

Viavi T-BERD 5800 RFC-2544 Ethernet Layer 2 Testing Guide



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Scope

This document describes how to measure Layer 2 Metro Ethernet performance with the T-BERD 5800v2 or T-BERD 5800-100G in accordance with Viavi’s Enhanced RFC 2544 test methodology. RFC-2544 is a recommended test suite for verifying key performance indicators (KPIs) including Throughput, Delay and Frame Loss. Viavi’s Enhanced RFC 2544 Test Suite also measures Jitter and Committed Burst Size (CBS) to verify conformance to a Service Level Agreement (SLA) or Service Level Objectives. This document is not intended to be a user guide. This Method of Procedure (MOP) should be used in conjunction with the T-BERD User’s Guides for detailed explanation of all testing options.

The following procedures are documented:

- Setting up the T-BERD up as a Layer 2 Loopback device (Section 2)
- Running a Layer 2 RFC-2544 tests from the T-BERD (Section 3)

The Loopback device may be another Viavi test set (SmartClass, HST-3000 or T-BERD), a Viavi Test Head (QT-600), a Viavi-compatible NID, a Viavi JMEP loopable SFP, or an ALU 7705 Service Aggregation Router configured for IEEE 802.1ag Connectivity Fault Management (CFM) loopback. Fiber Loopback Cables (Hard Loops) may only be used if there is no Layer 2 switching equipment on the link.

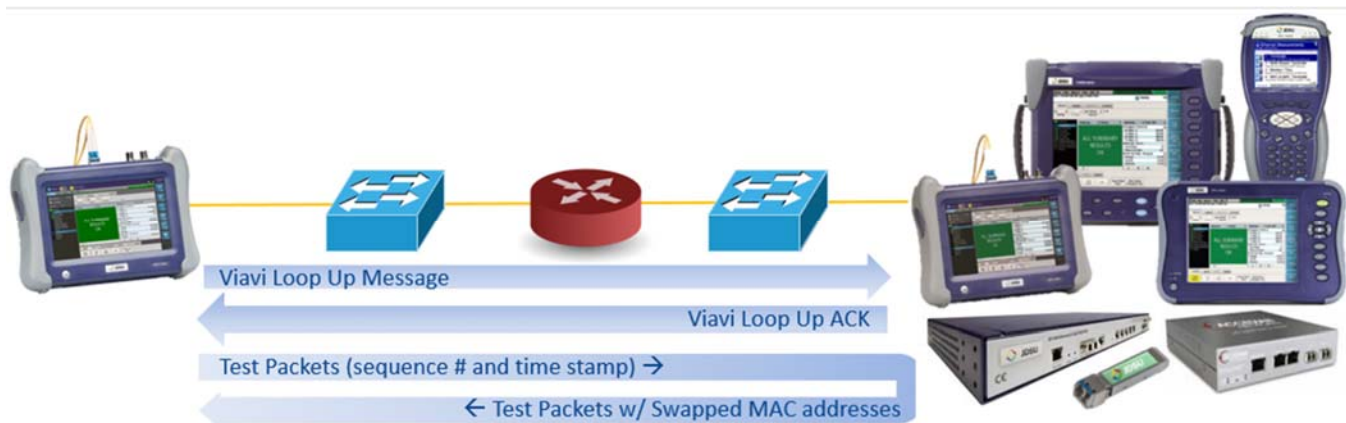


Figure 1: T-BERD to Viavi compatible loopback device

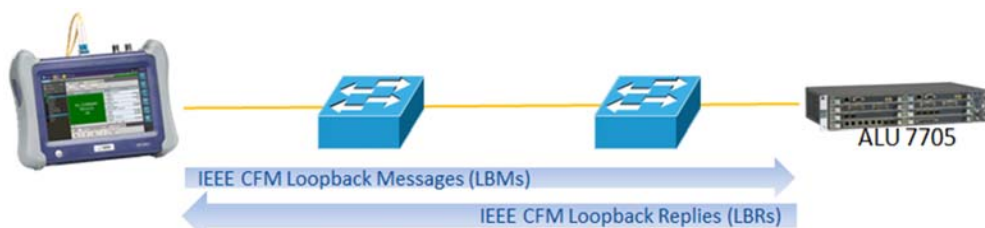


Figure 2: T-BERD to ALU 7705

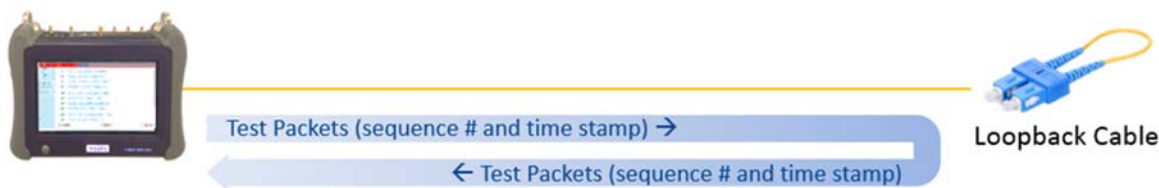


Figure 3: T-BERD to Hard Loop

The following minimum software revision is recommended:

- T-BERD 5800-100G BERT Software Release 25.0
- T-BERD 5800v2 BERT Software Release 25.1

If your T-BERD is Strata Sync enabled, use StrataSync to update your software. Otherwise, go to <http://updatemyunit.net/> for software update instructions. StrataSync can also be used to create configuration templates and download configuration files for this procedure.

1. Hardware Description

The T-BERD 5800 is a portable test tool for Ethernet testing. The product can also be optioned to support T1, DS3, SONET, OTN, Fiber Channel, CPRI, and OBSAI. Test connections are made from the top of the mainframe. Menu selections are made from the color touch screen. The T-BERD 5800v2 uses RJ-45 ports, labeled **10/100/1000** for copper testing (10/100/1000BASE-T) and SFP+ ports for optical testing:

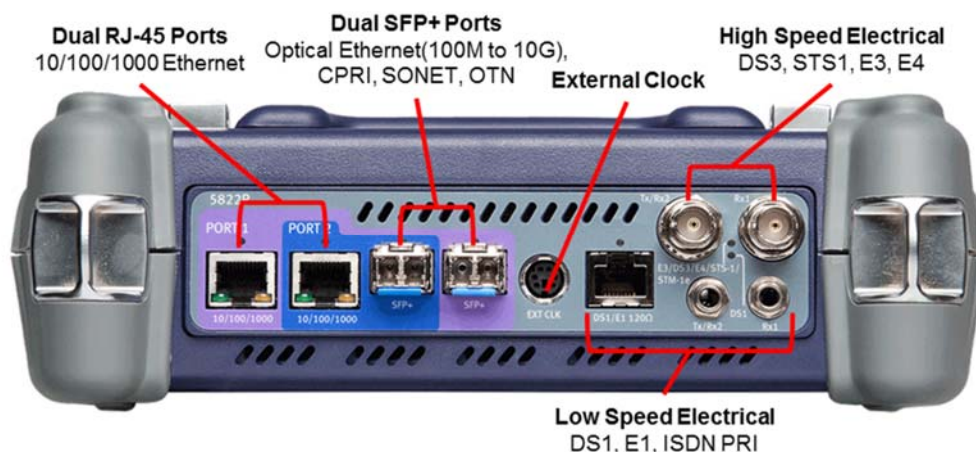


Figure 4: T-BERD 5800v2 Top View (dual port configuration)

The T-BERD 5800-100G uses the SFP+ port for both copper and optical testing. The RJ-45 10/100/1000 port is only used for dual port testing and requires option C5DUALPORT:

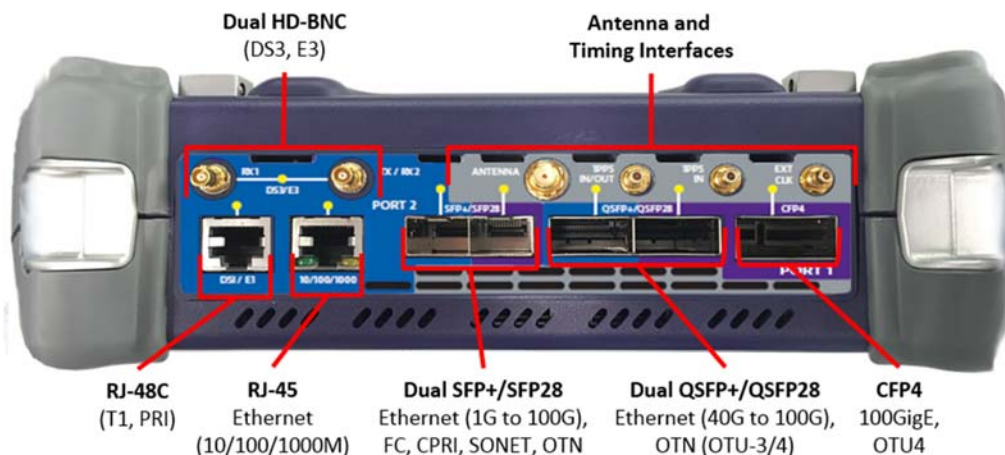


Figure 5: T-BERD 5800-100G Top View

2. T-BERD 5800 Remote Unit setup



Follow this procedure to set up a T-BERD as a layer 2 loopback device.

2.1 Information requirements

The following information is required to set up the T-BERD as a loopback device. This information should be included in the Work Order:

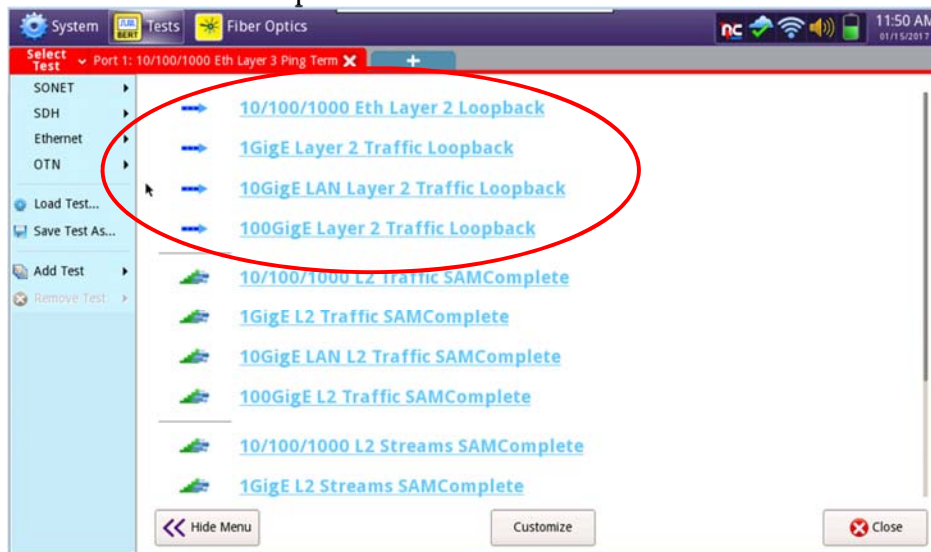
- *Physical Interface (10/100/1000BASE-T, 100BASE-FX, 1000BASE-SX, 1000BASE-LX, 10GBASE-LR, 40GBASE-SR4, 100GBASE-LR4, etc.)*
- *Auto Negotiation settings of the port under test.*

2.2 Test Setup


<i>Step</i>	<i>Action</i>	<i>Details</i>
1.	Power On	Press and hold the ON/OFF button to turn on the T-BERD. For copper testing with the T-BERD 5800v2, connect the Port 1 10/100/1000 RJ-45 jack to the port under test using CAT 5E or better cable, and proceed to step 5. For optical testing, or for copper testing on the T-BERD 5800-100G, proceed to step 2.
2.	Insert SFP	Insert desired Copper SFP, Optical SFP, QSFP, or CFP4 into the Port 1 slot on the top of the T-BERD.
3.	Clean & Inspect	Ensure the fiber and connectors are clean using a Fiber Inspection probe. 
4.	Connect	Connect the SFP, QSFP, or CFP4 to the port under test. <ul style="list-style-type: none"> • Use orange or aqua Multimode jumper cables for 850 nm 1000BASE-SX or 10GBASE-SR. • Use yellow or dark blue Single Mode Fiber jumper cables for 1310 nm 1000BASE-LX, 10GBASE-LR, 40GBASE-LR4, or 100GBASE-LR4. • Use CAT 5E or better cable for copper 10/100/1000BASE-TX connections. • Use 12-fiber MPO trunk cables for 40GBASE-SR4. • Use 24-fiber MPO trunk cables for 100GBASE-SR10. 

5. Load Test

If a shortcut for this test is stored on the T-BERD, use the Test List to launch the test. Proceed to step 8.



6. All Test

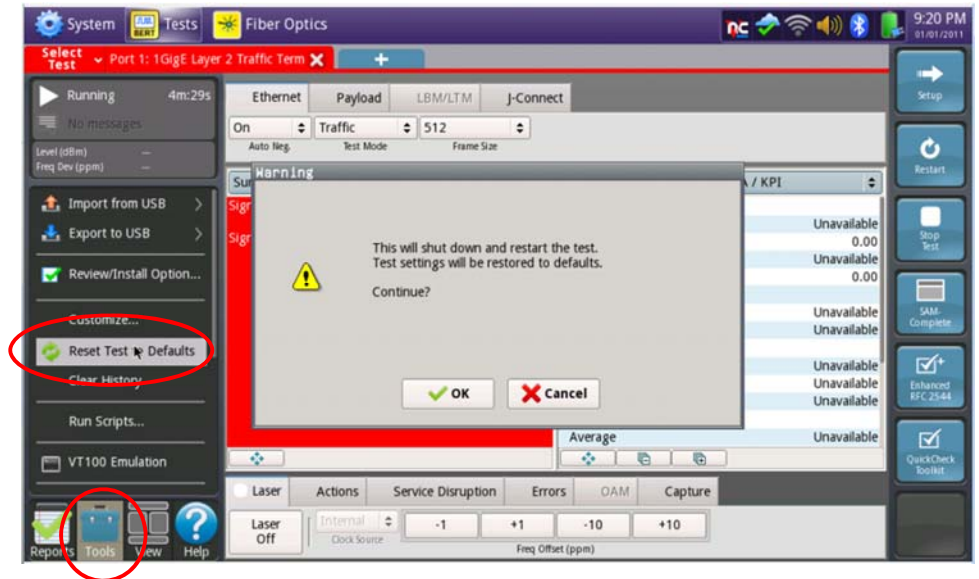
If the Select Test menu is hidden, tap  to display the menu.

7. Select Test

In the Select Test menu,  at the top left corner of the screen, choose one of the following:

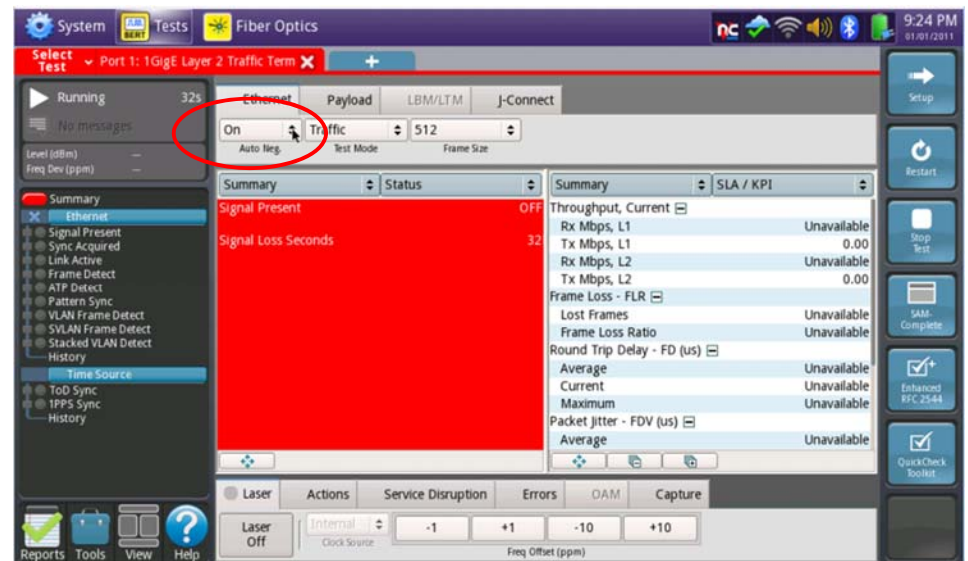
- For 10BASE-T, 100BASE-T, or 1000BASE-T Electrical Ethernet testing:
Ethernet ▶ 10/100/1000 ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 10/100/1000 ▶ Layer 2 Traffic ▶ P1 Terminate.
- For 100BASE-FX Optical Fast Ethernet testing:
Ethernet ▶ 100M Optical ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 100M Optical ▶ Layer 2 Traffic ▶ P1 Terminate.
- For 1000BASE-SR, 1000BASE-LR, or other GigE Optical Testing:
Ethernet ▶ 1GigE Optical ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 1GigE Optical ▶ Layer 2 Traffic ▶ P1 Terminate.
- For 10GBASE-SR, 10GBASE-LR, other 10GigE Optical Testing:
Ethernet ▶ 10GigE LAN ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 10GigE LAN ▶ Layer 2 Traffic ▶ P1 Terminate.
- For 40GBASE-SR4, 40GBASE-LR4, other 40GigE Optical Testing:
Ethernet ▶ 40GigE ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 40GigE ▶ Layer 2 Traffic ▶ P1 Terminate.
- For 100GBASE-SR4, 40GBASE-LR4, other 40GigE Optical Testing:
Ethernet ▶ 100GigE ▶ Layer 2 Traffic ▶ Terminate or
Ethernet ▶ 100GigE ▶ Layer 2 Traffic ▶ P1 Terminate.

8. Reset Test to Defaults In the **Tools Panel**, , select **Reset Test to Defaults**. Press  to continue.





9. Auto Negotiation

For **10/100/1000 Electrical** and **1GigE Optical** tests, select the **Ethernet** tab of the **Quick Config** and set **Auto Neg.** to the same value as the Ethernet port under test.




10. Turn Laser On

For **1GigE**, **10GigE**, **40GigE**, or **100GigE** Optical tests, select the **Laser** tab in the **Actions panel**, and press . The button will turn yellow and be relabeled .

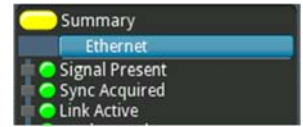


11. Restart Test

Press the **Restart** Soft Key, , on the right side of the screen.

12. Check LEDs


A green **Signal Present** LED ● indicates the T-BERD is receiving an optical signal from the Ethernet port under test. Green **Sync Acquired** and **Link Active** LEDs indicate that the T-BERD has successfully connected to the port under test and the link is active.

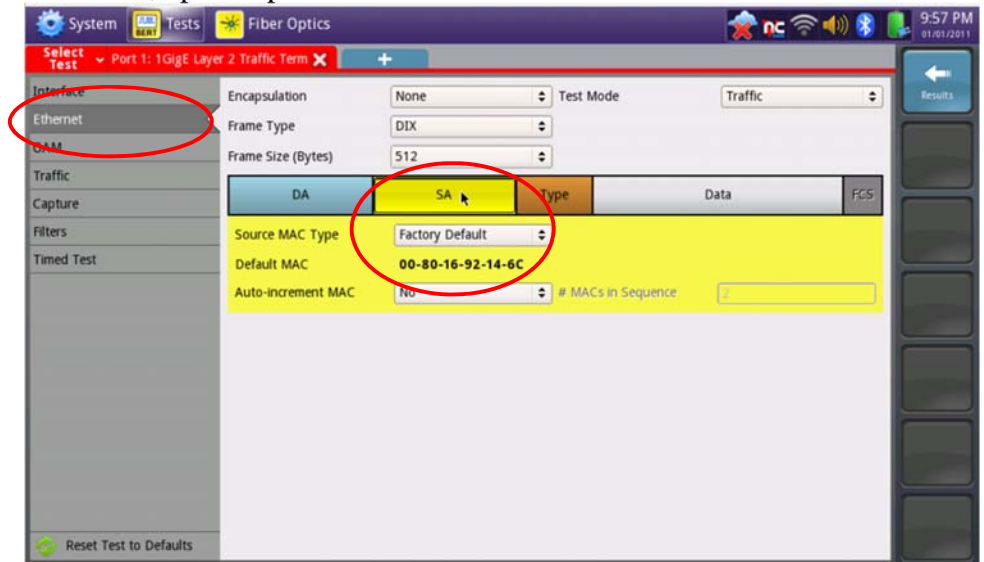


The T-BERD is ready to be looped.


13. Setup

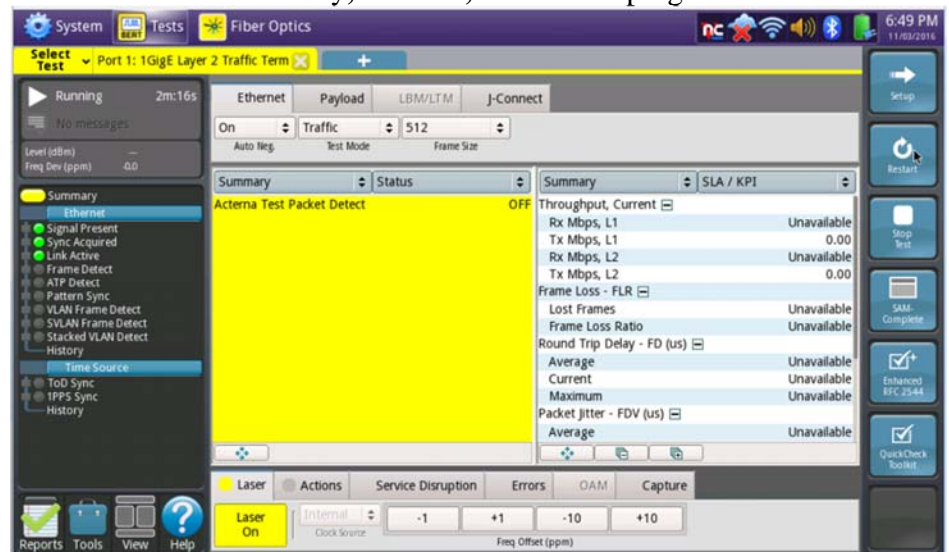
Press the **Setup** Soft Key, , and select the **Ethernet** menu.

Tap  to display the Default Source MAC Address of your T-BERD. Provide this address to the operator of the Y.1564 Traffic Generator, upon request.



14. Results

Press the **Results** Soft Key, , to view the progress of the test.



3. T-BERD 5800 RFC-2544 Test Procedure



Follow this procedure to set up a T-BERD to run the **Enhanced RFC 2544** Test.

3.1 Information requirements

The following information is required to set the T-BERD up to run the RFC 2544 Test. This information should be included in the Work Order:

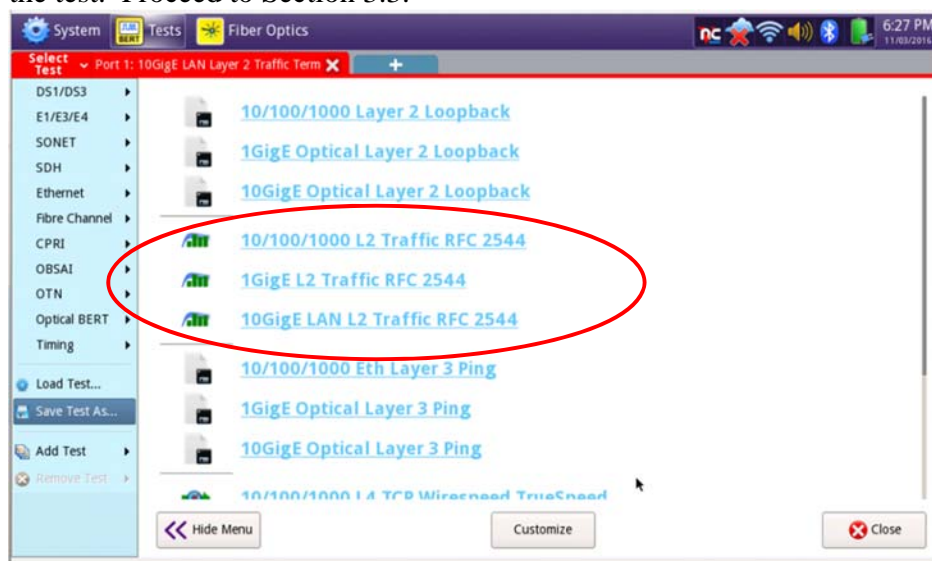
- *Physical Interface (10/100/1000BASE-T, 1000BASE-SX, 1000BASE-LX, 10GBASE-LR, 40GBASE-SR4, 100GBASE-LR4, etc.)*
- *Type of Loopback Device (T-BERD, HST-3000, QT-600, JMEP, NID, ALU 7705, etc.)*
- *Destination MAC for for ALU 7705 CFM Loopback*
- *Maintenance Domain Level for ALU 7705 CFM Loopback*
- *VLAN ID, if VLAN tagging is used.*
- *Maximum Transmission Unit (MTU)*
- *Committed Information Rate (CIR)*
- *Committed Burst Size (CBS)*
- *Pass/Fail Threshold for Throughput, Frame Loss, Latency and Jitter*

3.2 Test Setup


Step	Action	Details
1.	Power On	Press and hold the ON/OFF button to turn on the T-BERD. For copper testing with the T-BERD 5800v2, connect the Port 1 10/100/1000 RJ-45 jack to the port under test using CAT 5E or better cable, and proceed to step 5. For optical testing, or for copper testing on the T-BERD 5800-100G, proceed to step 2.
2.	Insert Transceiver	Insert desired copper SFP, optical SFP, QSFP, or CFP4 into the Port 1 slot on the top of the T- BERD.
3.	Clean & Inspect	Ensure the fiber and connectors are clean using a Fiber Inspection probe. 
4.	Connect	Connect the SFP, QSFP, or CFP4 to the port under test. <ul style="list-style-type: none"> • Use orange or aqua Multimode jumper cables for 850 nm 1000BASE-SX or 10GBASE-SR. • Use yellow or dark blue Single Mode Fiber jumper cables for 1310 nm 1000BASE-LX, 10GBASE-LR, 40GBASE-LR4, or 100GBASE-LR4. • Use CAT 5E or better cable for copper 10/100/1000BASE-TX connections. • Use 12-fiber MPO trunk cables for 40GBASE-SR4. • Use 24-fiber MPO trunk cables for 100GBASE-SR10. 

5. Load Test

If a shortcut for this test is stored on the T-BERD, use the Test List to launch the test. Proceed to Section 3.3.



6. All Test

If the Select Test menu is hidden, tap  to display the menu.

7. Select Test

In the Select Test menu, , at the top left corner of the screen, choose one of the following:

- For 10BASE-T, 100BASE-T, or 1000BASE-T Electrical Ethernet testing:
Ethernet ▶ 10/100/1000 ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 10/100/1000 ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.
- For 100BASE-FX Optical Fast Ethernet testing:
Ethernet ▶ 100M Optical ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 100M Optical ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.
- For 1000BASE-SR, 1000BASE-LR, or other GigE Optical Testing:
Ethernet ▶ 1GigE Optical ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 1GigE Optical ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.
- For 10GBASE-SR, 10GBASE-LR, or other 10GigE Optical Testing:
Ethernet ▶ 10GigE LAN ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 10GigE LAN ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.
- For 40GBASE-SR4, 40GBASE-LR4, or other 40GigE Optical Testing:
Ethernet ▶ 40GigE ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 40GigE ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.
- For 100GBASE-SR10, 100GBASE-LR4, or other 100GigE Testing:
Ethernet ▶ 10GigE ▶ RFC 2544 ▶ L2 Traffic ▶ Terminate or
Ethernet ▶ 10GigE ▶ RFC 2544 ▶ L2 Traffic ▶ P1 Terminate.

3.3 Configuring RFC-2544 Test Settings

The RFC-2544 workflow consists of a series of screen that allow the user to configure the test, run the test, and generate a report.

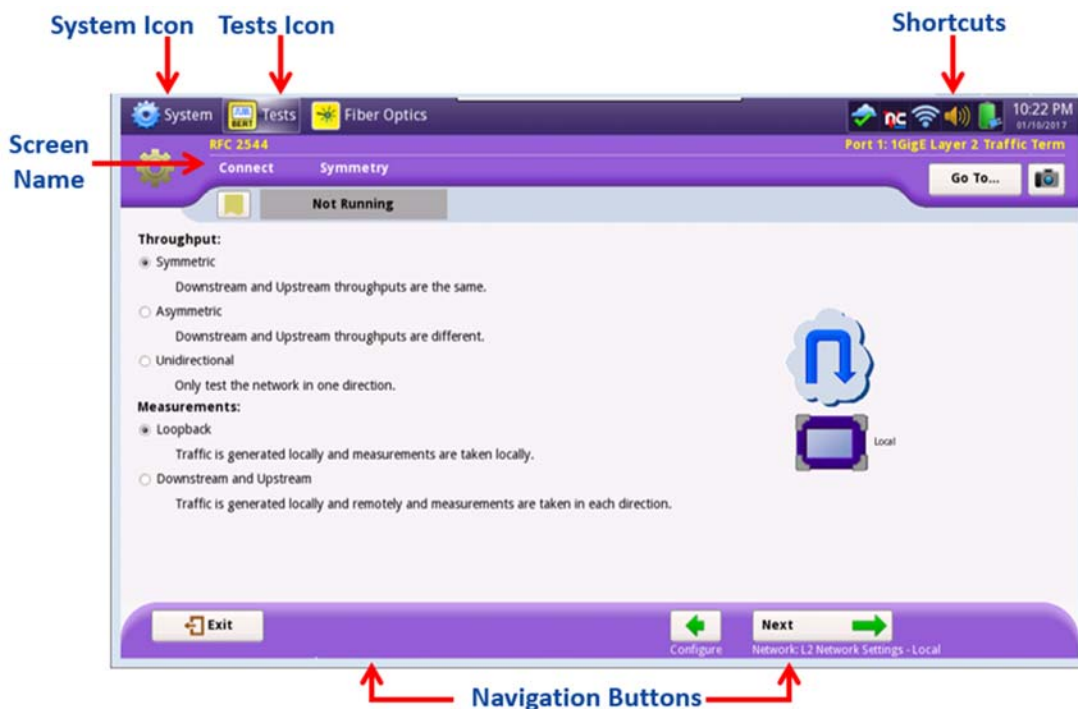








Figure 6: RFC-2544 GUI

Step	Action	Details
1.	Configure	If this is the first time using the RFC 2544 test and your unit does not have pre-loaded configuration files, tap the  button next to “ Start a New Configuration (reset to defaults) ” and proceed to step 2.



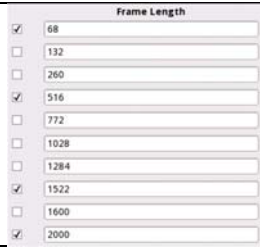
Otherwise, tap the  button next to “**Load Configuration from a Profile**”



Select the desired configuration, and tap .
 Tap  to acknowledge successful load.
 Tap the  button.
 Tap the  button next to **Edit Configuration**.



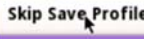

2. Setup Use the  and  buttons at the bottom of the screen to advance through the wizard and configure the settings as follows:

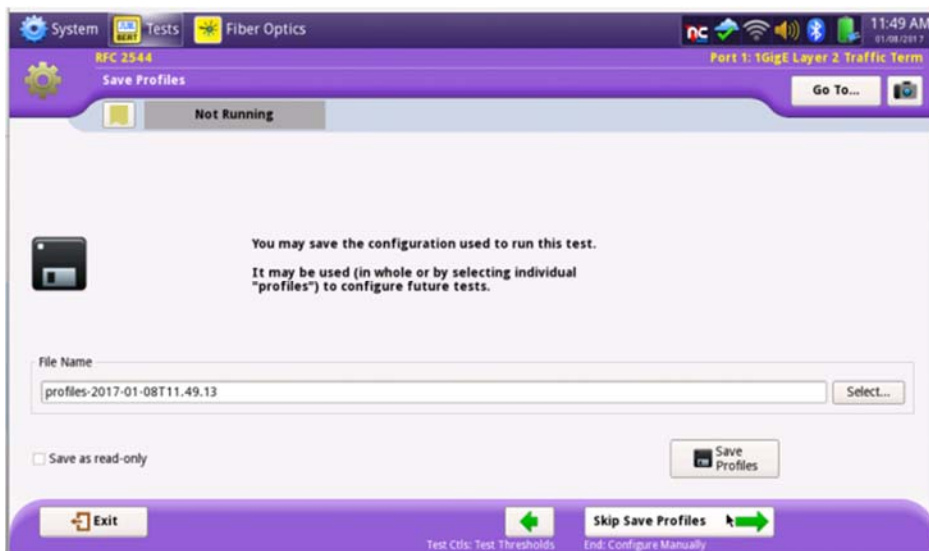
Screen	Option	Value(s)	Comment
Connect: Symmetry	Throughput	Symmetric	
	Measurements	Loopback	
Network: L2 Network Settings - Local	Frame Type	DIX	
	Encapsulation	See Work Order	None or VLAN
	Test Mode	Traffic or LBM Traffic	Select "LBM Traffic" if the loopback device is an ALU 7705. Select "Traffic" for all other loopback devices.
	VLAN ID	See Work Order	Option only displayed if Encapsulation = VLAN
	User Priority	0 (lowest)	
	Source Type	Factory Default	
	Destination MAC	See Work Order. Enter MAC address of the ALU 7705	If Test Mode = LBM Traffic, Tap the Set MAC Addresses, EtherType, and LBM link to configure these settings and use the Back button to return (see below). Otherwise leave at defaults.
	Maint. Domain Level (MDL)	See Work Order. Enter MDL of the ALU 7705	
Enable Sender TLV	No (unchecked)		
RFC 2544 Tests: Configuration Templates	Do you want to use a configuration template?	No	
RFC 2544 Tests: Select Tests	RCF 2544 Tests	<ul style="list-style-type: none"> ✓ Throughput, ✓ Latency, ✓ Frame Loss 	
	Additional Tests	<ul style="list-style-type: none"> ✓ Packet Jitter 	
RFC 2544 Tests: Utilization	Bandwidth Unit	L1 Mbps	
	Maximum Bandwidth	See Work Order	Enter Committed Information Rate (CIR)
RFC 2544 Tests: Frame Lengths	Frame Lengths	<ul style="list-style-type: none"> • Select 1st, 4th, and 8th Frame Lengths. • If the MTU is greater than 1518 (1522 with VLAN), also enter and select the frame length of the MTU. • Deselect (uncheck) all other frame sizes. 	
RFC 2544 Tests: Throughput	Zero-in Process	Viavi Enhanced	
	Measurement Accuracy	To within 1 Mbps	
RFC 2544 Tests: Frame Loss Test	Test Procedure	RFC 2544 Standard	
	Bandwidth Granularity (L1Mbps)	Enter minimum value: <ul style="list-style-type: none"> • 1 for 100Mbps Ethernet • 10 for Gigabit Ethernet • 100 for 10GigE • 400 for 40GiE • 1000 for 100GigE 	
Test Ctls: Test Durations	Configure test durations separately?	No	
	Duration	120 seconds	This will result in approximately 6 minutes of test time per frame length.
	Number of Trials	1	
Test Ctls: Test Thresholds	Show Pass/Fail	Select all (✓)	
	Throughput Threshold	See Work Order	Enter CIR
	Throughput Frame Loss Tolerance (%)	See Work Order	Enter 0.0000 if not specified
	Latency RTD (µs)	See Work Order	Enter threshold in µsec (1 msec = 1000 µsec). Uncheck the Show Pass/Fail box if a threshold is not specified.
	Packet Jitter (µs)	See Work Order	
Acterna Payload Version	Version 3		

3. Save Profile


If you wish to save this configuration as a new profile, enter a File Name and tap  in the Save Profiles screen.

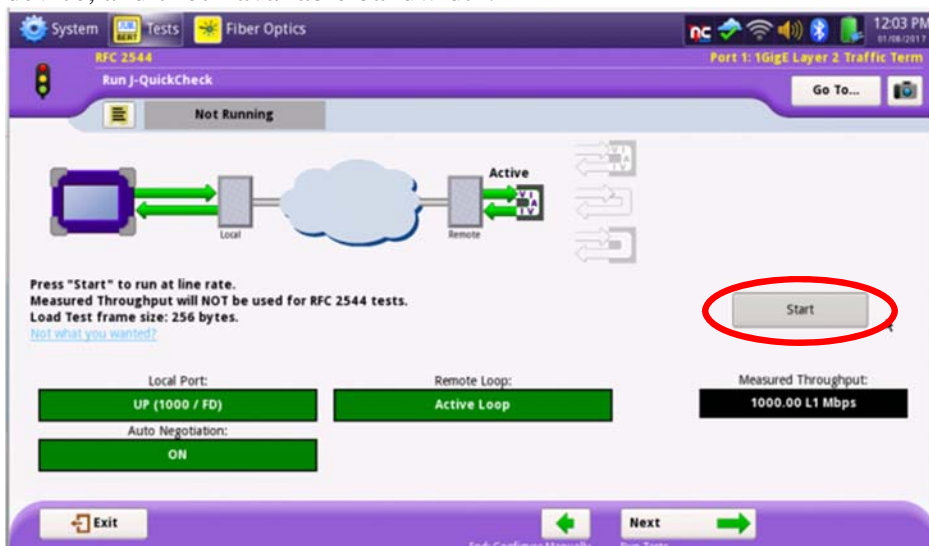
Tap , tap , and tap  twice.

Otherwise, tap  and tap .





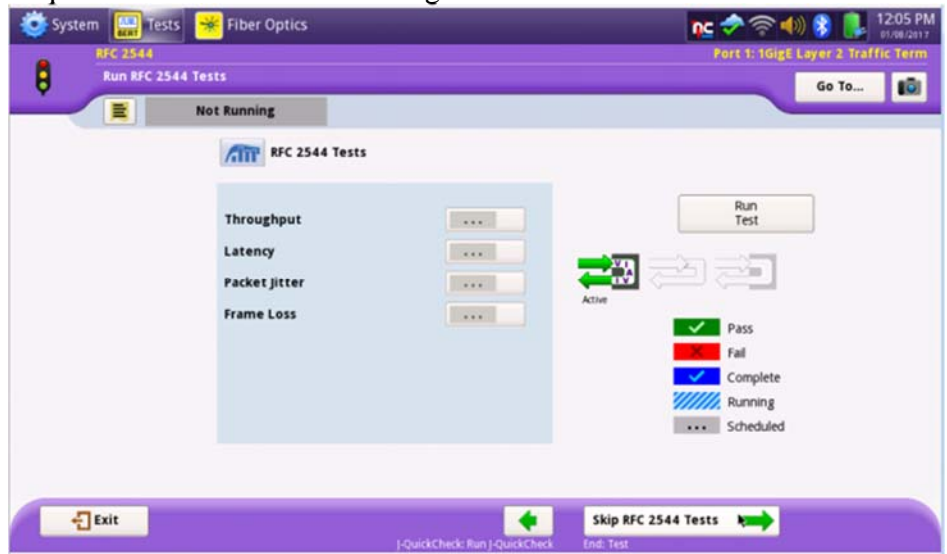
3.4 Running the Test





Step	Action	Details
1.	QuickCheck	Ensure that the loopback device has been setup, and tap  to run J- QuickCheck to verify local connectivity, loop up the remote loopback device, and check available bandwidth.

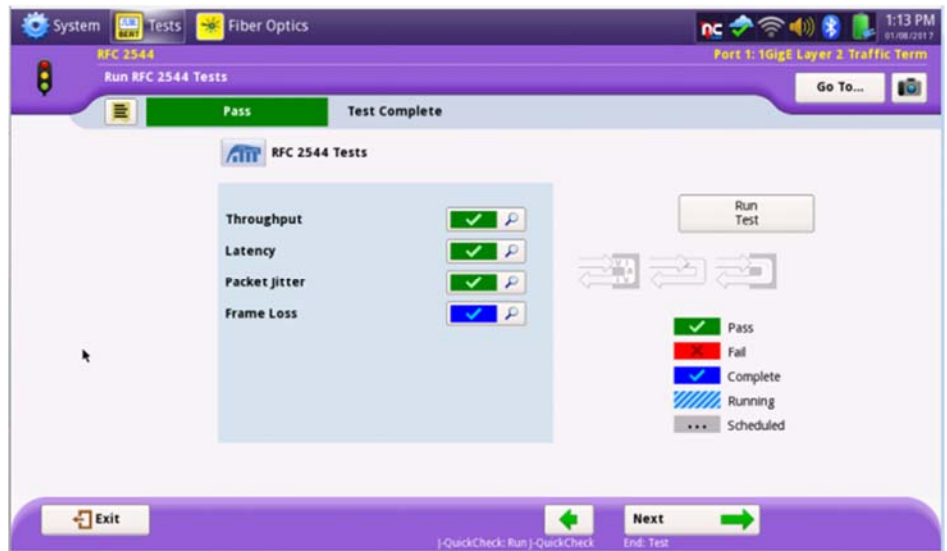


2. Run Tests

Tap , and tap . The T-BERD will loop up the loopback device and run all configured tests.



At the conclusion of the test, the T-BERD will automatically loop down the loopback device. Pass/Fail status for each test will be indicated by green checkmark, , or red x, . Test for which no pass/fail threshold was specified will have a blue checkmark, . The Frame Loss test will always have a blue checkmark, because there is no pass/fail value. Detailed results for each test can be viewed by tapping .



3.5 Saving Test Results

Step	Action	Details
1.	Create Report	Tap  twice and enter Customer name, Technician ID, Test Location, Work Order Number and Comments/Notes. Tap  again and tap  .
2.	View Report	View the Report and tap  .
3.	Exit	Tap  and  to shut down the RFC 2544 test.
4.	Connect USB	Connect the USB Flash Drive to the USB port on the side of the T-BERD.
5.	Export Report	In the Reports Panel ,  , select  , select the desired file, and tap Export . Tap Close when export is complete.
6.	Shutdown	Press and hold the ON/OFF button to turn off the T-BERD. Remove the USB Flash Drive from the USB port.

