 X
Unknown (Mbps)	950.0
Service I Web Connectivity	
URL	https://s3.amazonaws.com/c...
Network I Ping	enfilbels[swebconnectivity.html?ip=10.11.21
Server IP	4.2.2.1
Requests Sent	10
Replies Received	10
Replies Lost	0
Average Delay (ms)	14.0
Replies Lost (%)	0
Network I IP Address	
2 / 4	
bh001	
NSC-100 / RRS0071990071	
0.0.99-2049	

## Test Results

This chapter describes the test results that are gathered when running a test, including the following:

- "DSL/G.fast results" on page 270
- "IP Data results" on page 279
- "TrueSpeed results" on page 280
- "Video results" on page 282
- "VoIP results" on page 280
- "HPNA results" on page 287
- "SmartID results" on page 290
- "Copper results" on page 291
- "WiFi Advisor results" on page 297

## DSL/G.fast results

The following section describes the results available in the DSL mode. To view the different categories of statistics, use the left and right arrows, or tap the tab on the screen. Tapping TRG or AG area in the heading toggles the display for the connectors (for example, the RJ-45 connector).

Different result categories are available on different tabs on the screen, and the results displayed vary depending on the settings that you specified when you configured your test (for example, the test mode, the xDSL technology, network type, and IP mode).

For example, in bonded mode, the same Summary results are provided, but the results are grouped into different rows and columns:

- Group rows – Provide results for both pairs combined.
- Pair 1 or Pair 2 column – Provides results for a specific pair.

*Results tabs*

	Upstream	Downstream
Actual Rate	--	--
Max Rate	--	--
Capacity	--	--
Margin	--	--
SATN	--	--
LATN	--	--
CRC	--	--
FEC	--	--
RTX-UC	--	--

## Context sensitive help

The context sensitive Help system is available for all the results in the xDSL/G.fast single-line applications and the bonded application.

To access the help window using the keypad, use the up/down arrows to navigate and select the desired result. Then press the **OK** button to activate the help dialog box for that result. The left/right arrows let you move to another results tab.

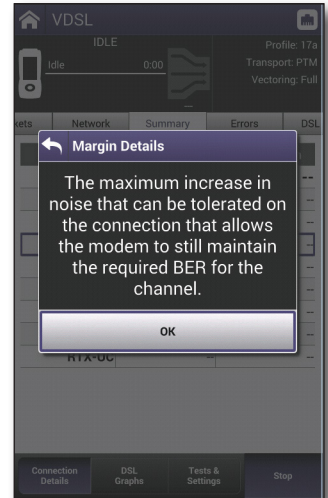
To access the help dialog box using the touch screen, press anywhere on the row of the result. The selected result will be highlighted while selected.

Press and hold to activate the help dialog box for that result. You can swipe the screen left/right to scroll through the tabs.

In this example, the DSL Summary **Margin** results are selected.

	Upstream	Downstream
Actual Rate	--	--
Max Rate	--	--
Capacity	--	--
Margin	--	--
SATN	--	--
LATN	--	--
CRC	--	--
FEC	--	--
RTX-UC	--	--

When selected, the corresponding help box is displayed, as shown here.



## Summary

This category provides a summary of the most frequently used DSL test results, as shown in the following table.

Results	Description	Range
Training State	The state of modem synchronization (appears in the menu heading).	BOOTING, IDLE, INIT, SHOWTIME
Sync Time	The elapsed time (duration) since reaching Showtime.	N/A
Trained Mode	The DSL line format agreed upon during training (appears in the menu heading).	T1.413, READSL, ADSL2+, ADSL2, G.Lite, G.DMT, VDSL2, G.fast

## Summary (continued)

Results	Description	Range
<b>Connection Statistics</b>		
Actual Rate	Current upstream and downstream connection rates.	32 kB–3.3 MB <sup>1</sup> (Up) 32 kB–25 MB <sup>1</sup> (Dn) 64 kB–50 MB (Up) <sup>2</sup> 64 kB–100 MB (Dn) <sup>2</sup> Upstream and downstream aggregate net data rates up to 1 Gbps <sup>3</sup>
Max Rate	Maximum upstream and downstream connection rates	32 kB–3.3 MB <sup>1</sup> (Up) 32 kB–25 MB <sup>1</sup> (Dn) 64 kB–50 MB (Up) <sup>2</sup> 64 kB–150 MB (Dn) <sup>2</sup> Upstream and downstream aggregate net data rates up to 1 Gbps <sup>3</sup>
Capacity	The percentage of total bandwidth currently used by the actual connect rate upstream and downstream.	0–100%
Margin	SNR margin upstream and downstream.	-51.1–+51.1 dB



Results	Description	Range
SATN	Signal attenuation. Attenuation average of the bins/tones that contain the actual signal (empty bins are not included). For a description of the settings impacting this calculated value, see <a href="#">step 10 "Specifying test settings" on page 137</a> .	0–63.5 dB (ADSL1) 0–102.2 dB (ADSL2/2+) 0–02.2 dB (VDSL)
LATN	Line attenuation. Attenuation average of all tones/bins (the entire line, including empty bins/tones). For a description of the settings impacting this calculated value, see <a href="#">step 10 "Specifying test settings" on page 137</a> .	0–63.5 dB (ADSL1) 0–102.2 dB (ADSL2/2+) 0–102.2 dB (VDSL)
CRC	Cyclical redundancy check upstream and downstream for Fast Path and Interleave Path.	n/a
FEC	Forward Error Correction upstream and downstream for Fast Path and Interleave Path.	n/a
RTX-UC	Count of the number of DTUs that have been detected in error and have not been corrected within the maximum allowed time.	n/a

1. These are ADSL2 rates.
2. These are VDSL2 rates.
3. These are G.fast rates.

In the saved test report, two additional statistics are included:

- **Start Time** is the time of day when the DSL modem achieves Showtime. The Start time is updated if you clear errors.
- **Stop Time** is the time of day when the report is generated or DSL sync is lost.

## Packets

This category provides results concerning transmitted and received DSL data. The results displayed vary depending on the network type that you specified when you configured your test (Terminate, Through-Router, or Through-Bridge).

### All Network Types

- **Rate** – The bit rate for received (Rx) and transmitted (Tx) packets.
- **Bytes** – The amount of data received (Rx) and transmitted (Tx) expressed in Kilobytes (kB).
- **Frames** – A count of the total number of frames (packets) received (Rx) and transmitted (Tx) since starting the test.

### Through-Router or Through-Bridge only

- **Link State** – Indicates whether or not the communications link is Up or Down for both Port 1 and Port 2.
- **Bytes** – A count of the number of bytes received (Rx) and transmitted (Tx) for both Port 1 and Port 2.
- **Frames** – A count of the number of frames (packets) received (Rx) and transmitted (Tx) for both Port 1 and Port 2.
- **Errors** – A count of the number of errors detected in received (Rx) data and the number of errors transmitted (Tx) for both Port 1 and Port 2.
- **Drops** – A count of the number of dropped frames (packets) detected in received (Rx) data and the number of dropped frames in transmitted (Tx) data for both Port 1 and Port 2.
- **Collisions** – Ethernet frames are transmitted "space-available" when there is a break on the signal on the cable; sometimes frames are transmitted at the same time as another transmitter, causing a "collision" of frames.
  - For received collisions, a count of the number of times the unit has received a jam signal while it was not transmitting frames.
  - For transmitted collisions, a count of the number of times the unit has transmitted a frame, and then received a jam signal in the time slot for the frame.

These counts are provided for both Port 1 and Port 2.

## Network

This category provides network statistics which vary based on the network type (Terminate, Through-Router, or Through-Bridge) and IP mode (IPv4, IPv6, or IPv4/IPv6 Dual Stack) that you specified when you configured your test. If you are testing using the Through-Router or Through-Bridge network type; statistics are provided for both ports on your instrument.

### All Network Types

- **Network Status** – Indicates whether the communications link is Up or Down.

### Network Type: Terminate

- **MAC Address** – The source destination address communicated to devices on the LAN.
- **VLAN ID** – The VLAN ID specified for outgoing traffic.
- **VLAN Priority** – The VLAN Priority specified for outgoing traffic.

### Network Type: Through-Bridge or Through-Router

- **LAN MAC Address** – The destination MAC address used for traffic transmitted by the unit to another device on the LAN. .

### Network Type: Through-Router

- **WAN MAC Address** – The destination MAC address used for traffic transmitted by the unit to another device on the LAN.

### IPv4 or IPv4/IPv6 Dual Stack

- **Address** – The OneExpert DSL's IPv4 address to the access the provider network.
- **Netmask** – The OneExpert DSL's netmask address. IP devices use a netmask IP address to determine if IP packets are to be routed to other networks or sub-networks.
- **Gateway** – The OneExpert DSL's IPv4 gateway address. When an IP device has determined that a packet is not addressed to it or devices on the same sub-network (subnet), it sends all such packets to the gateway address for further routing to the correct address.

## Network (continued)

### IPv6 or IPv4/IPv6 Dual Stack

- **Global Address** – The OneExpert DSL's IPv6 address used to access the global network (beyond the router).
- **Local Address** – The OneExpert DSL's IPv6 address used to access the local network.
- **Gateway** – The OneExpert DSL's IPv6 gateway address. When an IP device has determined that a packet is not addressed to it or devices on the same sub-network (subnet), it sends all such packets to the gateway address for further routing to the correct address.
- **Primary DNS** – The address of the preferred DNS server. When using internet addresses such as `www.viavi.com`, the OneExpert DSL (and all IP devices) must translate the address to an IP address (such as `157.234.12.20`) in order to route the packets or data. To do so, it first requests a DNS server to translate an internet address into an IP address; then the OneExpert DSL can correctly route IP pings or other data.

The DNS address must be that of a real DNS server, preferably in the provider network.

## Errors

- **FEC** – Forward Error Correction upstream and downstream for Fast Path and Interleave Path.
- **FEC/min** – The average rolling count of FECs that have occurred in a one minute period.
- **CRC** – Cyclical redundancy check upstream and downstream for Fast Path and Interleave Path.
- **CRC/min** – The average rolling count of CRCs that have occurred in a one minute period.
- **ES** – Errored Seconds; Number of seconds during which a LOS, SEF, LPR, or CRC occurred since starting the test.
- **SES** – Severely Errored Seconds; Number of seconds during which one or more LOS, SEF, or LPR errors were present, or 18 CRCs occurred.
- **UAS** – Unavailable Seconds; A count of the number of test seconds which met the ITU-T Rec. G.821 definition of unavailable time.
- **LOS** – Loss of Signal; Number of errored seconds due to loss of signal.
- **LOF** – Loss of Frame; Number of errored seconds due to loss of framing.
- **LOM** – Loss of Margin Errors; Number of errored seconds due to loss of margin.

## Events

The Events page shows the new G.fast results and is available only with the Sckipio modem. The user needs to have the correct module attached (ONX-TM-GFAST), the Sckipio option installed (ONX580-GFASTSCKIPIO), and has "Sckipio" selected as the DSL Modem Vendor.

- **Full Inits** – Number of successful full initialization attempts.
- **Failed Full Inits** – Number of failed full initialization attempts.
- **Fast Inits** – Number of successful fast initialization attempts.
- **Failed Fast Inits** – Number of failed fast initialization attempts.
- **TIGA** – Number of Transmitter Initiated Gain Adjustments.
- **Bitswaps** – Number of bitswaps that have occurred.
- **SRA** – Number of Seamless Rate Adaption adjustments.
- **FRA** – Number of Fast Rate Adaption adjustments.

## DSL RTX (retransmission)

- **Status** – The state of modem synchronization.
- **RTX-TX** – Count of the number of DTUs that have been retransmitted.
- **RTX-C** – Count of the number of DTUs that have been detected in error and successfully corrected.
- **RTX-UC** – Count of the number of DTUs that have been detected in error and have not been corrected within the maximum allowed time.
- **INP REIN** – The number of consecutive DMT symbols corrupted by REIN that can be completely corrected by retransmission.

## Signal

- **Sync Count** – The number of synchronization attempts. It is possible that modems do not synchronize immediately and make multiple attempts before achieving synchronization.
- **Uptime** – Amount of time the modems have been synchronized.
- **Est. Line Length** – The estimated length of the line based on the attenuation of the line.
- **Path** – RJ45, (T/R or A/B)
- **VDSL2-LR Mode** – Shows when VDSL2-LR mode is activated and the length of copper loop detected for Long Reach. This improves the achievable downstream rates on longer loops. When in use, the title bar displays "VDSL2-LR".
- **SATN** – Signal attenuation. Attenuation average of the bins/tones that contain the actual signal (empty bins are not included). For a description of the settings impacting this calculated value, see [step 10 "Specifying test settings" on page 137](#).

## Signal (continued)

- **LATN** – Line attenuation. Attenuation average of all tones/bins (the entire line, including empty bins/tones). For a description of the settings impacting this calculated value, see [step 10 "Specifying test settings" on page 137](#).
- **Tx Power** – Power level, in dBm, of the signal, downstream (from the DSLAM) and upstream (transmitted by the OneExpert DSL).
- **INTLV Delay** – Interleaving depth set by the DSLAM. This is a measure of latency introduced on the link due to the scrambling of DSL frames to protect data and create a more reliable link.
- **Actual INP** – The number of consecutive DMT symbols for which errors can be completely corrected.

## Identity

- **HW Type** – Type of modem hardware
- **HW Rev** – Revision of the hardware
- **xTU-R SW Revision** – SW revision of the local modem
- **xTU-R PHY Revision** – PHY firmware revision for the local modem
- **xTU-O Vendor** – CO vendor code
- **xTU-O Rev** – CO revision number
- **XTU-O S/N** – Far-end (DSLAM or DPU) Broadcom chipset serial number. This may contain information that uniquely identifies the DSLAM or DPU port under test (only available for the BCM63138 chipset).

## DSL graphs

The graphs provide a graphical representation of the following:

- SNR (signal to noise ratio) Per Tone
- Bits Per Tone (BPT)
- QLN (quiet line noise) Per Tone
- Hlog Per Tone

The SNR graph indicates line quality. The BPT graph indicates the total bit rate and is a useful tool for finding disturbers. Bits per tone is defined as bits assigned per DMT tone.

Examine the portions of the graphs where there are dips or breaks. These dips represent areas where interference is degrading the DSL signal.

The following table lists common noise sources and the corresponding frequencies and tones.

Noise Source	Noise Frequency (kHz)	Tone #	Tone Frequency
ISDN BRI	40	9	38.8125
HDSL passband center	196	45	194.0625
HDSL passband max	392	91	392.4375
HDSL2	274	64	276
T1 passband center	772	179	772
E1 passband center	1024	237	1022

## IP Data results

The following section describes the results available in IP Data mode. To view the different categories of statistics, use either the left and right arrows, or press the number for the desired result category.

### Ping results

- **Destination** – Destination address where the ping is being sent.
- **Message** – Status message.
- **Echos TX** – The number of ping messages sent.
- **Replies RX** – The number of echo reply messages returned to the OneExpert DSL from the destination.
- **Replies Lost** – The number of pings that did not return to the OneExpert DSL. This could be caused by an unresponsive target (destination) or by heavy congestion on the network; the more packets lost the more congested the network, indicating slow or poor throughput.
- **Replies Lost %** – The percentage of lost echoes compared to echoes sent.
- **Echos RX** – The number of ping messages sent to the OneExpert DSL from other devices on the network.
- **Ping Time** – The current, minimum, maximum, and average time in milliseconds it has taken one transmitted ping to reach its destination and receive a reply back to the OneExpert DSL.

## File Transfer results

- **Status** – The status of the transfer.
- **Bytes Transferred** – The number of bytes transferred.
- **Transfer Rate** – The speed that the file was uploaded or downloaded.

## TrueSpeed results

The summary result screen reports the round trip time and the actual upload and download rates. Pressing the Results soft key provides more detailed results.

The test report is available on both the ONX-VTS client and VTS-Server.

- **Actual Rate** – The actual measured upload and download rate.
- **Ideal Rate** – The ideal upload and download rate, based on the specified CIR.
- **Server** – The IP address and port number of the server.
- **RTT** – The round trip time, specified in milliseconds.
- **MSS** – The maximum segment size, measured in bytes.

## VoIP results

The following section describes the results available in VoIP mode. To view the different categories of statistics, use either the left and right arrows, or press the number for the desired result category.

### Summary

The summary results provide a quick go/no go result for QoS, loss, jitter, and delay, as well as the MOS score, the audio codec used for the incoming call, and the call log.

### QoS

This category provides quality of service (QoS) test results. The Local QoS reports what we receive (in the test set), while the Remote QoS reports what they receive (at the far end). Table 18 describes the QoS results.

A green check mark appears next to the number to provide a quick good/ bad indication (bad shows a red X)

- **Delay** – End to end delay in milliseconds.
- **Jitter** – Deviation in packet arrival times, in milliseconds).
- **Loss** – Packet loss based as a percentage lost divided by total packets.



## MOS

The following section describes the VoIP Audio Quality MOS (mean opinion score) results. These results relate to one call.

R-value is a number that indicates the quality of speech, displayed as a percentage (1=worst and 100=best).

- **Conversational MOS** – Current conversation quality, between 1 (bad) and 5 (excellent).
- **Listener MOS** – Current listener quality, between 1 (bad) and 5 (excellent).
- **Conversational R Factor** – Current conversation quality R factor.
- **Listener R Factor** – Current listener quality R factor.
- **G.107 R Factor** – Current G.107 R factor.
- **Burst R Factor** – Current burst R factor
- **Gap R Factor** – Current gap R factor
- **Maximum Possible** – The best possible conversation quality R factor for the connection.
- **Maximum Codec** – The best possible quality coming through the codec.
- **Packet Loss Degradation** – Degradation factor due to Packet Loss.
- **Codec Degradation** – Degradation factor due to the Codec.
- **Delay Degradation** – Degradation factor due to Delay.
- **Recency Degradation** – Degradation factor due to recent events.
- **Discard Degradation** – Degradation factor due to Discard.

## Network results

- **Local Throughput Rate** – Bit rate transmitted (TX) or received (RX) for the audio and video portions of the call.
- **Local Throughput Bytes** – Total number of bytes transmitted (TX) or received (RX).
- **Local Throughput Packets** – Total number of packets transmitted (TX) or received (RX).
- **Local Throughput Packets OOS** – Total number of packets that arrive out of sequence.
- **Remote Throughput Bytes** – The number of Bytes that the remote entity reports that it has transmitted (sent via RTCP).
- **Remote Throughput Packets** – The number of Packets that the remote entity reports that it has transmitted (sent via RTCP)

## Network results (continued)

- **Network Delay** – Time, in milliseconds, needed to travel the network (only displayed when a call is active).
- **Packetization Delay** – Number of milliseconds needed to fill the frame(s) comprising one RTP data packet.
- **Encoding Delay** – Time, in milliseconds, needed to convert samples in selected codec form.
- **Buffering Delay** – Time, in milliseconds, that the data was held in a jitter buffer.
- **Total Delay**– Total of all delays.

## Call Information results

- **Call Duration** – Length of time for the current call. If the call duration continues beyond 59:59 (meaning, is more than an hour), the display changes from mm:ss to hh::mm (note the change from : to :: ).
- **Far End Information** – The IP address, Name, and Alias for the incoming call.
- **Audio Parameters** – Whether RTCP is being used for the Audio path, the receive and transmit codec being used, Codec Packetization Interval RX and TX, whether silence suppression is enabled, and the number of jitter buffer replays or times the jitter buffer has dropped cells.

## Video results

After the OneExpert DSL is setup and a data connection is established, video streams become available for analysis.

In the upper area of the screen, the graphic indicates the network status (up/down), the number of active streams, and the combined rate indicates the total video bandwidth (current and max). The total video bandwidth ("Combined rate") peaks can be important in analyzing total bandwidth available. The total bandwidth is found on the DSL Summary screen. The difference in the two numbers is the bandwidth available for either Internet data or Internet data and VoIP data. The system keys along the bottom to clear a stream, Play or Stop (rightpointing arrow / square box) a stream, or QoS Expert to compare streams,

The test results used for analysis are split among several categories, displayed on separate tabs. To view the different categories of statistics, press the tab for the results that you wish to view.

## Summary

- **Stream IDs** – Numbered 1-6, identifies the stream

Each result provides the following four statistics:

- **State** – Status of the stream

**Stream Up** – Active

**Idle** – No active stream

**Failed** – A stream is no longer detected.

All streams brought up using RTSP protocol will eventually reach the Failed state. This is because the OneExpert does not detect RTSP termination messages or RTSP messages used for special features such as pause.

- **IP address** – The IP address of the stream.
- **Type** – The type of media detected:
  - udp** (for MPEG-2 TS Video over UDP)
  - rtp** (MPEG-2 TS Video over RTP)



**NOTE:**

***The State, Type, IP address, and Port results refer to the media stream, not the signaling protocol (IGMP or RTSP) that brought up the stream.***

## QoS results

This category provides a summary of the video quality of the selected program flow. This screen varies depending on the stream type.

- **Err. Ind.** – Number of MPEG2 bits with the error indicator bit set.
- **PCR Jitter** – MPEG2 Program Clock Reference deviation, in milliseconds.
- **RTP Jitter** – The current jitter, in milliseconds, when analyzing UDP, ISMA, or Rolling Stream video streams.
- **RTP Lost** – Percentage of packets that were lost.
- **Cont. Err** – MPEG2 Continuity Errors or lost packets, in percent.
- **IGMP Latency** – The measure of time to complete a program change. For example, in broadcast video, it is the time between the IGMP join message is sent to the time the first video packet is received.
- **Leave Latency** – Delay from when a stream is terminated (via an IGMP leave request) and when we receive the last media packet.
- **Overall** – A rating (good, fair, poor) of the combination of jitter, latency, and cont.err. (FAIL if any one item is a fail status).

## Loss results

This category provides information on lost packets.

- **Distance Err.** – “Distance Errors” measured in the current measurement interval, which is 5 minutes.
- **Period Err.** – “Loss Period Errors” measured in the current measurement interval, which is 5 minutes.
- **Min Distance** – The minimum distance between two loss events, measured over the lifetime of the stream.
- **Max Period** – The maximum loss period (i.e. greatest number of consecutive loss packets) measured over the lifetime of the stream.
- **RTP Lost** – Number of RTP packets that were lost.
- **RTP OOS** – RTP OOS Number of RTP packets that were out of sequence.
- **RTP Errors** – RTP Errors Number of RTP packets with errors in the RTP header.
- **Video Continuity Err.** – Number of MPEG continuity errors detected.
- **ETHERNET RX Errors** – Number of Ethernet errors received. (Appears only if testing on Ethernet interface)
- **ETHERNET RX Drops** – Number of dropped Ethernet frames received. (Appears only if testing on Ethernet interface)

## Packet statistics

This category provides statistics for the packets at the IP layer.

- **IP Packets Rx** – Total number of IP packets received.
- **Jitter Current** – The current jitter value.
- **Jitter Max** – The maximum jitter value.
- **IGMP Latency** – The measure of time to complete a program change. For example, in broadcast video, it is the time between the IGMP join message is sent to the time the first video packet is received.
- **Current Gap Errors** – The current number of gap errors.
- **Max Gap Errors** – The maximum number of gap errors received since the start of the test.
- **Total Gap Errors** – The total number of gap errors received since the start of the test.
- **Max Gap** – The maximum gap received.

## Stream rates

This category provides individual bit rates for each portion of the video stream. The “IP Total” statistics measure the bandwidth used by the video stream, including the UDP and IP headers.

## Stream (TS) statistics

This category provides statistics for each test stream (TS) of video. Statistics are kept on up to three streams.

- **Error Indicator** – Number of MPEG2-TS packets with the error indicator bit set.
- **Continuity Errors** – Number of MPEG continuity errors detected.
- **PAT Errors** – Number of errors in the Program Association Table. Error conditions include any of the following:
  - Scrambling is ON
  - Repetition rate is less than the configured threshold value
  - PAT not found
- **PMT Errors** – Number of errors in the Program Map Table. Error conditions include any of the following:
  - Scrambling is ON
  - Repetition rate is less than the configured threshold value
  - PMT not found

## Stream (TS) statistics (continued)

- **PID Timeouts** – Number of occurrences when the PID for Video or Audio is not present for more than the configured threshold value.
- **Service Name** – The name of the service as given by the "service name" string in the MPEG2-TS transport stream.
- **Program Name** – The name of the program as given by the "program name" string in the MPEG2-TS transport stream.



**NOTE:**

***The Error Indicator is set by the video stream encoder when it detects corrupted source content. Typically any count will result in an anomaly on the TV.***

## PID results

This category provides the PIDs (Packet Identifiers) for each piece (video, audio, and data) of the video program stream.



**NOTE:**

***The PAT and PMT items are table data inserted into the stream to enable the decoder to perform correctly. These two items should always be present.***

## HPNA results

The following section describes the results available in HPNA mode.

### Node list

The following table describes the Node List results.

Results	Description	Units	Range/Values
H	This column indicates the host/client of every HPNA device in the network.		<b>H:</b> Host device
Id	The station identifier for the HPNA device.	numeric digit	0–9
Hpna MAC	The MAC address of the HPNA device in the network	aa:bb:cc:dd:ee:ff	Each field is 00–FF hex
Ver–Chip	The device's firmware version and Copper Gate™ chip ID.	revision–chip id	Chip ID = Chipset 0 3010 1 3110 2 3210 3 3310 4 3320

### Node details

Node details provides details for a particular node.

## Network test

The following table describes the HPNA results.

Results	Description	Units	Range/ Values
Station ID -> ID	This is a directional indication of each link denoted by each node ID.		
Rate, Mod Mbps	This is the current data rate, and baud/constellation of the specific link.	Mbps, MBaud/ bits per symbol	0-112, 2-24/2-10
PER	The Packet Error Rate on the specific link.	Rate x.xxe+yy	0.00e0 – 1.00e0
SNR	This is the Signal to Noise Ratio of the specific link.	dB	
<b>Receive and Transmit Results</b>			
bytes	The number of total (good and bad) transmitted or received bytes.	Bytes	
packets	The number of total (good and bad) transmitted or received packets.	Packets	
bcast	The number of transmitted or received broadcast packets.	Packets	
mcast	The number of transmitted or received multicast packets.	Packets	
dropped	The number of transmitted or received packets dropped due to lack of resources.	Packets	



Results	Description	Units	Range/ Values
crc	The number of received packets that have had an invalid checksum.  (NOTE: There is no count for transmitted packets.)	Packets	
<b>Protocol Messages</b>			
ctrl_log_req	The number of control requests from the local host (CERT protocol).		
ctrl_log_rec	The number of control replies to the local host (CERT protocol).		
ctrl_rem_req	The number of control requests from a remote host (CERT protocol).		
ctrl_rem_rec	The number of control replies to a remote host (CERT protocol).		

## SmartID results

The following section paragraphs describes the results available in SmartID tests.

### Test summary

This category provides an overview of the results, including basic pass/fail indications of the links between the SmartIDs. Use the arrow keys to navigate and highlight a section. The details for that section appear. If you navigate to a section/link that failed, the results on the left update and you can see which measurement failed.

### Detailed view

This category shows detail of the selected section/link of the network between two SmartIDs. Use the # key to reverse the direction (change the focus from the near end of the cable to the far end).

### Network map

This category shows the layout of the network. The SmartID connected to the OneExpert DSL is on the left and the home network cascades to the right. Use the up and down arrow keys to select different SmartIDs on the map. Press OK to see details of a particular segment.

### Sweep data

This category shows a graph of the frequency sweep. Use the # key to reverse the direction.

## Copper results

The copper results are described in the following sections.

### AC voltage

You measure AC volts to:

- Detect the presence of hazardous voltage.
- Measure stray or foreign voltages.
- Measure ringer voltage level.

AC voltage results on Tip (A) to Ring (B) should be 0.0 volts. Tip (A) to ground and Ring (B) to ground should be equal to each other. Anything else indicates AC signal interference and/or an unbalanced line.

The following table describes the AC voltage result.

Range (VAC)	Resolution (V)	Accuracy
AC peak + [VDC] ≤ 300	1	2% ± 1.0V



#### **WARNING: INSTRUMENT DAMAGE**

**Although the OneExpert DSL OneExpert DSL is designed to measure hazardous voltage, it is designed to do so on telecom circuits, not power mains. Hazardous voltages may be on the power lines. 220 mains (RMS) are equivalent to 308 peak. Connecting to these circuits may result in damage to equipment or serious injury.**

## DC voltage

You measure DC volts to:

- Detect and measure CO/exchange battery voltage.
- Detect crossed battery conditions.

To measure DC volts, remove the line battery and measure Tip (A) and Ring (B) to ground. It should be < 3.0 volts; anything else indicates crossed battery that inhibits digital signals.

The following table describes the DC voltage result.

Range (VDC)	Resolution (V)	Accuracy
AC peak + [VDC] ≤ 300	1	2% ± 1.0V

## Resistance

You measure resistance to test line continuity and quality, and to detect corrosion, shorts, opens, and faults.

The OneExpert DSL is able to measure resistance in the presence of noise and foreign voltage, but the accuracy may be reduced, depending on the noise level.

Resistance should be measured with the line disconnected, so that the battery voltage and CO/Exchange termination don't affect the measurement.

Normal resistance should be at least 5 MΩ; lower values indicate the presence of faults.

The following table describes the resistance result (no ambient).

Range (Ω)	Resolution (Ω)	Accuracy
0 to 999	1	2% ± 2.5Ω
1.0K to 9.99K	10	2%
10.0K to 99.9K	100	2%
100.0K to 999K	1K	2%
1.0M to 9.9M	10K	6.5%
10.0M to 100M	100K	10%

## Distance to short

This result measures the distance to the short. A resistance measurement of 4 k $\Omega$  or less typically indicates a short. For values greater than 4 k $\Omega$ , this function is disabled.

The following table describes the distance to short result.

Range (feet)	Resolution	Range (meters)	Resolution
0 to 3000	30 feet	0 to 999	9 meters
3000 to 30,000	100 feet	1000 to 10,000	30.5 meters

## Leakage

Leakage is a resistance measurement using higher voltage.

The following table describes the leakage result (no ambient).

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy
0 to 49.99	1	2% $\pm$ 2.5 $\Omega$
50 to 999	1	5% $\pm$ 2.5 $\Omega$
1.0K to 9.99K	10	5%
10.0K to 99.9K	100	5%
100.0K to 999K	1K	5%
1.0M to 9.9M	10K	10%
10.0M to 100M	100K	15%

## Opens/Capacitance

You measure opens/capacitance to:

- Measure total electrical loop length (includes length of bridged taps).
- Find wet sections, bridged taps or open faults.

Opens/Capacitance: < 3% difference between Tip (A) and Ring (B) values indicate an acceptably balanced loop. Anything greater indicates an unbalanced line or open fault, which inhibit digital signals.

The following table describes the opens/capacitance result (no ambient).

Range (ft)	Resolution (ft)	Range (meters)	Resolution (meters)	Range (capacitance)	Accuracy (applies to capacitance only)
0 to 2,999	1 foot	0 to 999	0.1 meter	0 to 471 nF	1% ± 15 pF
3000 to 66000	1 foot	1,000 to 20,000	0.1 meter	471 nF to 1.57 µF	2%

## DC current

You measure DC current to verify if enough current is present to operate equipment including the phone or caller ID boxes.

DC current on Tip (A) to Ring (B) should be ≥ 23 mA at the NID. Anything less will not allow for differences in temperature and phone equipment will not operate during extremes.

The following table describes the DC current result.

Range	Resolution	Accuracy
0 to 110 mA	1mA	2% ± 1mA

## Longitudinal balance

You measure longitudinal balance to measure the quality of the pair – a measurement of the degree to which the Tip (A) lead is electrically the same as the Ring (B) lead.

The more each lead is electrically identical (capacitance, inductance, impedance), the better the pair will resist induced noise.

The balance result should be >60 dB. Anything less indicates electrical differences between Tip (A) and Ring (B) that can lead to noise and other signal problems.

The following table describes the DC current result.

Range	Resolution	Accuracy
28 to 70 dB	1 dB	± 2 dB
70 to 120 dB	1 dB	indication only

The calculated balance (PI - Noise = Balance) appears below the longitudinal balance.

Power influence (Tip to Ground [A to E] and Ring to Ground [B to E] noise) is the unwanted current inducted on the pair from power lines and other AC sources. Noise is the unwanted current that the pair has failed to cancel and which the customer hears as noise.

## Load coil

You check for load coils to ensure there are no load coils present on a digital line (such as ADSL or ISDN). Load coil detection and elimination is essential in the installation of an xDSL circuit

The following table describes the load coil result.

Range	Resolution	Accuracy
Up to 27,000 ft (8229.6 m)	up to 5	± 1

## TDR

A TDR (Time Domain Reflectometer) is used to identify and locate buried splices, shorts and low resistance faults, opens, bridge taps, load coils, and wet cables.

Velocity of Propagation (VoP) is the speed of the TDR signal traveling down the wire pair relative to the speed of light. The OneExpert DSL uses this value to convert reflections to distance. It is important to select the correct cable gauge and fill for an accurate distance calculation. The default value is appropriate for 24–26 AWG (4–5 mm) telco aerial cable and provides sufficient accuracy in most situations.

The following table describes the TDR result.

Range	Accuracy
0 to 30,000 ft (10 km)	± 0.5% of distance

## RFL

You use an RFL to find resistive faults such as poor splices, water, shorts, and battery crosses by cable damage (caused by rodents, the weather, etc.).

## Spectral

Radio frequency interference from digital services or AM radios can reduce the performance of a copper wire. The spectral test can detect and measure the existence of such interference.

Comparing traces is useful to troubleshoot anomalies such as excessive impulse noise on the copper loop, large noise spikes on a spectral graph, and DSL errors impacting performance.

## Noise

You measure noise to determine the amount of noise in a frequency range used for digital services such as ADSL and VDSL (wideband) or in voice frequencies (narrowband).

## Impulse noise

Impulse noise is used to check for the presence of noise spikes that disrupt digital services.

## RX and TX tones

You use tones to check cable performance (attenuation) at higher frequencies used for digital services (wideband) or in voice frequencies (narrowband).



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## WiFi Advisor results

### BSSID results

The BSSID results screen provides a listing of all detected BSSIDs along with their channel setting, current signal strength, and MAC address.

To view more details of a particular BSSID, select the desired BSSID, and then press the right arrow. The details include Noise and SNR as well as general items like the MAC address and type of security.

The BSSID Details menu also includes trend graphs that show RSSI, Noise, and Channel Utilization over time for the selected BSSID.

### Channel results

The Channel results include a RSSI view, a utilization graph, a noise graph, channel scores, and a best channel list.

To view other results, either scroll up or down, or press a result to minimize or maximize the view.

#### ***RSSI view***

The RSSI view provides quick visibility into the wireless networks active in the current environment. It provides a visual representation of overlap in the channels to help identify problem spots. It also shows signal strength for each BSSID. This view is useful for understanding an existing Access Point's channel configuration and signal strength.

#### ***Utilization graph***

The utilization graph shows the channel utilization for all channels in the selected band which could indicate co-channel or adjacent channel interference. This allows you to select the best channels available in the current environment.

If the channel view shows utilization in the wrong channels, the likely issue is that a high energy 802.11 transmitter is very close to the OneExpert DSL. For example, a high energy 802.11ac transmitter is using channels 149, 153, 157, and 161. The channel view should show utilization in these channels only. Move the WiFi Advisor away from the high energy transmitter and test again.

#### ***Noise graph***

The noise graph displays the noise per channel.

#### ***Channel score***

The channel score provides a score per channel which determines the best channels.

## Best Channels

A table that identifies the current top 3 best channels based on channel width for the band being viewed. This helps determine which channel to select for a new access point.

## Spectral results

The Spectral results provide a real-time spectral analyzer configurable by 802.11 band, channel, and channel width. It is helpful for finding signals that interfere with 802.11 networks by showing both 802.11 and non-802.11 RF signals within a given channel of interest.

The Spectral results screen includes the spectral graph area, where the real-time spectral data is displayed, and the controls area, where the user can configure the spectrum analyzer ranges and modes.



### **NOTE:**

***The BSSID View and Channel View must be run first in order for the BSSID and Channel Snapshots to populate in Spectral.***

The Spectrum Analyzer controls consist of the following:

- **Channel width** – Specifies the width of the spectrum analyzer.
- **Max Hold** – The blue line above the standard spectral line that represents the peak value (in dBm) seen at each frequency point. Press OK to reset the Max Hold trace and restart the measurement.
- **Averages** – Specifies the number of samples to be used for averaging of the real-time trace

The following are some common interferences that could show up in a spectral measurement.

Microwave ovens can interfere with an 802.11 signal. They are most prevalent in channels 10 and 11. If possible, it is a good idea to look at the spectral response while the microwave is running to determine its impact.

Bluetooth devices appear as spikes and appear to “roll” through the spectral view. They are fast moving and you may only see them occasionally. The systems are designed to be interoperable, but Bluetooth will impact throughput.

Channels can “bleed over” into adjacent channels. The width of the signal (due to RF considerations) can affect nearby channels. This bleed over is treated as noise.

## Appendix

This appendix includes troubleshooting and supplemental information for the OneExpert, including the following:

- "Cleaning the instrument" on page 300
- "Resolving problems" on page 300
- "Copper testing" on page 302
- "Getting technical assistance" on page 328
- "WiFi Advisor" on page 327
- "Additional information" on page 328
- "Specifications" on page 329

## Cleaning the instrument

The instrument itself does not require any specialized cleaning. An occasional wipe with a damp cloth is sufficient.



**NOTE:**

***When cleaning the instrument, use a damp cloth and water only. Cleaning with chemicals could cause damage to the plastic case, buttons, or removal of markings.***

## Resolving problems

If you are having trouble with the OneExpert, the following sections describe common problems and solutions. You should verify whether your problem is listed here before contacting technical assistance.

### ***General testing***

- **Inconsistent test results** – Verify that your test leads are good and are connected properly for the test you are performing.

### ***Copper testing***

- **The Tip-Ring voltage is reading negative** – The Tip and Ring test leads may be swapped. Check your test leads to verify that they are hooked up properly.
- **I am performing an Opens test. The mutual value looks good, but the Tip and Ring values are really short** – Verify the ground. The module must be grounded to the same ground as the pair under test.

### ***Copper testing***

- **The modem cannot achieve sync with the CO** – Inability to sync can have many causes. Perform the following steps to troubleshoot:
  - Disconnect the customer's DSL modem
  - Verify tester connection to the correct pair
  - Verify the Data mode

- Verify that the Standard is correct (ADSL2+, G.DMT, Auto, etc.)
- Isolate premise wiring
- Check for premise alarm system
- Verify the copper pair is provisioned for ADSL at the CO
- Test at the CO/Exchange on the customer pair
- Check the DSLAM modem vendor and software version
- **The modem achieves sync with the CO, but the rate is lower than expected** – Check the loop length and attenuation. Long loops and high attenuation will degrade DSL performance.

Make sure you are connected on the correct pins. For single-line service pins 4 and 5 are used on an RJ-45 connector. For bonded service, pair 1 should be on pins 4 and 5 and pair 2 should be on pins 3 and 6 of an RJ45 connector. Check for premise alarm system on the same pair.

Verify that the noise margin on the line is within acceptable limits. Noise margins should typically be  $\geq 6$ dB to allow for acceptable performance.

### ***Data testing***

- **The IP ping menu says pings are being sent, but the network statistics are not incrementing** – Verify the IP address and netmask.

Make sure you are not behind a firewall; they can block ping responses from reaching the host.

The IP ping function only *attempts* to send a ping every second. Depending on certain conditions, a physical ping packet may not be sent.

If IPoE standards require that the device has to ARP the address first. If this fails eventually you will see a ARP HOST UNREACHABLE message.

Check to see that the destination IP address and your configured IP parameters are correct.

Make sure that the Ethernet interface cabling is correct. If the Ethernet cable is not hooked up, or is hooked up incorrectly, a packet will not be sent. Thus the Ethernet statistics will not increment.

## Copper testing

The following section provides some additional information and help when testing copper lines .

### TX/RX tones

Use the **TX (Transmit) Tones** to send a narrow or wide band tone of the selected frequency and level (amplitude) on an out of service pair. The far end of the pair normally would have another ONX set to RX (Receive) Tones to show the Actual Measured Loss of the pair at the frequency. The test will terminate the pair, like the installed equipment.

By selecting **Technology** (service type) the ONX allows Voice Frequency (NB) or WB frequency and termination required for the test to be set.

#### *Tips*

- Terminations are usually 600 ohms for NB (Narrow Band) and 100 ohms for WB (Wide Band).
- Standard NB frequencies used for Loss are 1004, 1600, and 820 Hz.
- Standard WB frequencies used for Loss are based on the technology. For example, 196kHz is used for HDSL, 772kHz for T1, 1MHz for E1 and 300kHz is often used for xDSL.

#### **General information**

- Most technologies or services use an Actual Measured Loss (AML) test at specific frequencies to pre-qualify a pair before turn-up. The acceptable Loss result is determined by being sure the service could operate with the expected performance (throughput or rates) with margin. The frequency used is often the 'Nyquist' (center frequency divided in half) of the technology.
- Loss is the measure of attenuation between two points. It is done by sending a tone at a known level into one end of the pair and measuring the received level at the far-end. The difference between the transmit and the received level is the loss.
- The TX Tone is a sine wave with the level usually 0dBm. The loss of the pair is expressed in dBm.
- Too much loss lowers the signal level decreasing the Signal-to-Noise Ratio (SNR). The goal is a high level of "good signal" compared to noise at the receiver. More loss makes the data signal susceptible to errors.
- Having "good signal" is mainly due to how much loss the pair has at the required frequencies. If the pair cannot be shorter or the gauge changed, usually there is no way to increase signal level.
- All pairs have loss. The larger the gauge or diameter the less it will be. Loss is not uniform for all frequencies. Higher frequencies experience more loss than lower frequencies on the same pair.

- Some services like HDSL have 'engineered' loops that calculate the Estimated Measured Loss (EML). The turn up of these services require that an AML be performed at a specific frequency and the results compared to the EML before the service is put into operation.

## Impulse noise

Impulse noise is not steady state (background) like what we measure in the **Noise** test. Use the **Impulse Noise** test to count noise events crossing a threshold on an out of service pair. The test will terminate the pair, like the installed equipment, and use a filter to look at just the frequency range of the technology being installed. The result is three counters: impulses exceeding the main threshold, impulses exceeding "+ 3 dB" and "- 3 dB" of the main threshold. This helps determine the amplitude range. The threshold is shown in dBr n (decibel reference to noise) or dBm (decibel per milliwatt) as well as millivolts. A low main count result is desirable.

By selecting the **Technology** (service type) being installed on the pair the ONX automatically sets the termination and filter required for the test.

### Tips

- Start by making sure the pair has no shorts, grounds or opens.
- Pair Balance is important. Most impulse noise is common mode (to ground) and only couples in strongly across the pair when it is unbalanced.
- Test for noise close to the customer premise. Most impulse noise sources are closer to distribution cable (F2) than central office or exchange cable (F1).
- Good bonding, grounding, and shielding can help reduce impulse noise on a pair.

### General information

- Impulse noise is transient in nature and often difficult to analyze. It occurs as 'spikes' or 'hits' that can be short in duration but contain a lot of energy. This type of noise can have an effect that spreads across a wide frequency range.
- Impulse noise events may have extremely sharp rise times and cause "ringing". To avoid counting the oscillations due to the ringing as an event, the counter is disabled for a period of time after a threshold has been exceeded. This is referred to as the dead time.
- Impulse noise can couple into the pair under test from other pairs inside the cable. Making Pair Balance better for the pair under test **and** other pairs can reduce it.
- Impulse noise is often much larger than a data signal and can corrupt several data bits in a row. More data is destroyed in high-speed data streams than low speed ones. Except for very low data rates, impulse noise will affect any kind of modulation scheme.
- Impulse noise is often misunderstood and the hardest to troubleshoot because it is not a constant noise source and varies in time depending on the source.
- Some impulse noise occurs at specific rates (like 60 times a second) because it originates from a device that is commercial AC powered. If its strong enough to wipe

out an xDSL bin 60 times a second, throughput will be poor even if there is no sync loss.

- Impulse noise can be defined as any noise spike that is 10dB, or higher, above the background noise (12dB is 4 times higher). It can corrupt one or more bins of data in xDSL circuits. A good threshold would be 14dB higher than the background noise.
- Impulse noise sources include Faulty fluorescent lights, street lights, Metal Halide lighting, heating/air switches, Jacuzzis, old TV sets / Video recorders, External Hi/Lo voltage Security Lights, Seasonal Lights, Satellite Receivers, POTS Ringing, Ringtrip, Phone off/on hook (POTS & DSL on the same pair).
- Noise is subject to loss. The farther away a noise source is from a receiver the better.

## Impulse noise capture

Use the **Impulse Noise Capture** test for in depth analysis of transient noise events crossing a threshold on an out of service pair. The test will terminate the pair, like the installed equipment, and use a filter to look at the frequency range of the selected technology. The result is a graph of noise level over time. The default result at the cursor is level in millivolts and time in microseconds. The threshold is selectable in dBm or dBr n.

By selecting the **Technology** (service type) being installed on the pair the ONX automatically sets the termination and filter required for the test.

### **Tips**

- The goal of Impulse Noise testing is to determine its impact on a service and find out as much about it as possible so that the source can be identified. The main characteristics to know are level, inter-arrival time or how often it occurs, and duration.
- Test with the **Impulse Noise** first. The level and how often it occurs can be seen and noted. Set the **Trigger Threshold** for **Capture** the same.
- Once triggered, the captured data looks like an oscilloscope trace. Inspect the event to determine what impact it might have on the service to be deployed.
- Use **Options Frequency** to inspect the event in the frequency domain instead of the time domain. Seeing the frequency content of the event helps assess its impact on a given technology.
- Start with **Single Capture**. Use **Options Continuous Capture** if needed.
- The box below the main graph shows the entire capture. When zoomed in, data outside the main graph is shown. Shading indicates where the main graph is in the capture.
- The **Capture Display** defaults the trigger event to the center of the captured data. If needed, the data can be captured leading up to or trailing the trigger event.



### General information

- Impulse noise can be defined as any noise spike that is 10dB, or higher, above the background noise. A good threshold would be 14dB higher than the background noise.
- Impulse noise is transient in nature and often difficult to analyze. It occurs as 'spikes' or 'hits' that can be short in duration but contain a lot of energy. This type of noise can have an effect that spreads across a wide frequency range.
- Impulse noise is often misunderstood and the hardest to troubleshoot because it is not a constant noise and varies in time depending on the source.
- Some impulse noise occurs at specific rates, like 60 times a second, because the source is a device powered from AC mains.
- Impulse noise sources include Faulty fluorescent lights, street lights, Metal Halide lighting, heating/air switches, Jacuzzis, old TV sets / Video recorders, External Hi/Lo voltage Security Lights, Seasonal Lights, Satellite Receivers, POTS Ringing, Ringtrip, Phone off/on hook (POTS & DSL on the same pair). Each of these have different signatures that will show in a capture.
- If the interference cannot be isolated to a source, seeing the graphed noise is helpful to understand its impact. The graphs can be stored and catalogued for future reference.
- **Options External Bridge** mode is used for testing an active line with the Viavi Monitor cable. Active line testing allows evaluating the interference while in service. Note: the **Trigger Threshold** will have to be set higher than the signal level.

## Noise

Use the **Noise** test to measure the level or amplitude of steady state (background) noise on an out of service pair. The test will terminate the pair, like the installed equipment, and use a filter to look only at the frequency range of the technology being installed. The result is a single number that shows the average noise power on the pair coming through the filter. The default result is usually dBm (decibel per milliwatt). The more negative the result is the lower the noise.

By selecting the **Technology** (service type) being installed on the pair the ONX automatically sets the termination and filter required for the test.

### Tips

- Start by making sure the pair has no shorts, grounds or opens.
- Pair Balance is very important. The better the balance the less noise will affect it.
- Test for downstream noise as close to the customer premise as possible and upstream as close to the equipment as possible.
- If noise levels are still unacceptable, use the Spectral analyser to see how many noise sources there are at what level, and which ones might be service impacting.

### **General information**

- The goal is good SNR (Signal to Noise Ratio). High levels of “good signal” compared to low noise at the receiver. Noise reduces a receiver’s ability to correctly recover data.
- Having “good signal” is mainly due to how much loss or attenuation the pair has at the required frequencies. Unless the pair can be shortened, or the gauge changed, usually there is no way to increase signal level.
- All copper pairs have noise. Focus on reducing noise to get the desired service level.
- High noise levels, in the service bandwidth, will degrade it. As the noise amplitude goes up the SNR and margin go down.
- Noise is subject to loss. The farther away a noise source is from a receiver the better.
- Noise sources can be internal to a cable or external coming from outside the cable. It is important to understand the noise so that steps can be taken to reduce it.
- Noise sources internal to a cable are usually crosstalk from another service. Making Pair Balance better for the pair under test **and** the other service pair can reduce noise. Using a transmitter on an unbalanced pair is a noise source causing higher crosstalk levels.
- Noise sources external (outside) to the cable are usually Radio Frequency Interference (RFI). Bonding, grounding, and shielding reduces RFI on the pair under test.
- Shorter pairs tolerate higher noise. Testing for one Noise pass threshold will not work.

## RFL

Resistive Fault Locate (RFL) is used to show where a contact fault occurs on a wire in a cable pair. A series of resistance measurements are done with a strap or short at the far end of the cable under test. Once the Resistance to Fault of the wire between the ONX and where the fault is located is known, it can be converted to the Distance to Fault (DTF) by selecting the correct wire gauge and temperature. Distance to Strap (DTS), Distance Strap to Fault (DSTF) and Fault Size are also shown as results.

**Single Pair** mode is used when one wire in a pair has a fault and the other wire has no fault. If both wires in a pair have faults use a "known good" wire in the same cable path and one of the faulted wires in the pair. If a similar "good" wire cannot be found use **Separate Pair** or **K-Test** mode.

**Separate Pair** mode is used when both wires in a pair are faulted and there is a "known good" pair available for a reference. The gauge, temperature, and length of the reference will not affect results. DTS is the length of the bad wire. On a short cable, roll out a good pair using a reel of wire.

**K (Kupfmuller)-Test** mode is used when both wires in a pair are faulted and no "known good" pair is available for a reference. Use only when **Single** and **Separate Pair** modes cannot be. The test starts with the far end open and does measurements to look for faults. With the far end shorted, it finishes and shows the results. The Viavi UltraFED can be used to provide open and short conditions at the far end.

### ***K-Test guidelines***

- The Fault ratio must be at least 2:1 (fault size on one wire at least twice as large as the other).
- The larger fault must be at least 100 times greater than the loop ohms of the pair under test.
- The faults on each wire must occur at the same physical location on the cable.

### ***General RFL guidelines***

- Test long cables in sections and keep the distance to the strap as short as possible.
- Test more than once and test from both ends.
- Low ohm (good) connections must be made to the pair under test. Use a low ohm (good) strap.
- When testing a pair that is not all a **Single Gauge**, use **Multiple Gauge** for accurate results.
- If the "good" wire for **Single Pair**, or pair for **Separate Pair** mode has a fault, the result may be wrong. A fault on the "good" reference must be 500 times greater than the "bad" wire fault.
- Selecting the right gauge is more crucial than temperature. Accuracy is best if both are correct.
- If there is more than one fault on the pair, the result will be wrong.
- Load coils add distance that is not accounted for.

### ***RFL specifications***

- Loop resistance up to 7,000 ohms
- Fault size up to 20 Meg ohms
- RTF accuracy - 0.2% RTS  $\pm 0.1\Omega \pm RF/5M\Omega$ . **K-Test** - 3% or +/- 3 ohms whichever is greater

### ***RFL cord compensation***

Select Tray in the RFL application.

- Run when you first get the ONX
- Run if you change test leads
- Run if the temperature of the ONX changes drastically
- Run if you desire the highest accuracy for digging to repair buried cable

A self-test can be done with the test leads shorted. Look for close to zero results.

## TDR

The **TDR** (Time Domain Reflectometer) is used to locate pair faults like shorts, opens, bridged taps (lateral), splices, wet sections, and Load Coils. It works by sending an electrical pulse down the pair under test and "looking" for pulse reflections to return. Anything that changes the characteristic impedance of the pair will cause the pulses energy to be reflected toward the source. The distance from the ONX is found by using the cables VP (Velocity of Propagation) to convert the return time of the reflection to distance. The user can determine the type of fault by analyzing the reflections trace.

**Standard TDR** – This mode is a traditional pulse-based TDR designed to be used on typical outside plant telephone cables of varying lengths and conditions to find faults. Use this Mode when looking for small reflections like joints & wet cable. Use this Mode on long pairs.

**In Home TDR** – This mode is short range (about 400ft. or 100m) with high resolution (about 2 in. or 0.05m) designed to be used on typical cables found inside a home or dwelling unit (Cat 3, 5, 6, etc.). It has high sensitivity to impedance changes in the pair under test with enough resolution to pinpoint faults in adjacent jacks in different rooms. Use this mode for locating shorts and opens on inside wiring.

**SmartGain TDR** – This is a user-friendly Mode. It uses our patented TVG (Time Varying Gain) algorithm where Gain is applied over time (distance) to bring focus to events that may have service impact. It also eliminates events that may be confusing. This Mode depends on knowing the characteristics of the cable under test. It has a reflection "threshold" to be exceeded for an event to be "seen".

Use **SmartGain** on cables in range where the user will set **Fine Tune** to the closest gauge and adjust it for best response. Use it for seeing the open end of the cable, a dead short, bridged tap and close in splices. We do not recommend using **SmartGain** where the **Fine Tune** will not be adjusted or for events that create small reflections such as wet cable, series faults, and splices farther away. These events will show or not show based on the reflection level, which changes drastically with cable type, location and severity.

**AutoID TDR** – This mode uses the **SmartGain** technique with auto ranging (no **Quick Range** setting) and attempts to identify the fault based on its signature. Use **AutoID** on cables in range where the user will set **Fine Tune** to the closest gauge and adjust it for best response.

**OneCheck TDR** – This mode uses the **SmartGain** technique with auto ranging and identifies the fault based on its signature with the help of copper tests, for greater accuracy. Use **OneCheck** on cables in range where the user will set **Fine Tune** to the closest gauge and adjust it for best response.

**Dual** – Use this option for live compare of a "good" and "bad" pair. Connect ONX red / black leads to a pair and blue / yellow to a pair. Both traces appear in **Offset View**. Also, **Overlap** and **Difference View**.

**Peak** – Use this option for the trace changing over time. It shows the current, highest, and lowest traces.

**Crosstalk** – Use this mode to locate where a pair is split with another pair. Launch pulse is sent on red / black leads and the ONX looks for reflections on blue / yellow. A peak or valley occurs at the cross.

**World view** – This box, below the main trace, shows the entire viewable range. Events that are outside the main trace show here. Shading indicates where the main trace is in the viewable range.

**Tips**

- A clean Open will be the tallest "peak" (other than the launch pulse) in the trace.
- A dead short will be the lowest "valley" in the trace.
- There can be a reflection from where the test leads are hooked to the pair under test. Events that are close will cause large reflections. Ignore the reflections shown at the start of the trace and look at the points of interest farther out unless you are trying to see close up events.
- Test from both ends, if possible, and make sure the distances to the fault match.
- Use TDR on as many cable pairs as possible to determine the fault on a single pair in the count.
- A TDR cannot 'see' anything beyond an Open, Short or Load Coil. A TDR pulse and reflections are high frequency signals that Load Coils attenuate greatly.
- Shorts above 100 ohms will be difficult to see or not be seen at all.
- The TDR does not use the green / ground lead. Shorts to ground may not be seen at all.
- Large reflections make things beyond it harder to see. Find the close fault first or test beyond it.
- The "valley" followed by a "peak" trace display for bridged taps is not always a "mirror image" above and below the line. The length and condition of the tap determines how the trace is displayed. A bad splice followed by open can look like tap.
- A bridged tap longer than the length to end of the cable may not show the "peak" on the trace.
- Bridged taps less than 20 feet (6m) long are hard to see beyond 200 feet (60m) from the tester.

### **General information**

- A TDR's pulse is subject to the attenuation of the cable as it travels out **and** so is the reflection as it travels back. The larger the wire diameter, the less the attenuation is for both directions.
- On long loops, having the Viavi UltraFED at the far end in the "TDR Helper" mode makes it clear on the trace where the end of the cable is. The UltraFED slowly shorts and opens the pair.
- A splice or joint shows as a peak closely followed by a valley. When a pair is untwisted to allow the splice, the impedance goes up there then down as it returns to the normal impedance of the pair. A well done joint with little pair untwisting can still be seen if close enough to it.
- The difference in signatures for a good joint, bad joint, and a gauge change are subtle.
- A gauge change can make the amplitude of the valley larger or smaller based on going from large to small gauge or vice versa. A bad joint alters the impedance with series resistance in one or both wires. It may be seen by the peak or valley being out of proportion in height or width.
- If a TDR sends a pulse down a pair terminated in the same impedance as its source, there is little reflection because the energy is absorbed. Also, a short less than the source impedance will have a larger valley the closer it gets to 0 ohms. More energy is reflected. The opposite is also true, the higher the value of the short is from the source impedance the less it looks like a short.

### **Specifications**

The TDR viewable range is about 30kft (9km). The operating range is subject to pair gauge. Expected performance for seeing a clean open or dead short on a pair with no other faults and correct setup is:

- For 26 AWG, (0.4mm) about 12,000ft (3.7km)
- For 24 AWG, (0.5mm) about 18,000ft (5.5km)
- For 22 AWG, (0.6mm) about 25,500ft (7.8km)
- For 19 AWG, (0.8mm) about 29,500ft (9km)

The accuracy of the TDR is approximately 0.5% of full scale for each range.

## DVOM Opens LB PINB

### AC Volts

The primary use for the AC Volts test is for Safety to make sure there is no Power Mains contact or leakage onto a telephone company pair. If a large amount of AC Volts is on the pair, it could indicate a Hazardous condition. Abort tests and follow company practices to eliminate risk.

AC Volts to ground is also another way to look at the amount of Power Influence (noise to ground) on a pair since the AC voltmeter frequency range includes a large part of the power influence spectrum.

Using the power influence shown by the AC voltmeter is another way to look at pair balance. The voltage across the pair should be close to zero volts. If not, one side to ground will be higher than the other indicating unbalance.

### DC Volts

The DC Volts test is used to see if the out of service pair under test is in contact with another working pair (Cross Battery) due to a cable fault. Less than or equal to 3 Volts DC, measured with the 100K ohm termination, is desirable.

When measuring volts there are two terminations selectable: 1 megohm and 100k ohm. To test for battery cross, we recommend the 100K ohm selection to match industry standards.

To locate the point of contact, the far end should be strapped and the RFL (Resistive Fault Locate) test run. Refer to the User Guide for more information on RFL.

With the Snapshot Mode you can quickly assess AC & DC volts results for all three sets of leads (TR/AB, T/A & R/B to ground).

### Resistance

This test is used to see if the out of service pair under test has resistive faults, normally due to a cable fault. This test shows Shorts across the pair (T/A and R/B are in contact with each other) or grounds that indicate the pair is in contact with the shield, ground, or is in contact with another working pair (Ground Cross). Greater than or equal to 3.5 Meg ohms between all leads is desirable.

Low resistance (<100 Ohm) faults across the pair can be located with the TDR. Refer to the User Guide for more information on TDR.

To locate higher resistance connections across the pair, or locate the ground point of contact, the far end should be strapped and the RFL (Resistive Fault Locate) test run. Refer to the User Guide for more information on RFL.

Leakage allows the resistance test to use >100VDC as the source voltage when running the test. This insures isolation.

The Distance to Short test is used to find the resistive distance of a pair or tests to make sure loop resistance is not too high. When using the Distance to Short test, T/A and R/B must have a zero-ohm short at the far end and the gauge with temperature set correctly.

**Note:** Load coils add length to the measurement.

You can compare loop ohms distance to Opens (Capacitance) for a bridge tap check.



The Resistive Balance (Delta R) test is used to see if the resistance of one lead in the pair is close to the resistance of the other lead (balanced). This test also checks for shield or earth continuity as T/A and R/B are shorted and grounded at the far end.

### **Opens/Capacitance**

Opens (length to open)/Capacitance measures the capacitance of an out of service pair under test and converts it to distance to show the length of the pair. We measure the capacitance by applying a low frequency AC signal to the pair and analyzing its characteristics.

The length result is used to compare with plant records and make sure your pair is not too long to support the service being installed. If the mutual (T to R / A to B) result is off from the plant record and there are no bridged taps, this could mean wrong pair, bad plant records, or a wet section where moisture increases the capacitance through the section. Also, Ringers and Build out capacitors add capacitance to the result. Bridged taps add to the result as they are parallel capacitors.

The Opens capacitance result is converted to length by using a known capacitance per mile or km. Tip/A to Ring/B is assumed to be .083ufd per mile when the ONX is set to Imperial and 45nf per km for Metric. The cable fill type is used for capacitance results to Ground distance conversion. For example, Aircore is about 0.125ufd per mile to ground.

Correct cable parameters, used for distance conversion, are crucial for an accurate distance result. You can enter your own Custom conversions, or you can use the "Calculate" feature to measure and use the capacitance on a known good length of cable.

Loop Length can be verified with TDR. Refer to the User Guide for more information on TDR.

Another way to verify loop length is by shorting the pair at the far end and using the Distance to Short feature in the Resistance test. Refer to the User Guide for more information.

The length result to ground / earth is used for locating a one sided open. If one lead is significantly shorter than the other, you can use that result to find the open.

This test is also used for capacitive balance which is an indication of differences in the capacitance of the T/A wire compared to the R/B wire using ground as the reference. It may be the result of open or partially open conductors.

For Opens in a resistive environment (parallel or series resistance), the results may not be accurate. Use the Enhanced Mode for best results in this environment.

The ONX uses a Three Terminal mode feature to overcome the issue of doing a T/A or R/B to Ground measurement on a pair in a large pair count cable with most of the pairs unused. The three Terminal mode is only used for measurements to ground / earth. The unused lead is connected to the earth/ground lead inside the tester while making the measurement, that is why the "three terminal" description is used. For example, when doing TG/AE we tie the R/B lead to earth inside the tester.

If the Two Terminal mode is used, the capacitance may be lower causing the result to be short. This mode looks at "two terminals" or leads at a time (TR/AB, TG/AE, or RG/BE) and gives a result of the capacitance seen only on those leads.

There is a mathematical way to do 3 terminal capacitances, which we do not do at this time.

## Longitudinal (AC) Balance

This test is used to indicate if the pair under test is balanced or how much Tip (A) “looks like” Ring (B) using ground as a reference. It is a very good test for overall pair quality. The measurement result is in dB and the higher it is, the better the pair is balanced. For example, a result of 60 or greater indicates the pair has good balance and should be acceptable.

For a twisted pair to be able to cancel noise or interference coupled in from outside sources, good balance is crucial. The major characteristics of a pair are resistance, capacitance and inductance. A well-balanced pair has these electrical characteristics closely matched between T/A and R/B. When the conductors are identical, or well balanced, the pair can reject noise. Any noise coupled in from outside the pair will be coupled in equally on each wire when the pair is well balanced. The noise will then be rejected at the ends of the pair as the signal is recovered. On a pair with poor balance, the noise is coupled in at the source on one wire stronger than the other. At the ends of the pair the difference in the level of the noise across the pair is recovered with the signal. The more noise there is with the expected signal, the lower its quality will be.

A good ground reference, with proximity to the pair under test is crucial to obtaining valid results.

There is a Ground Reference check used for this test only. If the green lead is not connected to a “ground” with reference (proximity) to the pair under test, you will get an artificially high result.

To make sure you have the ground lead connected to a “good” reference, select the Ground Reference tab while the test is running. The circuit, internal to the test set, is deliberately imbalanced. This should cause a significant drop in the result. If not, your green lead may not be connected to a “good” reference.

It is also very important that the test leads are connected well. If needed, cut and strip wires to use under corroded screw heads to clip the leads to.

Results < 60 dB indicate physical pair trouble. Pair balance problems are mainly due to capacitive or resistive issues and should be analyzed by reviewing those results.

For resistance, there should be very little or no resistance to ground on either wire. If there is acceptable resistance results to ground, they should be close in value on both leads. To locate the point of contact, the far end should be strapped and the RFL (Resistive Fault Locate) test run.

There should be very low wire resistance difference between T/A and R/B, which is often caused by bad splices/joints (HR's). This can be tested by using the Resistive Balance Option in the Resistance test. Bad splices can potentially be located with the TDR if close enough to the test set.

For Capacitance (Opens), if one wire in the pair has more capacitance to ground than the other (capacitive balance is bad) this will cause the Longitudinal Balance result to be low. This might be caused by a bridge tap or load coil only being cut off one lead or by the pair being split. The Opens length result to ground/earth might be used for locating an issue. Other issues can potentially be located with the TDR.

Balance problems may have to be found by sectionalizing the cable.

## PI (power influence)/Noise/Balance

In North America and some other countries, the conventional method of measuring circuit balance is to first measure the amount of power influence or noise to ground that is on a pair, then measure the amount of noise that develops across the pair due to this power influence. Subtracting N (Noise) from PI gives the balance result. Power influence is induced interference from nearby AC power lines and is measured in dBnC; dB reference to noise through a C Message filter. The noise this causes on the pair is also measured in dBnC. The O.41 Psophometric and the IEEE 743 3K Flat filters are also available. The Balance result is in dB and the higher the number, the better the pair is balanced. For example, a result of 60 or greater indicates the pair has good balance and should be acceptable.

The PI/Noise/Balance test runs the PI measurement followed by the Noise measurement to get the Balance result.

If a pair that has a balance of 60dB is exposed to 72dBnC of power influence, it can reject 60dB of that power influence and leave only 12dBnC of noise on the pair. This is very low noise and would not be audible to a customer.

To get accurate readings these measurements must be made with the line dialed into a quiet termination. Any other termination or no termination can result in noise on the pair and could provide a higher than actual reading.

There are limitations to the conventional balance test because this technique requires a minimal amount of power influence to obtain a valid balance reading. If the PI were only 50dBnC, the best balance reading you would see is 50dB even if the Noise was 0. The effect of not enough PI is that you will normally see lower than actual balance results. Longitudinal Balance should be used in this case.

Longitudinal balance works like the PI/Noise/Balance test, except that instead of relying on the presence of PI to get a result, this test applies its own signal in place of PI to measure the pair's ability to reject noise. During the Longitudinal Balance test, a common mode 1000 Hz tone is applied to the pair under test as it measures the level of induced noise across the pair. A calculation of the balance is done and displayed. This can be a more accurate and consistent measurement of balance. And this method also allows you to get accurate measurements on unterminated lines.

Longitudinal Balance and PI/Noise/Balance are both valuable tests.

## Spectral

Use **Spectral** when the **Noise** test fails to see the level and frequency of all steady state noise for a **Technology** on an out of service pair. The test can terminate the pair, like installed equipment, and shows a graph of noise level at frequency for the **Technology** chosen. The default result at the cursor is dBm. The more negative the level is the lower the noise.

By selecting the **Technology** (service type) being installed on the pair the ONX automatically sets the frequency range or bandwidth of interest for the test.

### *Tips*

- Use Spectral to analyse noise sources: How many, what level, and which are service impacting?
- Use Spectral to identify noise types. Select the **Technology** being installed and look at the highest noise peaks. Are they interference from another technology? If not, it may be from RFI.
- The **Max Hold** feature can be used to show the highest amplitude when the noise fluctuates. It captures and holds the maximum signal level measured at each frequency across the span.
- Do not use Spectral for analyzing transient events (Impulse Noise) because they come and go too fast. Spectral captures samples, averages and display them. The duty cycle is not 100%.
- Spectral will not give the same level at the cursor as the **Noise** test. It is not unusual to see 10 to 20 dB difference between the highest peak on **Spectral** and the **Noise** result.
- When a lot of noise is seen on a **Spectral** graph its impact on DSL can be seen by launching the DSL application. After sync look at the Bits per Tone graph. Dips or breaks in the BPT show the areas where interference might be degrading the DSL signal.
- The **Power Harmonics Technology** setting is used to show power mains influence. It can help identify power company and Bonding / Grounding issues.
- The box below the main trace, shows the entire range. When zoomed in, noise outside the main trace show here. Shading indicates where the main trace is in the viewable range.

### General information

- The **Spectral** measurement plots a graph of frequency vs. amplitude, for easy viewing of a user selected **Technology** band in the narrow or wideband spectrum.
- Noise sources internal to a cable are usually crosstalk from another service. Use the **Options PSD Masks** feature to select a technology **Mask** for comparison to the noise pattern. **Spectral Masks** are overlaid on the graph result for easy verification of a noise pattern by technology.
- If crosstalk is indicated, the pair under test or the pair carrying the offending technology may have bad balance. Improving Balance for both pairs reduces noise. Sometimes, the pair carrying the offending technology should not be in the cable. T1 for example.
- If interference is not from crosstalk, then it may be Radio Frequency Interference (RFI) from outside the cable. In most cases rehabbing or checking bonding, grounding, and shielding on the cable sections will reduce RFI. RFI usually appears on the **Spectral** graph as single peak while crosstalk interferers show multiple lobes of noise. RFI is usually at a known frequency used in the area such as an AM radio station, short-wave radio or even emergency responder radios.
- If the interference cannot be isolated to a source, being able to see the graphed noise is helpful to assess its impact on a service. The graphs can be stored and catalogued for future reference.
- All copper pairs have noise. A good pair will have a noise floor close to -90 dBm across the frequency range. Large noise events seen on the graph that exceed -60 dBm will likely degrade DSL performance. Focus on reducing noise to get the desired service level.
- **Options External Bridge** mode is used for testing an active line with the VIAVI Monitor cable. Active line testing allows evaluating the technology and interference while in service.

## Loss Sweep (UFED)

Use the Loss Sweep (UFED) test to look at attenuation (loss) over frequency on a pair. The UltraFED is required at the far end and commanded by the ONX to send narrow or wide band tones of pre-set frequencies on the pair under test. The ONX is set to receive the tones and graphs the measured loss of the frequencies with the highest levels at the top. The test will terminate the pair, like the installed equipment.

By selecting **Technology** (service type), the ONX automatically performs a VDSL, ADSL2+, or Voice Frequency (NB) tone sweep with the termination required for the test.

### **Tips**

- Look for a steady slope descending from left to right on the graph. This is a normal increase in loss as the frequency goes up.
- Higher frequencies have more loss than lower frequencies on the same pair.
- If there is an abnormal dip over frequency, this indicates a cable fault or a bridged tap.
- All cables have attenuation, but shorter cable pairs and larger gauge pairs have less.

### **General information**

- Loss is the measure of attenuation between two points. The UFED sends tones at 0 dBm into one end of the pair and the ONX measures the level at the other end. The difference between the two is the loss.
- Most technologies or services use an Actual Measured Loss test at specific frequencies to pre-qualify a pair before turn-up. Acceptable Loss results should be determined by lab testing to be sure the service can operate with the expected performance plus margin.
- A high level of "good signal" compared to noise at the receiver is desired. Too much loss lowers a signal level decreasing the Signal-to-Noise Ratio and makes it susceptible to errors.

### **Specifications**

- Voice frequencies used are: 300, 404, 450, 600, 750, 820, 900, 1004, 1020, 1050, 1200, 1350, 1500, 1650, 1800, 1950, 2100, 2250, 2400, 2550, 2700, 2804, 2850, 3000, 3150, 3300, 3450, 3600, and 3750Hz.
- ADSL2+ frequencies used are: 100, 150, 200, 300, 400, 500, 600, 700, 800, and 900kHz. 1, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.1, and 2.2 MHz.
- VDSL frequencies used are 150, 300, 600kHz, and 1 to 30 MHz in 1 MHz steps.

## NEXT Sweep

Use the NEXT Sweep test to measure the level of signal coupling (crosstalk) between two pairs over a set frequency range on out of service pairs. The test will terminate the pairs, like the installed equipment. The result is a graph showing the isolation of the pairs at each frequency. Larger results are at the top and the cursor result is in dB. The higher the result is the lower the crosstalk between the pairs.

By selecting **Technology** (service type), the ONX automatically performs a VDSL, ADSL2+, or Voice Frequency (NB) tone sweep with the termination required for the test.

### Tips

- Look for high results left to right on the graph. Dips in the result show more crosstalk at that frequency.
- Results in dB show what isolation you have between the pairs at that frequency.
- Pair Balance is important. The better the balance is the less crosstalk will affect it.
- Test for crosstalk close to the customer premise and close to the equipment.
- For pairs less than 1000ft (300m), use the UFED to terminate the far end for best results.
- Run crosstalk tests on two pair technologies like HDSL, BONDED xDSL or for measuring the amount of crosstalk between pairs in a cable.

### General Information

- Noise internal to a cable is usually crosstalk from another service. Making Pair Balance better for the pair under test **and** the other service pair can reduce it. Transmitting on an unbalanced pair causes higher crosstalk levels.
- For **NEXT Sweep**, the ONX transmitter is connected to the yellow / blue test leads as it steps through the frequencies. The ONX receiver is connected to the red / black leads to receive any signal on the other pair while the transmitter is active. This provides levels of the received signal at each frequency that coupled from one pair to the other. The result is the received level compared to the known transmitted level.

### Specifications

- Voice frequencies used are: 300–1,000Hz in 100Hz steps, 1000–10,000Hz in 1,000Hz steps, 12.5, 15, 17.5, and 20 kHz.
- ADSL2+ frequencies used are: 100kHz–2.2 MHz in 100kHz steps.
- VDSL frequencies used are 150, 300, 600kHz, and 1 to 30 MHz in 1 MHz steps.

## FEXT (UFED)

Use the **FEXT (UFED)** test to measure the level of signal coupling (crosstalk) between two pairs for a selected frequency on out of service pairs. The test will terminate the pairs, like the installed equipment. The result is a single number showing the isolation of the pairs at that frequency. The result is in dB. The higher the result is the lower the crosstalk between the pairs.

The UFED must be used with this test and located at the far end.

### *Tips*

- Look for high results. Low results show more crosstalk at that frequency.
- Results in dB show what isolation you have between the pairs at that frequency.
- Pair Balance is important. The better the balance is the less crosstalk will affect it.
- FEXT looks for crosstalk introduced from a tone at the far end. Place the UFED close to the equipment.
- FEXT looks for crosstalk coupled in from a far end source while NEXT looks for crosstalk coupled in from a source at the location of the ONX.
- Run crosstalk tests on two pair technologies like HDSL, BONDED xDSL or for measuring the amount of crosstalk between pairs in a cable.

### *General information*

- Noise internal to a cable is usually crosstalk from another service. Making Pair Balance better for the pair under test **and** the other service pair can reduce it. Transmitting on an unbalanced pair causes higher crosstalk levels.
- For **FEXT (UFED)**, the ONX commands the UFED at the far end to transmit a tone on its **Red Pair 2** leads. The ONX yellow / blue leads are connected to that pair at the near end. The ONX receiver is connected to the red / black leads to receive any signal on the other pair while the UFED transmitter is active. This provides the signal level of that frequency that coupled from one pair to the other. The result is the received level compared to the known transmitted level.

### *Specification*

- FEXT (UFED) range: 10kHz–30MHz Wideband only



## SNR

Use the **SNR** (Signal to Noise Ratio) test to measure the level or amplitude of a required test signal compared to steady state noise on an out of service pair. The test will terminate the pair, like the installed equipment and use a noise filter to look only at the frequency range of interest. The main result is a single number that shows the signal level compared to noise on the pair. The default result is dB and higher is better.

By selecting **Technology Custom**, the user can set the termination and filter required for the test.

### Tips

- Pair Balance is very important. The better the balance the less noise will affect it.
- If noise level is unacceptable, use the Spectral analyser to see noise sources and level.
- The VIAVI UFED is a convenient way to send a tone from the far end. In the Voice Frequency band, the SNR measurement uses an 820 or 1020 Hz tone.

### General information

- SNR is a receive measurement across the pair. It expects to get a signal, measure its level then use a notch filter to remove it so the noise can be measured. The noise filter selections are Channel, C-Message, 3K Flat, Psophometric, Flat, Optional or No Filter. The ratio of the signal to noise level is the **SNR** result displayed.
- The goal is a high SNR result. High levels of "good signal" compared to low noise. Noise can reduce a receiver's ability to correctly recover data.
- SNR is the ratio of the signal (wanted) against all other "signals" (unwanted) within a set bandwidth. This test gives a figure of merit for a given signal. A good SNR result can be anything down to about 30 dB. Below 30 dB the noise has more impact and below 10 dB the service can be seriously degraded.
- Having "good signal" is mainly how much attenuation the pair has at the required frequencies. There is no way to increase signal unless the pair can be shortened, or the gauge increased. Shorter pairs tolerate higher noise. Larger gauges have less loss.
- All copper pairs have noise. Focus on reducing noise to get the desired service level.
- When noise goes up SNR goes down. High noise levels, in the service bandwidth, will degrade it.
- Noise is subject to loss. The farther away a noise source is from a receiver the better.
- Noise sources can be internal to a cable or external from outside the cable. It is important to understand the noise so steps can be taken to reduce it.
- Noise sources internal to a cable are usually crosstalk from another service. Making Pair Balance better for the pair under test **and** the other service pair can reduce noise.
- Noise coming from outside the cable is usually reduced by redoing bonding and grounding.

## Balance Sweep

Use **Balance Sweep** to test if a pair is balanced at higher frequencies. The result is in dB and higher is better indicating the pair is balanced at that frequency. The ONX graphs the results over frequency with higher levels at the top.

### *Tips*

- Make good connections. Cut / strip wires to use under corroded screw heads to clip leads to.
- Look for a slope from left to right or a mostly flat line on the graph. It is normal for the result go down as the frequency goes up. Large variations could indicate a fault.
- Results of 40 or greater show the pair has good balance. Results < 40 dB could indicate a fault. Pair balance problems are usually capacitive or resistive issues so start by reviewing those results (see below). Balance problems may have to be found by sectionalizing the cable.
- Use **Balance Sweep** to test drop wire ability to carry XDSL without affecting performance. Flat untwisted drop wire can have balance issues at higher frequencies.
- **Balance Sweep** may show high results on long pairs due to cable loss at high frequencies.
- You get false passing results If the green ONX lead is not connected to a ground with reference or proximity to the pair under test. Disconnecting black or red while the test runs should cause the result to drop if the green lead is connected to a "good" reference.

### *General information*

- Balance is how much the wires in a pair "look alike" using ground as a reference.
- Twisted pairs need balance to cancel noise. Balanced pairs have the main characteristics of resistance, capacitance and inductance similar for each wire. With these matching, noise is coupled into the wires equally and rejected at the ends as signal is recovered. A pair with poor balance has noise couple into one wire stronger and the difference in level is recovered with the signal at the ends. Greater noise lowers signal quality.
- **Balance Sweep** uses signals up to 2.2 MHz and is a single ended test like Longitudinal Balance.
- Longitudinal Balance can show a passing result on short cables where **Balance Sweep** may show variations across frequency indicating how it impacts XDSL performance.
- The resistance results to ground should be close in value. If not, use RFL to locate the contact.
- The resistance of the wires should be close in value. If not, there might be bad splices / joints. Use the Resistive Balance Option in Resistance. Bad splices might be located with the TDR.

- The capacitance results to ground should be close in value. If not, there might be a bridge tap, build out cap, or another device only on one wire. Also, the pair might be split. Use the Opens result to ground to locate the issue. Other issues might be located with the TDR.

### **Specifications**

- Frequencies used are: 100kHz to 2.2 MHz in 100kHz steps.

## **Return Loss**

Use **Return Loss** to measure the variation from a selected impedance at frequency on out of service pairs. The test will terminate the pair, like installed equipment. The ONX graphs the sweep results over frequency with higher levels at the top. Single Frequency can be selected as well. The result is in dB. The higher the result the lower the reflection.

By selecting **Technology** (service type), the ONX allows Voice Frequency (NB) or WB frequency and impedance required for the test to be set.

### **Tips**

- Results in dB show how close to the selected impedance the pair is at that frequency.
- Impedance is usually set to 600 for Narrow Band and 100 ohms for Wide Band.
- Look for a result of 15dB or higher at frequencies used by the service on the pair. For example, ADSL2+ uses 25kHz to 2.2MHz. A low result may be caused by a fault affecting the impedance at that frequency and may have to be found by sectionalizing the cable.
- Test toward the network from the customer premise and to the customer premise from the network equipment. Flat or untwisted wire can have issues at high frequencies.
- Use the UFED IIB or other means to terminate the far end for good results.
- Look for a slope or a mostly flat line on the graph. It is normal for the result go down as the frequency goes up. Large variations could indicate a fault.
- **Return Loss** will only detect faults on part of long cable sections due to loss at high frequencies.

### **General information**

- Return Loss is a measure of reflected power received from a transmitted signal. It is expressed in dB. The larger the value, the less power is reflected. As a signal travels down a pair part of it may be reflected to the transmitter. Reflections are caused by impedance abnormalities. These discontinuities may be due to poor connections, improper installation, or cable damage. Energy that is reflected reduces the power of the transmitted signal. If the ONX is set to a source impedance of 100 ohms, the closer the impedance of the pair is, at frequency, to the source impedance the higher the result is. For example, if the pair impedance is 105 ohms, you may get a result of 10. If it is 100 ohms, then you may get 49 or 50. Everything is compared to the source impedance setting. If you have 15 or higher for a result, there is very little reflection.
- For **Return Loss**, the ONX transmitter is connected to the red / black test leads as it steps through the frequencies. The ONX receiver is connected to the transmitter to provide levels of the signal reflected toward the transmitter at each frequency. The result is the reflected level compared to the known transmitted level.
- Making balance better for the pair under test can improve the result.
- Resistance of the wires should be close in value. If not, there might be bad splices/joints. Use the Resistive Balance Option in Resistance. Bad splices may be located with the TDR.

### **Compensation**

- Select Tray in the application. Run when you first get the ONX or change leads.

### **Specifications**

- Voice frequencies used are: 200–20kHz in 200Hz steps.
- DSL frequencies used are 20, 40, 45, 65, 85kHz, 100kHz to 1MHz in 50kHz steps, and 1 to 10MHz in 500kHz steps.

## Impedance

Use Impedance to show a pairs impedance at frequency in ohms on out of service pairs. The ONX graphs the sweep results over frequency with higher levels at the top. Single Frequency can also be selected. All results are in ohms at a frequency.

By selecting **Technology** (service type), the ONX allows Voice Frequency (NB) or WB frequency to be selected.

### *Tips*

- Result in ohms shows the impedance of the pair at that frequency.
- Impedance is usually 600 for Narrow Band and 100 ohms for Wideband.
- Use the UFED IIB or other means to terminate the far end correctly.
- Look for results close to the termination used by the service on the pair. A low result may be caused by a fault affecting the impedance at that frequency and might have to be found by sectionalizing the cable.
- Look for a slope or a mostly flat line on the graph. Large variations could indicate a fault.
- Test toward the network from the customer premise and to the customer premise from the network equipment. Flat or untwisted wire can have issues at high frequencies.
- **WB Impedance** will only detect faults on part of long cable sections due to loss at high frequencies.

### *General Information*

- Impedance measures total opposition to current flow of an AC signal. As a signal travels down a pair it is influenced by the characteristics of the pair (transmission line). The main characteristics are resistance, capacitance, and inductance. Impedance abnormalities affect the result. These may be due to poor connections, improper installation, or cable damage. A perfect transmission line allows all the energy that is transmitted into it to be received at the far end.
- For **Impedance**, the ONX transmitter is connected to the red / black test leads as it steps through the frequencies. The ONX receiver is connected to the transmitter to provide levels of the signal at each frequency. The result is the applied level compared to the known transmitted level.
- Making balance better for the pair under test can improve the result.
- Resistance of the wires should be close in value. If not, there might be bad splices/joints. Use the Resistive Balance Option in Resistance. Bad splices may be located with the TDR.

### ***Compensation***

- Select Tray in the application. Run when you first get the ONX or change test leads.

### ***Specifications***

- Voice frequencies used are: 200–20kHz in 200Hz steps.
- Wideband frequencies used are 20, 40, 45, 65, 85kHz, 100kHz to 1MHz in 50kHz steps, and 1 to 10MHz in 500kHz steps.

## WiFi Advisor

The following table provides some typical problems and resolutions.

Problem	Resolution
Signal strength and coverage problems <ul style="list-style-type: none"> <li>– Attenuation with distance and materials in the home</li> <li>– 5GHz has shorter reach than 2.4GHz</li> </ul>	Look for -35 to -70 dBm RSSI and >20 dB SNR.
802.11 interference sources <ul style="list-style-type: none"> <li>– Co-channel interference (forces your AP to share the channel)</li> <li>– Adjacent channel interference (looks like noise to your AP)</li> </ul>	Look for < 4 co-channel interferers and < 3 adjacent channel.
Non 802.11 Interference sources <ul style="list-style-type: none"> <li>– Microwaves, AV transmitters, cordless phones, baby monitors, etc.</li> </ul>	Observe spectrum for interferers in the channel of interest.
High channel utilization <ul style="list-style-type: none"> <li>– The more APs in the channel, the higher potential utilization</li> <li>– High utilization, low noise = high 802.11 traffic on the channel</li> <li>– High utilization, high noise = potential non-802.11 interferer</li> </ul>	Look for <35% utilization + low noise.
802.11 a/b/g devices on your network <ul style="list-style-type: none"> <li>– Slow a/b/g PHY rates occupy the channel longer than modern PHY rates for the same amount of information transfer.</li> <li>– Old security types (WEP/WEPA1) limit connection to lower 802.11 rates</li> </ul>	Detect and advise replacement of old gear.

Problem	Resolution
Cannot connect the OneExpert to the WiFi Advisor	Check that Bluetooth is ON (enabled) on the WiFi Advisor. Make sure that the WiFi Advisor and OneExpert DSL are within reasonable Bluetooth range of each other (ideally 0 to 20 feet).
The WiFi Advisor is unresponsive (locked-up)	Press and hold the power button for 5 seconds.

## Getting technical assistance

If you require technical assistance, call 1-844-GO-VIAVI / 1.844.468.4284.

Outside US: +1-855-275-5378

Email: [CATVsupport@viavisolutions.com](mailto:CATVsupport@viavisolutions.com)

For the latest TAC information, visit

<https://support.viavisolutions.com>

<https://www.viavisolutions.com/en/services-and-support/support/technical-assistance>

## Additional information

For more detailed information, contact us at [CATVsupport@viavisolutions.com](mailto:CATVsupport@viavisolutions.com) for these additional documents.

**OneExpert Quick Start Guide**



## Specifications

Physical specifications	
Height	9.8" (250 mm)
Width	4.68" (119 mm)
Depth	3.2" (82.4 mm)
Weight	4.05 lb. (1.84 kg)
Connector specifications	
USB	USB 2.0
AC Adapter	see "Power specifications"
T/A R/B Ground	mini-banana
POTS	8-pin modular (RJ-45)
Ethernet	8-pin modular (RJ-45)
Wiring	6-pin modular (RJ-11) and 8-pin modular (RJ-45)
xDSL / G.fast	8-pin modular (RJ-45)
Environmental specifications	
Operating Temperature	-0° to +50° C (32° to +122° F)
Storage Temperature	-10° to +60° C (14° to 140° F)
Humidity	10% to 90% RHNC
Maximum operating altitude	4000 meters (13,123 feet)
Vibration	sinusoidal vibration testing per IEC 60068-2-6 (Sinusoidal Vibration)
Shock	shock testing to IEC 60068-2-29 Ed. 2.0 "Continuous Bumps."

<b>Physical specifications</b>	
Operating time	>4 hours for typical use cases
Charging time	5 hours for a fast charge; for a full charge, allow to trickle charge overnight
Power supply input	100-240VAC, 1.5A, 50-60 Hz
Power supply output	12VDC, 5.0A Max
Power supply operating temperature range	0° to +40° C (-22° to 104° F)





**22052280**  
**July 2021**  
**English**

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