Method of Procedure - CellSite Installation

Fiber Inspection, Fiber Continuity, Optical Insertion Loss, OTDR and Cable & Antenna Testing

OneAdvisor 800

Table of Contents

1. Scope

This document describes how to configure the OneAdvisor-800 (and Fiber Accessories) for

- Fiber Inspection, including:
  - Fiber Endface and Bulkhead Analysis
  - Simplex, Duplex and MPO Endfaces
- Fiber Continuity Testing
- Optical Insertion Loss
- Optical Time Domain Reflectometry, including:
  - Optical Insertion Loss
  - Event Characterization
  - Event Loss and Length
- Cable and Antenna Testing, including:
  - Reflection tests: Return loss and VSWR
  - Distance to Fault
  - Cable Loss

2. Typical Carrier Test Standards

The following parameters are typical test requirements set by various Wireless Network Operators. These are mentioned here and then again with each applicable test application in this document. The numbers in bubbles are a reference to the test applications discussed later that provide the required measurement.

Measurement	Passing Criteria
Fiber Inspection	Passing Auto-Test according to IEC-61300-3-xx
Fiber Reflectance per Connector	More negative than -45 dB
Fiber Loss through a Connector	Less than .5 dB
Fiber Path loss - end to end	Less than 3 dB of loss ($\geq$ -3 dB)
COAX/System - Return Loss	-12dB to -16dB typical
VSWR/System	1:67 to 1:37

3. Test Applications Overview

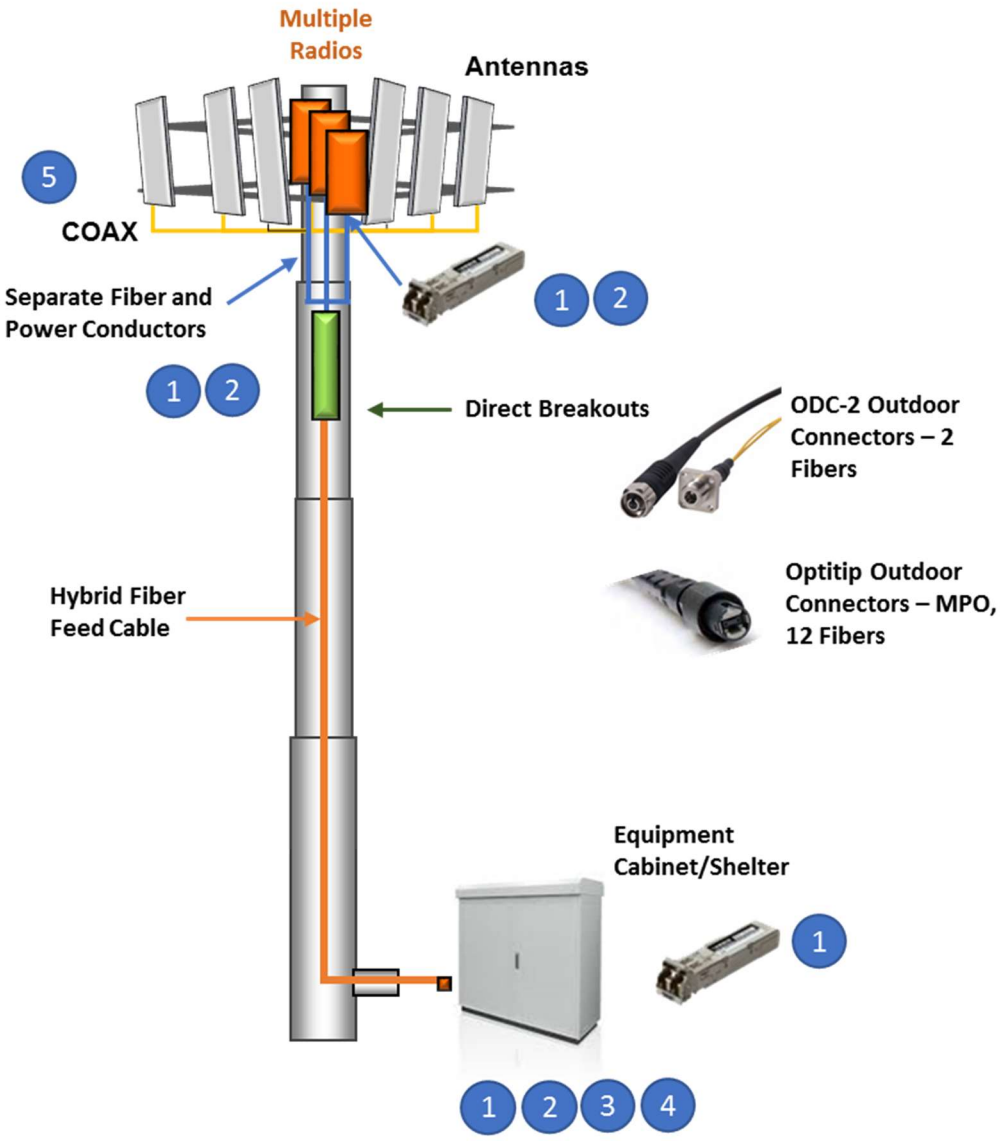


Figure - Test Access Points at the Tower

4. Required Products

The required products and parts to complete this procedure are as follows:

Test Point	Test	When	Why	Where	With
1	Fiber Inspection: Inspect Before You Connect (IBYC) – **Simplex/Duplex Fibers**	Anytime a fiber connection is about to be made. It is also useful to pre-inspect fibers in a hybrid cable before installation.	Dirt and debris in connections will cause system failure. Dirty fibers can be cleaned. Damaged ones should be replaced.	Every Connection. Often forgotten are: • SFP ports • OTDR port **This is all the Tower Top Technician needs**	 USB Fiber Inspection Probe – p5000i  Wireless Fiber Inspection Probe – Fiberchek  Fiber Inspection Tips
1	Fiber Inspection: Inspect Before You Connect (IBYC) – **MPO Fibers**	Any Fiber using an MPO Connector such as Corning Optitip, Jonhon, CommScope HMFOC and ODC MPO connectors	Dirt and debris in connections will cause system failure. Dirty fibers can be cleaned. Damaged ones should be replaced.	At the Top of the Tower, at the junction box. At the Bottom of the Tower, at the handoff from Fronthaul to Tower. **May be done at the Top and Bottom of Tower depending on network architecture**	 MPO Inspection Probe – Sidewinder  MPO Fiber Cleaner
2	Continuity Test: Visual Fault Locator (VFL)	Use to prove basic continuity and make sure the ground tech and the climber are working on the same fiber pair	Reduces confusion and speeds up work- flow. Reveals mislabeling. Reveals damaged fiber jumpers	On the Hybrid and on any fiber jumpers to be used. **Done from the bottom of the tower.**	 VFL – FFL-050

Test Point	Test	When	Why	Where	With
3	Optical Insertion Loss: Optical Light Source and Optical Power Meter	During Construction, as it requires an optical light source at one end and an optical power meter at the other. Such access requires a tower climb. <u>If you have an OTDR, skip this test as an OTDR result includes this measure.</u>	Reveals overall loss through the fiber system. Should be less than 3dB. If it passes, move on. If it fails, isolate problem with VFL/OTDR. <u>If you have an OTDR, skip this test as an OTDR result includes this measure.</u>	Through one fiber in a pair within the hybrid, thru the RU jumper with a loopback on RU end of the jumper, back down to the source. <u>If you have an OTDR, skip this test as an OTDR result includes this measure.</u> **From the Bottom**	ONA-800 with OTDR CW Light Source  ONA-800 with USB Optical Power Meter – MP-60/80
4	Optical Time Domain Reflectometry (OTDR)	During Construction. Test both TX and RX on a duplex fiber (up and back) via a loopback fiber placed at the RU end. This is done for efficiency (half the tests)	An OTDR provides a much more detailed characterization of the fiber system. Problems are immediately identified based on their distance from the source	Through one fiber in a pair within the hybrid, thru the RU jumper with a loopback on RU end of the jumper, back down to the source. **From the Bottom**	 OTDR - ONA-800 Front  OTDR – ONA-800 Side  ONA-800 Modules

Test Point	Test	When	Why	Where	With
5	Cable and Antenna Testing				
Accessories – Cable and Antenna Module					
Open Short Load (OSL) Calibration Kit either Electronic (Manual or EZcal) - Manual OSL calibration kit Type-N(m) - EZcal, electronic OSL calibration kit Type-N(m)					Manual EZCal  JD78050509 JD70050509
RF Cables - RF Cable DC to 8 GHz Type-N M to Type-N (F) 1.5 m					 G700050531
Accessories – Fiber Tools					
OTDR Jumper Cable					 >=20 meters
Fiber Cleaner(s)					IBC Cleaner for Bulkheads, Jumpers and SFPs  Cletop for Fiber Jumpers Only

5. CellSite Installation Test Overview

The OneAdvisor is a portable instrument for Cell Site installation and maintenance, the main test functions of OneAdvisor for cell site installation include:

- Fiber Inspection
- Continuity Testing
- Optical Insertion Loss
- Fiber Characterization - OTDR
- COAX Sweep Testing - Cable and Antenna

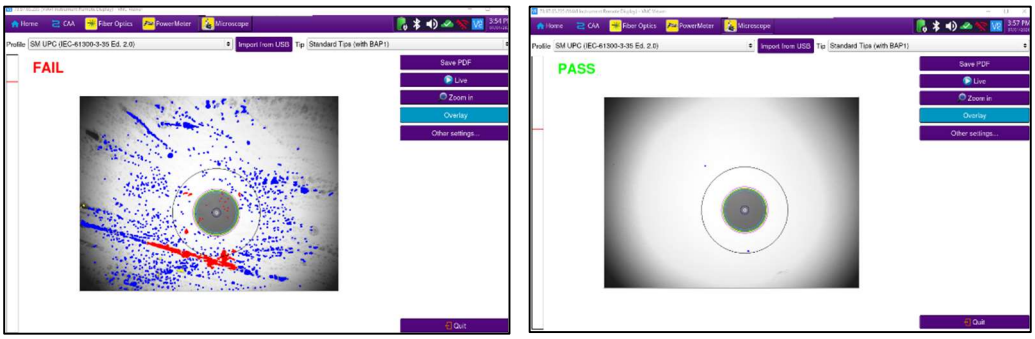
5.1 Fiber Inspection and Test – Simplex/Duplex

5.1.1 Overview

Every fiber connection is a potential point of failure should the end face of the mated fibers be dirty or damaged. Proper handling as well as inspection and cleaning techniques are imperative. The best practice is to Inspect Before You Connect (IBYC). Trace the steps on the flow chart below. Always inspect before that first cleaning attempt. If the end face is already pristine, the redundant cleaning effort could introduce a problem.

Most Operators require fiber inspection of every end face in the path to the IEC-61300-3-35 Standard. The VIAVI P5000i and FiberChek Pro both provide automated pass/fail analysis to this standard.

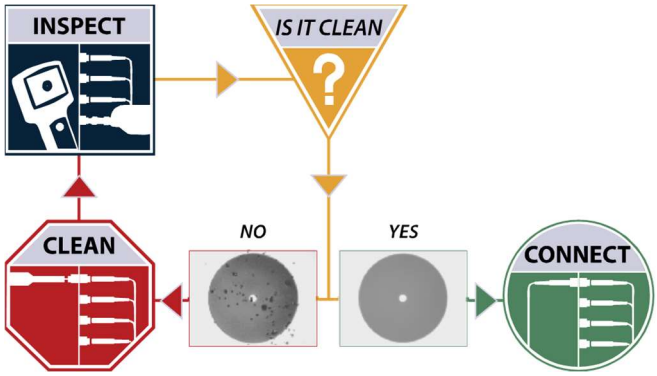
Measurement	Passing Criteria
Fiber Inspection	Passing Auto-Test according to IEC-61300-3-35



Fibercheck - Fiber Inspection Quick card

5.1.2 Fiber Inspection Workflow

Inspect Before You Connect
When you are building or troubleshooting a site, it is all about eliminating possible sources of problems. Making sure fibers AND ports (Bulkheads and SFPs) are clean and undamaged is a quick and simple step that should be undertaken as soon as the decision is made to make/break any fiber connections.



5.1.3 Tools: Fiber Inspection Microscopes

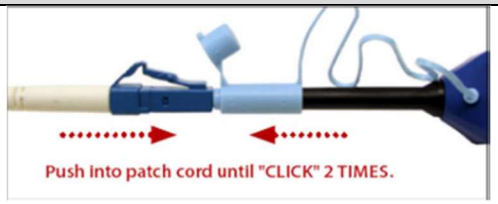
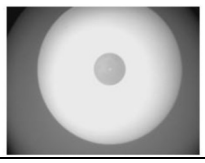
FiberChek Probe shown below. Full Pass/Fail Analysis and results saving can be done on the FiberChek Probe/Sidewinder. Or it can be connected via USB or WIFI to a PC/Android/IOS/ONA.

The **P5000i** Microscope shown below operates with a PC/Android/TBERD or purpose built VIAVI displays.

The FiberChek Probe and P5000i use the same adapters for the various interfaces you will encounter.

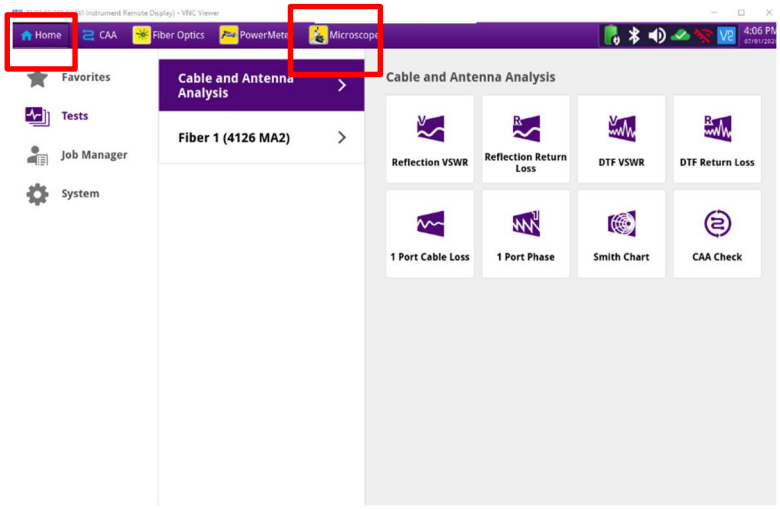
Study the following table for proper adapter tips and cleaning options.

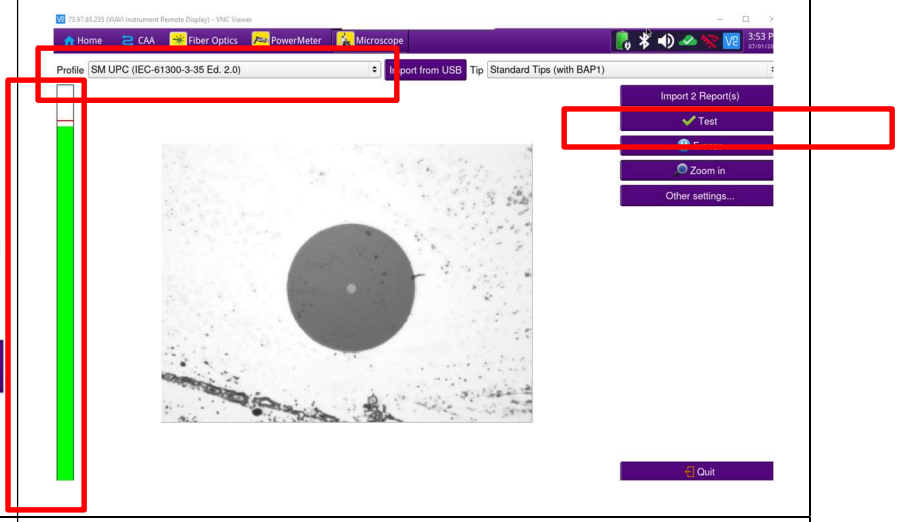
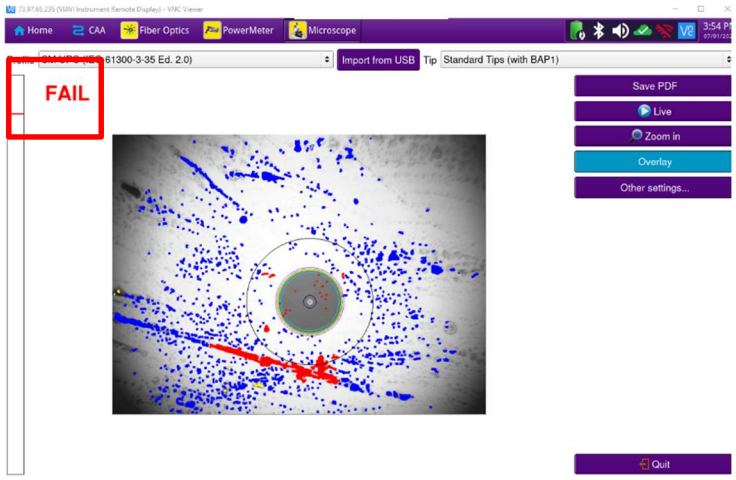
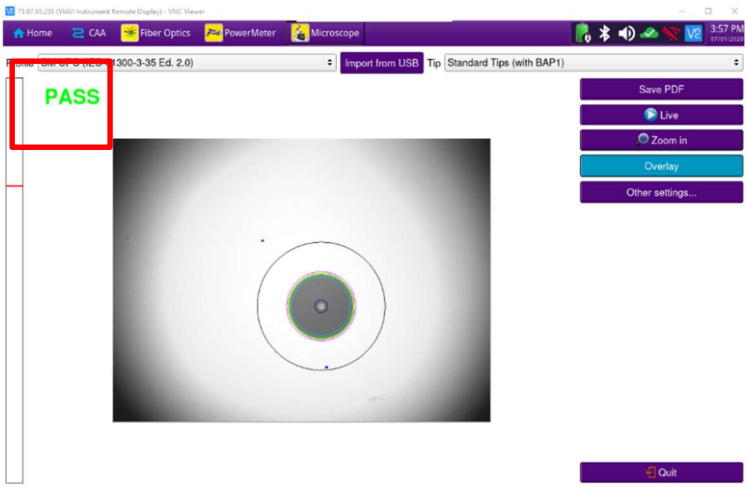
5.1.4 Tools: Fiber Inspection Tips and Cleaners

Fiber Type / Connector	Tip(s) to use on FiberChek/P5000i	Cleaning options
LC Fiber Used at DU to Hybrid connection and at the RU side of tower jumper. Possibly on CSR	 FBPT-U12M 	 LC type IBC Cleaner (above) Cletop (below)  
SFP/SFP+ In DU and RU. Possibly on CSR	 FBPT-LC  	 Clean the TX side only if it has the same appearance as a fiber (picture on far left). The RX side of SFP should not be cleaned, just inspected to make certain there are no large obstructions. Remove the entire aqua blue cap from the pen to clean the SFP or a bulkhead (see below)
LC Bulkhead or Patch Panel	 FBPT-LC	
ODC – **O**ut-**D**oor **C**onnector Located at top of the hybrid to the RU jumper cable on Ericsson	 To inspect ODC fibers, the BAP-3 Barrel assembly should replace the BAP-1 barrel on the probe and then the Male/Female guides are used to align the	 H125 type IBC Cleaner  

Fiber Type / Connector	Tip(s) to use on FiberChek/P5000i	Cleaning options
	BAP-3 over the fibers. See right >>	
SC-APC	 FBPT-SC-APC OTDR Test Port	
SC-APC Connector on OTDR Launch Fiber	 FBPT-U25MA 	Note that the TBERD 5800 OTDR Port and the 10M launch fiber may have the SC-APC style green connection. A is for Angled. The 8-degree angle on the end face creates a superior connection in terms of reflectance and durability. The OTDR port can be cleaned with a SC style IBC stick cleaner (shown above). The fiber itself can be cleaned with that as well or with wipes, CLETOP, etc. The tips for the inspection scope have a built-in angle as well. Be sure and inspect and then protect the cleanliness of your OTDR port and launch fiber.

5.1.5 Fiber Inspection Testing – p5000i

Step	Action	Description/Diagram
1	Press and hold the ON/OFF button to turn on the ONA-800. Press the Home Key  Select the Microscope Tab 	

Step	Action	Description/Diagram
2	Fiber end-face will appear on screen Confirm “Focus Bar” is suitable Using Drop-Down, select type of connector profile  Select *Test*  	
3	Analyze Pass / Fail If Test fails, please clean the fiber end face and retest with scope procedure. If Test passes, move-on to VFL Testing.	
3	Analyze Pass / Fail If Test fails, please clean the fiber end face and retest with scope procedure. If Test passes, move-on to VFL Testing.	

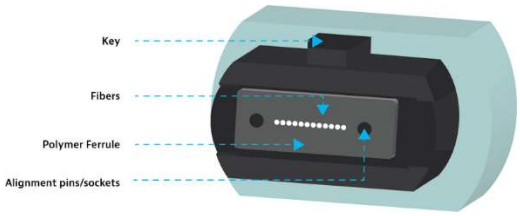
5.2 Fiber Inspection and Test - MPO

As with simplex fiber, MPO connections are a potential point of failure should the end face of the mated fibers be dirty or damaged. However, whereas simplex fibers are a single connection, an MPO has 8-24 fiber connections. Proper handling as well as inspection and cleaning techniques are imperative. The best practice is to Inspect Before You Connect (IBYC). Trace the steps on the flow chart below. Always inspect before that first cleaning attempt. If the end face is already pristine, the redundant cleaning effort could introduce a problem.

Examples of MPO connectors on the Tower are ***Corning Optitip, Jonhon, CommScope HMFOC*** and ***ODC MPO*** connectors.

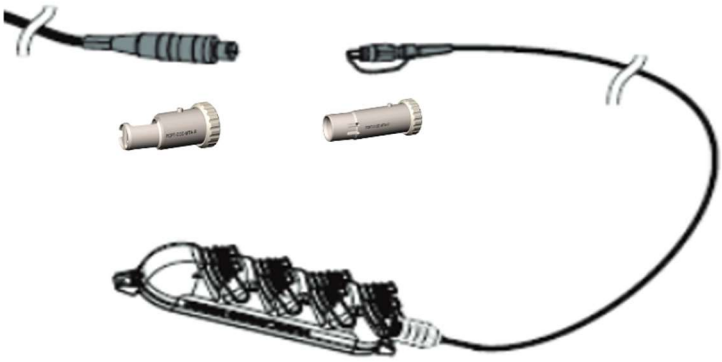
Most Operators require fiber inspection of every end face in the path to the IEC-61300-3-35 Standard. The MPO Sidewinder provides automated pass/fail analysis to this standard.

Measurement	Passing Criteria
Fiber Inspection	Passing Auto-Test according to IEC-61300-3-35

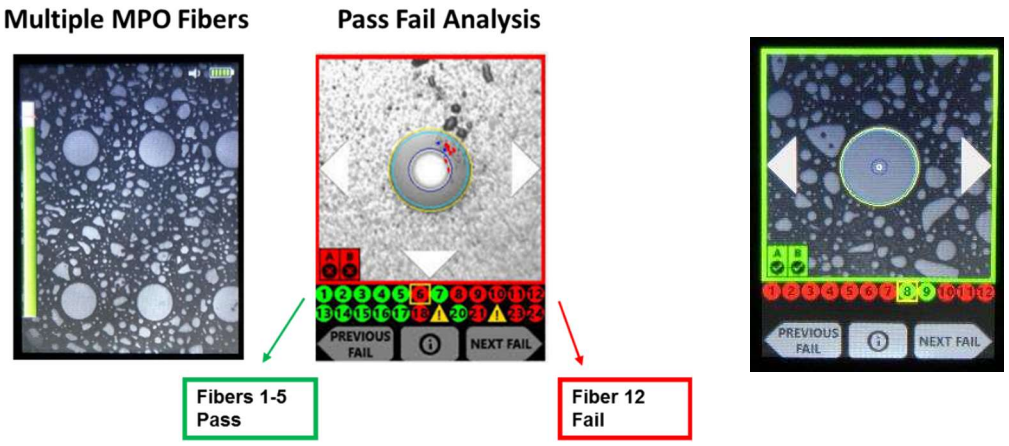


Tools: MPO Fiber Inspection Microscope and cleaning tools/supplies

The MPO Sidewinder is shown above. Full Pass/Fail Analysis and results saving can be done on the MPT Sidewinder alone. Or it can be connected via USB or WIFI to a PC/Android/IOS/ONA.

Fiber Type / Connector	Tip(s) to use on MPO Sidewinder	Inspection and Cleaning options
MPO Fiber OptiTip ODC Used at the Hybrid connection and at the DU side of tower jumper.	  FCPT-MTPA FCPT-MTP   FCPT-COD-MTA-P FCPT-COD-MTA-R   FCPT-ODC12A-P FCPT-ODC12A-S	
Sidewinder connection to MPO jumpers and connectors	  FCPT-MTPA FCPT-MTP	
OptiTip Connectors Located at top of the hybrid to the RU jumper cable ODC – **O**ut-**D**oor **C**onnector	  FCPT-COD-MTA-P FCPT-COD-MTA-R     FCPT-ODC12A-P FCPT-ODC12A-S	

Test Examples from the MPO result



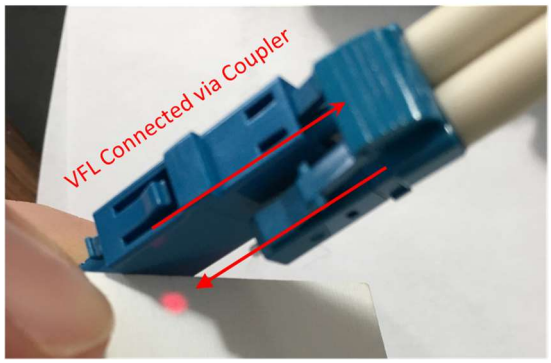
MPO Fiber Inspection Quick card

5.3 Continuity Test with a Visual Fault Locator

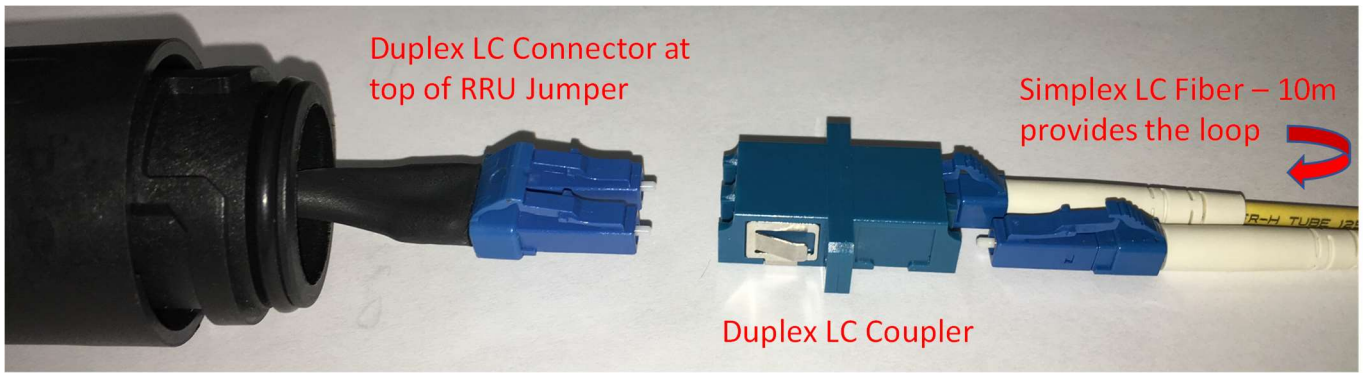
A VFL is handy device that should be in the tool kit for anyone who deals with fiber optics. Use it to inject visible red light through a fiber under test up to 5 km on single-mode fiber. Seeing the red light at the far end of the fiber proves to the observer that there is continuity. It also resolves the "*Are we on the same fiber*?" question. If it is a short fiber or fiber jumper, you can also look along the length of it for any red light escaping from a bend, break, or cut.

When installing a fiber system for a macro cell site, the VFL is a time saver. When testing each TX/RX fiber pair, a loopback device or cable can be placed at the far (usually the RU end) of the fiber pair. The VFL's red light is shined up one fiber and returns on the other. If it does not, the person at the far end might notice the red light coming from a fiber other than where they connected the loopback and make the adjustment.

An FFL-050 VFL is shown below left. Below right shows a simplex coupler for connecting the VFL through a short jumper. The duplex fiber in the right portion of the picture is eventually looped back and the red light comes out of the other fiber in the pair. The back of business card is held there just to show this for a photograph.



The picture below shows as example of the LC Duplex connector at the RU end of the tower top jumper. A duplex coupler can be used to then connect a simplex fiber as a loopback.



Once Continuity is proven with a VFL you can move on to an Optical Insertion Loss Measurement or an OTDR Measurement.

5.4 Optical Insertion Loss

This is a measurement of the total optical power loss from the beginning to the end of the fiber system. In a tower or rooftop site during construction, this would typically be from the bottom, to the top, through a loopback cable or device, and back to the bottom. This speeds up and simplifies the test by keeping the Source and Meter at ground level. On a 12-pair hybrid, this also cuts the test count from 24 to 12. This step comes immediately after IBYC and creating the loopback and proving continuity with the VFL (see above). However, if an OTDR is available, skip the Optical Insertion Loss test because a system loss expressed in dB is one of the results that an OTDR provides. Doing both tests would be redundant. Use the Insertion Loss Test as part of a spot check at the warehouse or on the ground before hoisting. The use of an OTDR test is recommended for final close-out. The OTDR provides the system loss information as well as the per event reflectance and per event loss information required.

Most Operators expect a round trip Insertion Loss (IL) value to be less than 3 dB (half power loss)

Measurement	Passing Criteria
Path loss end to end	Less than 3 dB of loss ($\leq$ -3 dB)

5.4.1 Tools: ONA-800 OTDR with Optical Source (CW) and USB Optical Power Meter (MP-60/80)

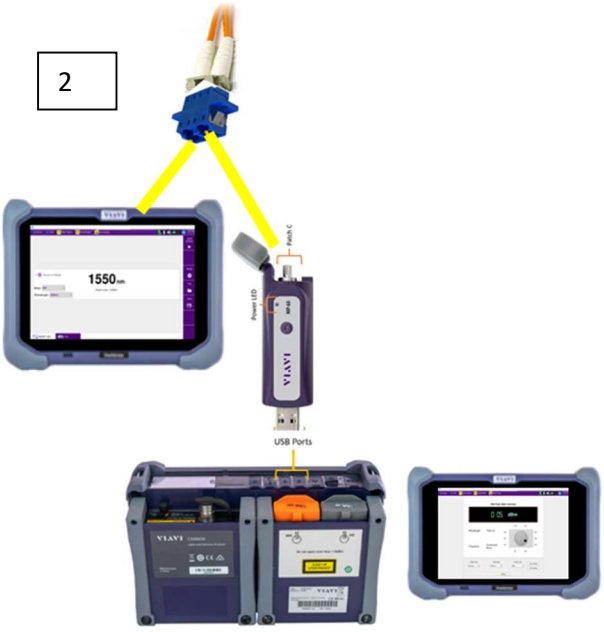
This test has 2 steps.

1) (Left picture below) As always, IBYC. Then the Light Source and the MP-60/80 Power Meter needs to be connected to each other using the clean test leads that will be used in the actual test. Use 1310 nm for Single Mode Fiber. Regardless of the absolute power from the source (in dBm) the Power Meter is referenced to 0 dB. This also negates any losses from the test leads themselves.
2) (Right picture below) Now the Light Source and Power Meter are connected to the system under test using the same test fibers that have been referenced out. The loopback established in the Continuity Test earlier is still in place. Read the value on the power meter. It will be expressed in

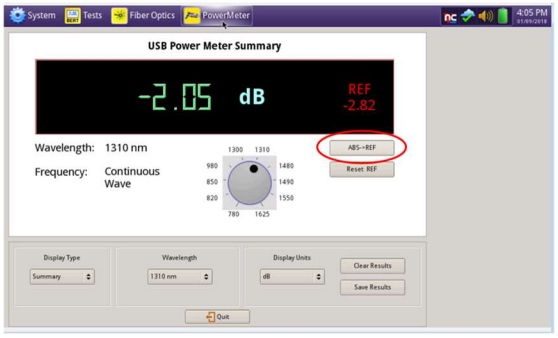
dB to indicate loss as compared to the reference test. We expect a negative value close to 0. Anything better than 3 dB of loss is passing.

1 – Referencing of the Test/Jumper Cables

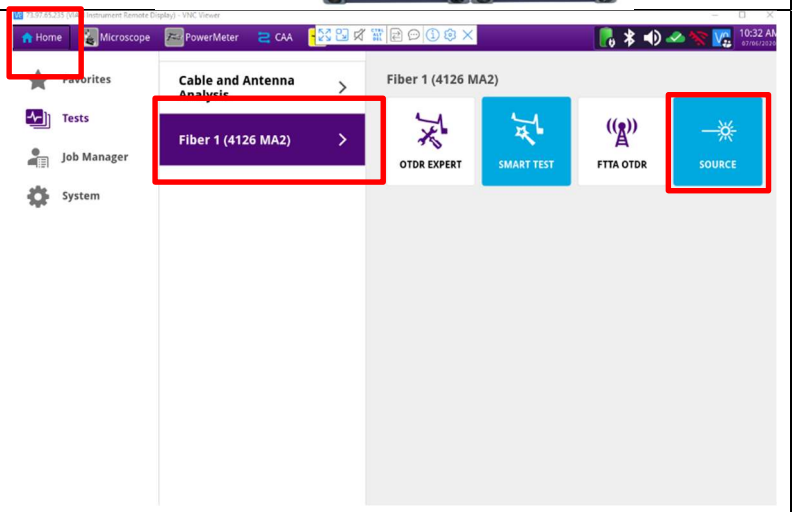
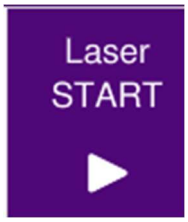
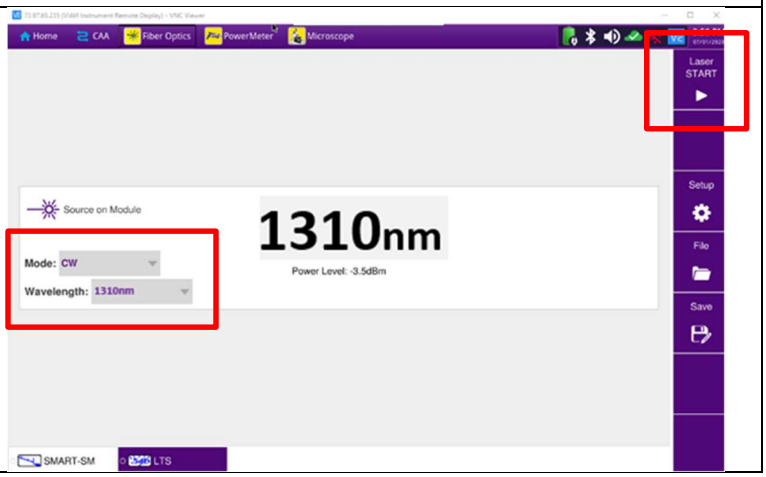
2 – Connecting to System under test

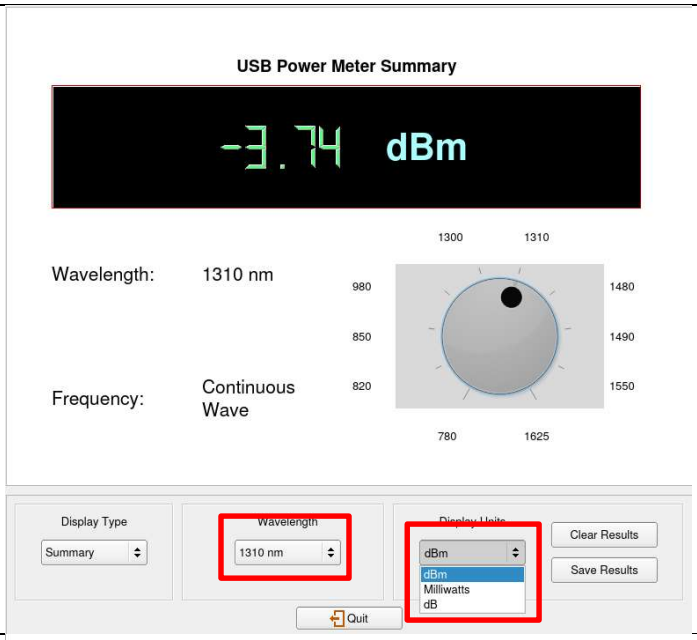
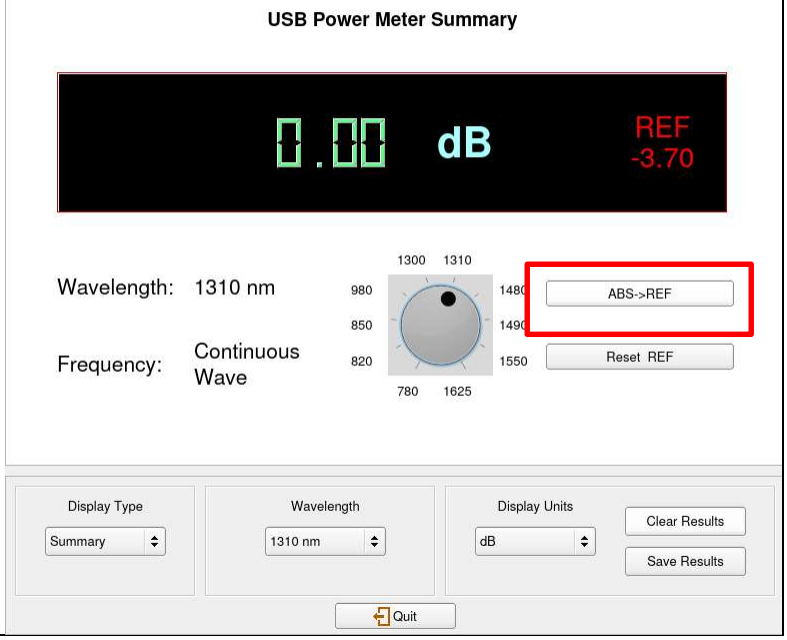


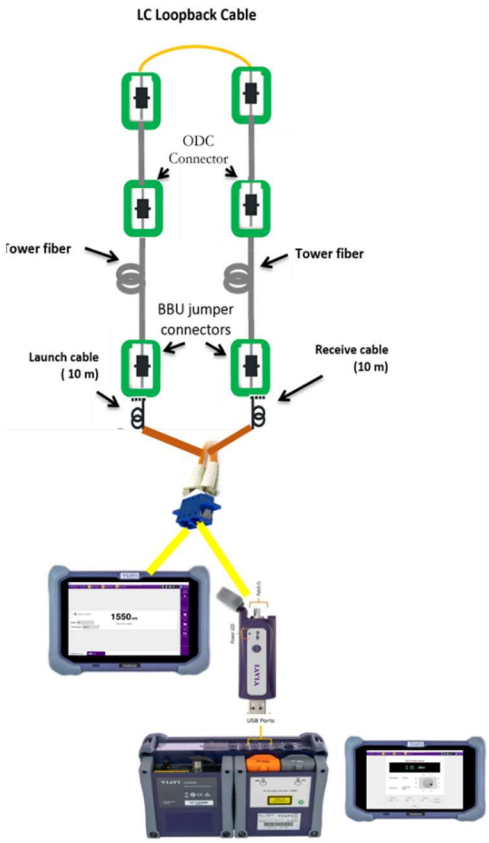
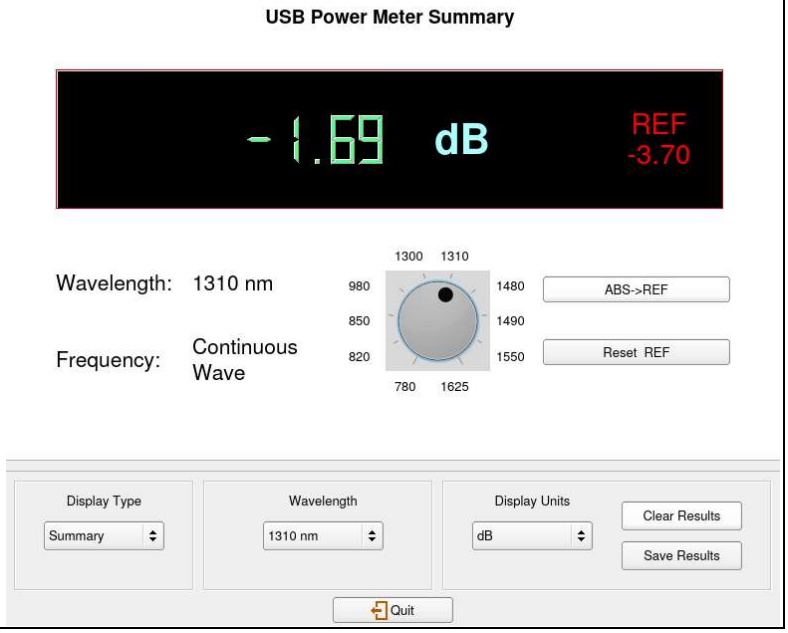
There are many Power Meters that could be used for this test. The one shown above is the MP-60A Power Meter plugged into the ONA-800. It is screen-less device with a USB connection to be plugged into a ONA-800 (display shown on left) in these illustrations. Both examples are passing because the result is that the loss is less than 3dB. Read that as NOT more negative than 3dB.



5.4.2 Referencing Fiber Jumpers / Performing the Test

1	Connect two test jumpers from the ONA-800 OTDR Port to the MP-60 installed into the USB port of the ONA thru a coupler as shown	
2	Press the Home Key  Select the *Fiber 1 Module*  Select the *Source key* 	
3	Confirm module is in “CW’ mode and confirm wavelength (1310nm) Using drop down menus. Select “Laser Start” 	

4	Confirm power and wavelength measurement with MP-60. Select  Tap  Select 1310nm Tap  **Select 'dB'** Verify Results / Power Level	
5	Once in the dB mode, touch the ABS>REF button to "reference out" the test cables The fiber jumpers have now been referenced into the results	

6	Return to “CW” screen (step 2 and 3) to “Turn Off Laser” Disconnect the jumpers from the coupler and connect the 20m launch cable from the ONA-800 OTDR port to the fiber pair under test using a duplex LC coupler. Also connect the “receive cable” to the other port on the duplex coupler. This receive or run out cable will give the OTDR visibility to the last connection that will be part of the system. “Turn Laser On” Return to Power Meter screen and record measurements This is the Loss in both directions	
7	The result should be greater than (-3dB). It does not appear can set a pass/fail threshold in our OPM display.	

5.5 OTDR Testing

The following procedure describes the steps to perform OTDR analysis with the OneAdvisor.

5.5.1 OTDR Test Overview

An OTDR sends thousands of very short pulses of light at designated wavelengths into the fiber under test. It detects the amplitude and time delay of both the scattering and the reflection of the light as it returns to the same interface. Through computations, an OTDR builds a picture of the loss characteristics of the fiber throughout its path. It then asserts the location and nature of events such as splices, bends, breaks, connectors and the fiber end. It also provides the aggregate loss of the fiber from start to end.

The Insertion Loss test described below can tell you if a fiber run is performing acceptably. If it fails your threshold (-3dB), you do not know where the problem or problems are. An OTDR provides location and magnitude of every contributor to the losses incurred in the fiber system. Thresholds can be set not just for total loss (dB) but for each contributing element.

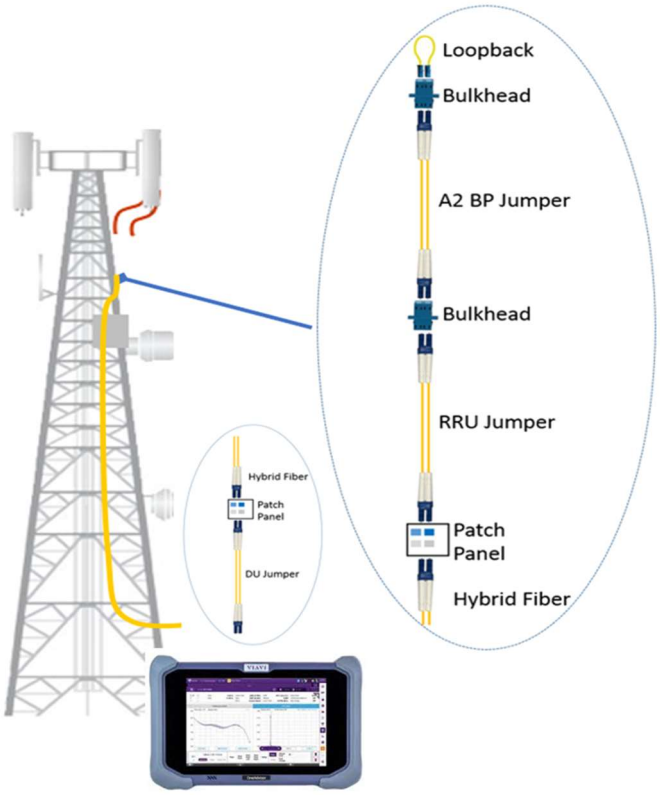
Most Operators expect the following limits for events and measurements made by an OTDR

Measurement	Passing Criteria
Reflectance (per event)	More negative than -45 dB
Loss through a Connector	Less than .5 dB
Path loss end to end	Less than 3 dB

USEFUL INFORMATION: It is important to know the fiber distance from the DU connection to the RU connection. This is typically the length of the hybrid plus any jumpers. These parts are typically purchased at some standard length. When you run the OTDR test, you want to see the Test Set declare "End of Fiber" at a distance that correlates to the "as built" information for the system under test. A declaration of "End of Fiber" before that length indicates a connection is still open or there is a fiber break.

5.5.2 Test Setup

Tower Macro Site - Single Mode Duplex Fiber - Macro sites are usually tested at the base of the tower at the BBU/DU. A 1310/1550 OTDR with a 10m (min) loopback cable at the top of the tower. The OTDR will test the duplex fiber from the BBU/DU to the top of the tower and back to the bottom.



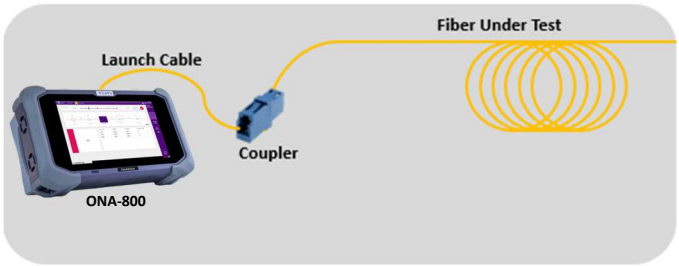
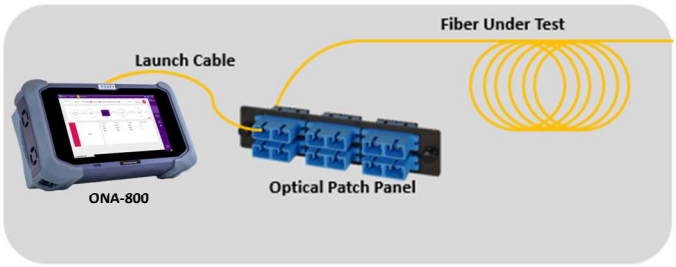
Test Setup – Testing from the Base of the Tower

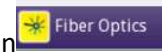
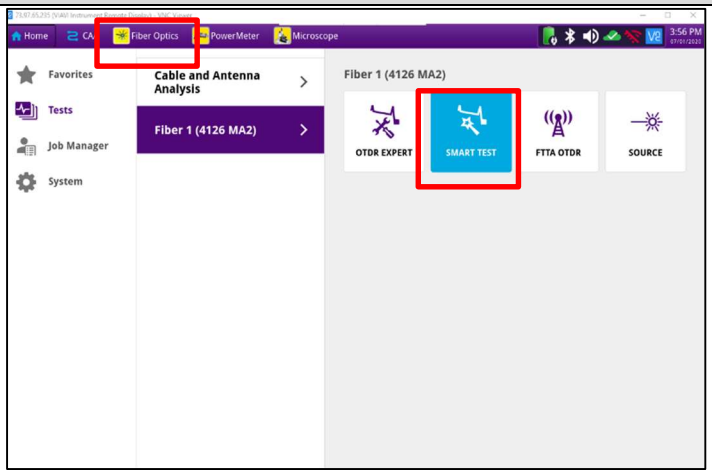
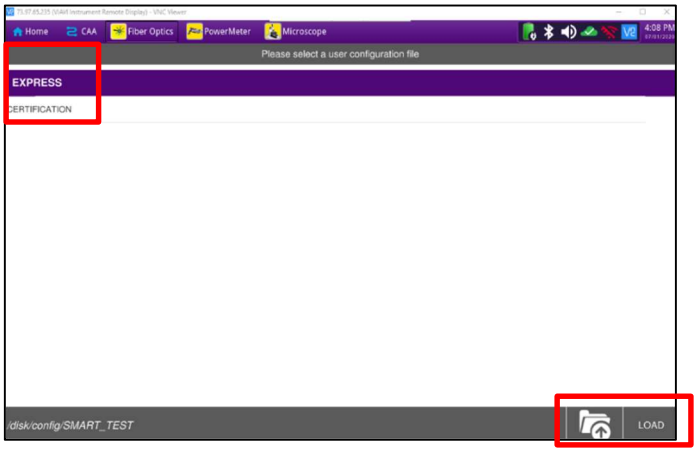
5.5.3 Instrument Setup and Test - OTDR

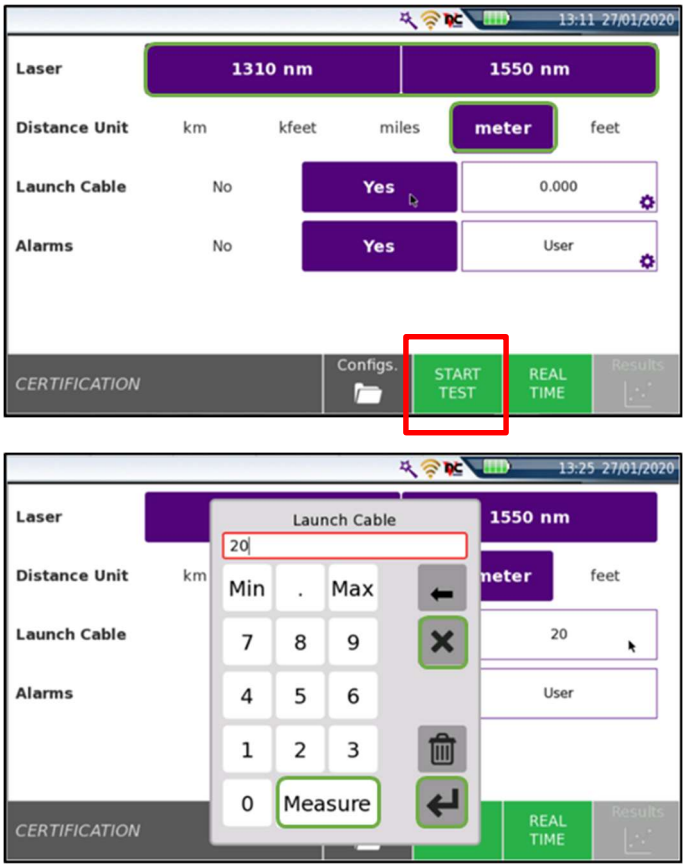
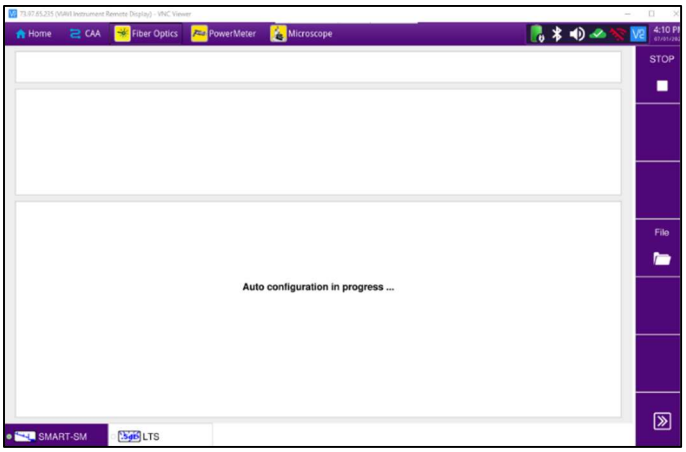
Follow this procedure to set up a ONA-800 to run the Optical Time Domain Reflectometer (OTDR). The picture below is of a ONA-800 with an OTDR module attached. The port of the OTDR module is covered with a green dust protector indicating that an Angled Physical Contact (APC) connector is used on the port.

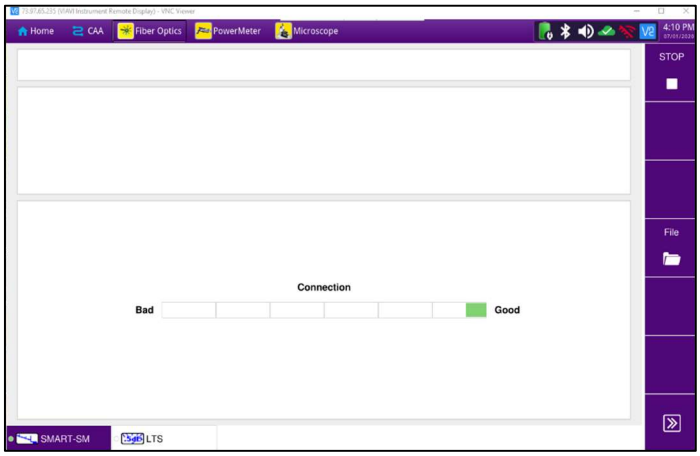
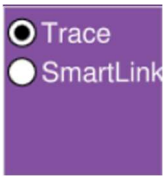
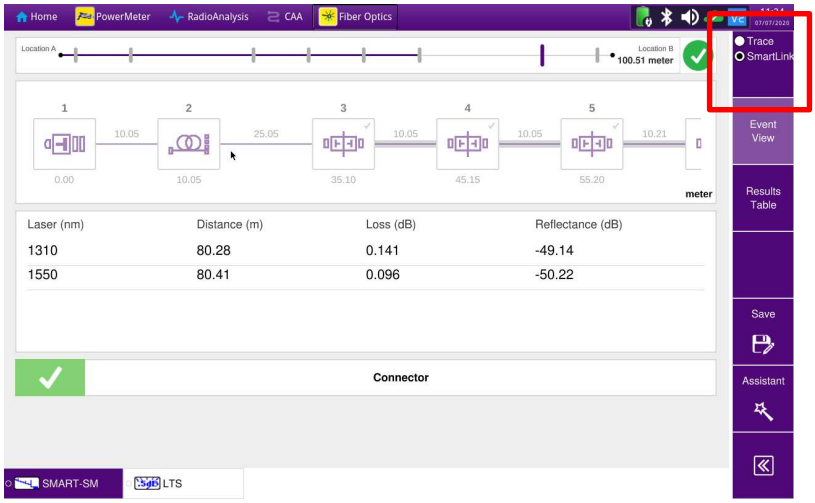
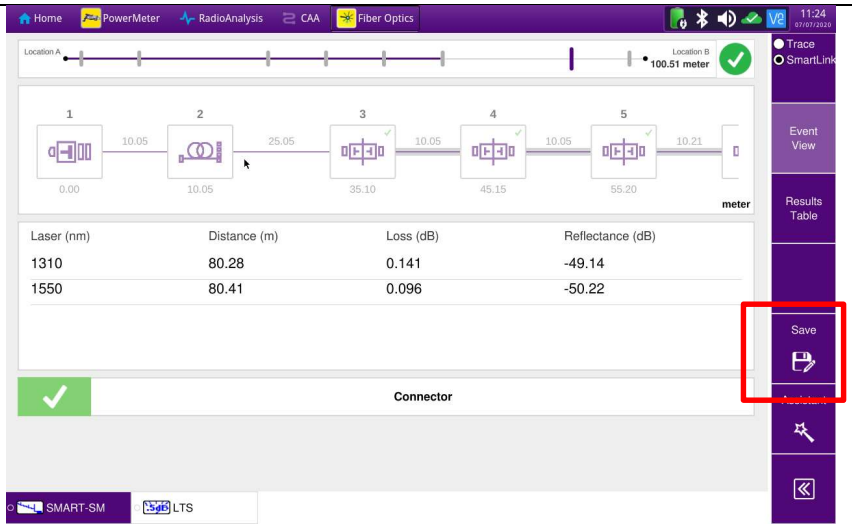
ONA with Smartlink View

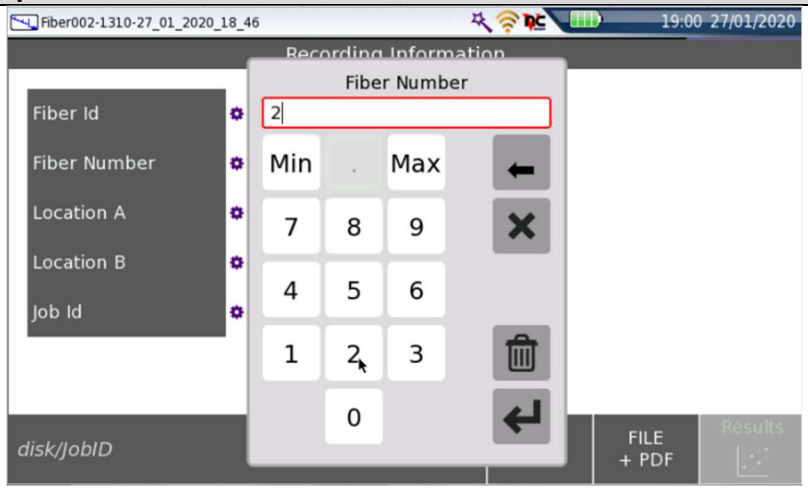
Step	Action	Description
1	Power ON the OneAdvisor **Connect Launch Cable to the OTDR port:**	Press and hold the ON/OFF button for 3 seconds to power on the OneAdvisor 

Step	Action	Description
	- Inspect the OTDR port on top of the ONA-800. - Inspect the fiber end face of Launch Cable. - Connect Launch Cable to the OTDR port.	 ONA Front  ONA Back
2	**Connect to Fiber Under Test (FUT):** The Launch Cable may be connected to the FUT via an optical patch panel (OPP) or an optical coupler: 1. If the interface to the FUT is a patch cord, connect the patch cord to an optical coupler with the same connector type. 2. Inspect the FUT connected to the coupler or OPP. 3. Inspect the other fiber end face of the Launch Cable. 4. Connect the Launch Cable to the coupler or OPP.	 Figure 1: Connecting the Launch Cable to the FUT with a coupler  Figure 2: Connecting the Launch Cable to an OPP

Step	Action	Description
3	Select the Fiber Optics Tab at the top of the screen  Select Smartest 	 The last trace taken will be showing in the results screen
4	Select the *Express* or *Certification* option • Select the **EXPRESS** configuration file to setup the T-BERD for 5 second acquisitions to quickly confirm loss and distance. • Select the **CERTIFICATION** configuration file to setup for 20 second acquisitions to confirm loss and distance AND analyze all events (slices, connectors, etc.) Tap  to select a user configuration file stored in the /disk/fiber/config folder Select Load 	 If you used this same test last time it will all be loaded already.

Step	Action	Description
5	**Select:** - Desired Wavelength (laser) - Measurement (unit) - Launch Cable (yes / no) - Alarm (yes/no/User Defined) - Select *Start Test* START TEST If a launch cable is being used, add the length and units	
6	• SmartTest will automatically configure the OTDR	

Step	Action	Description
7	SmartTest will confirm if the connector / connection to the OTDR is good	
9	Touch the “SmartLink” Button for the SLM View if needed 	
10	1. Tap the Save softkey  to view File Recording Information. 2. Enter Fiber Id, Fiber Number, Locations, and Job ID as follows: 3. Tap field to open keyboard 4. Tap  to clear existing text. 5. Enter desired value. 6. Tap  icon to return.	

Step	Action	Description
	7. Note: Job ID field identifies Job ID and creates a folder to save the result by the same name. Default location is JOB folder under disk. 8. Tap FILE ONLY to save the trace in .sor format. Tap FILE + PDF to save the trace in .sor and .pdf format.	

5.6 Cable and Antenna Testing

5.6.1 Return Loss, VSWR and Distance to Fault Overview

Return loss is a measure of VSWR (Voltage Standing Wave Ratio), expressed in decibels (db). The return-loss is caused due to impedance mismatch between two or more circuits. For a simple cable assembly, there will be a mismatch where the connector is mated with the cable. There may be an impedance mismatch caused by nick or cuts in a cable. Also, the material properties as well as the dimensions of the cable or connector plays important role in determining the impedance match or mismatch. A high value of return-loss denotes better quality of the system under test (or device under test). For example, a cable with a return loss of 21 db is better than another similar cable with a return loss of 14 db, and so on.

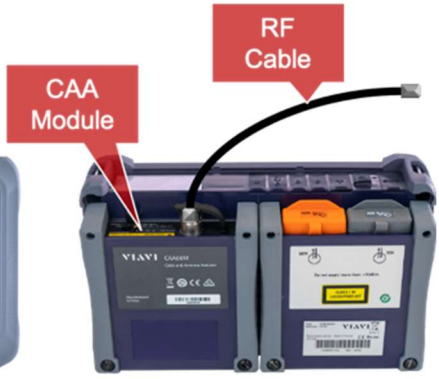
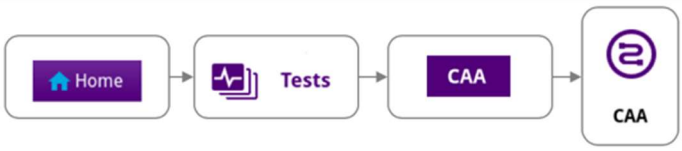
Voltage Standing Wave Ratio simply put is the ratio of the maximum to the minimum voltage of a standing wave (which is the instantaneous sum of incident and reflected waves). Ideally, 100% of the incoming signal should pass through the component without any reflection, in which case, there would be no standing wave (1:0). A 1:5 VSWR (or mismatch) equals a return loss of 13.98dB for example.

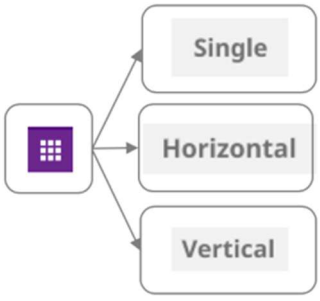
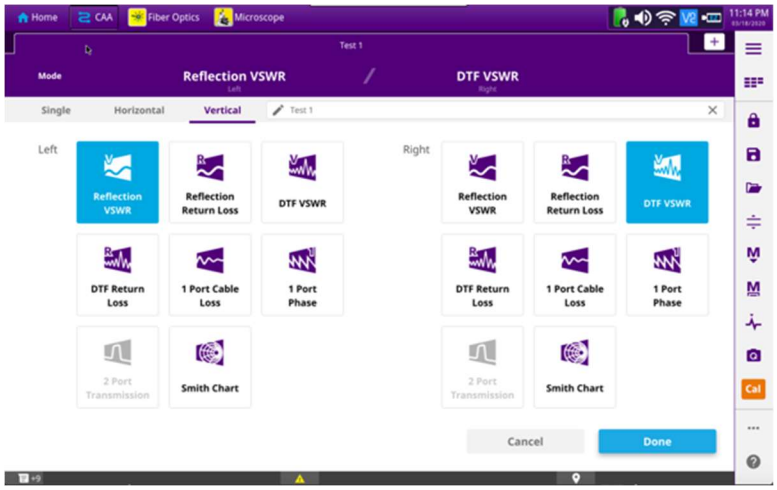
Return Loss / VSWR measurement characterizes the performance of the overall system. If either of these is failing, the DTF measurement can be used to troubleshoot the system and locate the exact location of a fault.

Measurement	Passing Criteria
Return Loss	-12dB to -16dB typical
VSWR	1:67 to 1:37

5.6.2 Initial Setup

The following procedure describes the initial setup of cable and antenna analysis, including turn-up and connectivity.

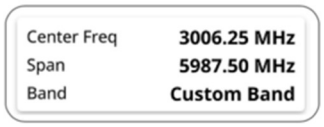
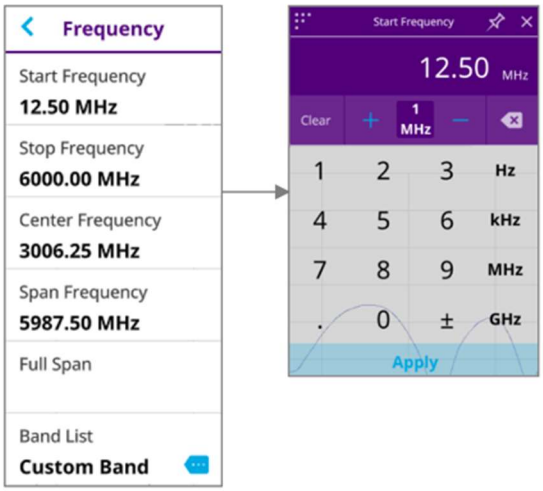
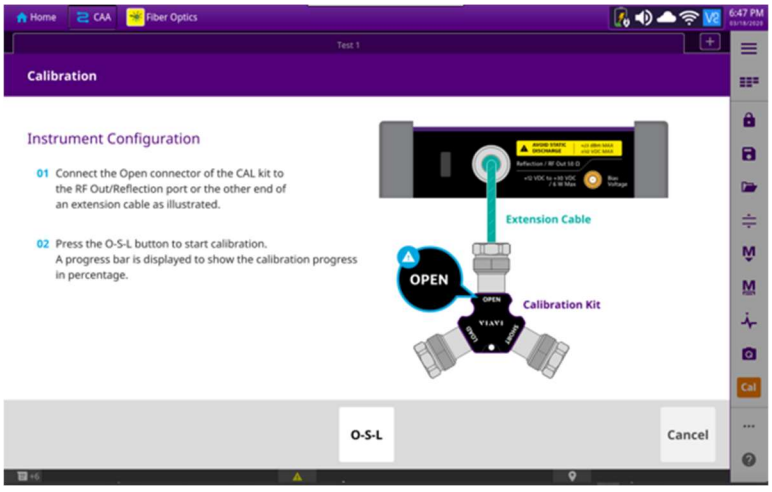
Step	Action	Description
1	Power ON OneAdvisor	Press and hold the ON/OFF button for 3 seconds to power on the OneAdviosr 
2	Connectivity: connect the RF cable (cable under test or extension cable) into the CAA Module Reflection / RF Output port.	 ONA Front View.  ONA Back View
3	Cable and Antenna Analysis mode: - Select {Home}, {Tests}, {CAA}, {CAA} - To select a measurement type, select the multi-grid icon  - Choose either single or dual testing selecting the corresponding layout: ○ Single ○ Horizontal ○ Vertical - Select the desired measurement type: ○ Reflection VSWR ○ Reflection Return Loss ○ DTF VSWR ○ DTF Return Loss ○ 1 Port Cable Loss	 Cable and Antenna Analyzer Measurement Mode 

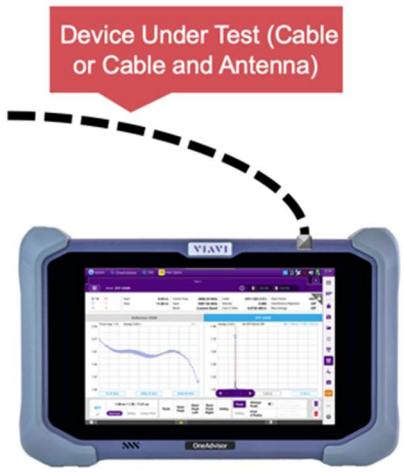
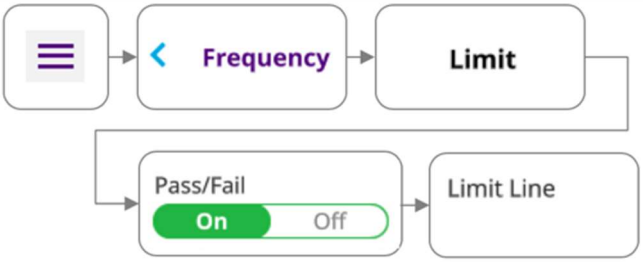
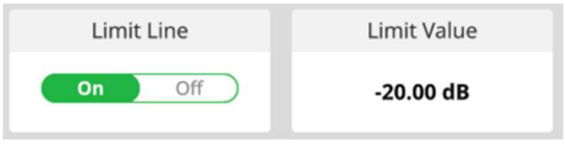
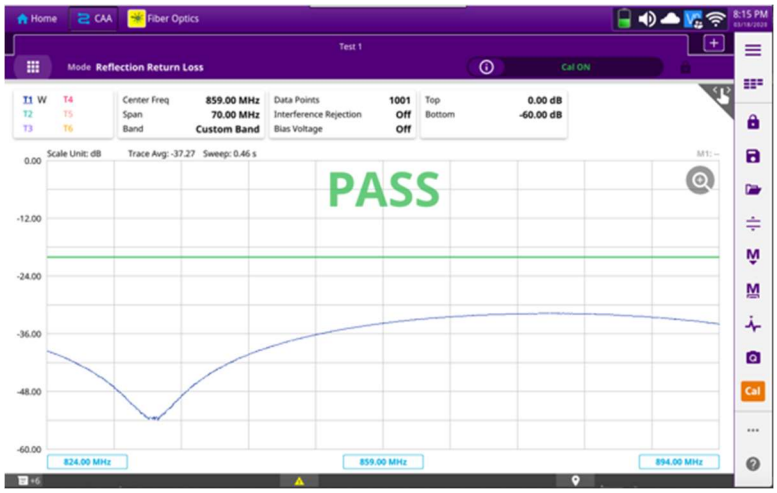
Step	Action	Description
	○ 1 Port Phase ○ RF Source ○ Smith Chart	Real-time Spectrum Measurement Screen  Measurement Types Layout  Cable and Antenna Measurement Types

5.6.3 RF Reflection Test

The following procedure describes the steps to perform reflection tests (Return Loss or VSWR) with OneAdvisor.

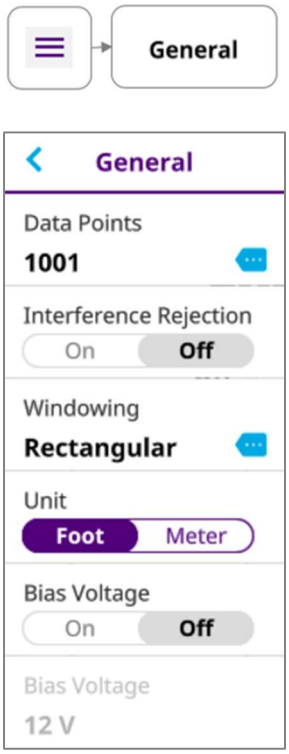
Step	Action	Description
1	Reflection measurement mode: - Select the desired measurement layout. - Select the corresponding reflection measurement icon (Return Loss or VSWR). *Note: Refer to the "Initial Setup" section for initial configuration and connectivity with OneAdvisor*	 Reflection Test Measurement Types

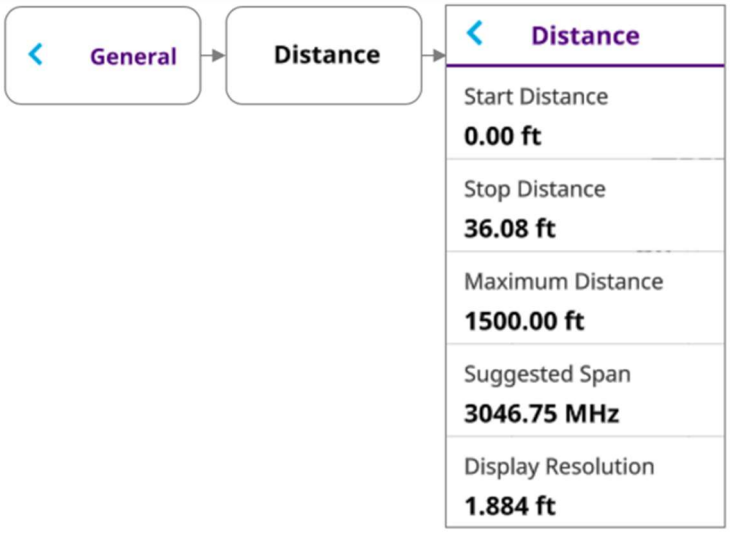
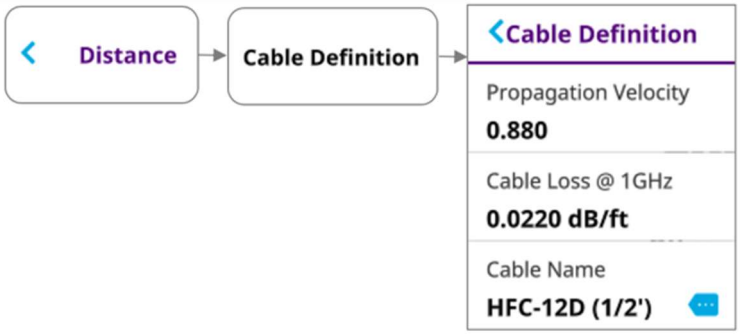
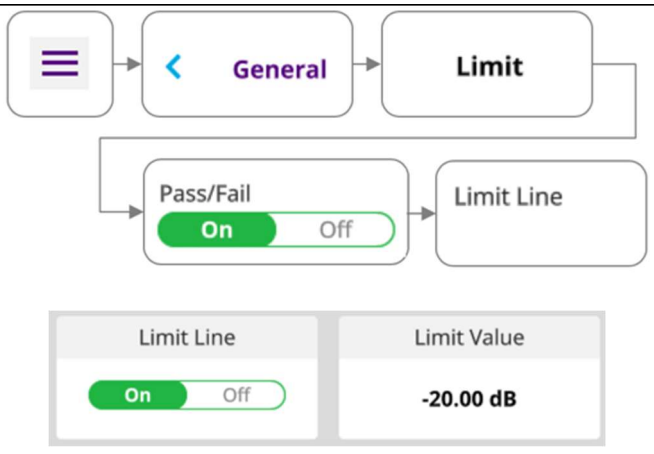
Step	Action	Description
2	Set the frequency band or range to perform reflection test: - Select the frequency group of the top-bar navigation or the configuration icon from the side-bar navigation - Set the required frequency range by selecting, the desired field, enter the frequency value and select {Apply} *Note: Frequency is set by either {Start Frequency} and {Stop Frequency} or by {Center Frequency} and {Span Frequency}*	 Top bar frequency group  Side-bar configuration icon  Setting Frequency Range
3	Calibrate the instrument: - Select {Cal} icon from the side-bar navigation and follow the on-screen instructions. *Note: If an RF extension cable is required, connect the RF extension cable into the CAA Module Reflection / RF Output port and on the other end of the RF extension cable connect the calibration kit.*	  Calibration Process

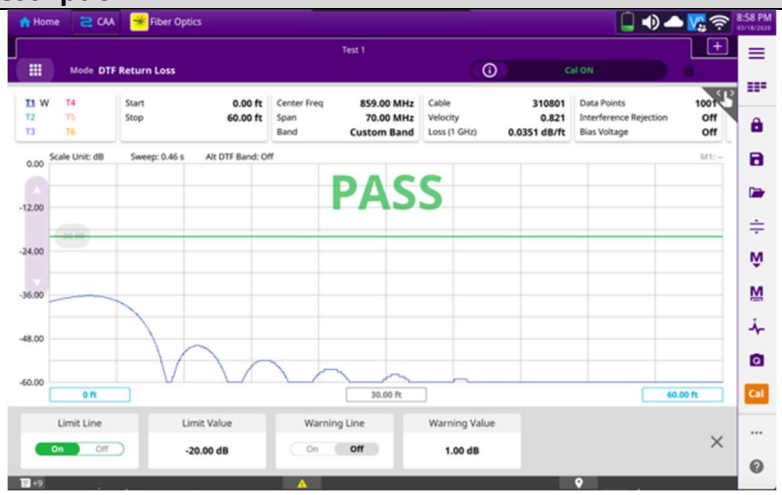
Step	Action	Description
4	Perform the reflection test: - Connect the cable or cable and antenna system to be tested at the calibration point (CAA module RF port, or RF extension cable).	
5	Enable a PASS/FAIL indicator by setting a limit line: - Select the configuration icon from the side-bar navigation - Select the configuration title (the default is “Frequency”) - Select {Limit} - Select {Pass/Fail} to turn it ON - Select {Limit Line} - Set the limit line value from the bottom-bar navigation (e.g. -20) - Select {Limit Line} to turn it ON	   Reflection Loss with PASS/FAIL indicator

5.6.4 RF Distance to Fault (DTF)

The following procedure describes the steps to perform distance to fault tests (Return Loss or VSWR) with OneAdvisor.

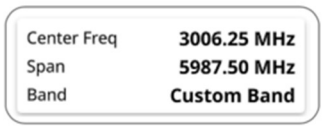
Step	Action	Description
1	DTF measurement mode: - Select the desired measurement layout. - Select the corresponding DTF measurement icon (RTF in Return Loss or DTF in VSWR). *Note: Refer to the "Initial Setup" and "RF Reflection Test" sections for initial configuration, connectivity and reflection test.*	 DTF Measurement Types
2	Configure the DTF measurement: - Select the configuration icon and select {General} - Set the desired Data Points, Interference Rejection, Windowing, Units, and Bias.	 General Cable and Antenna Settings
3	Configure the DTF distance measurement: - Select the measurement title {General} - Select {Distance} - Set the desired Start Distance, and Stop Distance.	

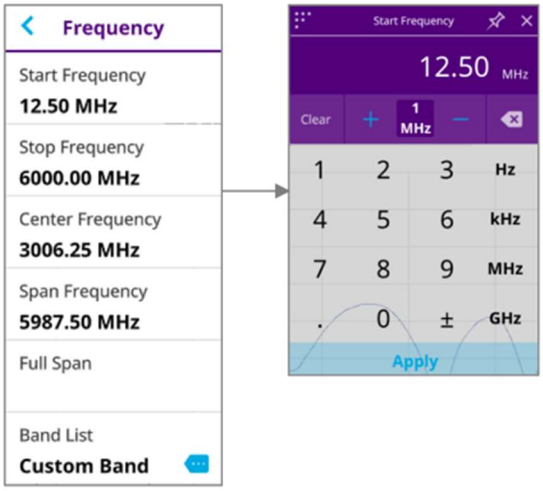
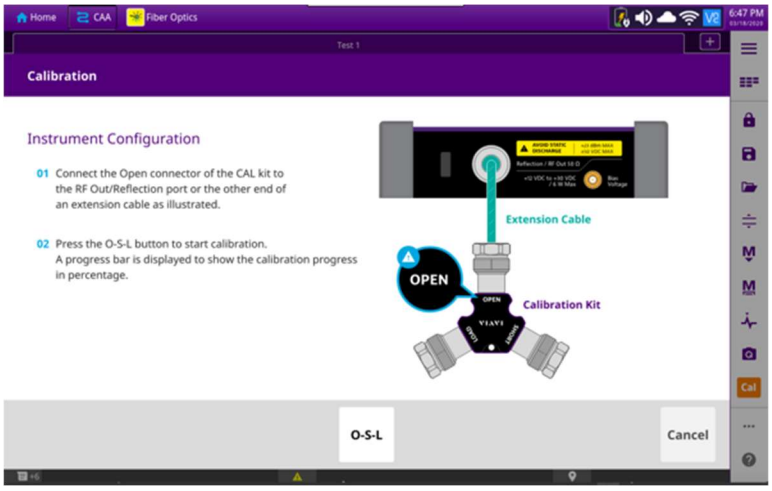
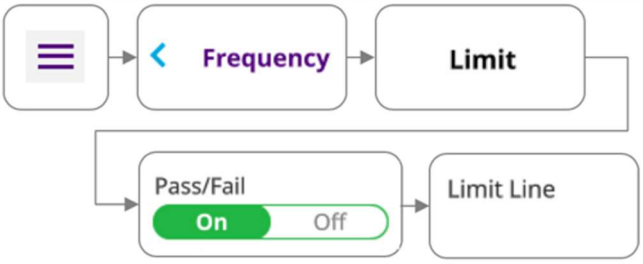
Step	Action	Description
		 Distance Setting
4	Configure the cable type: - Select the measurement title {Distance} - Select {Cable Definition} - Select the cable from the instruments data-base {Cable Name} or enter the corresponding propagation velocity and cable loss at 1GHz of the cable under test.	 Cable Type Setting
5	Enable a PASS/FAIL indicator by setting a limit line: - Select the configuration icon from the side-bar navigation - Select the configuration title (the default is “General”) - Select {Limit} - Select {Pass/Fail} to turn it ON - Select {Limit Line} - Set the limit line value from the bottom-bar navigation (e.g. -20) - Select {Limit Line} to turn it ON	

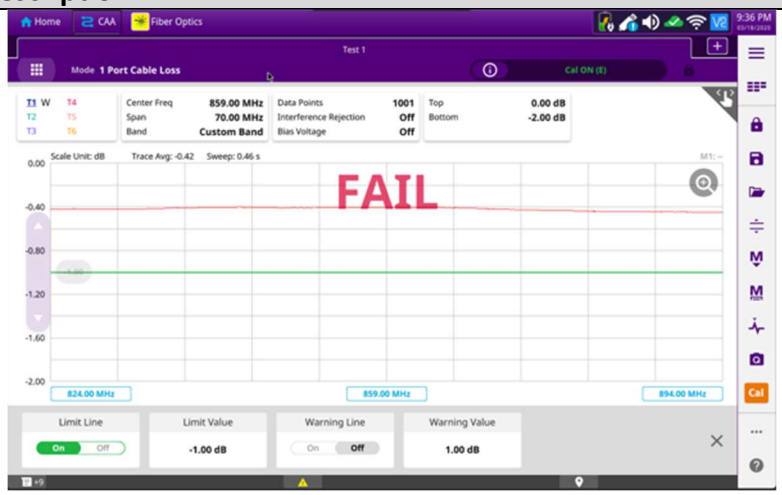
Step	Action	Description
		 DTF test with PASS/FAIL indicator

5.6.5 RF Cable Loss

The following procedure describes the steps to perform cable loss tests with OneAdvisor.

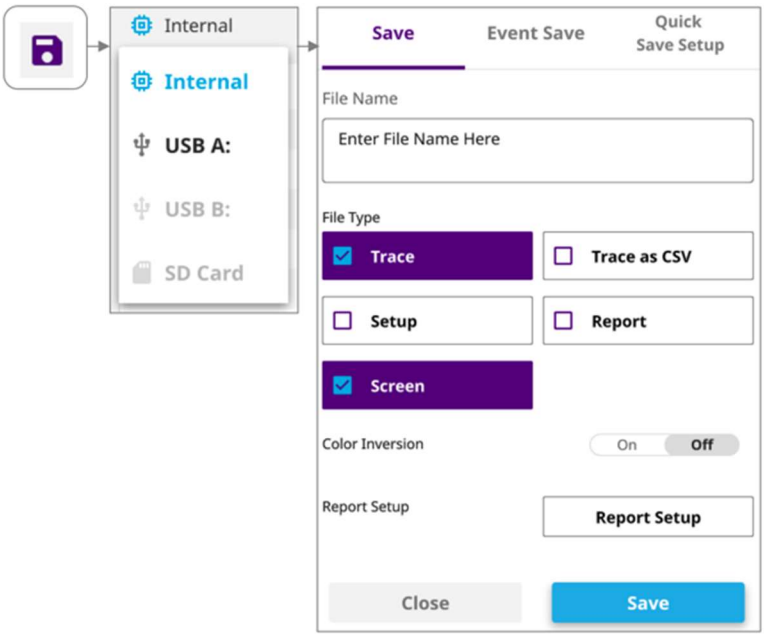
Step	Action	Description
1	Cable Loss measurement mode: - Select the desired measurement layout. - Select the {Cable Loss} icon. *Note: Refer to the "Initial Setup" section for initial configuration and connectivity.*	 Cable Loss Measurement
2	Set the frequency band or range to perform reflection test: - Select the frequency group of the top-bar navigation or the configuration icon from the side-bar navigation - Set the required frequency range by selecting, the desired field, enter the frequency value and select {Apply} *Note: Frequency is set by either {Start Frequency} and {Stop Frequency} or by {Center Frequency} and {Span Frequency}*	 Top bar frequency group  Side-bar configuration icon

Step	Action	Description
		 Setting Frequency Range
3	Calibrate the instrument: - Select {Cal} icon from the side-bar navigation and follow the on-screen instructions. *Note: If an RF extension cable is required, connect the RF extension cable into the CAA Module Reflection / RF Output port and on the other end of the RF extension cable connect the calibration kit.*	  Calibration Process
5	Enable a PASS/FAIL indicator by setting a limit line: - Select the configuration icon from the side-bar navigation - Select the configuration title (the default is “Frequency”) - Select {Limit} - Select {Pass/Fail} to turn it ON - Select {Limit Line}	 Reflection Loss with PASS/FAIL indicator

Step	Action	Description
	- Set the limit line value from the bottom-bar navigation (e.g. -5) - Select {Limit Line} to turn it ON	 Cable Loss test with PASS/FAIL indicator

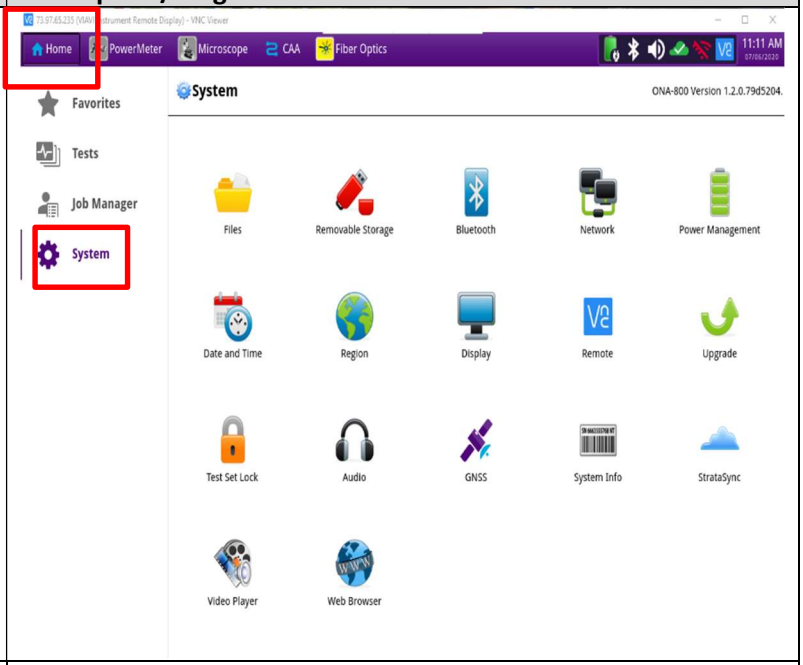
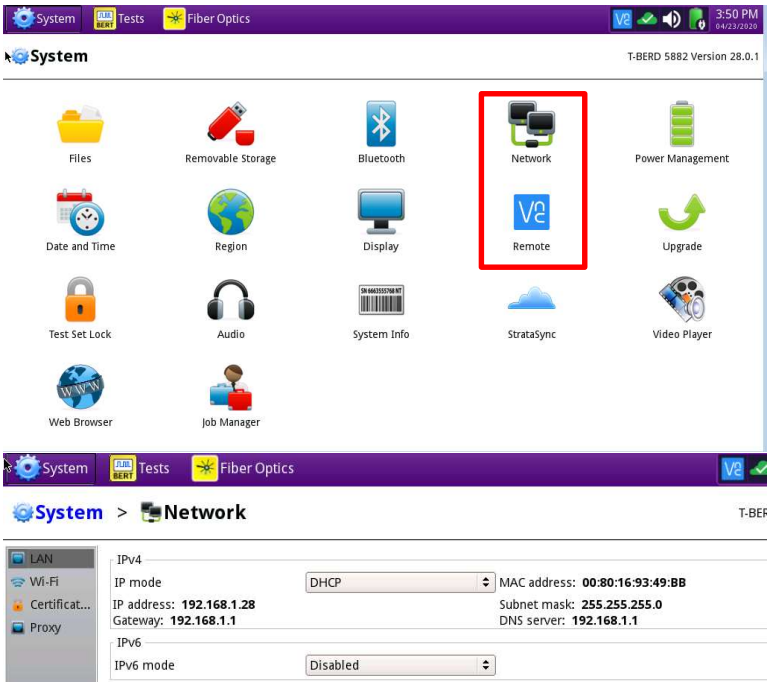
5.6.6 Save Measurement Results

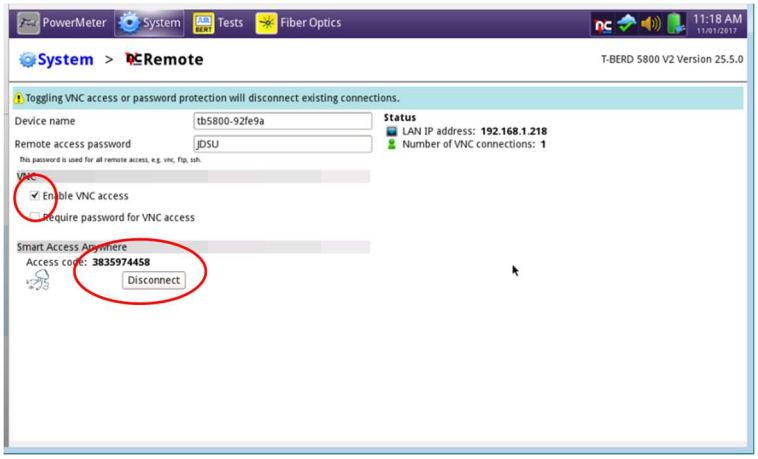
The following procedure describes the steps to save measurement results with OneAdvisor

Step	Action	Description
1	Saving measurement results: - Select the {Save} icon from the side-bar navigation. - Select {Internal} memory icon to set the file destination. - Select the destination memory - Enter the desired file name in the {File Name} field - Select the measurement file type - Select {Save}	 Save Measurement Results

6. Remote Control

You, a co-worker, and/or VIAVI Tech Support personnel can collaborate on test set-up and/or results interpretation quite efficiently via Smart Access Anywhere.

Step	Action	Description/Diagram
1	Place ONA-800 on the network. Press the Home Key  Select the “System” menu  	
2	System  > Network Icon  to configure LAN/WAN access (obtain an IP address) Use wired Ethernet (Static or DHCP) or WIFI if so equipped.	

Step	Action	Description/Diagram
2	System > Remote Icon to configure a session Check the Enable VNC access box To set-up a session, Click the Connect Button. (Picture now shows the Disconnect button) The ONA-800 will communicate with the SSA server across the Internet and make a connection. The server will return a 10-character alpha-numeric string. Shown here.	

7. Technical Support

Technical support is provided by:

- Phone: 1-844-GO-VIAVI (1-844-468-4284) options 3-2-3
- Email: diagnostics.tac@viavisolutions.com

Regularly new firmware updates for the CellAdvisor 5G are released and it is recommended to keep the instrument in the latest firmware to provide all the enhancements and bug fixes.

- For firmware updates go to: http://celladvisor.updatemyunit.net/
- For additional information of cell site test go to: http://www.viavisolutions.com/en/products/network-test-and-certification/cell-site-test