RxT 10GE User's Manual

Table of Contents

RxT System

Working Desktop

Important Information	Computer System Notes	Hardware Notes

RxT is a touch-screen unit. Use your finger or the stylus to make selections. Many graphics are interactive. Often, a number pad will appear for use in entering alphanumeric data. The Status Bar is the double black row at the top of the screen; it provides system information. The Action Bar of buttons at the left of the screen gives access to many functions.
Here is an overview on using the screen:

- Touch buttons to activate (single touch/click) the function, or to open (double touch/click) their configuration screens.
  Be careful not to touch the screen in to places at the same time.
- Button colors have meaning: light gray-available button; orange-active selection.
- The text on an active button is yellow; on the inactive button, it is black
- Press **START** ( ) to begin taking measurements. Press **STOP** ( ) to stop a test. It takes a few seconds for a test to begin or stop.
- The **TEST Results** button at the bottom left takes you to the results screens, but doesn't actually start a test.
- Press **TEST PROFILES** to select a new test mode from the menu. To configure the test, press **TEST SETUP**.

Status Bar: Located at the top of the screen.
The status of each port is reported, including messages (e.g. IDLE, RUNNING) and the ET (elapsed time since the start of test) and TT (total time of test)

Section	Information
LINK ALM PAT LOCAL ACT ERR BIT REMOTE	Soft virtual LEDs show the logical and physical state of the selected port.
P1 Test Mode: THROUGHPUT Tx ON Error Laser Rx Pause Alarm replace me	Module Status Panel: Get module data, such as the port, test mode, transmission, and alarm generation status.
Jun 16, 2010 12:17:56 PM load time: 0.247s ?	System Status Panel: Get system-related information, including the battery charge status, and the **?** button, which is used to access this Help system. Press **?** again to exit Help

Action Bar: The Action Bar is located at the left of the screen.

Button	Action
Start, Stop	Start and stop a test. To get measurement results, start at test.
Laser	Activate the laser for testing. Turn the laser off for safety. >>>Flow
Error Inj	Configure/Inject errors in the payload.

Alarm	Configure/Generate alarms in a 10G setup..
Capture	Start capturing packets.
L2 Loop	Access Loopback Control.
Flow	Transmits a flow control (pause) frame, according to parameters set on the active port.
TX Start/Stop	Start or Stop transmitting data, if Start TX Coupled is not checked on Measurement Setup.

Test Features Bar: The Test Features Bar is located at the bottom of the scree

Test Profiles	Select test type: Ethernet, RFC2544.....
Test Results	View the measurements screens.
View Test Records	Work with saved files; measurement results, reports, captured packets, test profiles.
Test Features	Access features specific to the test setup.
Tools	Access test tools: System Status, Software Options, System Upgrade • Clear LED Status: clear LEDs of historical data • Clear Result: Zero all results statistics.
Tests	View/quickly access the tests and results for each port.

Generate a measurement report.
See a graphic of the hardware ports and buttons.

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

Important Information

RxT 10GE provides not only sophisticated technical specifications, but easy to use applications for the verification, turn-up, and hand-off of Ethernet services. Use RxT in conjunction with another test set or loopback device (such as the Metro Responder), to qualify network performance and verify quality of service per ITU and MEF standards and service level agreements.

Complete the Warranty Registration Card and return it immediately to Sunrise Telecom.

Sunrise Telecom Incorporated must receive your warranty registration information either online or by the enclosed card in order to provide you with updated software releases.

Unpacking Details

Warnings and Cautions

⚠ Using the supplied equipment in a manner not specified by Sunrise Telecom may impair the protection provided by the equipment.

This is a Class 1 LASER product. Avoid looking directly at the Transmitter source. For added safety, turn off the laser when not in use.

End of Life Recycling and Disposal Information

DO NOT dispose of Waste Electrical and Electronic Equipment (WEEE) as unsorted municipal waste. For proper disposal return the product to Sunrise Telecom. Please contact our local offices or service centers for information on how to arrange the return and recycling of any of our products.

EC Directive on Waste Electrical and Electronic Equipment (WEEE).

The Waste Electrical and Electronic Equipment Directive aims to minimize the impact of the disposal of electrical and electronic equipment on the environment. It encourages and sets criteria for the collection, treatment, recycling, recovery, and disposal of waste electrical and electronic equipment.

Tips on RxT & this Help System

Disclaimer: Contents of this Help system are subject to change without notice and are not guaranteed for accuracy.

Visit the Working Desktop page to get an overview of how to use RXT's controls and features. Visit the Hardware Notes for hardware tips.

Get a technology tip related to the topic.

Get a testing tip; information that will help you in your testing.

A button may be referred to via text in bold (for example: **Start**), or via its icon.

FCC Information

FCC ID: UEBXT5000

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.

Note: This equipment has been 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 equipment 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 equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
⚠**Caution**: Exposure to Radio Frequency Radiation

To comply with FCC RF exposure compliance requirements, this device must not be co-located or operating in conjunction with any other antenna or transmitter.
Hardware Calibration
Under normal usage, the RxT does not require calibration. However, the optical power measurement on the optical module should be checked every 12 months. Perform a level measurement with a hard loop at the optical transceiver module. If the level measured falls outside the transmit level limits of the transceiver module, even after performing an optical connector cleaning, then the optical module may need to be replaced. Contact Sunrise Telecom Customer Service for technical assistance, or contact your local Sunrise Telecom sales representative or authorized distributor to purchase a replacement transceiver module.
Sunrise Telecom Transceiver Part Numbers

Where do you want to go next?

Customer Service
Working Desktop
index

Index

Use this page to move through the Help system quickly.

Unpacking

To unpack and test a new test set:

1. Remove the packing list, test set, and accessories from the shipping container.
2. Inspect all parts and immediately report any damage to the carrier and to Sunrise Telecom.
3. Verify that all parts specified on the packing list were received.
4. Complete the Warranty Registration Card and return it immediately to Sunrise Telecom.

Sunrise Telecom must receive the Warranty Registration Card in order to provide software updates.

Where do you want to go next?

Meas. Setup: Configure measurement parameters
Working Desktop

Number Pad

To enter data, oftentimes you will use a number pad, which pops up automatically when you select a configuration item, such as a VLAN tag or MAC address.

The title appears at the top; corresponds to the parameter.
Press X to close the window without saving changes.
Press () to close the window ,saving changes.
The range of options appears beneath the entry field.
<-: Backspace; removes one character in the entry field.
CE: Deletes all characters in the entry field.

Sample Numeric Number Pad

The alphabetical number pad (keypad) uses a standard keyboard layout, with additional useful URL keys such as 'www' and 'com.'

Sample Alphabetical Keypad

Computer System Notes

Press the blue Alt button and F6 to move between the RxT 10GE and the computer system desktop. See the hardware notes and graphic.
On the Windows desktop, access useful basic computer tools:
System: Access RxT 10GE system information and setups.

- **Brightness Control**: Decrease or increase the brightness the LCD screen on the System LCD Setup window which pops up, then press **Close**. Use also the ALT F1 and F2 buttons.
- **Calibrate Touchscreen**: Recalibrate the touch screen if screen response seems off. Touch each 'x'.
- **Date Time Setup**: Enter the current Date, Time, and select your Time Zone on the pop up window.
- **Evolution Mail and Calendar**: Access a mail/calendar client. See http://projects.gnome.org/evolution/ for information.
- **Network Setup**: Enter the local settings; these settings apply to RxT itself, NOT the test ports. Proceed carefully-changing these settings may cause the module to lose connection with the system.

Ethernet Port

Configure the system settings, if necessary.

⚠**IMPORTANT NOTE**: These settings apply to the RxT module's own *LAN* port, NOT the test ports. Changing these settings may cause the module to lose connection with the system.

Parameter	Details
Admin IP	Enter the IP address for the RxT module.
Subnet Mask	Enter the subnet address for the RxT module, if appropriate.
Gateway	Specify the gateway address for the RxT. Used for static IP.
DHCP Enabled	RxT automatically retrieves the appropriate IP address when connected to a LAN. When enabled, the previous three items are grayed out.
MAC Address	View the LAN port's MAC address.

DNS servers

Parameter	Details
Primary DNS Server	Specify the local primary (master) DNS server address. Enter an address directly, using the number pad which pops up. The secondary Server is a server that obtains information about a zone from a Primary Server via a zone transfer mechanism. Sometimes known as a Slave Server.
Secondary DNS Server	Specify the secondary (slave) DNS server address.

- **Package Manager**: no clue.....

Application Note: Access helpful testing and technology documents.
Web Browser: Launch a Firefox web browser. Requires internet connectivity.
PDF Viewer: Launch a viewer to read PDF files.
Calculator
File Manager_____-
KMPlayer: Launch a media player. See http://en.softonic.com/.

Text Editor: Launch a text editor.
Eject USB Drive / 2: Safely eject a USB memory drive at USB1 or USB2.

⚠**Important Note - Caution**: External memory devices must be ejected properly, using the appropriate button, in order to safeguard your data. Failure to eject a drive properly may result in lost data.

Where do you want to go next?

The Working Desktop
Meas. Setup: Configure measurement parameters
Throughput Test Setup
index

Hardware Notes

RxT 10GE is a touch screen test set; use your finger or a stylus to make selections. However, you may find attaching and using a mouse is fastest. Plug the power cord in on the right side, and press and hold the top round button for a few moments to turn the unit on (or off).

⚠No liquids. RxT has been designed to move water away from its vents, but it is not waterproof; avoid spills and liquids.

Get unpacking details. See a graphic of the features, buttons and ports.

Press the red power button to power on. You will see a Sunrise Telecom screen, then the unit will pause on the computer system desktop, then your test application will automatically launch. Modules are easy to exchange.

Ports - Right Side

 USB 2 host port	USB 2.0 port
 Mini USB client	No user application.
 LAN	10/100T Ethernet port Use for a network connection; use for remote control, realGate, system updates.

Ports - Left Side

	Serial port; no user application.
	Plug in the AC charger. See the Battery notes.

Non Test Ports - Top

 USB 1 host port	USB 2.0 port
🎧Earphone	Plug in a headset.
Mic	Plug in a microphone.
In addition, the top of the unit features GPS and WiFi connectivity. Just in front on top is a built-in speaker. Access test modules from the rear. Access the battery pack from the rear. See the Battery notes.	

Ports - Top

The top connector panel holds the test ports and a USB 2.0 host port.

- See Port Address.
- See SFPs are hot-swappable. Handle the bale carefully, and avoid touching the end of the connector. See Handling Optical Fiber.

Front Buttons

See a graphic.

	The red round top button is the power on/off button. Pressed briefly: The unit powers on, or, if on, the restart/reboot query window appears. Normal shut down. Hold several seconds: Forces a hard restart.
	Start/Stop measurements; it takes a few moments for each action to occur.
 ,	Use the up, down and left and right arrowhead buttons on the right side of the chassis to move around in the screens.

ESC	Go back one screen.
Alt	Press the blue Alt button to use the alternative blue functions on the F-keys. F1, F2: Decrease or increase system volume. F3, F4:Decrease or increase screen brightness. F5: Bring up the on screen keyboard F6: Toggle between the computer desktop the RxT application, and any other open functions (e.g. the File Manager).
F1-F6	Special function keys; press one to activate the function on the screen button directly above it. Used with the blue Alt key for system functions (see Alt above)

Module Exchange

	To remove a module, simply press the module release button on the back of the chassis, then gently pull the module straight up and out. Place a module into the chassis straight down, gently, pressing it into place.

External Storage

If you are using an external form of storage on the RxT (USB drive), and have written files to the external volume, you must cleanly dismount the volume from the computer before removing it, or the files may not be written safely to the external storage volume.

Use a desktop icon to safely remove hardware (eject the USB drive).

Where do you want to go next?

Unpacking Details
Meas. Setup: Configure measurement parameters
Working Desktop
index

RxT 10GE System Overview Graphic

RxT Front Overview

Where do you want to go next?

Unpacking Details
Hardware Notes
Working Desktop

Sunrise Telecom Transceiver Part Numbers

STT-3822
STT-3823
STT-3824
STT-3801
SA580-850
SA580-1310
SA580-1550
SSMTT-28-FXM
SSMTT-28-FXS

Where do you want to go next?

Hardware Notes
Unpacking Details
index
Working Desktop

Battery

The battery charge status is represented by an icon in the Status Bar.
The hardware battery icon reflects charging status; green-full charge, orange-charging, red-low power; the plug icon indicates the unit is plugged in and charging. The screen icon shows as green when the battery is fully charged, or connected to AC power. The green diminishes and red fills the icon as the available power decreases. When the battery is charging (note the plug icon within), the red will give way to green.
When there is approximately 10% battery life remaining, you will see a warning message pop up to remind you to plug in the power adapter.
At approximately 4% remaining power, RxT will pop up warning, save results for the test in progress, then shut down.
To replace the battery, remove the two screws at the bottom of the back battery cover. The screws will stay attached to the cover. Pull the battery pack out, then replace it with the new one. Replace the cover, and replace the screws, without overtightening.
⚠Battery Care and Storage
It is important to observe the basic battery care procedures in order to avoid possible damage to the battery and to maintain it's performance.
Lithium Ion batteries packs are small, compact, have high energy concentration, and are ideal for providing long lasting power to portable test equipment in demanding applications. Li-Ion battery packs contain Li-Ion cells and battery protection circuitry, both sealed in a plastic container that can not be disassembled. For safety reasons, these batteries and products containing them MUST be used, charged and handled properly and according to the manufacturer's recommendations. Improper use can result in product damage, serious injury, fire, or death.
Performance and life expectancy of batteries depend heavily on how battery packs are used. In order to ensure safety, be sure to carefully read and understand this document and to keep it handy.
If you have any questions, or do not want to continue using this product, please contact Sunrise Telecom Incorporated immediately at 1-800-701-5208 / 1-408-360-2200, or support@sunrisetelecom.com.
Lithium-Ion Advantages

- The biggest Li-Ion advantage batteries have is the improvements in cell voltage and capacity over nickel cadmium (NiCd) or nickel metal hydride (NiMH) batteries. Li-Ion batteries are therefore said to have a much higher energy density compared with NiCd or NiMH batteries. Unlike NiCd or NiMH batteries, Li-Ion batteries have no 'r;memory' effect. This translates into a more productive test set that can be used un-corded for longer periods or handle higher end applications, which are usually more demanding.
- Much lighter batteries, compared to the same capacity NiCd.
- No cadmium. As most people know, cadmium is highly toxic and is known to accumulate in biological systems, which is why NiCd batteries must be disposed of carefully and in the right places, following local regulations.

Although there are many other technical advantages that make Li-Ion the current chemistry of choice for high-end portable equipment, much greater care is required for Li-Ion batteries. Fortunately, more precise equipment and monitoring systems are built-into these battery packs for performance and safety reasons. A more rigorous approach, plus a profound awareness of Li-Ions, is vital to the wellbeing and

SAFETY of users, bystanders, equipment, and premises. It's important to remember that, like other batteries, these batteries too will explode if abused!

Registration and Calibration

- For warranty and safety purposes all Sunrise Telecom products must be registered by the owner and/or end user. Registration is the sole responsibility of the end user. Products shall also be registered, and contact information shall be updated, when the end user or responsible person changes. Customers would not only benefit from service notes, safety notifications or recalls, but from access to a wide range of improvements (e.g. software updates, new features, new documentation, etc.). Please follow the registration instructions that came with your product.
- Customer and end user shall follow the recommended calibration, verification and/or preventive maintenance cycles for each specific product, to keep it under warranty and assure safety. During these procedures the battery pack will be checked for any sign of degradation, leakage or any other possible defect that may affect safety. Refer to the specific manual and data sheet for the suggested maintenance period.
- Copy of this document shall be kept with the product at all times.

⚠ General Warnings

- Do not place the battery pack or cells in fire or apply heat to the battery.
- Do not pierce the battery with any sharp objects, strike the battery with a hammer or heavy objects, step on the battery pack, or otherwise damage the outer casing.
- Do not subject the battery pack to strong impacts or shocks.
- Do not expose the battery to water, salt water, any other type of liquid, or allow the battery to get wet.
- Do not disassemble or modify the battery pack. The battery contains safety and protection devices which, if damaged, may cause the battery to generate heat, rupture or ignite. Any modification may damage the battery pack or cells and will invalidate any warranty claim.
- Do not place the battery on or near fires, stoves, or other high temperature locations.
- Do not leave the battery in direct sunlight, and avoid storing spare battery packs inside cars in hot weather. Doing so may cause the battery to generate heat, rupture, or ignite. Using the battery in this manner may also result in a loss of performance and a shortened life expectancy. When a battery becomes too hot, the built-in protection circuitry is activated, preventing the battery from charging further. Heating the battery can destroy the safety devices, and can cause additional heating, rupture or ignition of the battery cells.
- Never short-circuit, reverse polarity, disassemble, damage or heat the battery pack over 100ºC (212ºF).
- If an exposed lithium battery does start a fire, it will burn even more violently if it comes into contact with water or even the moisture in the air. DO NOT THROW WATER ON A BURNING LI-ION BATTERY! A fire extinguisher must be used.
- Do not carry individual battery packs in your pockets or bags, as they could short-circuit against other items.
- In the case of a high-impact event to the test set or the battery pack (e.g. car crash or drop > 1m/3.3ft) you must carefully inspect the battery for damage and properly discard it if it is damaged. Always observe the battery carefully for at least 20 minutes after an impact. The pack may look fine but a

perforation or damaged wire means the pack must be disposed of. Contact Sunrise Telecom if in doubt.
- Any modification may damage the battery pack or cells and will invalidate any warranty claim.
- Keep battery packs away from children!
- If you happen to get any electrolyte from the cells on your skin, wash thoroughly with soap and water. If in your eyes, do not rub. Rinse thoroughly with water and seek medical assistance.

Charging and Storing the Battery Pack

Always use the Sunrise Telecom's Lithium Ion Charger that came with the device. Do not attempt to charge the battery pack by any other means. Never modify or repair the charger supplied. Never use a NiCd charger or any other charger to recharge the Li-Ion battery pack as this is very dangerous. Only use the recommended Sunrise Telecom charger.

- Refer to the device's manual and data sheet for details on charging time.
- Do not use the Sunrise Telecom's Lithium Ion Charger on other lithium batteries or on any other type of battery – fire or explosion may occur.
- The test set, external chargers, and the battery pack itself continuously monitor the conditions of the cells for safety and maximum performance.
- Never charge your Li-Ion battery pack near heat or flammable objects.
- The required charging time will depend upon the charge level of the battery, and will vary from product to product. Charging the battery while the test set is being used will increase the charging time. Required charging time may also increase at lower temperatures.
- The temperature range over which the battery can be charged is typically 0°C to 45°C. Therefore, charging efforts outside the prescribed temperature range are automatically blocked by the protection circuitry of the battery pack.
- If a battery pack can not maintain charge for long period of time, even when it is being charged correctly, this may indicate it is time to replace the battery.
- Never charge unattended battery packs or products containing Li-Ion batteries. Never leave your battery while charging, in case of overheating or fire risk.
- If the product or battery pack becomes too hot to the touch during charging, disconnect and switch off immediately. Contact Sunrise Telecom.
- Do not charge battery packs if the battery has expanded or swollen in size, or if the battery cells have been punctured, even if this is the first time the battery is going to be charged.
- Do not charge or use the battery if any mechanical damage has occurred.
- Do not continue charging the battery if it does not recharge within the specified charging time. Doing so may cause the battery to become hot, rupture, or ignite. Please consult the product's manual and data sheet.
- Because batteries utilize a chemical reaction, battery performance will naturally deteriorate over time, even if stored for a long period without being used. In addition, if the various conditions such us charge, discharge, ambient temperature, etc. are not maintained within the specified ranges, the life expectancy of the battery may be shortened, or the device in which the battery is used may be damaged by electrolyte leakage.
- Storage: For long term storage, the battery pack should be stored at room temperature (around 20ºC), charged at about 30 to 50% of capacity. We recommend that spare battery packs are charged about once per year to prevent over-discharge.
- If you have a spare battery pack, rotate the packs frequently.

Using the Battery Pack

For the expected performance of each individual battery pack and test set, please refer to their specific manuals and data sheets.

- Sunrise Telecom battery packs shall only be used with the Sunrise Telecom product for which they were intended to be used. Follow the product's low battery indication and warnings. Do not over discharge a Li-Ion battery pack. If the voltage does drop below specifications, and you can get your battery to take a charge, it may not give its full capacity and deterioration in performance will occur. This will invalidate all warranty claims.
- Do not discharge the battery pack using any device except for the specified test set it came with. The test set constantly monitors and controls the discharge rate to keep it within specifications. If used in devices aside from the specified devices, it may damage the performance of the battery pack, reduce its life expectancy, and if such device causes an abnormal current flow, it may cause the battery to become hot, rupture, or ignite, and could cause serious injuries.
- The temperature range over which the battery can be discharged is -10°C to 60°C. Use of batteries at temperatures outside this range may damage the performance of the battery pack or may reduce its life expectancy.]
- To avoid short circuits, make sure the battery pack's contacts are not exposed when transported outside the intended device (e.g. spares).
- Every deep discharge cycle decreases their capacity. Battery life will be extended by proper storage, and by charging the pack at least once per year to prevent over discharge.

Battery Pack Disposal

- Always follow local regulations for the disposal of Li-Ion battery packs and electronics.
- Do not trash battery packs in the garbage can; they shall be recycled properly.
- Before disposing the battery pack or cells, insulate any exposed terminals with adhesive tape or similar material to prevent short circuits

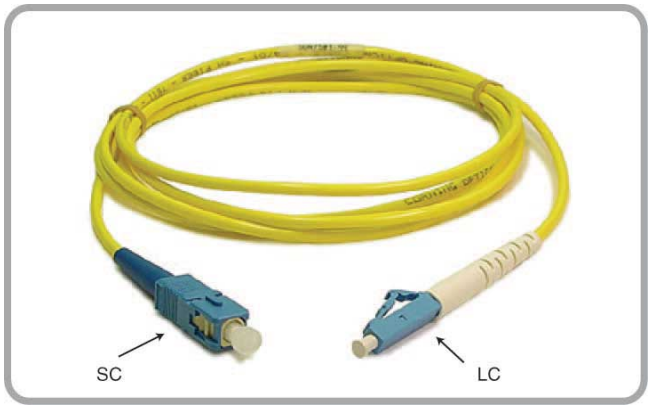
Where do you want to go next?

Meas. Setup: Configure measurement parameters
Working Desktop
Hardware Notes
index

Handling Optical Fiber

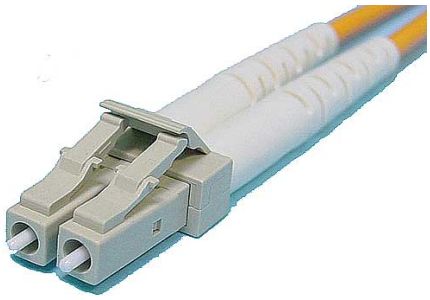
In general, handle fiber patch cords and connectors carefully. Always replace dust covers. Keep the optical connectors clean, and make a practice of not looking into fiber ends.
An optical fiber is a strand of glass about the same diameter as a human hair. Though it is remarkably durable, careful handling is required to ensure continued high performance and long life.

- Do not pull or kink patch cords, as the glass strand in the middle might become damaged or broken.
- A sharp bend will cause excessive signal loss.
- Keep patch cord bend radiuses no less than an inch.
- Use specialized optical cable raceways and plenums whenever they are available.
- Don’t use tie wraps as you would with electrical cables. Tie wraps will put strain on the fiber. The next figure shows the proper method of wrapping and securing fiber patch cords.



SC to LC Cable

There are several types of optical connectors in use today. This figure shows the two most popular for Ethernet, SC and LC.



Duplex LC Cable

This is a duplex multi-mode LC cord. Look closely at the pictures to see the details of the connection mechanism.

- When using optical connectors, insert or remove the ferrule straight into the sleeve.
- Minimize wiggling the connector as this may loosen the tight fit that is required for the ferrule and sleeve.
- For SC connectors, orient the prominent key on the connector body with the slot in bulkhead adapter. Push the connector in until it clicks. To remove,

pinch the connector body between your thumb and finger, and gently pull straight out.
- LC connectors evolved from the basic RJ-45 connector design, and are placed on and removed in the same fashion as an RJ-45. Simply push the rear prongs together to release the connector. Listen for the click when you seat the connector.

Cleaning Optical Fiber

Fiber optic connectors must be kept clean to ensure long life of the connectors and to minimize transmission loss at the connection point.

Precautions

- When not in use, always replace dust covers and caps to prevent deposits and films from airborne particles. A single dust particle caught between two connectors will cause significant signal loss. Dust particles can scratch the polished fiber end, resulting in permanent damage.
- Do not touch the connector end or the ferrules, since this will leave an oily deposit from your fingers.
- Do not allow uncapped connectors to drop on the floor.

How to Clean

- Should a fiber connector become dirty or exhibit high loss, carefully clean the entire ferrule and end face.
- Special lint-free pads should be used with isopropyl alcohol.
- Even though not very accessible, the end face in a bulkhead adapter on test equipment can be cleaned by using a special lint-free swab, again with isopropyl alcohol.
- In extreme cases, a test unit may require more thorough cleaning at the factory.
- Cotton, paper, or solvents should never be used for cleaning since they may leave behind particles or residues.
- Use a fiber optic cleaning kit especially made for cleaning optical connectors, and follow the directions.
- Canned air can do more harm than good if not used properly. Again, follow the directions that come with the kit.

Where do you want to go next?

- Throughput Test Setup
- RFC2544/NE Applications
- IP Test Setup
- Monitor Setup
- Loopback Test Setup
- Working Desktop
- index

Customer Service

Sunrise Telecom Customer Service performs the following functions:

- Answers customer questions over the phone on such topics as product operation and repair.
- Repairs malfunctioning XTT promptly.
- Provides information about product upgrades.

The warranty period covering the RxT is one year from the date of shipment on hardware, software, accessories, and the battery.
A Return Merchandise Authorization (RMA) Number is required before any product may be shipped to Sunrise Telecom for repair. Out-of-warranty repairs require both an RMA and a Purchase Order before the unit is returned. All repairs are warranted for 90 days.
Please contact Customer Service if you need additional assistance:

Customer Service
Sunrise Telecom Incorporated
302 Enzo Drive
San Jose, CA 95138 U.S.A.
Tel: 1 408 360 2200 or 1 800 701 5208
Fax: 1 408 363 8313
Internet: http://www.sunrisetelecom.com
E-mail: support@sunrisetelecom.com

Offices
Sunrise Telecom offices are located around the world:

HEADQUARTERS
302 Enzo Drive, San Jose, CA 95138, USA
Tel: 408-363-8000, Fax: 408-363-8313
info@sunrisetelecom.com

SUNRISE TELECOM - ATLANTA
3075 Northwoods Circle, Norcross, GA 30071, USA
Tel: 770-446-6086, Fax: 770-446-6850
catv@sunrisetelecom.com

SUNRISE TELECOM CHINA
Room 1503, Tower 3 , No.1, Xizhimenwai Street
Xicheng District, Beijing, 100044, CHINA
Tel: +86-10-5830-2220, Fax: +86-10-5830-2239
info@sunrisetelecom.com.cn

SUNRISE TELECOM FRANCE SAS
ZA Courtaboeuf 2 - Immeuble le Ceylan
6 Allée de Londres 91140 Villejust, FRANCE
Tel: +33 (0) 1 6993 8990, Fax: +33 (0) 1 6993 8991
info@sunrisetelecom.fr

SUNRISE TELECOM GERMANY GmbH
Grabenstrasse 1, 16 Mössingen GERMANY
Tel: +49 7473 378 2400, Fax: +49 7473 378 2424
info@sunrisetelecom.de

SUNRISE TELECOM TAIWAN
21, Wu Chuan 3rd Road, Wu-Ku Hsiang
Taipei County, 248, Taiwan, R.O.C.
Tel: +886-2-5578-0788, Fax: +886-2-2298-2575
info@sunrisetelecom.com.tw

Express Limited Warranty

This Sunrise Telecom product is warranted against defects in materials and workmanship during its warranty period. The warranty period for this product is contained in the warranty page on http://www.sunrisetelecom.com.
Sunrise Telecom agrees to repair or replace any assembly or component found to be defective under normal use during this period. The obligation under this warranty is limited solely to repairing or replacing the product that proves to be defective within the scope of the warranty when returned to the factory. This warranty does not apply under certain conditions, as set forth on the warranty page on http://www.sunrisetelecom.com. Please refer to the website for specific details.
THIS IS A LIMITED WARRANTY AND THE ONLY WARRANTY MADE BY SUNRISE TELECOM. SUNRISE TELECOM MAKES NO OTHER WARRANTY, REPRESENTATION OR CONDITION, EXPRESS OR IMPLIED, AND EXPRESSLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS.

Where do you want to go next?

Customer Service
Working Desktop
index

Measurement Setup

Configure how and when results are taken.

Start/Stop Mode		
Parameter	**Options**	**Details**
Start Mode	**PROGRAM**: Program a specified date and time in the future to begin taking measurements. Once you have selected Program, enter the desired date and time in the next two items. **MANUAL**: Manually begin the test measurements.	Select the method to begin your test measurements.
Start Time	Specify the Hour, Minute, and Seconds to begin measurements.	Start Mode=PROGRAM.
Start Date	Enter the Year, Month, and Day to begin measurements.	Start Mode=PROGRAM. On the pop up calendar, use the arrows to scroll to the month you want, then tap the specific date.
Stop Mode	**CONTINUOUS:** Test will run indefinitely until you press 'Stop'. **TIMED:** Test runs for the specified Hours and Minutes.	Set the mode in which measurements will be taken.
Test Hours/Minutes	Enter the number of Hours and Minutes you want the test to run for in those fields.	Stop Mode=TIMED. Set the length of time a timed test will run once you press 'Start'.

Other		
Parameter	**Options**	**Details**
Save Mode	**Auto Save**: Results are saved automatically when the test is stopped. A file name will be assigned automatically. **Never Save**: Results are not saved. **Manual Save**: Results are saved when the test is stopped. A dialog box will appear for you to input a filename in.	Select the method to save your test measurements. • Test results are saved automatically at the end of a test, unless you have chosen otherwise • When Save Mode is set to Manual, when a test has concluded, a window will pop up asking if you would like to save the measurement. Press **Yes**.
Start TX Coupled	**On**: The transmitter and measurement begin at the same time.	Determine when the transmitter will turn on. Particularly useful for capturing packets.

	Off: A **TX On** button appears on the Action Bar. This button is grayed out until the measurement is started. Once the measurement is started, press **TX On** to begin sending traffic.	

OK: Save changes and close the window.
Cancel: Close the window without saving changes.

To access the window, touch Measurement Setup on the signal setup window.

Where do you want to go next?

The Working Desktop
Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Tech: Ethernet Overview
index

System Setup

Set the basic system information if required. Select Menu > System > System Setup.

System Clock

Parameter	Function
Date	Set the calendar date if necessary.
Time	Enter the time of day on the pop window.
Get Local Time	Align the XTT-5000 system clock to the time that is "local" to the PC with the browser. Applies when RxT 10GE is controlled from a remote browser.
Time Zone	Choose your time zone on the pop up window.

System Control

Brightness	On a scale of 1-10 (10 being brightest), set the brightness of the screen, using the up and down arrow keys.

Where do you want to go next?

Throughput Signal Setup
Throughput Stream Table Setup
Throughput Summary Results
Tech: Ethernet Overview
Loopback Test Setup
IP Test Setup
IP Testing
Throughput Test Setup
RFC2544 Applications
Working Desktop
Home

System Status

Get details on RxT 10GE system performance. On a Test Setup window, press **Tools** > System Status.

General	
Statistic	**Meaning**
File Usage	Percentage of system currently in use.
Memory Usage	Percentage of system RAM in use.
Temperature	Unit temperature; normal range is 0°C to 45°C.

Power	
Statistic	**Meaning**
AC Power	ON if the unit is plugged in; OFF if it is not.
Total Charge	The percentage of charge remaining in the battery; see the Battery icon.
Remaining Time	When running on battery, approximately how long the battery will last.
Time to Full Charge	When running on battery, approximately how long it will take to recharge the battery.

Version Information

Version Information	
Statistic	**Meaning**
Firmware Version	ON if the unit is plugged in; OFF if it is not.
CPLD Version	
System Serial No.	RxT system serial number
Module Serial No.	10GE module serial number

Where would you like to go next?

Test Type Menu
Working Desktop Overview
Home

Software Options

To Install a New Option

1. Purchase a new RxT option from Sunrise Telecom; you will be asked to provide the RxT 10GE's serial number.
2. Sunrise Telecom will mail you an option file, with a name in the format: TCxxxxxxx.opt, where xxxxxx is the serial number.
3. RxT 10GE must access the file. Copy it to one of the following locations:
   - top directory of USB flash, after copying the file on, plug the flash drive into the RxT 10GE.
   - copy to the RxT 10GE hard drive; xtt-5000 directory /home/Sunrise/option/ .
4. On the RxT 10GE, go to Software Options tab and select the appropriate location, according to step 3.
5. Click **Load**. RxT 10GE will retrieve the option key and validate the option file in that particular location. If there is an error, an informative window will pop up to help you correct the problem.

Test options may be purchased from Sunrise Telecom. Contact Customer Service. The color of the option button shows whether or note the option is enabled for the unit:

- Checked: Option Enabled
- Not checked: Disabled

Option	Type	Description
Remote User Access	System	Control RxT 10GE from a remote browser.
10GigE	Test Ports	Optional 10 GigE hardware
Dual Media 1 Gig and Below	Test Ports	Enables dual media ports 2 and 3.
*Loopback-Responder	Advanced Testing	Test option
*Packet Capture	Advanced Testing	Test option
*WAN on 10GigE	Advanced Testing	Test option
*Time Cop	Advanced Testing	Test option

If your unit is set for Loopback Only, Advanced IP Test, VLAN ID Scan, 10GE WAN and Fibre Channel will be disabled.

New Software Option	
*Software test options must be loaded. You will be provided with an option key. Use the next selection to tell RxT 10GE where to find the software option key (for Step 3 in the procedure above).	
Item	**Description**
Media: USB Device*	Retrieves the file from an external USB drive. See the Hardware Notes.
Default Location*	Retrieves the file from the RxT 10GE internal hard drive.

Load	Activate the option; Press **Load** to have the RxT 10GE look for and load your option key.
*Hardware Devices: Only one may be used at a time.	

RxT 10GE Software Options - Location:xxx pop up window
Once you press load to retrieve your software option key, a Software Options window pops up. It shows all of the options qualified to work on this test set. To enable options:

1. Check marks appear next to the installed options.
2. Check 'Accept new options'.
3. Close the window.
4. Press.

A popup dialog box displays details about new options file.

- Part Number, Time Generated
- New options

Access this Software Options tab in the System menu.

Where do you want to go next?

Throughput Signal Setup
Working Desktop
Hardware Notes
Home

View Test Records Summary

Access saved files.

Set how/when results are saved in the Meas. Setup tab.

- Results Tab: Work with saved View Test Records Setup results files
- Reports Tab: Work with previously generated .csv and .pdf results reports
- Capture Tab: Work with files of captured packets; See Capture for more information.
- File Usage Tab: View detailed memory/storage information on saved files.

Files may be exported from most screens.

Setup Feature Buttons	
Highlight a file then choose an action to perform on it. The Action Bar for each type of saved file has minor variations. This table summarizes all of the functions.	
Save	Save the current test file.
View	Open a saved file to review it.
Load	Load the highlighted profile.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.
Copy	Save a copy of the file under a new name; edit with the soft keyboard which appears. A few characters, such as "/" are not allowed in file names.
Load Default	Load the factory default profile.
Import/Export	Retrieve and load an exported profile, or Export (save) the file to an external location, a USB Flash Drive.

Export a File

To save a file to a removable disk.

1. Press 'Saved Results' in the Action Bar.

2. Highlight a file, and select 'Export'. A Report Results from File window pops up.*

A. Choose the external location; an SD Card or USB Flash Drive.

3. On the Report Setup tab,

***File Format**: When applicable, choose one of the following:*

- *CSV File: On to create a .csv file to use in a program such as Excel©*
- *PDF File: On to create a PDF file, which opens with any PDF viewer*

A PDF viewer is available on the system desktop.

***Report Selection**: Choose the result to appear in the Report. Only Summary is selected by default, to save space.*

4. If desired, enter Customer, User, and Trouble Ticket information. Press 'Apply', then return to the Report Setup tab to generate the file.

5. Press 'Create Report' at the bottom of the Report Setup tab to generate the file.

- *The new file appears on the Reports tab.*

To read the file, attach the external disk to another RxT, go to the system desktop, and open the File Manager. Choose the external drive containing the file, and open it. See below. RxT 10GE can open the compressed file.

** If you are Exporting a file with Remote operation, a pdf viewer appears when the report has generated, showing the file you exported. Make sure to press 'Save' to save the file for future use.*

Top

Open a Saved File via the File Manager

To open a saved file via the computer system

1. Press  on the front of the chassis to switch to the system desktop.
2. Touch the File Manager icon. It may take several seconds for the program to open.
3. Under Places, select File System. After a moment, the right half of the screen will fill with the a list or display of file icons. Touch 'View As' above the display to choose View as List or View as Icons, as you prefer.
4. Open the Media folder.
5. Choose the location of your file; an SD Card or a USB drive.
6. Browse to the required file, and open it.

Generate a Report

1. Press 'Saved Results' on any screen.
2. Select the file name you want a report from on the Results File window
3. On the Report Setup tab,

   File Format: When applicable, choose one of the following:
   - CSV File: On to create a .csv file to use in a program such as Excel©
   - PDF File: On to create a PDF file, which opens with any PDF viewer

     A PDF viewer is available on the system desktop.

   Report Selection: Choose the result to appear in the Report. Only Summary is selected by default, to save space.
5. If desired, enter Customer, User, and Trouble Ticket information on the Data Entry tab.

   Press 'Apply', then return to the Report Setup tab to generate the file.

6. Press 'Create Report' at the bottom of the Report Setup tab to generate the file.

   The new file appears on the Reports tab.

   Find the report in one of the following location:
   - RxT 10GE hard drive: /home/Sunrise/Measurement/reports
   - Web URL: http://<XTT5000_ip>/reports
   - USB/SD (Exported): /xtt-5000/reports

Top

Where do you want to go next?

The Working Desktop
Meas. Setup: Configure measurement parameters
Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

View Test Records Results

For each **saved results** file, view

- the File name
- the Port the test was taken on
- Application (test module; e.g.: 10G Ethernet, OTN)
- Test Mode (e.g. Throughput or RFC2544 for an Ethernet Application)
- the file Size (e.g. 30 kb), and
- the date the record was saved.
- Press 'Page Down' at the bottom of the screen to scroll to the next page of results.

Highlight a file, then press **View** to look at its details, including results and test profile. *It may take several seconds for a file to open; a secondary program opens some types of files*.

 *Saved reports and captured packet files are opened ('viewed') with a separate application. The required application will launch automatically when you open a saved file. Use File > Close/Quit to exit the secondary application.*
See http://www.wireshark.org/docs/ for help using the Wire Shark application..

View Results Feature Buttons Highlight a file then choose an action to perform on it.	
View	Open a saved file to review it.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.
Copy	Save a copy of the file under a new name; edit with the soft keyboard which appears.  A few characters, such as "/" are not allowed in file names.
Compress File	Reduce the file size. <details:.>
Generate a Report	Retrieve and load an exported profile, or Export (save) the file to an external location; an SD Card or USB Flash Drive.
Export	Export (save) the file to an external USB Flash Drive.

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

Viewing Test Record

Highlight a record on the View Test Records screen, then press **View** to open it.

in the left column, view a synopsis of the configuration of each port. Highlight an element, and it will open up in the right column, showing all related information.

(something about results eventually)

View Test Records Captures

For each saved **Captured packets** file, get a snapshot of captured packets stored in memory. In the top frame, view

- the File Name
- Time the packet was captured,
- the Source IP address,
- the Destination IP address,
- any Protocol in use,
- and any Info available

The middle and bottom frames presents the packet offer a detailed protocol analysis. Click an item in any of the three portions of the window, and the corresponding item will be highlighted in each of the other two. This allows you to easily see and understand the contents of the packet, including byte-by-byte analysis of the packet contents.
A down arrow indicates more data is available for decode. Click the plus to see the rest of the data.

Saved reports and captured packet files are opened ('viewed') with a separate application. The required application will launch automatically when you open a saved file. Use File > Close/Quit to exit the secondary application.
See http://www.wireshark.org/docs/ for help using the Wire Shark application..

View Captures Feature Buttons Highlight a file then choose an action to perform on it.	
Export	*Export (save) the file to an external location; a USB Flash Drive.*
View	Open a saved file to review it.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.

View Test Records File Usage

View detailed memory/storage information on saved files.
File types reported on:

- Setup
- Results
- Reports
- Captures

For each type of file, view the:

- number of files saved
- amount of memory used (Storage)
- amount of storage memory available

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
Working Desktop
index

Throughput Applications

Select Throughput as the test type on the Test Profile . Before you begin testing, make sure the link is up.

To send loopback commands in a test, press the **L2** () button in the Action Bar.

BERT Applications

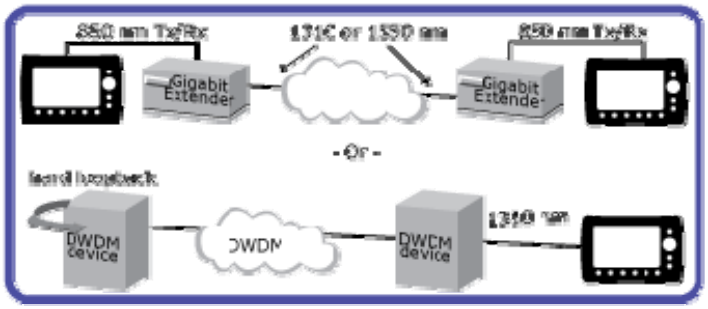
Select *BERT* as the Test Type on the Test Profile tab. See the diagrams.
Layer 1 BERT
Layer 1 testing is used for verifying the quality of the physical layer connection. Most commonly, this is done for basic point-to-point fiber connections, whether over a single fiber pair or through a DWDM network.
Layer 2 BERT
Run a BERT between two testers.
Layer 2 testing is often performed to verify the quality of service provided over an Ethernet network. Unlike a Layer 1 BERT , the Layer 2 BERT generates valid MAC frames so that the test traffic can traverse through bridges and switches.

Caution: If you are sending packets to your responder via a router or other device with its own IP address, make sure to set the Dest MAC to the MAC address of the router, NOT the responder. Otherwise, the router will likely discard the packets (without ARP in use).If you are staying down at layer 2 (MAC) this does not apply. IP works fine if all the devices are on the same local network segment; this is applies when sending traffic off your local network segment.

Where do you want to go next?

Throughput Test Setup
Throughput Summary Results
Working Desktop
index

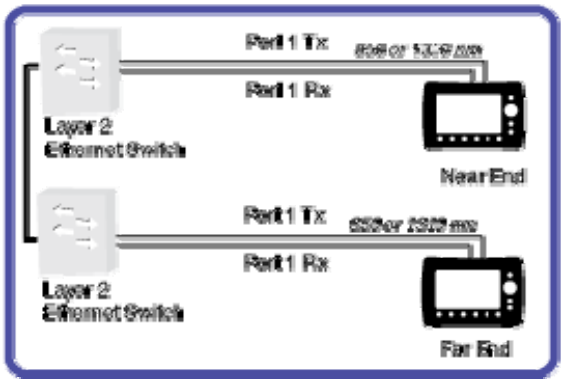
L1 BERT Diagram



Layer 1 *BERT* Applications

Where do you want to go next?
index

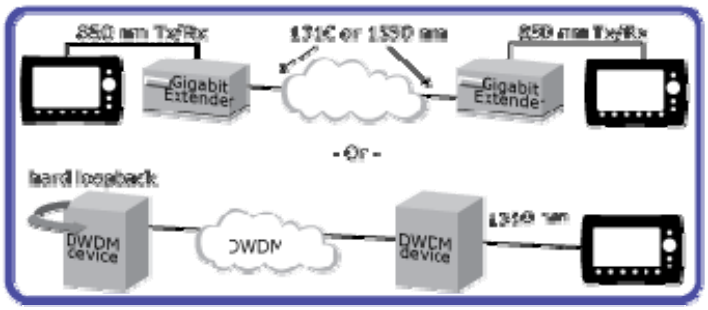
L2 BERT Diagram



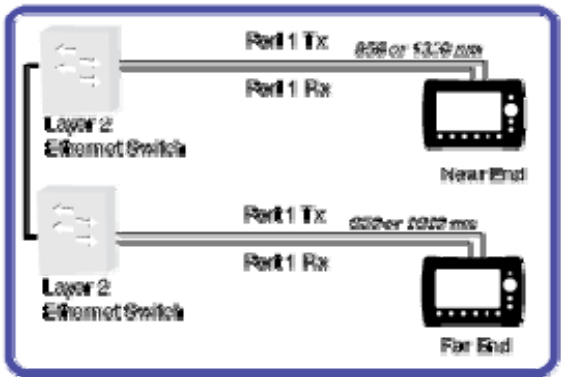
Layer 2 BERT

Where do you want to go next?
index

Thruput Application Diagrams



Layer 1 Ethernet Testing Applications



Layer 2 BERT

Where do you want to go next?

Throughput Test Setup
Working Desktop
index

Ethernet Port Configuration

Press a **RJ45 / SFP / XFP** Test Port button to change the port in use.
Configure a Port Address if necessary.

Port Configuration		
Parameter	**Options**	**Details**
XFP (1)	XFP (1) SFP (2), SFP (3) RJ-45 (2), RJ-45 (3)	
Interface		

Pause Frame		
Parameter	**Options**	**Details**
Pause	Enable: The unit will stop transmitting on receipt of flow control pause packets. Disable: RxT 10GE will not stop TX even if it receives a pause frame from remote peer.	Set how the local device will respond to pause packets.
Delay	0 to 3355 µs	Set the length of time indicated by the Pause frame sent by the module.

Interface	
Parameter	**Description**
LAN	Local Area Network;SDH or SONET measurements, alarm generation, and error injection become available
WAN-SDH	Wide Area Network; SDH standards
WAN-SONET	Wide Area Network; SONET standards

Choose a port to test with
Tests can run on all three ports at the same time.
Port1: *XFP* – 10 10GE test; choose LAN or SONET/SDH WAN
Port2/3: RJ-45 – 10/100/1000BASE-T test
Port2/3: *SFP* – 1000BASE-T, 100BASE-FX, 1/2/4G Fibre Channel

Possible Port Combinations

A	Port1: XFP	Port2: RJ-45	Port3: RJ-45
B	Port1: XFP	Port2: RJ-45	Port3: SFP
C	Port1: XFP	Port2: SFP	Port3: SFP
D	Port1: XFP	Port2: SFP	Port3: RJ-45

- Port2/3 can't be selected as RJ-45 and SFP at the same time; only one interface at a time.

Where do you want to go next?

The Working Desktop
Meas. Setup: Configure measurement parameters
Throughput Test Setup

IP Test Setup
Monitor Setup
Loopback Test Setup
Index

Port Address

Configure the local port settings, if necessary.
⚠**IMPORTANT NOTE**: These settings apply to the RxT module's test ports.

For each port, set the IP Address, Subnet Mask, and Gateway addresses, and view the factory default MAC Source address. The port numbers refer to the port labels on the outside of the unit.
A number pad will appear for you to edit the addresses with.
Make sure to press **Laser** to on (orange) in the Action Bar to activate the laser when required. Access this tab in the System menu.
Where would you like to go next?
Ethernet Port Config
Working Desktop
index

Capture Setup

Press **Capture** on the Test Setup window to specify the frame elements that will be captured. The filter applies to the packet capture and decode function. Configure up to ten filters; use one filter at a time.

When the filter is set to no filtering (by leaving all # boxes unchecked, all packets will be captured, up to the 1M Capture buffer size.
To enable filtering , check a numbered filter at the left of the window.
To configure a filter, click its row. The Capture Filter configuration window pops up, with its five tabs of frame elements.
Capture Packets

1. Configure the filters, then press **OK**. The Capture Setup window closes.
2. After starting the test Press **Capture** It will turn orange and become **Stop Capture**.
3. To view captured packets, go to View Test Records Captures.

   The buffer fills up in an average of one second, depending on the packet size and the rate of incoming traffic.

Capture Filter Configuration Options

- MAC: MAC Source and Destination addresses, specific types of frames
- VLAN: Capture up to three VLAN ID numbers (stacked/Q-in-Q).
- IP: IP Source and Destination address will be captured.
- Error: Choose types of received errors to filter on.
- Length: Filter on specific frame lengths.

To activate an element, touch it on the stream Number you want to capture on; the button will turn green. Additional fields may become available, such as a Destination or Source address.
Even with filtering in place, the standard Ethernet measurements and statistics will measure all received frames.

Where do you want to go next?

RFC2544 Applications
Loopback Test Setup
IP Test Setup
Throughput Test Setup
index

Capture MAC Setup

On the Capture tab, set MAC filters. Touch an element to turn it On, then configure any follow up settings.

Parameter	Details
MAC Source/Destination	Enter the address.
MAC Unicast	Unicast frames
MAC Multicast	Multicast frames
MAC Broadcast	Broadcast frames
Ethertype	Some Ethertype values, such as 0800 and AAAA, are considered invalid. To avoid potential problems with how a network device interprets the Ethertype field, 0800 is automatically chosen when IP is selected for the frame setup.

Press to confirm your entries and close the window.

Configure the other elements: VLAN, IP, Error, Length

Where do you want to go next?

Capture
Throughput Test Setup
Loopback Test Setup
Throughput Summary Results
IP Test Setup
IP Testing
Throughput Test Setup
IP Ping Testing
Home

Capture VLAN Setup

On the Capture tab, set VLAN filters. Touch an ID to turn it On, then enter the number.

Parameter	Options	Details
ID	0-4095	Enter the optional Virtual LAN identification number. VLAN tags conform to IEEE 802.1Q and IEEE 802.1P.

Configure the other elements: MAC, IP, Error, Length

Where do you want to go next?

Capture
Throughput Test Setup
Throughput Summary Results
Loopback Test Setup
IP Test Setup
Working Desktop
index

Capture IP Setup

On the Capture tab, set IP filters. Touch an element to turn it On, then configure any follow up settings.

Parameter	Details
IP Source/Destination	Enter the address.
IP Unicast	Unicast frames
IP Multicast	Multicast frames
IP Broadcast	Broadcast frames

Press to confirm your entries and close the window.
Configure the other elements: MAC, VLAN, Error, Length.

Where do you want to go next?

Capture
Throughput Test Setup
Loopback Test Setup
Throughput Summary Results
IP Test Setup
IP Testing
Throughput Test Setup
IP Ping Testing
Home

Capture Error Setup

On the Capture tab, set error count filters. Touch an error to turn it On, and the data on any errors of that type received will be captured.

Parameter	Details
TCP/UDP Checksum	Frames containing Layer 4 Transmission Control or User Datagram Protocol
IP Checksum	IP checksum errors received
Bit Error	Packet Bit Errors
FCS Error	Frame Check Sequence errors

Press to confirm your entries and close the window.
Configure the other elements: MAC, VLAN, IP, Length.

Where do you want to go next?

Capture
Throughput Test Setup
Loopback Test Setup
Throughput Summary Results
IP Test Setup
IP Testing
Throughput Test Setup
IP Ping Testing
Home

Capture Length Setup

On the Capture tab, set packet length count filters.
Touch a packet length to turn it On, and the data on any packets of that length received will be captured.

- Test Frame
- Non Test Frame: Frame not matching test configuration
- Packet Length Jumbo: over 1518 bytes
- Packet Length 1024 – 1518
- Packet Length 512 – 1023
- Packet Length 256 – 511
- Packet Length 128 – 255
- Packet Length 65 – 127
- Packet Length 64
- Packet Length (< 64): runt packets

Press to confirm your entries and close the window.
Configure the other elements: MAC, VLAN, IP, Length.

Where do you want to go next?

Capture
Throughput Test Setup
Loopback Test Setup
Throughput Summary Results
IP Test Setup
IP Testing
Throughput Test Setup
IP Ping Testing
Home

Throughput Test Profile

Throughput is the basic test setup. Select **Carrier Class Ethernet**, then Throughput as the test type. Press **SETUP** to configure the test

To Configure a Throughput Test

1. Select Throughput under Carrier Class Ethernet, then press **Setup**.
2. On the Setup window, if not already set, choose a port by pressing the **RJ45 / SFP / XFP** button.
3. Configure the Stream Table (L2 Framed only)
   - If desired, configure the Capture Filter.
- Press **START**, then **TEST RESULTS.**

 Before you begin testing, make sure the link is up.

To send loopback commands in a test, press the **L2 Loop** button in the Action Bar. To start the test, press **Start** in the Action Bar. The results Summary screen will appear.
Where would you like to go next?
Throughput Applications
Throughput Summary Results
Throughput Test Setup
Working Desktop
Index

Throughput Test Setup

The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens (Layer 2 tests).
Click on a frame element in the graphic to configure the Stream Table.
If necessary, press the single left dark blue button to choose a port and its configuration (shown by the connector; XFP/SFP/RJ-45 and rate), then configure the rest of the setup.

Parameter	Options	Details
Layer	**L1 64B/55B:** Unframed signal. Continuous bits without framing, containing 8B/10B line coding for RJ-45 and SFP ports. **L2 PRBS+*FCS***: Layer 2 Framed. The BERT is performed at OSI Layer 1 (physical layer, using the FCS or the *CRC* field defined for an Ethernet frame, without the MAC header. **L2+ Framed**: The BERT is performed at OSI Layer 2 (data link).	Select the test layer. **L1 64B/55B Note**: Configure the Test Pattern. **L2 PRBS+FCS Note**: Configure the Frame Size, Pattern and Traffic Shape. **L2+ Framed Note**: Configure the Stream Table. See the diagrams.
Test Type	**BERT**: Out-of-service testing; traffic would be disrupted; perform a throughput/BER test. **Live**: Take statistics on frames, but does not look for pattern synchronization or bit errors.	Select the type of test. **BERT Note**: The key metrics are utilization and lost frames. This is the basic configuration.
Total Streams	View/set the number of streams in use; 1-16. Touch the frame element graphic to access the Stream Table configuration.	Use the **- / +** buttons to enter a new quantity of streams for the table if necessary.

Measurement Setup: Configure how and when results are taken.
Capture Filter: Specify which frame elements will be captured.

Press **START** to begin the test, then press **TEST RESULTS** to see the statistics.
Remember to press **TX START** to start the transmitter.

Where do you want to go next?

Throughput Summary Results
Working Desktop
index

Ethernet Connection *Home*

Troubleshooting Extras: ARP Error Message Connecting to an STT Ethernet

Before you begin testing, verify the link.

- Make sure to use the right type of connectors when connecting the test port to the fiber access point of the network.
- Make sure the laser is turned on for optical ports.
- Verify the port has a green LINK LED.
- For RJ-45 and SFP ports, if there is no link, then go to the Port window and set the Auto-Negotiation to Disable (on both units, if applicable). If that doesn't work, set Auto-Negotiation to Enable, and configure the test set to match the DUT settings.

Getting the link up is the most important step in any application, and it can be the most frustrating. Take the time to ensure the Ethernet tab is properly configured. You may need to make a change, see what effect that has, make another change, and so on, until the configuration is correct.
Once you have a green LINK LED, testing is ready to begin.
Troubleshooting an ARP Error Message
The ARP feature makes configuring RxT 10GE easier. ARP takes an IP address and returns the MAC address of the destination system.
If the unit Failed to resolve the host via ARP, one of two things are likely responsible:

- The IP Address configuration on the test equipment does not match the network you are testing.
  Solution: Enable DHCP if available, or check your network configuration by pinging your default gateway. If you get no response, your configuration is invalid.
- The IP Address provided for the destination host is wrong or the host is not on the network.
  Solution: Please check the configuration of the destination host.
  From that host, attempt to ping the default gateway to verify network connectivity.
- XTT-5000 will always ARP for the default gateway. If the ARP fails it will not affect anything. Requesting the MAC of the default gateway is only required when sending traffic off of your local Ethernet segment.

Troubleshooting an STT Ethernet Connection
If you are testing using an STT Ethernet there common configuration will cause problems:

RxT 10GE Throughput --> STT Ethernet
RxT 10GE Throughput <-- STT Ethernet

By default, if you are using Layer 2-4 testing, the RxT 10GE will default to 802.3 framing, and the STT Ethernet will default to Ethernet type II framing.
When sending Throughput (BERT) traffic in both directions, a LOPS error will appear on one of the units, due to bidirectional traffic.

Where do you want to go next?

Throughput Summary Results
Throughput Aggregate Results

Throughput Stream Results
Throughput Test Setup
Working Desktop
Home

Ethernet Port Configuration

Press a **RJ45 / SFP / XFP** Test Port button to change the port in use.
Configure a Port Address if necessary.

Port Configuration		
Parameter	**Options**	**Details**
XFP (1)	XFP (1) SFP (2), SFP (3) RJ-45 (2), RJ-45 (3)	
Interface		

Pause Frame		
Parameter	**Options**	**Details**
Pause	Enable: The unit will stop transmitting on receipt of flow control pause packets. Disable: RxT 10GE will not stop TX even if it receives a pause frame from remote peer.	Set how the local device will respond to pause packets.
Delay	0 to 3355 µs	Set the length of time indicated by the Pause frame sent by the module.

Interface	
Parameter	**Description**
LAN	Local Area Network;SDH or SONET measurements, alarm generation, and error injection become available
WAN-SDH	Wide Area Network; SDH standards
WAN-SONET	Wide Area Network; SONET standards

Choose a port to test with
Tests can run on all three ports at the same time.
Port1: *XFP* – 10 10GE test; choose LAN or SONET/SDH WAN
Port2/3: RJ-45 – 10/100/1000BASE-T test
Port2/3: *SFP* – 1000BASE-T, 100BASE-FX, 1/2/4G Fibre Channel

Possible Port Combinations

A	Port1: XFP	Port2: RJ-45	Port3: RJ-45
B	Port1: XFP	Port2: RJ-45	Port3: SFP
C	Port1: XFP	Port2: SFP	Port3: SFP
D	Port1: XFP	Port2: SFP	Port3: RJ-45

- Port2/3 can't be selected as RJ-45 and SFP at the same time; only one interface at a time.

Stream Table Setup

- Each stream may be configured independently. See Auto Fill to configure multiple streams.
- Throughput tests support up to 16 streams for a 10G test. RFC 2544 tests support one stream.

To configure a stream, tap a stream row. The Stream: X window will pop up, for configuring the stream in detail; configure each tab. When there are multiple streams, the window will have scroll arrows for moving between Stream Number x windows. Applies to L2+ Framed tests.

MAC	VLAN	MPLS	IP	TCP	UDP	Payload	Traffic Shape*: Constant, Ramp, Burst
*Traffic shaping is not available in Layer 1, Unframed mode.							

Stream Table Features

Feature	Function
Total Streams	View/set the number of streams in use. Use the **+ / -** buttons to enter a new quantity (1-16) of streams for the table if necessary. The number in use is shown on the Total Stream gadget on the Setup as well.
Move Up/Move Down	Highlight a stream, then use the **Move Up**/**Move Down** button to move it one row up or down.
Remove	*Delete the highlighted stream and reduce the total number of streams by one.*
Auto Fill	Automatically fill in the addresses of all streams in the table.

TPID/BERT ID
Note: This is a global settings; all BERT streams get the same ID.
	Edit the **TPID** directly in the field if required; applies only when VLAN is in use.
	• 8100 is the standard IEEE 802.1Q/802.1P value.
	  • A TPID is available for each VLAN.
	  • Technology: VLAN Tagging
	BERT ID: Ox40 to 0x8100.
	• The RxT 10GE place the BERT ID value in the IP Header (Identification field) so the tester can easily identify whether IP traffic is BERT traffic or not.

Visit the Technology Overview for information on frame components and more.
Press **OK** to save changes and close the window.
Press **Cancel** to close with window without saving changes.

Where do you want to go next?

Throughput Applications
Throughput Summary Results
Throughput Test Setup
Working Desktop
index

Stream - Auto Fill

On the Throughput Stream Table, press **AutoFill** to configure the stream element/s (MAC, VLAN, etc) of multiple streams at one time.

On the Auto Fill popup, configure the fill parameters:

1. Select the frame element to configure, using **Auto Fill**.
2. Enter the required Auto Fill Item data.

> **Example**: if you had selected MAC Destination as the Auto Fill item, the field below would appear as 'MAC Destination'. Tap it to bring up a keypad, then enter the starting MAC Destination address.

Auto Fill Action

To access all the Auto Fill options, you must have 2 or more streams.

Parameter	Details	Action
Fixed	The frame element settings will be identical for all active streams.	Apply the Fixed value to or from the current stream, or from the first stream.
Increment	The frame element settings will increase by one each time.	Press 'From Stream' to enter the number of the stream to start applying the Incremented value from. Press 'To Stream' to enter the number of the stream to stop applying the Incremented value to.
Decrement	The frame element settings will decrease by one each time.	Set the 'From Stream' and 'To Stream' values as described above.
Random	The last several bytes of the setting are filled with a random value.	Only the last 1, 2, or 3 bytes of the frame element address are determined randomly. The value of the other bytes is based on the value entered in the item button (e.g. 'MAC Destination' value). Set the 'From Stream' and 'To Stream' values as described above. Addresses are not changed during the test.

Where do you want to go next?

Stream Table Setup
Throughput Summary Results
Throughput Test Setup
Working Desktop
index

Stream MAC Setup

Configure Layer 2 by setting the MAC Source and Destination addresses for the streams.
Touch a MAC address on the Stream Table to bring up this configuration window; configure the Source and Destination addresses separately. See Auto Fill to configure multiple streams.
To configure a different stream, use **- / +** at the bottom of the screen to select the stream.

Frame / Ether Type		
Parameter	**Options**	**Details**
Frame	Ethernet II, IEEE 802.3	Select the Ethernet standard to use. Choices depend on the Frame Type. **802.3**: *LLC* and *SNAP* appear.
EtherType	**IEEE 802.3**: Ethertype= Length. **Ethernet II**: 64-5535. Enter the Ethertype value in its field.	Some Ethertype values, such as 0800 and AAAA, are considered invalid. To avoid potential problems with how a network device interprets the Ethertype field, 0800 is automatically chosen when IP is selected for the frame setup.
LLC	On,Off	The LLC protocol is set to On for 802.3.
SNAP	On, Off	Toggle the SNAP protocol On or Off; 802.3 only.

Mac Source / Destination		
Parameter	**Options**	**Details**
MAC Source/Destination	Enter the address.	Touch the MAC field. Use the number pad which appears to enter the data. • Each MAC address source and destination pair defines traffic flow.
Default		Reset the MAC source address of that port to the factory set default. The settings for each port, along with the factory settings of the MAC addresses can be found on System>Port Address.
ARP		Obtain the MAC destination address for each test stream via ARP. A pop up reports the status of the ARP process; IP ON only. Troubleshooting ARP: • Check the cables on both units. • Make sure the Destination IP on the unit sending the ARP request matches the Source IP on the unit receiving the request. • Make sure IP is enabled

Press **OK** to save your changes, and return to the Stream Table.
Press **Cancel** to exit the screen without saving changes.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Working Desktop
index

Stream Frame Setup

Set the frame structure. On the Stream Table, select a row to configure that stream.
Frame Structure Elements
Tick an element to turn it On; a setup tab will appear for that element. Some elements, such as MPLS and IP, are connected. The graphic at the bottom of the window reflects the structure in use.

Configure each tab.	Mac in Mac N/A	MAC	VLAN	MPLS	IP	TCP	UDP	Payload	Traffic Shape

Press **Apply to All** to have the selected frame elements used by every stream in the Stream Table.
Frame Type

Options	Details	Details
Set at Fixed.	Select the frame length distribution to use.	**Fixed**: All frames transmitted will be of the same length, as indicated in the Frame Size field. • The most common means of testing a network is to use a fixed frame size. In this way, the network performance can be characterized for different frame lengths. • For instance, the frame loss rate may be very different for 64-byte frames than for 1518-byte frames. By sending only frames 64 (or 1518) bytes long, the frame loss rate can be calculated for each. • You will also need to enter the Frame Size.
Frame Size	60-12,000 bytes, depending on the rate*.	Enter the total length of the Ethernet frame in the number pad which pops up
*Rx allows for undersized and oversized frames. See the Frame size details table for the maximum and minimum frame sizes.		

Where do you want to go next?

Throughput Summary Results

Throughput Aggregate Results
Throughput Stream Results
Working Desktop
index

Stream - IP Setup

Use the *IP* tab to configure the IP addresses for the stream/s, after selecting *UDP* as part of the Frame Setup on the Stream Table. See Auto Fill to configure multiple streams. To configure IP for the next or previous, use **- / +** at the bottom of the screen.

Address Input		
Statistic(s)	**Options**	**Details**
IP Source and IP Destination	Enter the new IP address source and destination pairs to use.	Enter the address using the pop up number pad. • The IP address is the network layer address that identifies the source and destination of the test frames.
IP Gateway	Specify the gateway addresses.	Leave the gateway value as 000.000.000.000 to indicate no gateway.
Subnet Mask	Specify the subnet mask.	For non-DHCP (static) systems.
'DHCP Offer'		The unit will acquire the IP address of Test Ports via DHCP. You will see a 'waiting; message, then the Local IP Address, Net Mask, and Gateway IP address will be changed if successful.

IP Header		
Statistic(s)	Options	Details
IP Option	Tick to enable.	Opt whether or not to include the "option type" IP header field.
IP Version	IP Version 4, 6	View the IP Version.
Protocol (Ver4) The protocol value selected is the number placed into the IP header; it doesn't indicate the proper datagram or payload of the payload.*	View/set?? the originating protocol module. 0 HOPOPT 1 ICMP 2 IGMP 3 GGP	Set at TCP in a TCP/UDP configuration. • The assigned values are maintained by the Internet Assigned Numbers Authority (IANA) ; available on at www.ianan.org/assignments/protocol-numbers. Commonly used values include 6 (TCP) or 17 (UDP). * For example, setting the Protocol field to 001, which indicates an ICMP payload, does not create an ICMP payload in the test traffic. This can cause problems with network elements who look at the Protocol field and attempt to process the non-existent protocol payload.
Type of Service	RFC1349,	Select the Type of Service protocol.

(Ver4)	RFC2474	• This selection determines the rest of the third column. • See the TOS parameters.
IP Header Length (Ver4)	Set the number of 32-bit (4-byte) words.	These form the header. • A setting of 5 indicates an IP header of 20 bytes.
Precedence	0-7	
Flag Don't Fragment (Ver4)	Yes, No	Select whether or not to fragment the packet.
Flag More Fragment (Ver4)	1: Additional fragments follow the current one; 0: No additional fragment bits follow.	The packets generated by the RxT 10GE are never actually fragmented, even if the fragmentation bits are set otherwise.
Fragment Offset (v4)	0-8191 bits	Enter the position of the fragment in the original datagram. • Leave at 0 if you are unsure of what to select
Time to Live (Ver4)	0-255 hops	Enter the time to live. 64 and 128 are commonly used.
Precedence (RFC1349)	0-7	Enter the Precedence using the number pad.

Type of Service Parameters

Statistic	Options	Details
Precedence (RFC1349)	3 digit value	
MBZ	0, 1	Select a MBZ (Must Be Zero) on the Number Pad.
TOS Value		Enter the type of service. • Leave it at 0 if you are unsure of what to select. • See RFC 1349 and RFC 2474 for technical details.
DSCP (Bits 0-5)		Enter the RFC 2474 *DSCP* bits.
Currently Unused	0,1 for two bits	Enter the two bits. Reserved

Press 'OK' to save your changes, and return to the Stream Table.
Press 'Cancel' to exit the screen without saving changes.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Tech: IP Overview
Working Desktop
Index

Stream MPLS Setup

Activate MPLS
MPLS 1 is set on. For MPLS 2 and MPLS 3, the labels toggle from Off to On. To configure MPLS for the next or previous, use **- / +** at the bottom of the screen.

MPLS Type	Unicast, Multicast	Select the frame type

For each label selected , set the following:

Parameter	Options	Details
ID	Up to seven digits	Enter the next hop label.
Exp	Up to seven digits	Enter the Experimental label.
S	One digit	Enter the end-of-stack label.
Time to Live	0-255 hops	The Time Time to Live label expires at the conclusion of this number of hops.

MPLS Label Parameters

See Auto Fill to configure multiple streams.
Enable the MultiProtocol Label Switching architecture by pressing *MPLS* to On on the Stream Table Frame Setup tab.
See Technology: MPLS for details on the parameters.

Press 'OK' to save your changes, and return to the Stream Table.
Press 'Cancel' to exit the screen without saving changes.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Working Desktop
index

Stream - VLAN Setup

VLAN 1 is set on. For VLAN2 and VLAN3, the labels toggle from Off to On. To configure VLAN for the next or previous, use **-** / **+** at the bottom of the screen.

Parameter	Options	Details
TPID	0x40 to 0x8100	Edit the TPID if required 8100 is the standard IEEE 802.1Q/802.1P value.
Priority	0-7	Enter the User Priority value, per IEEE 802.1Q. • User Priority 0 is the default for Ethernet networks. • The Number Pad will appear to facilitate numeric entry. The Priority Table shows the traffic types by priority.
CFI	0, 1	The CFI should almost always be set to 0 to be compatible with Ethernet switches.
ID	0-2045	Enter the optional Virtual LAN tags into the field for each stream. VLAN tags conform to IEEE 802.1Q and IEEE 802.1P.

VLAN Options

Notes

- The last TPID should always be 0x8100; this means the first TPID is set to 0x8100 if only one VLAN is in use.
- When an additional VLAN is enabled, it will automatically increment. However, you may edit the value.
- When a VLAN is enabled in such a way that it is not the innermost VLAN, it will assume the last saved value.
- The use of two and sometimes three tags is referred to as 'Stacked VLAN Tags' or 'Q-in-Q.'

Press 'OK' to save your changes, and return to the Stream Table.
Press 'Cancel' to exit the screen without saving changes.

Where do you want to go next?

Stream TPID/BERT ID Setup
Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Tech: Ethernet Overview
Home

Stream Payload Setup *Home*

Press 'Payload' on the Stream Table to configure the test payload elements. See Auto Fill to configure multiple streams. To configure the Payload for the next or previous, use the _____ at the bottom of the screen.

Parameter	Options	Details
Sunrise Tag Read the notes.	None, SN/TS, STAG	Enable useful proprietary tagging, or not.
Tag: SN/TS	On, Off	Sequence Number + Time Stamp; select for compatibility with STT Ethernet. The SN/TS tags include a sequence number and a time stamp; enable both of these fields on the XTT Ethernet.
Tag: STAG	On, Off	Sequence Number + Time Stamp + Sunrise Tag 5 bytes (Reserved). Select for maximum usefulness of proprietary tagging.
Invert	On, Off	The selected test pattern will be transmitted inverted.
Pattern Type	2^31, 2^31C, 2^23, 2^23C, 2^20, 2^15, 1111, 1010, 0000. User32, User 1024*	Select a test pattern to perform a BERT with. Not all patterns are available for all configurations.
(User) Pattern Data 32		Enter the four-byte test pattern in hexadecimal format with the number pad. • Edit each line directly. • Use the 'Next/Previous Patterns' button to access the next screen of patterns.
(User 1024)Pattern Setup		Tap a Pattern Data field, then use the pop up to enter the pattern. Repeat as required.
'Apply to All' button	Apply the Tag, Type, and Pattern selections to all of the streams in the table, in a multiple stream setup.	

Press 'OK' to apply the new settings and close the window.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Home

Stream - TCP Setup

Use the TCP tab to configure the TCP ports and header, after selecting UDP as part of the Frame Setup on the Stream Table. See Auto Fill to configure multiple streams. To configure TCP for the next or previous, use **- / +** at the bottom of the screen.

Selecting TCP puts a TCP header into the IP packet datagram but does not establish a true TCP connection with the far end. This "static TCP" is useful for entering a proper TCP port value to pass traffic through firewalls and similar security features on a router, but does not test a live TCP connection.

Port Setup		
Parameter	**Options**	**Details**
Source Port	1-65,535	Enter the port address,using the pop up number pad.
Destination Port	0x1 to 0xFFFF	Enter the port address,using the pop up number pad.

Header Setup		
Statistic	**Options**	**Details**
Seq. Number	0x0 - 0xFFFFFFFFF	Initial data byte sequence number
Ack. Number	0x0 - 0xFFFFFFFFF	Expected next sequence number, sent by receiver.
Data Offset (4 bits)	0000-11111	Size of TCP header; also offset of the packet to the data.
Reserved 6 bits	000000-111111	Normally unused: set to 0.
Window Size	Enter the value in hex.	Increase the TCP congestion window size up to 1 Gb; *0x0x to 0xFFFF
Urgent Pointer		Enter the value for the Urgent Pointer Control Bit.
PSH		Enter the value for the Push Function Control Bit.
RST		Enter the value for the Reset the connection Control Bit.
SYN		Enter the value for the Synchronize sequence number Control Bit.
FIN		Enter the value for the No more data from sender Control Bit.
URG		Enter the value for the Urgent bit.
ACK		Enter the value for the Acknowledge bit.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Working Desktop
Index

Stream - UDP Setup

Use the *UDP* tab to configure the UDP ports and header, after selecting UDP as part of the Frame Setup on the Stream Table. See Auto Fill to configure multiple streams.

Parameter	Options	Details
UDP Source	0x1 to 0xFFFF	Enter the port address,using the pop up number pad.
UDP Destination	0x1 to 0xFFFF	Enter the port address,using the pop up number pad.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results.
Index

Traffic Shape Constant Setup

For Constant Traffic Shaping, traffic is transmitted at a constant rate (from 0.01% to 100.00% bandwidth) for the entire duration of the test. To configure Constant Traffic Shape for the next or previous stream, use the _____ at the bottom of the screen.

Traffic Shape - Constant		
Parameter	**Options**	**Details**
Rate	Percentage, Bit Rate, IPG (ns)	Determine the traffic rate. When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.
Rate: Percentage	Range: 0.01% to 100.00%	Commonly, Ethernet traffic is referred to in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)		Set the interpacket gap. The minimum IPG is 12 bytes or 96 bit times.
Rate: Bit Rate		The bit rate, given as a number of kbps, is a direct function of the bandwidth percentage. 1 kbps corresponds to 0.00001% of a 10GE LAN interface. Because the frame length can be random, there is no fixed relationship between the bit rate and the data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold

Apply to All: Apply this traffic configuration to all streams.

Data Input		
Constant, Bandwidth	0.00% to 100.00%	Enter the percentage of bandwidth which will be constantly filled directly in the field.

Press **OK** to apply the new settings and close the window.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Applications
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Throughput Test Setup
Home

Traffic Shape Ramp Setup

From the Throughput Stream Table or Pattern on the Signal tab, press 'Traffic Shape' to configure the traffic.
The traffic is transmitted at a variable rate from Start Bandwidth (between 0.00% and 100.00%) to Stop Bandwidth (between 0.00% and 100.00%), with increments of Step Size (between 0.01% and 100.00%).

Traffic Shape		
Parameter	**Options**	**Details**
Rate	Percentage, IPG (ns), Bit Rate	Determine the traffic rate.*
Rate: Percentage	0.01% to 100.00%	Ethernet traffic is expressed in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)	The minimum IPG is 12 bytes or 96 bit times.	The interpacket gap (IPG) is the delay between successive frames.
Rate: Bit Rate		The bit rate, given as a number of kbps, is a direct function of the bandwidth percentage. Because the frame length can be random, there is no fixed relationship between bit rate and data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold.
* When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.		

The following parameters are explained in terms of percentages, but would appear as ns or kbps if Percentage was not selected as the Rate.

Data Input		
Parameter	**Options**	**Details**
Start Bandwidth		Enter the bandwidth percentage the RxT 10GE will start transmitting at the beginning of the test.
Stop Bandwidth		Enter the bandwidth percentage where the RxT 10GE will stop ramping. After transmitting at this bandwidth (e.g. 100%) for the determined Step Duration, the unit will continue transmitting frames at this maximum rate.
Step Duration	1-60 seconds	Number of seconds the RxT 10GE will transmit each bandwidth step. The time scale on the graph is based on this unit of time.
Step Bandwidth		Enter the bandwidth percentage the unit will increase each step up.

Repeat		When set to On,, the ramp sequence will repeat until you stop the test; left off, the ramp sequence will run one time, and stop. Applies to Rate: IPG only.

Press **OK** to apply the new settings and close the window.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Applications
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Throughput Test Setup
index

Traffic Shape Burst Setup

With Burst traffic, traffic is transmitted at a variable rate.
Traffic is transmitted at Burst 1 Bandwidth rate (from 0.00% to 100.00%) for Burst 1 Duration seconds, then at Burst 2 Bandwidth rate (from 0.00% to 100.00%) for Burst 2 Duration seconds.
Gigabit Ethernet has a minimum burst of 0.01%. This sequence is repeated for the duration of the test.
To configure Traffic Shape for the next or previous stream, use the _____ at the bottom of the screen.

Traffic Shape		
Parameter	**Options**	**Details**
Rate	Percentage, IPG (ns), Bit Rate	Determine the traffic rate.*
Rate: Percentage	0.01% to 100.00%	Ethernet traffic is expressed in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)	The minimum IPG is 12 bytes or 96 bit times.	The interpacket gap (IPG) is the delay between successive frames.
Rate: Bit Rate		The bit rate, given as a number of kbps, is a direct function of the bandwidth percentage. Because the frame length can be random, there is no fixed relationship between bit rate and data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold.
'Apply to All'		*Apply this traffic configuration to all*

		streams.

* When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.

Data Input		
Burst Bandwidth/Rate/IPG 1/2		Enter the size of the burst the RxT will transmit.
Burst 1/2 Duration		Enter the number of seconds the first or second burst of traffic will last.

Press **OK** to apply the new settings and close the window.

Burst Bandwidth Accuracy
The accuracy of the burst bandwidth is reduced when the burst duration is shorter than the time to send approximately 100 frames at 100% bandwidth. The minimum recommended durations follow:

Burst Size	Duration
64 bytes	0.0051 ms
1519 bytes	0.0121 ms
4096 bytes	0.3278 ms
12000 bytes	0.9600 ms

Minimum Burst Durations

Example: Sending a 1510 byte burst at a burst duration of 0.0051 ms would likely lead to inaccurate results.

From the Throughput Stream Table,press 'Traffic Shape' and select Burst to configure Burst traffic

Where do you want to go next?

Throughput Stream Table Setup
Throughput Applications
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Throughput Test Setup
index

Test Patterns

To send a standard test pattern with its 1s and 0s reversed, tick **Invert**.
Here is a list of standard test patterns the RxT 10GE supports. Availability depends on configuration.

2^31	Industry-standard 231-1 pseudo random bit sequence. This signal is formed from a 31-stage shift register and is not zero-constrained. This pattern contains up to 30 zeros in a row.
2^23	Industry-standard 223-1 pseudo random bit sequence. This signal is formed from a 23-stage shift register and is not zero-constrained. This pattern contains up to 22 zeros in a row.
2^20	Industry-standard 220-1 pseudo random bit sequence. This signal is formed from a 20-stage shift register and is not zero-constrained. This pattern contains up to 19 zeros in a row.
2^15	Industry-standard 215-1 pseudo random bit sequence. This signal is formed from a 15-stage shift register and is not zero-constrained. This pattern contains up to 14 zeros in a row.
2^11	Pseudorandom 2047 bit code. The pattern conforms to the ITU O.152 technical standard.
2^9	Pseudorandom 511-bit code. The pattern conforms to the ITU V.52 technical standard.
2^7	This is the pseudorandom 127-bit code.
2^6	This is the pseudorandom 63-bit code.
1111	Industry-standard all 1s pattern.
1010	Industry-standard alternating ones and zeros pattern.
0000	Industry-standard all zeros pattern.
CJPAT	Continuous Jitter Test Pattern is used for jitter measurements. It is intended to expose a receiver's CDR (Clock and Data Recovery circuit) to instantaneous phase jumps. The pattern alternates repeating low transition density patterns with repeating high transition density patterns.
CRPAT	Continuous Random Test Pattern is intended to provide broad spectral content and minimal peaking that can be used for the measurement of jitter at either a component or system level.
1-4	The 1 in 4 pattern is used for stress testing circuits.
1-16	The 1 in 16 pattern is used for overstressing AMI lines. It violates industry standards for pulse density. Therefore an AMI circuit that fails this test could still be a good circuit. The pattern is frame aligned ("f" is the framing bit) as shown in its binary form: f 0100 0000 0000 0000.
1-8	The 1 in 8 pattern is used for stress testing AMI and B8ZS lines. The pattern is also called 1:7 in older literature. The pattern is frame aligned (f is the framing bit) as shown in its binary form: f 0100 0000.
DALY55	The Daly 55 Octet pattern is a special stress pattern that obeys industry standards for pulse density and maximum consecutive zeros in both AMI and B8ZS coded circuits. It is used for stress testing T1 circuits and network elements. If transmitted in a framed signal with AMI coding, it will violate the 15-zero constraint. It does not violate the zeros constraint in an unframed

	signal. If framed, the framing bit is inserted at octet boundaries. The Daly 55 octet pattern replaced the original 55 octet pattern. Here is the Daly 55 octet pattern: 80, 80, 80, 80, 80, 80, 01, 80, 80, 80, 80, 80, 80, C0, 80, 80, 80, 80, E0, 80, 80, 80, 80, AA, AA, AA, AA, 55, 55, 55, 55, 80, 80, 80, 80, 80, 80, FF, FF, FF, FF, FF, FF, 01, 80, 01, 80, 01, 80, 01, 80, 01, 80.
FOX	Industry-standard FOX pattern is used in data communications applications. The ASCII translation of the pattern is the " Quick brown fox jumped over the lazy dogs 0123456789 " sentence. The pattern is frame aligned to ensure proper ASCII translation of the bits. It is recommended that the pattern be sent with framed signals, otherwise, ASCII translation is not possible. Here is the pattern: 2A, 12, A2, 04, 8A, AA, 92, C2, D2, 04, 42, 4A, F2, EA, 72, 04, 62, F2, 1A, 04, 52, AA, B2, 0A, CA, 04, F2, 6A, A2, 4A, 04, 2A, 12, A2, 04, 32, 82, 5A, 9A, 04, 22, F2, E2, 04, 8C, 4C, CC, 2C, AC, 6C, EC, 1C, 9C, 0C, B0, 50.
QRSS	Quasi Random Signal pattern. Formed from a 20-stage shift register and is zero-constrained for a maximum of 14 consecutive zeros. When transmitted in a framed signal, up to 15 consecutive zeros will occur, in accordance with AMI minimum density requirements.
OCT55	This is the original 55-octet pattern; used for stress testing T1 circuits and network elements. If transmitted in a framed signal with AMI coding, it will violate the 15-zero constraint. It does not violate the zeros constraint in an unframed signal. If framed, the framing bit is inserted at octet boundaries. Here is the actual pattern: 80, 80, 80, 80, 80 80, 00, 80, 80, 80, 80, 80, 80, C0, 80, 80, 80, 80, E0, 80, 80, 80, 80, AA, AA, AA, AA, 55, 55, 55, 55, 80, 80, 80, 80, 80, 80, FF, FF, FF, FF, FF, FF, 01, 80, 01, 80, 01, 80, 01, 80, 01, 80, 01, 80.
DALY55	The Daly 55 Octet pattern is a special stress pattern that obeys industry standards for pulse density and maximum consecutive zeros in both AMI and B8ZS coded circuits. It is used for stress testing T1 circuits and network elements. If transmitted in a framed signal with AMI coding, it will violate the 15-zero constraint. It does not violate the zeros constraint in an unframed signal. If framed, the framing bit is inserted at octet boundaries. Note that the Daly 55 octet pattern replaced the original 55 octet pattern. Here is the Daly 55 octet pattern: 80, 80, 80, 80, 80, 80, 01, 80, 80, 80, 80, 80, 80, C0, 80, 80, 80, 80, E0, 80, 80, 80, 80, AA, AA, AA, AA, 55, 55, 55, 55, 80, 80, 80, 80, 80, 80, FF, FF, FF, FF, FF, FF, 01, 80, 01, 80, 01, 80, 01, 80, 01, 80, 01, 80.

Pattern Inversion (PRBS patterns only): Transmit the selected pattern in an inverted form (1s and 0s reversed). Remove the check mark to send the pattern normally.

User: Edit and send your own test pattern. The corresponding field will become active. Enter up to a 16-bit pattern in the field. Previous User patterns are stored. You may select a previously programmed User pattern from the drop down list.

Remember to deselect the 'User' button when you want to return to using a standard pattern; the button text will turn from orange to gray.

Where do you want to go next?

Throughput Test Setup
Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Home

Throughput Non Stream Results

Non Test Stream traffic shows statistics on traffic which does not meet the Stream Table configurations. The statistics are the same as on the Aggregate Results.

Statistic	Meaning
Total Frames	Number of received/transmitted frames.
Total Bytes	Number of received/transmitted bytes. • **Frame Rate** Current (fps), Average (fps), Minimum (fps),Maximum (fps) • **Utilization** Current (%)/Average (%)/Minimum (%)/Maximum (%)
Line Rate	Transmitted and Received data rate (in kbps, bps, etc.). The data rate includes the frame headers but not the IPG or Preamble. Thus, the data rate reflects both the frame rate and frame size.
Data Rate	Transmit data rate (in kbps, bps, etc.). The data rate includes the frame headers but not the IPG or Preamble. Thus, the data rate reflects both the frame rate and frame size.
Frame Sizes	Count of frame types of each size. Frame Size Under 64 Bytes/64 Bytes/65-127/128-255/256-511/512-10234/ 1024-1518/ Over 1518 Bytes
Test Frames: • Unicast • Multicast • Broadcast • Invalid MAC Frames • Total VLAN Frames • Single-Tagged VLAN Frames • Multi-Tagged VLAN Frames • IPv4, IPv6 Frames: Count/Unicast/Multicast/Broadcast • TCP Frames • UDP Frames • Pause Frames	For these test frame types, view the frame count or **Current** frame rate (frames per seconds) and the **Average** frame rate (fps). Counts and rates may show for the Transmit and/or Receive directions. Not all statistics will show for all ports or setups.
Packet Jitter μ	Minimum, Maximum, and Average variation in arrival rates between individual packets in the same stream (one-way delay).

Bit Error	Count of bit errors
Current Bit	Count of the number of bit errors since the beginning of the test.
Bit Error Ratio BER	Bit error ratio since the beginning of the test.
LOP(s)	Count of number of seconds containing Loss of Pattern.
No BERT Traffic (s)	Seconds containing no BERT traffic.
Frame Interval Minimum	Smallest frame interval observed during the measurement.
Frame Interval Maximum	The maximum frame interval observed during the measurement.
Frame Interval Variation	The maximum frame interval minus the minimum frame interval. This measurement is equivalent to a one-point frame delay variation or frame jitter measurement.
Frame Interval Technology Note	

Where would you like to go next?

Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Thruput SDH Results
TimeCop Results
Throughput Test Setup
Throughput Applications
Ethernet Technology Overview
Home

Summary Results

Get an overview of the Throughput test results.
It may take a few seconds for results to appear after starting a test.
The left side of the window displays:
E. Time: How long the test has been running (time elapsed).
R. Time: How long remains in a scheduled test, or **Continuous.**
Banner: A message summary banner of the status of the test. It reports any errors or alarms, along with a date and time stamp.
Below the banner, view a list of logged events: received errors and/or alarms, e.g. Lost Frame, including a count of the number of errors, with a resolution of one second.

The right side of the window shows more specific results.
In a **Live** throughput test, statistics are taken on frames, but the test does not look for pattern synchronization or bit errors (no Bit statistics appear).
For a **Monitor** test, only receive (RX) statistics are reported.

Status Statistics status	
Statistic	**Meaning**
TX Utilization (%)	Transmitted bandwidth as a percentage of maximum traffic rate (minimum frame gap).
TX Line Rate	Transmitted bit rate (in kbps, bps, etc.) of the Ethernet frames, ignoring the frame gap, preamble, and SAD. The data rate is always less than the line rate.
TX Data Rate	Transmit data rate (in kbps, bps, etc.). This includes the frame headers but not the IPG or Preamble. Thus, the data rate reflects both the frame rate and frame size.
TX Frame Rate	Transmit frame rate (in kbps, bps, etc.).
RX Utilization (%)	Received bandwidth as a percentage of maximum traffic rate (minimum frame gap).
RX Line Rate	Received bit rate, based on the current utilization.(in kbps, bps, etc.).
RX Data Rate	Received bit rate of the Ethernet frames, ignoring the frame gap, preamble, and SAD. The data rate is always less than the line rate (in kbps, bps, etc.).
RX Frame Rate	Received frame rate (in kbps, bps, etc.).
Capture Status	Status of packet capturing
Capture Packets	Count of captured packets
You may observer that sometimes the RxT is receiving more then you are transmitting. A small margin of error is built into the system, and is totally normal.	

Signal The signal information (vendor, wavelength, optical power, etc.) is provided by the SFP/XFP module. Not all manufacturers supply this information, and Sunrise Telecom Inc. is not responsible for modules provided by other vendors.	
Statistic	**Meaning**

Vendor	Name of the vendor
Wavelength	Optical wavelength is use at the port.
RX Optical Power	Received uW and dBm.

Where do you want to go next?

Throughput Aggregate Results
Throughput Stream Results
Working Desktop

Traffic Shape Ramp Setup

From the Throughput Stream Table or Pattern on the Signal tab, press 'Traffic Shape' to configure the traffic.
The traffic is transmitted at a variable rate from Start Bandwidth (between 0.00% and 100.00%) to Stop Bandwidth (between 0.00% and 100.00%), with increments of Step Size (between 0.01% and 100.00%).

Traffic Shape		
Parameter	**Options**	**Details**
Rate	Percentage, IPG (ns), Bit Rate	Determine the traffic rate.*
Rate: Percentage	0.01% to 100.00%	Ethernet traffic is expressed in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)	The minimum IPG is 12 bytes or 96 bit times.	The interpacket gap (IPG) is the delay between successive frames.
Rate:		The bit

Bit Rate		rate, given as a number of kbps, is a direct function of the bandwidth percentage. Because the frame length can be random, there is no fixed relationship between bit rate and data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold.
* When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.		

The following parameters are explained in terms of percentages, but would appear as ns or kbps if Percentage was not selected as the Rate.

Data Input		
Parameter	**Options**	**Details**
Start Bandwidth		Enter the bandwidth percentage the RxT 10GE will start transmitting at the beginning of the test.
Stop Bandwidth		Enter the bandwidth percentage where the RxT 10GE will stop ramping. After transmitting at this bandwidth (e.g. 100%) for the determined Step Duration, the unit will continue transmitting frames at this maximum rate.
Step Duration	1-60 seconds	Number of seconds the RxT 10GE will transmit each bandwidth step. The time scale on the graph is based on this unit of time.
Step Bandwidth		Enter the bandwidth percentage the unit will increase each step up.
Repeat		When set to On,, the ramp sequence will repeat until you stop the test; left off, the ramp sequence will run one time, and stop. Applies to Rate: IPG only.

Press **OK** to apply the new settings and close the window.

Traffic Shape Burst Setup

With Burst traffic, traffic is transmitted at a variable rate.
Traffic is transmitted at Burst 1 Bandwidth rate (from 0.00% to 100.00%) for Burst 1 Duration seconds, then at Burst 2 Bandwidth rate (from 0.00% to 100.00%) for Burst 2 Duration seconds.
Gigabit Ethernet has a minimum burst of 0.01%. This sequence is repeated for the duration of the test.
To configure Traffic Shape for the next or previous stream, use the _____ at the bottom of the screen.

Traffic Shape		
Parameter	**Options**	**Details**
Rate	Percentage, IPG (ns), Bit Rate	Determine the traffic rate.*
Rate: Percentage	0.01% to 100.00%	Ethernet traffic is expressed in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)	The minimum IPG is 12 bytes or 96 bit times.	The interpacket gap (IPG) is the delay between successive frames.
Rate: Bit Rate		The bit rate, given as a number of kbps, is a direct function of the bandwidth percentage. Because the frame length can be random, there is no fixed relationship between bit rate and data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold.
'Apply to All'		*Apply this traffic configuration to all streams.*
* When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.		

Data Input		
Burst Bandwidth/Rate/IPG 1/2		Enter the size of the burst the RxT will transmit.
Burst 1/2 Duration		Enter the number of seconds the first or second burst of traffic will last.

Press **OK** to apply the new settings and close the window.

Burst Bandwidth Accuracy

The accuracy of the burst bandwidth is reduced when the burst duration is shorter than the time to send approximately 100 frames at 100% bandwidth. The minimum recommended durations follow:

Burst Size	Duration
64 bytes	0.0051 ms
1519 bytes	0.0121 ms
4096 bytes	0.3278 ms
12000 bytes	0.9600 ms

Minimum Burst Durations

Example: Sending a 1510 byte burst at a burst duration of 0.0051 ms would likely lead to inaccurate results.

From the Throughput Stream Table,press 'Traffic Shape' and select Burst to configure Burst traffic

Where do you want to go next?

Throughput Stream Table Setup
Throughput Applications
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Throughput Test Setup
index

Traffic Shape Constant Setup

For Constant Traffic Shaping, traffic is transmitted at a constant rate (from 0.01% to 100.00% bandwidth) for the entire duration of the test. To configure Constant Traffic Shape for the next or previous stream, use the _____ at the bottom of the screen.

Traffic Shape - Constant		
Parameter	**Options**	**Details**
Rate	Percentage, Bit Rate, IPG (ns)	Determine the traffic rate. When changing units from Percentage to IPG to Bit Rate, the display will reset back to the last value entered for those units.
Rate: Percentage	Range: 0.01% to 100.00%	Commonly, Ethernet traffic is referred to in terms of the percentage of bandwidth used. At 100%, the gap between frames is at its minimum. As the percentage is reduced, the IPG is increased.
Rate: IPG (ns)		Set the interpacket gap. The minimum IPG is 12 bytes or 96 bit times.
Rate: Bit Rate		The bit rate, given as a number of kbps, is a direct function of the bandwidth percentage. 1 kbps corresponds to 0.00001% of a 10GE LAN interface. Because the frame length can be random, there is no fixed relationship between the bit rate and the data rate.
Disruption Threshold	0-10,000,000 microseconds	Service disruption threshold

Apply to All: Apply this traffic configuration to all streams.

Data Input		
Constant, Bandwidth	0.00% to 100.00%	Enter the percentage of bandwidth which will be constantly filled directly in the field.

Press **OK** to apply the new settings and close the window.

Where do you want to go next?

Throughput Stream Table Setup
Throughput Applications
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Throughput Test Setup
Home

Stream Rx Filter

To enable filtering, select the Rx Filter tab on the Stream:x specifies the frame elements that will be captured.
Turn an element On to filter for that element.

- For example, if you sent Source MAC on, only packets which match the Stream Table Source Mac settings will be captured.
- Set to Off, packets would be captured regardless of their Source MAC address.

Testing Tips
Most testing is done with a loopback unit at the other end. In a Layer 2/3 loopback, the Source and Destination MAC/IP will be swapped so the traffic can be returned to the test set. Layer 1 does not touch the traffic it simply copies the input to the output. Hence, configuring the RX Filter Source/Destination requires careful consideration. The behavior of the unit with multiple streams can also be complicated.
If you are sending two streams to the same Destination MAC, with differing Source MAC addresses, the stream data may be captured in unexpected ways.

Example 1
Stream 1
Source MAC: 00::02
Destination MAC: 00::01

Stream 2
Source MAC: 00::03
Destination MAC: 00::01

Without the Rx Filter in use, both streams will be detected normally.

Example 2
Stream 1
Destination MAC Rx Filter
All the traffic from both Stream 1 and Stream 2 will appear in the Stream 1 results; no traffic appears for Stream 2. Be aware of this when troubleshooting traffic. *Try rule 1 then rule 2 etc for each frame.*

In addition, the Destination is best ignored. This is because the Source MAC addresses are different. When they arrive at the loopback device, they will be swapped, making the SRC the DUST, and vice versa. Now the return frames have different Destinations with the same Source.

Where do you want to go next?

Throughput Applications
Throughput Summary Results
Throughput Aggregate Results

Throughput Stream Results
Throughput Test Setup
Stream - Table - Setup
Home

View Test Records Summary

Access saved files.

Set how/when results are saved in the Meas. Setup tab.

- Results Tab: Work with saved View Test Records Setup results files
- Reports Tab: Work with previously generated .csv and .pdf results reports
- Capture Tab: Work with files of captured packets; See Capture for more information.
- File Usage Tab: View detailed memory/storage information on saved files.

Files may be exported from most screens.

Setup Feature Buttons	
Highlight a file then choose an action to perform on it. The Action Bar for each type of saved file has minor variations. This table summarizes all of the functions.	
Save	Save the current test file.
View	Open a saved file to review it.
Load	Load the highlighted profile.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.
Copy	Save a copy of the file under a new name; edit with the soft keyboard which appears. A few characters, such as "/" are not allowed in file names.
Load Default	Load the factory default profile.
Import/Export	Retrieve and load an exported profile, or Export (save) the file to an external location, a USB Flash Drive.

Export a File

To save a file to a removable disk.
1. Press 'Saved Results' in the Action Bar.
2. Highlight a file, and select 'Export'. A Report Results from File window pops up.*
A. Choose the external location; an SD Card or USB Flash Drive.
3. On the Report Setup tab,
***File Format**: When applicable, choose one of the following:*
- *CSV File: On to create a .csv file to use in a program such as Excel©*
- *PDF File: On to create a PDF file, which opens with any PDF viewer*

A PDF viewer is available on the system desktop.
***Report Selection**: Choose the result to appear in the Report. Only Summary is selected by default, to save space.*
4. If desired, enter Customer, User, and Trouble Ticket information. Press 'Apply', then return to the Report Setup tab to generate the file.
5. Press 'Create Report' at the bottom of the Report Setup tab to generate the file.
- *The new file appears on the Reports tab.*

To read the file, attach the external disk to another RxT, go to the system desktop, and open the File Manager. Choose the external drive containing the file, and open it. See below. RxT 10GE can open the compressed file.

** If you are Exporting a file with Remote operation, a pdf viewer appears when the report has generated, showing the file you exported. Make sure to press 'Save' to save the file for future use.*

Top

Open a Saved File via the File Manager

To open a saved file via the computer system

1. Press  on the front of the chassis to switch to the system desktop.
2. Touch the File Manager icon. It may take several seconds for the program to open.
3. Under Places, select File System. After a moment, the right half of the screen will fill with the a list or display of file icons. Touch 'View As' above the display to choose View as List or View as Icons, as you prefer.
4. Open the Media folder.
5. Choose the location of your file; an SD Card or a USB drive.
6. Browse to the required file, and open it.

Generate a Report

1. Press 'Saved Results' on any screen.
2. Select the file name you want a report from on the Results File window
3. On the Report Setup tab,

   File Format: When applicable, choose one of the following:
   - CSV File: On to create a .csv file to use in a program such as Excel©
   - PDF File: On to create a PDF file, which opens with any PDF viewer

     A PDF viewer is available on the system desktop.

   Report Selection: Choose the result to appear in the Report. Only Summary is selected by default, to save space.
5. If desired, enter Customer, User, and Trouble Ticket information on the Data Entry tab.

   Press 'Apply', then return to the Report Setup tab to generate the file.

6. Press 'Create Report' at the bottom of the Report Setup tab to generate the file.

   The new file appears on the Reports tab.

   Find the report in one of the following location:
   - RxT 10GE hard drive: /home/Sunrise/Measurement/reports
   - Web URL: http://<XTT5000_ip>/reports
   - USB/SD (Exported): /xtt-5000/reports

Top

Where do you want to go next?

The Working Desktop
Meas. Setup: Configure measurement parameters
Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

Import/Export a File

Import

To use a profile you have previously exported,

1. On the View Test Records Setup window, press **Import Export**.
2. On the Import/Export window, choose the Import tab.
3. Under Media, select the profile location: on a Flash drive.
4. Select a file.
5. Press **Load** to import and load the selected profile to the test module.

Export

To save a profile,

1. On the View Test Records Setup window, press **Import Export**.
2. On the Import/Export window, choose the Export tab.
3. Select the file to work with it; it will be highlighted in orange.
4. Verify or update as required the File Name. View the File Size and File Created date and time.
5. Under Destination Media, select the location to save the file to; locations available depend on your peripherals.
6. Press **OK** to save the file to the indicated location.


Make sure to remove the external disk properly.

Where do you want to go next?

The Working Desktop
View Test Records: Profiles, results files
Meas. Setup: Configure measurement parameters
Loopback Test Setup
index

View Test Records Results

For each **saved results** file, view

- the File name
- the Port the test was taken on
- Application (test module; e.g.: 10G Ethernet, OTN)
- Test Mode (e.g. Throughput or RFC2544 for an Ethernet Application)
- the file Size (e.g. 30 kb), and
- the date the record was saved.
- Press 'Page Down' at the bottom of the screen to scroll to the next page of results.

Highlight a file, then press **View** to look at its details, including results and test profile. *It may take several seconds for a file to open; a secondary program opens some types of files*.

Saved reports and captured packet files are opened ('viewed') with a separate application. The required application will launch automatically when you open a saved file. Use File > Close/Quit to exit the secondary application.
See http://www.wireshark.org/docs/ for help using the Wire Shark application..

View Results Feature Buttons Highlight a file then choose an action to perform on it.	
View	Open a saved file to review it.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.
Copy	Save a copy of the file under a new name; edit with the soft keyboard which appears. A few characters, such as "/" are not allowed in file names.
Compress File	Reduce the file size. <details:.>
Generate a Report	Retrieve and load an exported profile, or Export (save) the file to an external location; an SD Card or USB Flash Drive.
Export	Export (save) the file to an external USB Flash Drive.

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

View Test Records Reports

On the View Test Records Reports tab,

File Format: When applicable, choose one of the following:

- CSV File: On to create a .csv file to use in a program such as Excel©
- PDF File: On to create a PDF file, which opens with any PDF viewer

A PDF viewer is available on the system desktop.

Report Selection: Choose the result to appear in the Report. Only Summary is selected by default, to save space.

4. If desired, enter Customer, User, and Trouble Ticket information. Press 'Apply', then return to the Report Setup tab to generate the file.
5. Press 'Create Report' at the bottom of the Report Setup tab to generate the file.
   - The new file appears on the Reports tab.

   To read the file, attach the external disk to another RxT, go to the system desktop, and open the File Manager. Choose the external drive containing the file, and open it. See below. RxT 10GE can open the compressed file.

   Make sure to remove the external disk properly.

* If you are Exporting a file with Remote operation, a pdf viewer appears when the report has generated, showing the file you exported. Make sure to press 'Save' to save the file for future use.

View Reports Feature Buttons Highlight a file then choose an action to perform on it.	
Export	
View	Open a saved file to review it.
Delete	Delete the highlighted profile, or saved file.
Rename	Rename the highlighted file, using the soft keyboard which appears.

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
index

View Test Records File Usage

View detailed memory/storage information on saved files.
File types reported on:

- Setup
- Results
- Reports
- Captures

For each type of file, view the:

- number of files saved
- amount of memory used (Storage)
- amount of storage memory available

Where do you want to go next?

Throughput Test Setup
RFC2544 Test Setup
Loopback Test Setup
IP Testing
Working Desktop
index

Alarm Generation

In a 10G SDH/SONET configuration, you can select and transmit an alarm. When an alarm is being transmitted, a red 'Alarm' indication appears in the Module Status Panel.
To access this feature, click **Alarm** on the Action Bar.

- Press the gear to access settings.
- Press the main button to generate the alarm as configured in the settings.

To Generate an Alarm

1. On the Alarm Generation window, touch an alarm to select it.
2. Press the **Send** button (which will then appear as **Stop**).
   You can transmit alarms while making measurements or viewing data.

Make sure to disable all alarms (press **Stop**) when you are through.
The LEDs show received alarm information.
WAN SDH/SONET Alarm Generation

- RS: LOS, LOF
- MS: MS-AIS, MS-RDI
- HP: AU-AIS, AU-LOP, HP-UNEQ, HP-PLM, HP-RDI

LAN Alarm Generation

- Local: Layer 1 Remote fault LFS status message
- Remote: Layer 1 Local fault LFS status messages

Where do you want to go next?

Working Desktop
XFP Port Setup
Index

Error Injection

Use Error injection to insert defects into the traffic generated by the test module, in the Throughput test mode.

1. Choose the Type of error
2. Choose to inject the error into all stream s (Broadcast), or one or more streams (Multiple; chose the streams)
3. Choose to inject a Single error, or many in a Burst.
4. Press Send. Remember to Cancel when you are through.

- To inject an error, you must first start the measurement and transmit traffic.

Stream	
Broadcast	Inject errors on all streams.
Multiple	Inject errors into one or more streams.
	need some info

Mode	
Select the error injection method.	
Single	Inject an individual error..
Burst	Inject a set number of errors with each press of the 'Send' or 'Error Inject' button. After selecting 'Burst', enter the number of errors you wish to inject in a burst when the 'Send' button is pressed. Send a burst of up to *64* errors for Ethernet.

Error Type Details

Error	Details
FCS/CRC	Frame Check Sequence/Cyclic Redundancy Check error.
Bit Error	Bit error in the frame payload/pattern. Pattern bit errors are inserted before the FCS/CRC is calculated, and therefore do not cause an FCS/CRC error, or cause the frame to be dropped.
Code	8B/10B encoding error.
Disparity	Running disparity error.
IP Checksum	IP Checksum error.
Lost Frame	The transmitted sequence number will skip a value, causing a lost frame to be detected at the far end. Requires a Sunrise Tag be enabled the Stream table Payload tab.
Duplicate Packet	The transmitted sequence number will be duplicated once, causing a duplicate or misinserted packet defect at the far end. Requires Sunrise Tags be enabled on the Stream Payload tab.
Lost Sequence	The transmitted sequence number will skip a value, causing a lost frame to be detected at the far end. Requires Sunrise Tags enabled.
Duplicate Sequence	The transmitted sequence number will duplicate the previous value, causing a lost frame to be detected at the far end.

	Requires Sunrise Tags enabled.
Out of Sequence	The transmitted sequence number will transpose two values, causing an out of sequence defect at the far end. Requires a Sunrise Tag be enabled on the Stream Payload tab.

Error Types by Rate	
Select the type of error to inject, which depends on the type of test. Details.	
1G Default Errors	2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1, 1111, 0000, 1010, 1100 CJPAT, CRPAT, User 32, User 1024
10G Default Errors	FCS/CRC, Bit, Lost Sequence, Out of Sequence, Duplicate Sequence, IP Checksum
User 32	32 bits pattern data.
User 1024	1024 bits pattern data. It doesn't support increment pattern.
Payload length is 1000 bytes. A User pattern is filled with every four bytes with same data. The User 1024 pattern is filled every 128 bytes.	

Error Availability					
Layer	**Default Errors**	**SN (Sequence Number)***	**IP**	**TCP**	**UDP**
Layer 1	Bit				
L2 PRBS + FCS	FCS/CRC, BIT				
L2+ Framed	FCS/CRC, BIT	Lost Frame, Out-of-Sequence, Duplicate Sequence Number	IP Checksum	TCP Checksum	UDP Checksum

To configure error injection, press the error injection button when it's available on the Action Bar.

Where do you want to go next?

Working Desktop
index

Technology: Ethernet Overview

Once the primary delivery mechanism for data across a LAN, the utilization of Ethernet has expanded to MAN and WAN to challenge traditional TDM-based technologies such as T-Carrier, PDH, and SONET/SDH.
Its superior cost performance, proven ability to carry packet-based data, and easy integration into a LAN environment make it a preferred solution to ATM, Token Ring, and Frame Relay for delivering IP-based services such as VoIP and IPTV as well as traditional data and internet traffic.
Ethernet interface rates today span from 10 Mbps up to 10 Gbps. Typically, Ethernet is carried over UTP (unshielded twisted pair) or fiber optic cable (single-mode or multi-mode, depending on wavelength), but other options exist, including thin coaxial cable.
The original Ethernet standard was for 10M and 100M is referred to as Fast Ethernet. Most copper Ethernet ports support both 10M and 100M (and even 1000M in some cases) and they are usually referred to as 10/100M ports or 10/100BASE-T.
10G LAN has a line rate of 10 Gbps. 10G WAN encapsulates Ethernet traffic into an OC-192c/STM-64c frame has thus has a line rate of 9.953 Gbps.
Ethernet Standards
Ethernet Frames
Frame Size Efficiency
Frame Size Details
VLAN Tagging
MAC Addresses
MPLS
Unicast/Multicast Testing Note
IPG
Where do you want to go next?
Working Desktop
index

Technology: Standards

IEEE Standards Request For Comments Metro Ethernet Forum

Ethernet is controlled by the IEEE 802.3 body of standards, but its historical development has also lead to deviations, such as the DIX Ethernet (also known as Ethernet II), as well as vendor-specific implementations (such as 1000BASE-LH for long-haul Ethernet). Except where noted, the following refers to IEEE standards.
IEEE Standards
The following 802 standards are available for free download from the IEEE website at http://standards.ieee.org/getieee802/index.html

- IEEE 802®: Overview & Architecture
- IEEE 802.1™ Bridging & Management
- IEEE 802.2™: Logical Link Control
- IEEE 802.3™: CSMA/CD Access Method
- IEEE 802.5™: Token Ring Access Method
- IEEE 802.11™: Wireless
- IEEE 802.15™: Wireless Personal Area Networks
- IEEE 802.16™: Broadband Wireless Metropolitan Area Networks

- IEEE 802.17™. Resilient Packet Rings

IEEE Registration Authority has a number of public listings available at http://standards.ieee.org/regauth/publiclistings.html

- OUI (Organizationally Unique Identifier) Public Listing
- IAB (Individual Address Block) Public Listing
- OUI-36 Public Listing
- EtherType Field Public Listing
- Manufacturer ID Public Listing
- LLC (Logical Link Control) Public Listing
- Standard Group MAC Address Public Listing
- URN (Unique Registration Numbers) Public Listing
- IEEE 802.16 Operator ID

Requests for Comments (RFC) Documents

RFC documents are a series of memoranda on internet technologies, techniques, and innovations. Organized through the Internet Society, RFCs are the best resource for technical information on these technologies and protocols. Some RFCs become internet standards through the IETF (Internet Engineering Task Force).

All RFCs are available for free online at the RFC Editor: http://www.rfc-editor.org/rfc.html, but most can be found easily simply by typing the RFC number (such as ”RFC 791”) into a web browser.

The most common RFCs for Ethernet services testing are:

- RFC 768: User Datagram Protocol
- RFC 793: Transmission Control Protocol
- RFC 791: Internet Protocol
- RFC 792: Internet Control Message Protocol
- RFC 826: Ethernet Address Resolution Protocol
- RFC 2544: Benchmarking Methodology for Network Interconnect Devices
- RFC 2889: Benchmarking Methodology for LAN Switching Devices class uses the label to determine the per hop behavior of the class.

Metro Ethernet Forum (MEF)

The Metro Ethernet Forum is an industry alliance which develops technical specifications for carrier Ethernet worldwide. Over a dozen specifications are online at www.metroethernetforum.org.

Where do you want to go next?

Ethernet Overview
Working Desktop
index

Technology: Ethernet Frame Size and Efficiency

Because each frame is followed by a frame gap and preamble, there is an inherent inefficiency built into Ethernet traffic. The percentage of bandwidth lost to the 20 bytes of *IPG* and preamble is lower for larger frames than smaller frames, as shown:

Data size	Overhead /frame	Frames/sec.	Total bits lost (oh)	% of Bandwidth Lost
64 Bytes (512 bits)	160 bits	1,488,095	238,095,238	23%
128 Bytes (1024 bits)	160 bits	844,594	135,135,135	13%
512 Bytes (4096 bits)	160 bits	234,962	37,593,984	3.7%
1024 Bytes (8192 bits)	160 bits	119,731	19,157,088	1.9%
1518 Bytes (12144 bits)	160 bits	81,274	13,003,901	1.3%

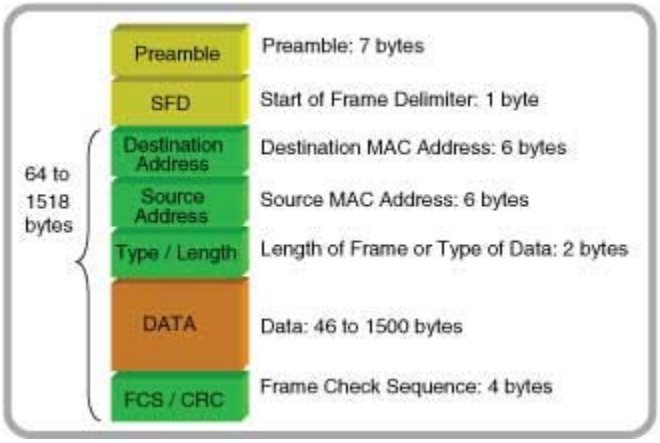
Frame Rates

Frame Size Efficiency
VLAN Tagging
MPLS
MAC Addresses
IPG

Where do you want to go next?

Ethernet Frames
Ethernet Overview
Throughput Stream Results
Working Desktop
index

Technology: Ethernet Frames



Basic Ethernet Frame

- **Preamble and SFD** (Start Frame Delimiter). Preceding each frame is a preamble of 7 bytes and a 1-byte SFD. The preamble is a pattern of alternating 1s and 0s (10101010) for all 7 bytes. The SFD has a pattern of 10101011. The preamble allows devices to detect and synchronize to incoming Ethernet frames; the SFP marks the end of the preamble. For the purposes of calculating frame lengths, the 8 bytes of Preamble and SFP are not included.
- **Ethernet frame**: Consists of a MAC (Media Access Control) header, followed by the frame payload, and ends with a FCS (Frame Check Sequence).
- **MAC header**: 14-bytes- consists of a 6-byte Destination Address, a 6-byte Source Address, and a 2-byte Ethertype field (see MAC Address Overview).
- **Ethertype field: U**sed as a frame length indicator or as protocol indicator, depending on which Ethernet standard is being used. IEEE 802.2 uses the field to indicate the frame length (in hex). The DIX or Ethernet II standard uses the field to indicate the type of data being transmitted. In most IP-based applications, the Ethernet II standard is used and the field is set to an Ethertype of 0x0800 to indicate an IP version 4 payload. Ethertype values: http://standards.ieee.org/regauth/ethertype/eth.txt
- **Payload Size**: The minimum payload size is 46 bytes.
  Frames with fewer payload bytes are considered undersized.
  The minimum Ethernet frame size is 64 bytes.
  The maximum frame size is 1518 bytes.
  Frame sizes above 1518, called jumbo frames, are allowed by some systems, and are an effective means of increasing the efficiency of the network.
  The presence of VLAN tags changes the effective minimum and maximum frame sizes .
- **FCS**: A 4-byte CRC performed over the entire Ethernet frame. Sometimes the FCS is called the CRC field.
  To avoid confusion, it is sometimes written as the FCS/CRC field. When an Ethernet device receives a frame, it performs a CRC calculation and compares it to the frame's FCS field. If they match, the frame is processed. If they do not match, the frame is discarded. Due to the limits of the error-checking capabilities of a 4-byte CRC, the largest practical size for an Ethernet frame is roughly 12,000 bytes.

- **Note**: Because errored frames are discarded, performing a bit error test at the Ethernet layer is very different than for TDM networks. The presence of a bit error that does not also cause a CRC error is exceedingly rare. In the vast majority of cases, a bit error translates into a lost frame. For this reason, most Ethernet QoS (Quality of Service) standards use lost frames as its primary metric and do not rely on bit error or BER (Bit Error Ratio).

MAC Addresses
IPG
Frame Size Efficiency
VLAN Tagging
MPLS

Where do you want to go next?

Ethernet Overview
Optical Line Encoding
Working Desktop
index

Technology: Frame Interval

Frame Interval: The time between the start of one frame and the start of the next frame. The frame interval increases as the frame size increases. However, as the effect of frame size is usually very small compared to the duration of traffic problems, the frame interval is useful for measuring service disruptions.
Minimum Frame Interval Note
Under normal network conditions, the smallest possible frame interval is for two 64-byte frames with a minimum frame gap. This is:

(64 + 20 bytes) x 8 bits / byte or 672 bit times.

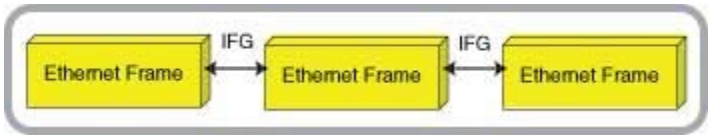
For Gigabit Ethernet, the bit time is 1.0 ns, making the minimum frame interval 672 ns over Gigabit Ethernet.
Undersized frames or abnormally small frame gaps will reduce the frame interval further.
Maximum Frame Interval Note
This value is also used as the basis for the Service Disruption measurement.
If there is a network disruption on the far side of a switch from the test set, the only indication of a problem will be an increase in the frame interval.
Because these disruptions are on the order of tens of milliseconds, the minor variances in frame interval caused by shorter or longer frames is negligible.

Where do you want to go next?

Tech: Ethernet Frames
Summary Results
Aggregate Results
Throughput Stream Results
Working Desktop
index

Technology: Ethernet IPG

The gap of time between the end of one frame and the start of the preamble for the next frame is called the inter frame gap (IFG); the delay between successive frames. IFG.



IFG

Because most Ethernet traffic carries IP packets, the IFG is often called the IPG (Inter Packet Gap). In fact, the terms packet and frame tend to be used interchangeably by users even though they refer to very distinct entities.
The minimum IFG is 12 bytes, or 96 bit-times. The minimum IFG thus depends on the interface rate, as follows:

Interface	Bit Time	Minimum IFG
10M	100.0 ns	9.6 s
100M	10.0 ns	0.96 s
1G	1.0 ns	96.0 ns
10G	0.1 ns	9.6 ns

Minimum IFG

To improve efficiency, some network elements support frame gaps lower than 12 bytes, but the non-standard implementation is not wide-spread and not generally recommended.
Frame Size Efficiency
VLAN Tagging
MPLS
MAC Addresses

Where do you want to go next?

Ethernet Frames
Ethernet Overview
Working Desktop
index

Technology: Frame Size Details

64 or 1518 bytes are used most often since these represent the normal minimum and maximum frame size allowed by the network.
The standard frame sizes for Ethernet testing are 64, 128, 256, 512, 1024, 1280, and 1518 bytes.
When testing RFC2544 with VLAN and/or MPLS tags, 64 bytes is no longer a proper frame length.
With systems that support jumbo frames, such as 4096- or 9000- byte frames, these frame sizes should be tested as well.
The RxT 10GE defaults to the frame size defined in RFC 2544, but allows you to set the frame size to any valid value.

Test Layer	Undersized	Oversized	FE	GE

Layer 1: FCS/CRC	N/A	N/A	20—20480	20—65535
Layer 2: MAC	Under 64	Over 1518	38—20480	38—65535
L2 + VLAN	Under 68	Over 1522	42—20480	42—65535
Layer 3: MAC + IP	Under 64	Over 1518	58—20480	58—65535
L3 + VLAN	Under 68	Over 1522	62—20480	62—65535

Table 10/100/1000M Ethernet Frame Length Options.

Where do you want to go next?

Stream - Frame -Setup
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Working Desktop
index

Technology: Multicast Frames

Layer 2 Multicast Frames
Typically, a multicast frame is a frame that is intended for multiple devices on the network. They use a special 24-bit prefix of 01-00-5E for the destination MAC address field; but any frame with an odd value in the first byte of the destination address is counted as a multicast frame:
x1-xx-xx-xx-xx-xx
x3-xx-xx-xx-xx-xx
x5-xx-xx-xx-xx-xx
x7-xx-xx-xx-xx-xx
x9-xx-xx-xx-xx-xx
xB-xx-xx-xx-xx-xx
xD-xx-xx-xx-xx-xx
xF-xx-xx-xx-xx-xx
where "x" can be any value, 0 to F.
Where do you want to go next?

Ethernet Frames
Ethernet Overview
Throughput Stream Results
Working Desktop
index

Technology: Unicast/Multicast Testing Note

Most Ethernet testing is performed with unicast traffic. One tester generates unicast frames that are received by the far end unit, which is either sending unicast traffic of its own or looping the frames by swapping the source and destination addresses. Furthermore, different test streams can be designated by their MAC addresses.
When testing multicast services, some care must be taken. Loopback devices will not loop multicast (or broadcast) traffic. Also, the use of multicast MAC destination addresses may cause problems designating test traffic. As shown below, the MAC addresses sent by a tester do not match the MAC addressed received.

	MAC Source	MAC Destination
Generated	00-D0-DD-12-34-56	01-00-5E-00-00-05

Received	00-D0-DD-AB-CD-EF	01-00-5E-00-00-06

Sample MAC Addresses

Thus, when running this test, the test summary will show "NO BERT TRAFFIC" since the incoming traffic does not match that sent. Fortunately, all normal traffic statistics and measurements can be made, with the exception of bit errors and BER.

Where do you want to go next?

Ethernet Frames
Ethernet MAC Addresses
Tech: Multicast Frames
Ethernet Overview
Working Desktop
index

Technology: Undersized Frames

Some VLAN and MPLS frames may be undersized even if they fall within standard Ethernet frame sizes. For example, a 64-byte frame with VLAN is too short — the length must be at least 68 bytes.
For Unframed tests, only Bit Errors are reported.
Where do you want to go next?

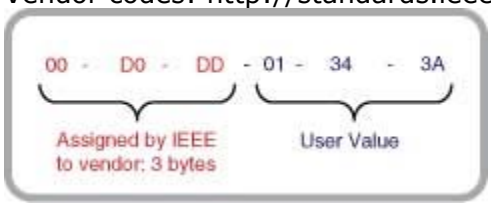
Ethernet Frames
Ethernet Overview
Throughput Stream Results
Working Desktop
index

Technology: Ethernet MAC Addresses

The MAC addresses is six bytes, written in hexadecimal.

- The first three bytes contain a vendor code, also known as the OUI (Organizationally Unique Identifier) or company_id.
- The last three bytes contain a unique station ID. Vendor codes are assigned and administered by the IEEE.

The OUI for Sunrise Telecom is 00-D0-DD. The station IDs are assigned by the manufacturers are often tied to the serial number of the device.
Vendor codes: http://standards.ieee.org/regauth/oui/oui.txt



MAC Address Format

Unicast: Most Ethernet traffic is designated to travel from one station to another specific station. This is called unicast traffic.
Broadcast Ethernet traffic is sent to all stations on the network; such frames are given a MAC destination of all-ones: FF-FF-FF-FF-FF-FF. Because broadcast traffic is very polluting, it should be avoided whenever possible.

Multicast traffic is sent from one station, but is then directed to a group of stations. Multicasting is more efficient and more network-friendly than broadcasting. Typical applications for multicast traffic include IP video delivery and LAN protocols.
Multicast traffic is designated by setting the first bit of the address to 1. Because the least significant bit is transmitted first, this means the last bit of the first byte is set to 1; in other words, the byte value is odd. The MAC vendor code used for IP multicast packets it typically 01-00-5E-xx-xx-xx, as specified by RFC 1112.
Unicast/Multicast Testing Note

IPG
Frame Size Efficiency
VLAN Tagging
MPLS

Where do you want to go next?

Ethernet Frames
Ethernet Overview
Working Desktop
index

Technology: Gaussian Frame Probability

The probability that a given frame length will be sent is given the following function:

$$P(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma^2} \qquad Width = 2\sigma\sqrt{2\ln 2}$$

X is the frame length, μ is the mean o r average, and σ is the standard deviation. The variance determines the width of the distribution (as measured at half its maximum value).
In the RxT 10GE, you specify the width (Width at 50%), which then sets the standard deviation of the distribution. Approximately two-thirds of the frames sent will be within one standard deviation of the mean.

Where do you want to go next?

Tech: Ethernet Overview
Stream Frame Setup
Working Desktop
index

Technology: IP Overview

TCP Routers Gateways ICMP and Ping DNS DHCP ARP

IP

Internet Protocol is the language computers on the Internet use to talk to one another.

IP Packet

To send a message using IP, the computer adds extra information, known as the IP header, in front of the message, creating an IP packet. The IP header contains the address of the computer meant to receive the message, as well as the address of the sender. It is like regular mail: the IP header is the envelope, with the recipient address and the sender addresses on it, and the message itself is inside. In this case the addresses are numbers, like "67.34.22.199". The IP packet is sent to the Internet, over Ethernet, DSL, or PPP.

The computers that make up the Internet itself look at the destination address in the IP header, and forward the packet on, from one to another, until it gets to where it is going, just as the Post Office forwards envelopes from one sorting office to the next until it is finally sent out for delivery.

TCP

IP is unreliable: packets can get lost due to faults or overloads in the network. If a packet does get lost the sender has no way of knowing. TCP (Transmission Control Protocol) is designed to fix this. Nearly everything that happens on the Internet – web browsing, e-mail, instant messaging, etc – uses TCP.

TCP adds its own header to the message, saying how much data it has already sent and how much it has received from the other end. The combination of TCP header and the actual message is then wrapped in IP and sent to the network, hopefully to reach the addressed computer - usually after passing through many, many forwarding computers on the way.

When the recipient computer receives the TCP message it sends an acknowledgment back. If the original sender sees that acknowledgment, then all is well: the next message can be sent.

If the sender does not get an acknowledgment within a reasonable time, it sends the message again, repeating this until it knows the message has got through, or until it eventually gives up and assumes that the network is broken.

In reality, TCP acknowledges many messages at a time, while simultaneously sending its own messages. For example, a TCP header might say "I have received all your messages up to number 97, and here is my message number 38".

ICMP and Ping

ICMP (Internet Control Message Protocol), like TCP, uses IP to communicate from one computer to another. Unlike with TCP, these messages do not carry information of interest to users; instead they let the computers find out about one another.

One important type of ICMP message is called echo request. When one computer wants to check that it can reach another, it sends it echo request ICMP packet, which asks ”r;are you there?” When the other end receives that, it sends back a reply, called an echo response, meaning ”yes, I am here”. This process is called a ping. By sending a series of pings it is possible to learn a lot about the state of the network.

If we send a series of echo requests and never get any echo replies, then something is broken: perhaps the network itself is down, or perhaps the computer we are trying to reach has lost its network connection.

If we send a series of echo requests, but only get replies to some of them, then the network and remote computer are working, but not very well: some IP packets are

getting lost. Even though TCP can compensate for lost packets, there is a limit to how much it can do – and every time a packet gets lost TCP has to send it again, making the overall network slower.
As a rough guide, anything more than about 10% packet loss will break TCP, and anything more than 1% will tend to make it painfully slow. A well engineered network should have negligible packet loss.
Each time we send an echo request, we can time how long it takes for the echo reply to come back. This can tell us something about the quality of the network connection. For example, if it takes a second for the reply to come back, then there is a long network delay which probably makes it unusable for some delay-sensitive applications, such as voice.

Routers

A router is a computer in the core of the network that forwards – routes – packets from one part of the network to another. It has multiple network interfaces, each connected to another router. Every time it receives a packet, a router looks at the destination IP address in the IP header, consults its internal tables to decide what to do with the packet, and then forwards it on, usually over a different network interface to a different router.
The backbone of the Internet is made up of thousands of routers, working in collaboration to forward packets from one to another, until they reach their destination.

Gateways

A gateway is a router that provides access to the Internet for user computers; it connects dissimilar networks and passes information between them.. On one side it has one or more connections to network of routers that make up the internet. On the other side it connects to individual computers.
In TCP/IP, the default gateway address is the address where the Internet protocol sends packets destined for remote networks, unless a different route is configured. Only used for static IP.
There is no fundamental difference between what a gateway does and what a router does (and the terms are often used interchangeably). They both take in packets on one interface, and forward them out of another, according to the destination IP address.
The difference is in their position in the network. Routers live inside the network, communicating with one another. Gateways live at the edge of the network, communicating between routers and individual users.

DNS

The DNS (Domain Name System) was created to handle the challenge of both remembering IP addresses and the fact that computer addresses may change over time. DNS runs on computers known as Name Servers. They have regularly updated tables of the names and IP addresses of all known computers on the Internet.
When you type ”r;www.google.com” into the address bar of your web browser, the first thing that happens is that a DNS request is sent to one of the name servers saying ”r;what is the IP address of www.google.com?” The name server will reply with the numerical IP address, such as 208.67.219.230. Your computer will then use that address in its IP packets to communicate with Google’s servers.

DHCP

DHCP (Dynamic Host Control Protocol) is the way a computer which is just joining the Internet can find its own IP address and other information, such as the IP addresses of the name server gateway to use.
When the network software is starting up, it sends out a DHCP message in an IP message which has a special type of destination address called a Broadcast address. This will be received by all computers connected to the same network segment and

one (or more) of them will reply, giving the IP address that should be used and other information.
ARP
The ARP (Address Resolution Protocol) allows a networked computer to search for a computer with a particular IP address. ARP is important on LANs, such as Ethernet, where there may be many computers attached to the network, but IP packets should only be sent to one of them.
To find another computer, an ARP message is sent saying "who has IP address 192.168.1.2?" All of the computers on the network will see that message, but only the one with that IP address will respond, saying "r;that's me, at Ethernet address 12:34:56:78:9A:BC". From then on, IP packets for 192.168.1.2 will be sent to Ethernet address 12:34:56:78:9A:BC, so that only that computer will see them: all the others on the network will filter out those packets.

Where do you want to go next?

IP Test Setup
IP Testing
Throughput Test Setup
RFC2544 Applications
Working Desktop
index

Technology: IP Packet Diagram

* such as TCP or UDP

Where do you want to go next?
Working Desktop
index

Technology: Jitter

Jitter affects both digital (generation of bit errors, uncontrolled slips) and analog signals (unwanted phase modulation of the transmitted signal). Essentially, jitter is an unwanted phase modulation of the digital signal. Jitter may cause errors or bit slips in a digital circuit, and deteriorate the performance of a transmission network (which is why you look for bit and other errors when testing jitter tolerance).
Jitter is classified as systematic and random jitter.

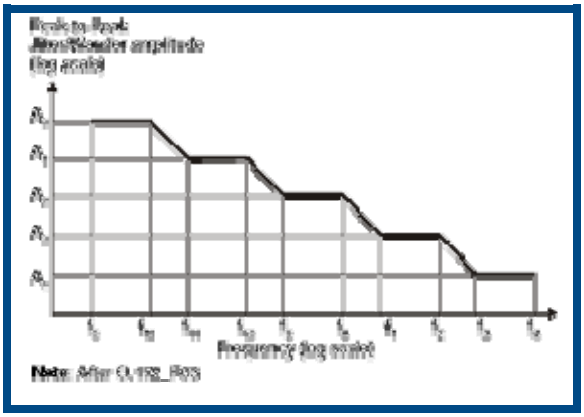
- Systematic jitter is pattern-dependent. In lower-rate digital systems, systematic jitter is dominant.
- Random jitter is independent of the transmitted pattern. In higher-rate systems, the random jitter may become more important.
- Packet Jitter**:** Measures the variation in arrival rates between individual packets in the same stream, which is called one-way delay. The difference is called IP Packet Delay Variation (ipvd).

Test environment parameters which affect the jitter performance are test sequences, bit rate, pulse shape, cable characteristics, temperature, cross-talk, and noise.
Network equipment must be able to operate in the presence of some jitter (jitter tolerance).
Output jitter measurement can be classified into two categories.

- Network output jitter (at hierarchical interface)
- Intrinsic jitter (generated by individual digital equipment)

Packet jitter is described in RFC 3393: IP Packet Delay Variation Metric for IP Performance Metrics (IPPM).

Jitter measurements are classified into three types: Output Jitter, Jitter Tolerance and Jitter Transfer. Output Jitter measures the amount of jitter at the network element output, either PDH or SDH. ITU-T defines a limit for a jitter output for every interface, which should not affect the quality of the transmission. Excess jitter in the signal will be reflected as bit errors when data is being transported, or as voice distortion if voice traffic is being carried.
The limits for maximum output jitter are defined by ITU-T G.823 (PDH interfaces), G.824 (T-Carrier interfaces) and G.825 (SDH interfaces).



Jitter Amplitude Measurement vs. Frequency Range

RFC 4689 defines packet jitter as the absolute value of the difference between the Forwarding Delay of two consecutive received packets belonging to the same stream.

ITU-T O.171 and O.172 define a range to measure jitter amplitude (Unit Intervals) over a range of frequencies (Hz).
The amplitude and frequency vary with the test interface being tested. The jitter test equipment normally uses the filter to cover these ranges. Jitter measurements normally start at 10 Hz (f1), whereas wander measurement includes all the frequency
ranges under 10 Hz.
Wideband measurements are normally performed from f0 (2 Hz) or f1 to f4, and are used to detect low frequency jitter. Highband frequency measurements (from f3 to f4) are used to identify the presence of high frequency jitter in the network.
Jitter Tolerance and Jitter Transfer have also been defined by ITU to set a limit that network elements, regenerators, multiplexers and other vendors must meet in order for the network to transmit error free signals.

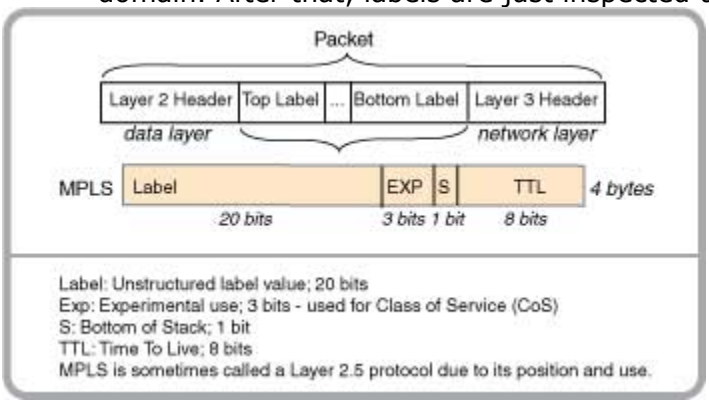
Where do you want to go next?

Summary Results
Aggregate Results
Throughput Stream Results
Working Desktop
index

Technology: MPLS

MultiProtocol Label Switching architecture provides a unified data-carrying service/simple routing for both circuit-based clients and packet-switching clients providing a datagram service model.

- It allows voice, IP, ATM, Frame Relay and Ethernet services all to be carried on the same network.
- It can be used with many types of framing, including Ethernet.
- The Layer 3 label analysis is only just once, when the packet enters the *MPLS* domain. After that, labels are just inspected to continue packet forwarding.



MPLS Structure

The **MPLS header** contains a 'stack' of one or more labels. A label has four fields:

- 20-bit label value
- 3-bit field for CoS priority (experimental)
- 1-bit bottom of stack flag. If used, it signifies the current label is the last in the stack
- 8-bit TTL (time to live) field; The Time to Live label will expire at the conclusion of this number of time-to-live hops.

- The Experimental field can be used to distinguish classes of service, or per hop behavior, for differing classes of traffic traveling within the MPLS tunnel (AKA Label Switched Path - LSP). Alternatively, an LSP carrying a single traffic class uses the label to determine the per hop behavior of the class.

Frame Size Efficiency
VLAN Tagging
MAC Addresses
IPG

Where do you want to go next?

Ethernet Frames
Ethernet Overview
Throughput Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Throughput Stream Results
Working Desktop
index

Technology: Ethernet Optical Line Encoding

Before being transmitted across optical fiber, the bits of the Ethernet signal are converted using an encoding scheme known as 8B/10B encoding (for Gigabit Ethernet) or 64B/66B encoding (for 10 Gigabit Ethernet). A receiving device reverses the encoding, so that the encoding is completely transparent to the user.
Encoding helps to ensure a balanced transmission of 1s and 0s in the signal which aids in DC balance and clock recovery.
8B/10B Encoding
8B/10B encoding takes each block of 8 bits and translated them into a code word that is 10 bits long. For a Gigabit Ethernet, this means the number of bits transmitted is actually 1.25 Gbps (1 Gbps x 10 bits / 8 bits). With 10 bits, there are 1024 unique code words for mapping 256 possible 8-bit data blocks.

- Many code words are not used.
- Some are reserved for link-level signaling.
- In many cases, a single 8-bit block can be mapped into one of two code words that are bitwise inverts of each other.

Code words are chosen in such a manner so as the number of 1s and 0s balance out in a process called running disparity. A violation of these rules is called a disparity error.
Note: The 8 data bits are actually first broken into 5-bit and 3-bit blocks which are encoded separately into 6- and 4-bit code words, but for the purposes of this discussion, thinking of the encoding process as a single step of 8-bits to 10-bits is sufficient.
64B/66B Encoding
64B/66B encoding serves a similar function but uses a different method of mapping data bits into code words.
The 64 data bits (8 bytes) are scrambled, and then a 2-bit synchronization header is added.
For 10GE LAN, the physical line rate is actually 10.3125 Gbps (10G x 66 bits / 64 bits).

For 10GE WAN, the encoding is done before the Ethernet payload is placed side the OC-192c/STM-64c payload envelope.

Where do you want to go next?

Ethernet Overview
Working Desktop
index

Technology: VLAN User Priority

Home

The User Priority may affect the speed and efficiency with which the frame data will be transmitted through the Ethernet network.

User Priority	Traffic Type
0	Best Effort
1	Background
2	Spare
3	Excellent Effort
4	Controlled Load
5	Video < 100 ms latency and jitter
6	Voice < 10 ms latency and jitter
7	Network Control

User Priority Table

Where do you want to go next?

Stream - VLAN - Setup
Stream Table Setup
Throughput Summary Results
Throughput Aggregate Results
Tech: Ethernet Overview
Home

RFC2544 Testing

RFC2544 Test Profile

In the Carrier Class Ethernet mode, perform RFC 2544 testing. The signal graphic both reflects the port and test setup, and gives you access to the associated configuration screens. See the RC2544 Test Notes. Before you begin testing, make sure the link is up.

Parameter	Options	Details
Type	RFC2544, NE TEST	• An **RFC2544** test tests a device by transmitting various frame lengths at different rates to find the maximum throughput rate. • An **NE** test stresses a NE at a variety of rates, which you define.
Test Type*	Point to Point, Dual Ports	View or set the port connections. RFC-2544 tests require the use of two ports. RFC 2544 may be run between two different ports such as: XFP - SFP XFP - RJ-45 SFP - SFP SFP - RJ-45 RJ-45 – RJ-45 • If you need to change the connection, touch first the TX port, then the RX port you want to have work with it. • Pair the TX port with the matching RX port, unless otherwise indicated by your design.
* The most common method of using RFC2544 for testing Ethernet services, as opposed to Ethernet devices, is to transmit frames through the network to the far end, where they are looped back and sent back to the test module. In this configuration, the TX and RX test port should be the same. However, there are times when the TX and RX test port need to be different, such as when testing a switch or when the TX and RX line rates are different. For example, if you were to transmit from a 10GE port to a GE port, the throughput rate couldn't be higher than 10%, since 1 Gigabit Ethernet is 10% of the bandwidth of 10 Gigabit Ethernet.		

Test Sequence	
Check the types of tests to run.	
Throughput	RFC 2544 tests use a binary search to determine the maximum traffic rate (expressed as a percentage) the DUT can pass without losing any frames. For RFC-2544 & NE Test
Latency/Quick Latency	Determines the round trip delay of the frame through the DUT. • **Standard** follows the guidelines of RFC 2544, which can take

	several hours for a complete test. • **Quick** measures the round trip delay while it is performing the Throughput test and takes no extra time. Results from failed throughput tests are discarded, and only the results from the highest successful throughput test are kept and recorded.
Frame Loss	Generates a table that shows the percentage of lost frames as a function of frame rate, expressed as a percentage. • RFC2544 Frame Loss: Scans DOWN from start rate, with Step Rate, until there are two consecutive no frame loss (for all frames in the setup) results, or until the test reaches the 0 frame rate. • NE Test Frame Loss: Scans UP from the Start Rate, until the Stop Rate, with Step Rate.
Back to Back	Determines the maximum number of frames sent back to- back at 100% frame rate that the DUT can process without losing frames
Estimated Test Time	View an estimation of how long it will take to run the selected tests, in a days, hours, minutes format. This allows you to weigh the detail of the RFC 2544 test vs. the time it will take.

Measurement Setup: Configure how and when results are taken.
Where do you want to go next?
Stream Table Setup
RFC Applications
RFC Summary Results
Working Desktop
index

RFC2544 Test Configuration

Test Notes See the application diagram.

To Configure an RFC-2544 Test

The graphic reflects the test set up. M shows where measurements are taken.

1. Select RFC-2544 under Carrier Class Ethernet on the Test Profiles screen. then press **Setup**.
2. If not already set, choose a port and rate by pressing the **RJ45 / SFP / XFP** button.
3. Configure the Type, Test Type, and Test Sequence as explained below.
4. Press **RFC2544 Setup** to configure frame and test details.
5. Press **Streams Setup** to configure the Stream Table.
   If desired, configure the Capture Filter.
6. Press **START**, then **TEST RESULTS.**

To Configure an RFC2544 NE Stress Test

To stress an RFC2544 network element, tests are performed incrementally for each frame size. This is a burn-in test.

1. Select RFC-2544 under Carrier Class Ethernet on the Test Profiles screen. then press **Setup**.
2. If not already set, choose a port and rate by pressing **RJ45 / SFP / XFP**.
3. Configure NE TEST as the Type,
4. Configure Test Type, and Test Sequence as explained below.
5. Press **RFC2544 Setup** to configure frame and test details:
6. On the Throughput tab, set
   - **Starting Rate**: 10%
   - **Stop Rate**: 100%
   - **Step size**: 10%
7. Press **Streams Setup** to configure the Stream Table.
8. If desired, configure the Capture Filter.
9. Press **START**, then **TEST RESULTS.**

Parameter	Options	Details
Type	RFC2544, NE TEST	• An **RFC2544** test tests a device by transmitting various frame lengths at different rates to find the maximum throughput rate. • An **NE** test stresses a NE at a variety of rates, which you define.
Test Type*	Point to Point, Dual Ports	View or set the port connections. RFC-2544 tests require the use of two ports. RFC 2544 may be run between two different ports such as: XFP - SFP XFP - RJ-45 SFP - SFP SFP - RJ-45

		RJ-45 – RJ-45 • If you need to change the connection, touch first the TX port, then the RX port you want to have work with it. • Pair the TX port with the matching RX port, unless otherwise indicated by your design.

Test Sequence: Check the types of tests to run.

- **Throughput/Latency**: Determine the maximum frame rate that has no lost frames and measure the time it takes for the test frame to pass through the device under test. The latency of each frame is measured.
- **Frame Loss and Back to Back**: Generates a graph that shows the frame loss rate as a function of the frame rate.

  The test begins at the starting rate (usually 100%), sends a number of frames, and then calculates the frame loss rate as a percentage based on the following equation: [(Input count – output count) x 100]/(Input count)
  Back to Back determines the maximum number of frames which can be sent at 100% bandwidth, with minimum inter-frame gap, before a frame is lost. It is also called burstability.
- **Estimated Time**: As you select and configure tests, view the predicted time the tests will take to run.

* The most common method of using RFC2544 for testing Ethernet services, as opposed to Ethernet devices, is to transmit frames through the network to the far end, where they are looped back and sent back to the test module. In this configuration, the TX and RX test port should be the same.
However, there are times when the TX and RX test port need to be different, such as when testing a switch or when the TX and RX line rates are different.

Where do you want to go next?
Stream Table Setup
RFC Applications
RFC Summary Results
Working Desktop
index

RFC2544 Test Notes *Home*

Test Types Latency Frame Loss Rates

Configure an RFC2544 Test

1. If not already set, choose a port.
2. Select Type to RFC-2544 or NE Test, as required.
3. Set Test Type to Point to Point to _____, or to Dual ports if you're going to test on multiple ports.
4. Touch RFC2544 to being configuring the test,
5. Touch 'Streams Setup' to configure the Stream Table (L2 Framed only) if required.
6. Set the Test Sequence, if desired,
7. Configure the Capture Filter
8. Press 'Start'.
9. Press the 'Test Results' tab to view the measurements.

Test Layers

RFC2544 is designed for Layer 2 and Layer 3 devices. As such, each test frame must have a valid MAC header, preamble, and interpacket gap. For testing Layer 3 devices, such as routers, a valid IP header is also required.
Though VLAN support is not mentioned in RFC 2544, VLAN-based services should include the appropriate VLAN tags. Unframed testing, where the payload data is not encapsulated into a valid Ethernet frame, is not compatible with RFC2544 device testing.
RxT 10GE uses a frame payload that consists of a sequence number, a time stamp, and a test pattern specified by the user. The sequence number and time stamp are used to accurately measure lost frames and latency, respectively.

Frame Sizes

The standard frame sizes for Ethernet testing are 64, 128, 256, 512, 1024, 1280, and 1518 bytes. With systems that support jumbo frames, such as 4096- or 9000-byte frames, these frame sizes should be tested as well. The RxT 10GE defaults to the frame size defined in RFC 2544, but allows you to set the frame size to any valid value.

RFC2544 Test Types

Throughput
The throughput test determines the maximum frame rate without lost frames the DUT can manage. The test begins at 100% frame rate by sending a predetermined number of frames, or, more commonly, sending the frames for a predetermined length of time. If any frames are lost, the test is repeated at a lower frame rate. This process continues until the maximum throughput is determined.
Sunrise Telecom uses a binary search algorithm for determining the throughput. The standard test method reduces the throughput by a set increment, such as 10%. This is not the most efficient algorithm available especially for determining the throughput with a better resolution, such as 1%. The binary search changes the throughput value by ever decreasing increments: 50%, 25%, etc. The throughput is increased or decreased depending on the results of the previous test. The algorithm continues to run until the throughput is determined to within the specified resolution, typically 1% to 10%.
Latency
The standard latency test is to run test traffic at the predetermined throughput rate or two minutes, and measure the latency of a single tagged frame sent at least one minute into test. The reported latency is the average of twenty such tests.
Strict adherence to the standard would require 280 minutes, over four hours, to complete for all frame sizes. The RxT 10GE provides the option to instead perform a 'Quick Latency” test that eliminates the need to run a separate and time consuming latency test. During the throughput test, the latency of the test frames is measured and averaged. Results from failed throughput tests are discarded. The latency results from the highest successful throughput test are kept and reported. Latency results as a function of frame size and throughput are tabularized.
Frame Loss Rate
The frame loss rate test plots the frame loss as a function of utilization. Similar to the throughput test, the test begins at 100% frame rate by sending a predetermined number of frames, and recording the percentage of lost frames. The bandwidth is reduced by a preset amount, 10% or less, and the test is repeated. If two successive trials result in no frame loss, the lower rates are not tested and assumed to have zero frame loss. This test is repeated for each frame size.

Where do you want to go next?

RFC2544 Signal Setup
RFC2544 Throughput Application
RFC2544 NE Stress Test Configuration
Home

RFC2544 Applications

RxT 10GE uses UDP echo request frames, as specified by RFC2544.
See the application diagram.

RFC2544 Throughput Test
RFC2544 is an automated test which will transmit a variety of frame lengths at different frame rates to find the optimal performance of the device under test (DUT). The signal configuration is the same as BERT, but without the need to specify frame length, traffic setting, or test pattern. The Test Layer selection and Stream Table for RFC2544 is identical to that for BERT.
To configure an RFC2544 throughput test, select RFC2544NE Test as the test mode on the Test Profile. Configure the Layer and Filter Selection (if desired). Only 1 stream is allowed. On the Test Setup window, click the graphic to configure the test details.

RFC2544 NE Stress Test
In a Network Element (NE) stress test, tests are performed incrementally for each frame size. NE tests are particularly useful for longer burn-in tests.
To configure an NE stress test, select RFC-2544 as the test on the Test Profile window, then set the Test Mode to NE test Type on the Test Setup. On the Throughput Latency tab, set the Starting and Stop Rates as well as the Step Size.

Make sure the laser is on, then Press **START** on the Action Bar to start a test.

Where do you want to go next?

RFC2544 Applications
RFC2544 Summary Results
IP Test Setup
Throughput Test Setup
Home

RFC2544 One Tester Application Diagram

RFC2544 Throughput and NE Test Setup

Where do you want to go next?

RFC Applications
RFC Thruput Application
RFC2544 Throughput Test Setup
RFC2544 NE Stress Test Configuration
index

RFC2544 Throughput Application

Test Notes

The following sample test presumes the use of an RJ-45 port for a RFC2544 throughput test. The test operates between two RxT 10GE modules or two test ports on the same module. Configure your port, then follow this procedure.

See the application diagram.

1. On the Test Profile window, select RFC-2544 as the Carrier Class Ethernet test.
2. On the Test Setup window,
   - Select RFC2544 or NETEST as the test Type
   - Select Dualport to run a test with one module, or Point to Point to test with two modules.
   - Configure the Test Sequence. Tap each test you want to run: Select Throughput, Latency, and Frame Loss.
   - Touch the graphic. The RFC2544 Setup window opens.
3. Configure the Throughput/Latency tab.
   Duration: Enter a Time of 10 seconds; longer values will increase testing time proportionately.
   When performing delay measurements over a network with more than 1 ms of delay, the average reported delay may be smaller than the minimum reported delay. Use the Maximum delay as the benchmark for delay testing.
   Starting Rate: 100%.
   Resolution: As desired—1% is typical.
4. Configure the Frame Size tab.
   - Check 64, 128, 256, 512, 1024, 1280, and 1518.
   - Selecting fewer frames will decrease testing time proportionately.
5. Configure the Frame Loss/Back to Back tab.
   Duration: Enter a Time of 10 seconds; longer values will increase testing time proportionately.
   -- **Starting Rate**: 100%.
   -- **Step size**: As desired; 10% is typical.
6. Configure the second test port or the far end module with a software loopback as follows:
Menu test type: Loopback
--**Mode**: Manual
--**Layer**: Layer 2
7. Make sure the laser is on, then Press **START** on the Action Bar to start the RFC2544 tests. The Summary measurement window will open automatically after a few moments.

Where do you want to go next?

RFC2544 Applications
RFC2544 Summary Results
Aggregate Results
index

RFC2544 Frame Size Setup

Set the frame sizes to test. RxT 10GE offers the standard frames sizes: 64, 128, 256, 512, 1024, 1280, 1518, 4096, 8192, 12,000.
The Frame Length row shows frame sizes in bytes.

- Check the corresponding box above for each frame size you want to test; active sizes are highlighted in orange.
- The default frame sizes are based on RFC 2544, but all are user-configurable.

To Edit Frame Sizes and Thresholds

1. To enable Thresholds, check 'Thresholds Enabled' below the frame grid.
2. Tick the box for each Frame Length you want to test. 'Edit' appears below each ticked column.
3. Press **Edit**, and configure the Frame Length, Throughput rate, and Latency period.

When testing with VLAN and/or MPLS tags, 64 bytes is no longer a proper frame length, and it does not appear on the list of frame sizes. However, it can be added using the Custom Frame Size field.

Press the **OK** when you are ready to save the configuration.

These thresholds have no direct effect on the RFC2544 Throughput or Latency results. They are intended to go beyond the RFC2544 standards and provide a means to standardize minimum acceptable results of these tests.

Parameter	Options	Details
Frame Length	34-12,000 frames	Set the required frame size.
Throughput %	1-100 percent	Configure the required Throughput percentage.
Latency	Configure the allowable Latency.	1-100 ms

Press **OK** to keep the changes and return to the RFC2554 Setup window, or press **Cancel** to simply close the Frame Length window.

Non-standard (user) frame sizes are used to test frame sizes that are outsized, such as a jumbo or undersized frames.

Where do you want to go next?

Stream Table Setup
RFC Applications
RFC Summary Results
Working Desktop
index

RFC-2544 Frame Loss & Back to Back Setup

Configure the RFC-2544 frame loss and back-to-back tests. Press **OK** to save the configuration.

Frame Loss

- RFC2544 Frame Loss: Scans DOWN from start rate, with Step Rate, until there are two consecutive no frame loss (for all frames in the setup) results, or until the test reaches the 0 frame rate.
- NE Test Frame Loss: Scans UP from the Start Rate, until the Stop Rate, with Step Rate.

Parameters	Options	Details
Test Type	TIME, FRAMES	Set how measurements will be taken
Duration Time/Frames	Time: 1-99,999 seconds Frames: 10,100-100,000	**Time**: Base measurements on a length of time, which you enter at the 'Time' button. **Frames** (N/A FE): Base measurements on a number of frames.
Start Rate	.01-100%	Set the rate at which frames will begin being transmitted. The rate recommended by RFC2544 is 100%.
Stop Rate	.01-100%	Set the rate at which frames will stop being transmitted. N/A RFC2544 test.
Rate Step Size	.01-100%	Determine the size (percentage) of each rate step. • The RFC 2544 default is steps of 10%.

Back to Back

Back-to-Back testing determines the maximum number of frames sent back-to-back at 100% frame rate that the DUT can process without losing frames.

Back-to-Back Testing Notes

Parameters	Options	Details
Time Duration	2-100 seconds	Enter the amount of time the frames will be sent initially.
Max Duration	2-100 seconds	Enter the longest amount of time, in seconds, the frames will be sent back-to-back. • In a perfect network, the duration is infinite, so the maximum duration is used to place a realistic cap on the time it takes to run the test.
Repetitions	1-100	Enter the number of times the test will be run. • The average result will be taken over all repetitions. Each repetition of the test can include many cycles of changing the duration and the number of frames sent.

Press **OK** to confirm the changes and close the window.
Press **CANCEL** to close the window without savings changes.
Where do you want to go next?

RFC2544 Back-to-Back Testing Notes

At the start of the test, the RxT 10GE will send frames back-to-back for the specified duration.

- If the test runs without losing frames, the duration will be increased and the test redone until frames are lost or until the maximum duration is reached.
- If frames are lost, the duration will be reduced until no frames are lost.
- This cycle will continue until the specified resolution is reached.
- Once completed, this is counted as one repetition; the test is then repeated, starting at the original duration, for the number of repetitions specified.

Where do you want to go next?

RFC2544 Back-to-Back Setup
RFC2544 Throughput Test Setup
RFC2544 NE Stress Test Configuration
RFC2544 Applications
RFC2544 Summary Results
index

RFC2544 Throughput Latency Setup

Select RFC2544/NE Test as the test type on the RFC2544 Signal setup window to perform RFC-2544 tests.

Throughput/(Quick) Latency - NE		
Parameter	**Options**	**Details**
Duration	**Time, Frames**	Set how measurements will be taken. **TIME**: Base measurements on a length of time. **FRAMES**: Base measurements on a number of frames
Frames	• 10/100M: N/A • GigE Options: 10,000-1,000,000 • 10GE Options: 10,000-10,000,000	Duration = Frames
Time	4-60 seconds	Duration = Time
Start Rate	.01-100%	Set the rate at which frames will begin being transmitted. • 100% is a good starting rate for a standard RFC test, recommended in RFC 2544. • For NE testing, select the rate applicable to your setup.
Stop Rate	01-100%	Set the rate at which frames will stop being transmitted. 100% is typical.

Rate Step Size * (N/A RFC2544 test)	01-100%	Each step increases (or decreases) the traffic rate by the specified amount. The NE Test tests the throughput and/or latency at different test rates and gives the result for each one.
*RFC2544 specifies a default resolution of 10%. This means if the true throughput rate of the DUT was 98.5%, the test would report 90%. In some cases, higher precision is required, hence the default for the test set is set to 1.0%. Make sure to set the Starting and Stop Rates when configuring an NE test.		

Standard Latency

Latency measures the time it takes for the test frame to pass through the device under test. The latency of each frame is measured. Set Standard or Quick Latency in the Test Sequence area on the setup window

Parameter	Options	Details
Duration	1-99,999 seconds	Determine for how long each frame size will be transmitted
Start Rate,Stop Rate (NE Test)		see above
Rate Step Size (NE Test)		Each step increases (or decreases) the traffic rate by the specified amount. The NE Test tests the throughput and/or latency at different test rates and gives the result for each one. N/A RFC2544 test
Warm-up	.01-100 seconds	Determine the amount of time to transmit frames before taking the latency measurement. RFC 2544 recommends 60 seconds.
Repetitions	1-50	Determine the number of repetitions taken for averaging. RFC 2544 recommends 20 repetitions.
Rate Type (RFC2544)	THROUGHPUT: Use the found rate. CUSTOM: Enter a specific rate.	CUSTOM: Use the -/+ gadget to enter the required test rate.

Press **OK** to confirm the changes and close the window.
Press **CANCEL** to close the window without savings changes.

Where do you want to go next?
Stream Table Setup
RFC Applications
RFC Summary Results
Working Desktop
index

RFC2544 Summary Results

View the overall RFC2544 results, including a Status report, such as "Pass" or "Fail"

- NE test results include the throughput status for each frame rate, with "Pass" or "Fail" result.
- For Throughput, the "Pass/Fail" message is an indication of whether or not any frames were lost during the test. This has no bearing on the Thresholds set in the configuration.

E Time: Time elapsed since the test was started.
R Time: Time remaining in the test; a countdown, or Continuous.
Left Results Table

Statistic	Meaning
Seq#	Sequence number denoting the order and repetitions of the tests.
Test	Type of test.
Size	Frame size under test.
Rate	The throughput rate currently being tested is reported, in percentage of bandwidth.
Frames	Number of frames tested. Applies to Back-to-Back frames test.
Status	Test status; in progress/pass/fail, percentage of frames lost.

Status

Statistic	Meaning
TX Utilization (%)	Transmitted percentage bandwidth utilization
TX Line Rate (kb/s)	Transmitted data rate (in kbps, bps, etc.).
TX Data Rate (kb/s)	Transmit data rate (in kbps, bps, etc.).
RX Utilization (%)	Received percentage bandwidth utilization.
RX Line Rate (kb/s)	Receive data rate (in kbps, bps, etc).
RX Data Rate (kb/s)	Receive data rate (in kbps, bps, etc).
Capture Status	
Capture Packets	

To view the link status and test summary when a test active, press **Tests** on the Test Setup window.
Signal
The signal information for optical interfaces (vendor, wavelength, optical power, etc.) is provided by the SFP module. Not all manufacturers supply this information, and Sunrise Telecom Inc. is not responsible for modules provided by other vendors.

- **Vendor**: Name of the vendor;
- **Wavelength**: Optical wavelength in use at the port.
- **RX Optical Power (Uw)** received in microamps**.**
- **RX Power (kbps)**: Received in dBm.

Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup

RFC2544 Applications
Working Desktop
Index

RFC2544 Thruput Latency Results

View the throughput and latency results for each selected frame size, in tabular form.
Latency results are shown by frame size and throughput, in microseconds.

- **Quick Latency**: Results from the highest successful throughput test.
- **Standard Latency**: Runs traffic at the set throughput rate for two minutes, measuring the latency of a single tagged frame sent a minute into the test; the reported latency is the result of twenty such tests.

Frame Size: Frame size, in bytes.
Throughput: Throughput **Percentage**, and In Progress/Pass/Fail/No Link **Status**.

- The rate passes if it meets or exceeds the Throughput standard.

Latency: View the **Average**, **Maximum**, and **Minimum** latency results in microseconds, and the link **Status** for each frame size.
Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup
RFC2544 Applications
Working Desktop
Index

RFC2544 Thruput Chart Results

The graph presents Throughput results.

- Horizontal axis: Size of each frame under test
- Vertical axis: Frame rate (percentage of 100% maximum).

Each result is the maximum throughput rate for the frame size.

See the Throughput/Latency tab for exact values.

If you use very small values, you will need to zoom in to see the results.
Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup
RFC2544 Applications
Working Desktop
Index

RFC2544 Back-to-Back Table Results

This function determines the maximum number of frames sent back-to-back with minimal IPG (in other words, at 100% frame rate) that the DUT can process without losing frames.
The test begins with a specified number of frames and repeats with more or fewer frames until it determines the maximum number. As always, this is repeated for each frame size.

- The Average, Minimum, and Maximum number of frames processed without error for each frame size is shown in the table.

Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup
RFC2544 Applications
Working Desktop
Index

RFC2544 Frame Loss Table Results

- View the percentage of frames of each size lost for the indicated Input Rate.
- Frames are plotted as a function of bandwidth utilization.
- See the Frame Loss Chart for a graphical representation of the results.

Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup
RFC2544 Applications
Working Desktop
Index

RFC2544 Frame Loss Chart Results

View the percentage of frames of each size lost for the indicated input rate; each rate has its own color. See the Frame Loss Table for the table of the results.

- The graph plots the frame loss as a function of frame rate (as a percentage of the maximum frame rate) and frame size.
- Different frame sizes are shown in different colors (see the color/size key to the right side the graph itself for reference).
- A perfect test results on 0.00% frame loss for all throughput rates and frame sizes. This will cause the graph to appear blank. Confirm the results with the tabular results.

Where do you want to go next?
RFC2544 Aggregate Results
RFC2544 Throughput Test Setup
RFC2544 Applications
Working Desktop
Index

IP Advanced Test Profile

After turning up the Ethernet link, select IP ADVANCED FEATURES. Perform advanced IP connectivity analysis, with expert PING testing with statistics, trace route testing, and VLAN scans. Press **SETUP** to configure to start configuring your test: PING, TRACEROUTE, FTP, HTTP.

To Configure an IP Test

1. Select Throughput under Carrier Class Ethernet, then press **Setup**.
2. If not already set, choose a port by pressing the RJ45/SFP button.
3. Configure the Address Setup, VLAN SETUP (if required), and test specific setup.
   - If desired, configure the Capture Filter.
4. Press **START**, then **TEST RESULTS**.

Before you begin testing, make sure the link is up.

To send loopback commands in a test, press the **L2 Loop** button in the Action Bar. To start the test, press **Start** in the Action Bar. The results Summary screen will appear.

Where do you want to go next?

Meas. Setup
IP Test Setup
Working Desktop
index

IP Advanced Test Ping Setup

The IP test tests end-to-end connectivity between active IP stations, providing various performance related statistics. The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens (Layer 2 tests).

To Configure an Advanced IP Test

1. Select IP Advanced Test under Carrier Class Ethernet on the Test Profile screen, then press **Setup**.
2. If not already set, choose a port by pressing the RJ45/SFP/XFP button.
3. Set the IP Test Type: Ping
4. Configure the Address Setup, VLAN Setup, and PING Setup.
5. If desired, configure the Capture Filter
6. Press **START**, then **TEST RESULTS**.

Before you begin testing, make sure the link is up.

Parameter	Options	Details
IP Test Type	• **PING**: Commonly used to discover whether two remote LAN segments, using TCP-IP protocol, are connected. • **TRACEROUTE**: Trace the route (see each hop) to the far end device • **FTP**:Web transfer testing • **HTTP**: Web access testing • **VLAN SCAN**: Scan and report all VLAN IDs observed on the test interface.	Select the type of test. Ping and trace route tests typically requires two RxT modules, or a RxT and a MTT-28/-29/-50 module. However, the ping test can also be used to ping a distant router directly, provided its IP address or URL are known, and the end router has been configured to respond to pings. Also note that some networks are set to not allow ping packets through. In that case, this test will not provide useful results.
Caution: If you are sending packets to your responder via a router or other device with its own IP address, make sure to set the Destination MAC to the MAC address or router, NOT the responder. Otherwise, the router will likely discard the packets (without ARP in use).If you are staying down at layer 2 (MAC) this does not apply. IP works fine if all the devices are on the same local network segment. This applies when sending traffic off your local network segment.		

Where do you want to go next?
Meas. Setup
IP Advanced Test Profile
Working Desktop
index

Ping Results

Status
Ping test messages appear in this field. The number of Pings Sent is reported in the Status Bar, as is the number of Pings Remaining to be sent.

Even though the test set generates pings, there are circumstances which cause the pings not to be sent. For example, the port could lose link or be paused, preventing the transmission of the Ethernet frames in which the ping packets reside. In these situations, the number of pings sent will not be displayed to avoid confusion.

Ping Results

View the overall Ping Test results.

Statistic	Meaning
IP Address	IP address the pings were sent to.
Sent	Number of transmitted pings.
Received	Number of correct echo responses received .
Lost	Number echo responses missing.
Unreachable	Number of echo responses with an 'unreach' flag.
TTL Exceed	Number of pings which exceeded TTL and timed out.
Round Trip Delay (ms)	Current: Current ping round trip delay. Average: Average of all round trip delay. Minimum: Maximum value of round trip delay. Maximum: Minimum value of round trip delay.

Where do you want to go next?

IP Test Setup
Ping Trace Route Results
Working Desktop
index

Echo Results

Get details on the transmitted pings and received ping echoes.
Observe the following for each ping response:

- Source addresses
- Destination address
- PING size in bytes
- PING round-trip time, in microseconds
- TTL of the inbound packet

The details are for reference only.
Only one line is displayed per second, even if the ping rate is higher.

Where do you want to go next?

Ping Trace Route Results
Ping Test Results
IP Test Setup
Working Desktop
index

IP Adv Test Traceroute Setup

The IP test tests end-to-end connectivity between active IP stations, providing various performance related statistics. TRACEROUTE maps each hop to the far end. The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens (Layer 2 tests).

To Configure an Advanced IP Trace Route Test

1. Select IP Advanced Test under Carrier Class Ethernet on the Test Profiles/Test Mode screen, then press Setup.
2. If not already set, choose a port by pressing the **RJ45 / SFP / XFP** button.
3. Select IP Test Type: TRACEROUTE.
4. Configure the Address Setup, VLAN Setup, and TRACEROUTE Setup.
5. if desired, configure the Capture Filter
6. Press **START**, then **TEST RESULTS**.

Before you begin testing, make sure the link is up.

Parameter	Options	Details
IP Test Type	• **PING**: Commonly used to discover whether two remote LAN segments, using TCP-IP protocol, are connected. • **TRACEROUTE**: Trace the route (see each hop) to the far end device • **FTP**:Web transfer testing • **HTTP**: Web access testing • **VLAN SCAN**: Scan and report all VLAN IDs observed on the test interface.	Select the type of test.
Caution: If you are sending packets to your responder via a router or other device with its own IP address, make sure to set the Dst MAC to the MAC address or router, NOT the responder. Otherwise, the router will likely discard the packets (without ARP in use). If you are staying down at layer 2 (MAC) this does not apply. IP works fine if all the devices are on the same local network segment. This applies when sending traffic off your local network segment.		

Where do you want to go next?
Meas. Setup
IP Advanced Test Profile
Working Desktop
index

Trace Route Results

The Trace Route results window displays:

- the status of the trace
- the sequence of hops
- the time between hops, between the test port and the destination address.

Select Ping as the IP TEST TYPE on the IP Advanced signal setup window to run a Ping test, and press **OK**, then **Start** to access this results window.

Where do you want to go next?

IP Test Setup
IP Testing
IP Summary Results
Ping Trace Route Setup
index

IP VLAN Setup

To add (turn On) VLAN tags, check the corresponding VLAN box.
Only use if VLAN is in use in your system. See VLAN Setup for details.

- Up to three VLANS are available.
- Enter the TPID, PPI, CFI, and VLAN ID for each VLAN; touch a button, then use the number pad to enter the data.
- See Tech: VLAN Tagging for technology information.

Press **OK** to save your settings and close the window.
Press **Cancel** to close the window without saving changes.
Where do you want to go next?
Meas. Setup
IP Advanced Test Profile
IP Test Setup
Working Desktop
index

IP Advanced Test FTP Setup

The IP test tests end-to-end connectivity between active IP stations, providing various performance related statistics. FTP tests web file transfer. The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens (Layer 2 tests).

To Configure an Advanced IP FTP Test

1. Select IP Advanced Test under Carrier Class Ethernet on the Test Profiles/Test Mode screen, then press **Setup**.
2. If not already set, choose a port by pressing the RJ45/SFP/XFP button.
3. Select IP Test Type: FTP.
4. Configure the Address Setup, VLAN Setup, and FTP Setup.
5. if desired, configure the Capture Filter
6. Press **START**, then **TEST RESULTS**.

Before you begin testing, make sure the link is up.

Parameter	Options	Details
IP Test Type	**PING**: Commonly used to discover whether two remote LAN segments, using TCP-IP protocol, are connected. **TRACEROUTE**: Trace the route (see each hop) to the far end device **FTP**:Web transfer testing **HTTP**: Web access testing	Select the type of test.
Caution: If you are sending packets to your responder via a router or other device with its own IP address, make sure to set the Dst MAC to the MAC address or router, NOT the responder. Otherwise, the router will likely discard the packets (without ARP in use).If you are staying down at layer 2 (MAC) this does not apply. IP works fine if all the devices are on the same local network segment. This applies when sending traffic off your local network segment.		

.

FTP Web Results

Select Ping as the IP TEST TYPE on the IP Advanced Test Profile window to run a FTP test.

FTP Test Statistics

Statistic	Description	Comment
Test Status	Current status of the test.	• PASS -Test completed, no errors • LOGIN FAIL - Failed to login to FTP server due to invalid user name or password mismatch • UNKNOWN HOST - FTP server is not available • FILE NOT FOUND - Specified file is not available • ACCESS DENIED - Not enough privilege to access the file • IN PROGRESS - Transfer is in progress • STOPPED - Test stopped by user • NO LINK - No link • FAIL - Test failed, unknown reason
FTP Server IP	View the server's IP address.	
File Name	Name of transferred file.	
Transfer Type	UPLOAD or DOWNLOAD	Set on the FTP Setup screen.
Transferred Bytes	Number of bytes downloaded.	
Transferred Time (ms)	Total up/download time	
Transferred Rate	Up/download bit rate.	
Average Transferred Rate (kbps)	Average up/download bit rate.	
Minimum Transferred Rate (kbps)	Minimum up/download bit rate.	
Maximum Transferred Rate (kbps)	The maximum up/download bit rate.	

Where do you want to go next?

FTP Setup
IP Test Setup
IP Summary Results
index

IP Advanced HTTP Setup

The IP test tests end-to-end connectivity between active IP stations, providing various performance related statistics. HTTP tests web access. The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens (Layer 2 tests).

To Configure an Advanced IP HTTP Test

1. Select IP Advanced Test under Carrier Class Ethernet on the Test Profile screen, then press **Setup**.
2. If not already set, choose a port by pressing the RJ45/SFP/XFP button.
3. Select IP Test Type: HTTP.
4. Configure the Address Setup, VLAN Setup, and HTTP setup.
5. if desired, configure the Capture Filter
6. Press **START**, then **TEST RESULTS**.

Before you begin testing, make sure the link is up.

Parameter	Options	Details
IP Test Type	**PING**: Commonly used to discover whether two remote LAN segments, using TCP-IP protocol, are connected. **TRACEROUTE**: Trace the route (see each hop) to the far end device **FTP**:Web transfer testing **HTTP**: Web access testing	Select the type of test.
Caution: If you are sending packets to your responder via a router or other device with its own IP address, make sure to set the Dst MAC to the MAC address or router, NOT the responder. Otherwise, the router will likely discard the packets (without ARP in use).If you are staying down at layer 2 (MAC) this does not apply. IP works fine if all the devices are on the same local network segment. This applies when sending traffic off your local network segment.		

HTTP Setup

Download a web page (specified by IP address or URL), then view statistics on the download. See
Destination IP/URL Selection
Enter the IP address of the ping destination with the **- / +** bar. A corresponding number of IP/URLs will become available.
Touch a row to configure a destination using a popup keyboard.

Press **OK**, then **START**, then see the HTTP Results.
HTTP Basics
Select HTTP as the IP TEST TYPE on the IP Advanced Test Setup window to run a HTTP test.

Where do you want to go next?

IP Adv HTTP Setup
HTTP Results

IP Summary Results
IP Test Setup
Home

HTTP Web Results

Select HTTP as the IP TEST TYPE on the Advanced IP signal setup window to run a HTTP test. RxT 10GE will display the web page.

HTTP Test Statistics

Statistic	Description
Test Status	Test Status: • PASS - Test complete, no errors • IN PROGRESS - Transfer is in progress • NO LINK - No link • FAIL - Test failed, unknown reason
HTTP Server IP	IP address of specified URL.
URL	IP address or domain name of the HTTP server to be connected to.
Transferred Bytes	Number of bytes downloaded
Transferred Time (ms)	Total download time
Average Transferred Rate (kbps)	Average download bit rate.
Minimum Transferred Rate (kbps)	Minimum download bit rate.
Maximum Transferred Rate (kbps)	The maximum download bit rate.

Where do you want to go next?

HTTP Setup
IP Test Setup
IP Summary Results
index

IP Summary Results *Home*

The top left of the results displays test status:
Elapsed Time: How long the test has been running.
Remaining Time: How long remains in the scheduled test, or Continuous.
Banner: A message summary banner of the status of the test. It reports any errors or alarms, along with a date and time stamp.
Below the banner, view a list of logged events: received errors and/or alarms, e.g. Lost Frame, including a count of the number of errors, with a resolution of one second.

The right side of the window shows more specific results.
Status
Even though the test set generates pings, there are circumstances which cause the pings not to be sent. For example, the port could lose link or be paused, preventing the transmission of the Ethernet frames in which the ping packets reside. In these situations, the number of pings sent will not be displayed to avoid confusion.

Parameter	Details
TX Utilization	Transmitted bandwidth as a percentage of maximum traffic rate (minimum frame gap)
TX Line Rate	Transmitted bit rate (in kbps, bps, etc.) of the Ethernet frames, ignoring the frame gap, preamble, and SAD. The data rate is always less than the line rate.
TX Data Rate	Transmit data rate (in kbps, bps, etc.); includes the frame headers but not the IPG or Preamble. Thus, the data rate reflects both the frame rate and frame size.
RX Utilization	Received bandwidth as a percentage of maximum traffic rate (minimum frame gap).
RX Line Rate	Received bit rate, based on the current utilization (in kbps, bps, etc.).
RX Data Rate	Received bit rate of the Ethernet frames, ignoring the frame gap, preamble, and SAD. The data rate is always less than the line rate (in kbps, bps, etc.).

Press Start on the Action Bar to start a test.

Where do you want to go next?

Ping Trace Route Results
Ping Test Results
IP Test Setup
IP Testing
Throughput Test Setup
RFC2544 Applications
Working Desktop
Home

IP Aggregate Results

View frame statistics and information on received errors.
The top line of the results tables shows you the port number and the type of test the statistics are for (e.g: PING or TRACEROUTE).

- Both the specific count of the error and the average rate at which the error was received may be displayed for each type of error.
- Frame statistics are shown for both the transmit direction and the receive direction, as appropriate.
- For both the Transmit and Receive directions, view the Total number of frames transmitted/received, and the Current, Minimum, Maximum and Average Frame Rates, as well as the Current, Minimum, Maximum and Average Data Rate. Results are aggregate totals since the beginning of the test, for all test streams and live traffic.

Statistic	Details
Total Frames	Number of received/transmitted frames.
Total Bytes	Number of received/transmitted bytes.
Frame Rate	Transmitted and received frames per second. **Frame Rate Current**: Current rate at which frames are being TX and RX at **Frame Rate Average**: Average transmitted and received frames per second over the duration of the test. **Frame Rate Minimum**: Minimum TX and RX frames per second since the beginning of the test. **Frame Rate Maximum**: Maximum TX and RX frames per second since the beginning of the test.
Utilization	Percentage of bandwidth in use: **Current**, **Maximum**, **Minimum**, and **Average** usages.
Line Rate	Transmitted bit rate, based on the current utilization.
Data Rate	Transmitted bit rate of the Ethernet frames, ignoring the frame gap, preamble, and SFD. The data rate is always less than the line rate.
Frame Size Under 64 Bytes	Number of undersized/fragmented frames with a length of less than 64 bytes. Some VLAN and MPLS frames may be undersized even if they fall within standard Ethernet frame sizes. For example, a 64-byte frame with VLAN is too short—the length must be at least 68 bytes. • For Unframed tests, only Bit Errors are reported.
FS 64 bytes	Count of frames with a length of 64 bytes.
FS 65-127	Count of frames with a length of 65-127 bytes.
FS 128-255 bytes	Count of frames with a length of 128-255 bytes.
FS 256-511	Count of frames with a length of 256-511 bytes.
FS 512-1023	Count of frames with a length of 512-1023 bytes.
FS 1024-1518	Count of frames with a length of 1024-1518 bytes.
FS Over 1518	Count of jumbo frames with a length of 1519 or more bytes.

Test Frames	View statistics on frames matching the stream table. **Frame Rate Current (fps)**:Current rate at which frames are being transmitted and received at this second. **Frame Rate Average (fps)**: Average transmitted and received frames per second over the duration of the test. **Utilization Current (fps)**:Current percentage of bandwidth in use. **Utilization Average (fps)**:Average Percentage of bandwidth in use.
Non Test Frames	Number of received frames that do not match the ports Stream Table, such as live traffic. Multicast and broadcast frames are reported as non-test frames. **Frame Rate Current (fps)**:Current rate at which non-test frames are being transmitted and received at this second. **Frame Rate Average (fps)**: Average transmitted and received non-test frames per second over the duration of the test. **Utilization Current (fps)**:Current percentage of non-test bandwidth in use. **Utilization Average (fps)**:Average Percentage of non-test bandwidth in use.
Unicast	Number of Layer 2 unicast frames transmitted and received. View the **Current** and **Average Unicast Test Frame rates**, and the **Current** and **Average unicast bandwidth utilization**.
Multicast	Number of Layer 2 multicast frames transmitted and received. Multicast Test Frame rates, and the Current and Average multicast bandwidth utilization.
Broadcast Test Frames	Number of broadcast frames transmitted and received. A broadcast frame is a frame that is intended for all of the devices on the network, the destination MAC address is set to 'FF-FF-FF-FF-FF-FF'. View **Broadcast Test Frame rates** and the **Current** and **Average multicast bandwidth utilization** statistics.
Invalid MAC Frames:	Number of MAC frames which don't match the Stream Table. View **Invalid MAC Frames Current and Average Frame rates,** and the **Current** and **Average Invalid MAC Frames bandwidth utilization** statistics
Good Frames	Number of frames which match the Stream Table. View **G**ood Frames **Current and Average Frame rates,** and the **Current** and **Average Good Frames bandwidth utilization** statistics.
Error Frames	Number of frames containing errors. View **Error Frames Current and Average Frame rates,** and the **Current** and **Average Error Frames bandwidth utilization** statistics.
Total VLAN Frames	Number of frames containing VLAN tags. View **Total VLAN Frames Current and Average Frame rates,** and the **Current** and **Average Total VLAN Frames bandwidth utilization** statistics.
Single Tag VLAN Frames	Number of frames containing exactly one VLAN tag. View **Single Tag VLAN Frames Current and Average Frame rates,** and **Current** and **Average Single Tag VLAN Frames bandwidth utilization** statistics.

Multi-Tagged VLAN Frames	Number of frames containing exactly more than one VLAN tag (Stacked/Q-in-Q). View **Multi-Tagged VLAN Frames Current and Average Frame rates,** and the **Current** and **Average Multi-Tagged VLAN Frames bandwidth utilization** statistics.
MPLS Frames	Number of frames containing MPLS labels. View **MPLS Frames Current and Average Frame rates,** and the **Current** and **Average MPLS Frames bandwidth utilization** statistics.
IPv4 Frames	Number of frames containing version 4 IP. View: **IPv4 Frames Current and Average Frame rates IPv4 Current** and **Average IPv4 Frames bandwidth utilization** statistics. **IPv4 Multicast Current** and **Average Frame Rates**, as well as Current and Average **utilization** rates. **IPv4 Broadcast Current** and **Average Frame Rates**, as well as Current and Average **utilization** rates.
TCP Frames	Number of frames containing TCP. View **TCP Frames Current and Average Frame rates,** and the **Current** and **Average TCP Frames bandwidth utilization** statistics.
UDP Frames	Number of frames containing TCP. View **UDP Frames Current and Average Frame rates,** and the **Current** and **Average UDP Frames bandwidth utilization** statistics
Pause Frames	Count of received pause frames.
Frame Gap	View the **Minimum**, **Maximum**, and **Average** frame gap. The minimum IPG is 12 bytes or 96 bit times.
Service Disruption Events	Count of received service disruptions. **Service Disruption Duration**: The longest packet interval detected during the measurement is displayed in microseconds. **Service Disruption Min/Max/Avg**: Minimum, Maximum, and Average disruptions.
Latency Min/Max/Avg	Measures the time it takes for each test frame to pass through the device under test. Sunrise Tagging required. View Minimum, Maximum, and Average statistics. These measurements assume a loopback at the far end. If you have two units back to back, the latency results will be erroneous.
LOS	Count of the number of times signal has been lost (LOS).
LOSS	Count of seconds of loss of signal: Minimum, Maximum, Current and Average.
LOSync	Count of the number of times synchronization has been lost View the Seconds and Min, Max, Current, and Average counts of LOSync.
FCS/CRC Error	Count of frames containing FCS/CRC error codes. **FCS/CRC Error Current and Average Frame rates,** and the **Current** and **Average FCS/CRC Error bandwidth utilization** statistics.
IP Checksum	Count of frames containing **IP Checksum** error codes.

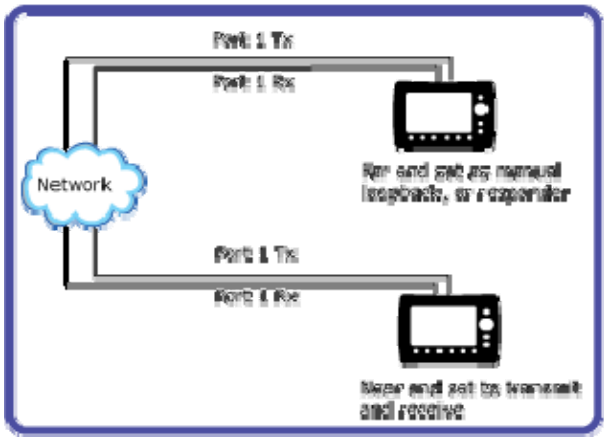
Error	**IP Checksum Error Current and Average Frame rates,** and the **Current** and **Average IP Checksum Error bandwidth utilization** statistics.
UDP Checksum Error	Count of frames containing **UDP Checksum** error codes. **UDP Checksum Error Current and Average Frame rates,** and the **Current** and **Average UDP Checksum Error bandwidth utilization** statistics.
Lost SN Error	Count of frames with no sequence number. **Lost SN Error Current and Average Frame rates,** and the **Current** and **Average Lost SN Error bandwidth utilization** statistics
Out of Sequence Error	Count of frames received out of sequence. **Out of Sequence Error Current and Average Frame rates,** and the **Current** and **Average Out of Sequence Error bandwidth utilization** statistics.
Duplicate SN Error	Count of frames with duplicated sequence numbers. **Duplicate SN Error Current and Average Frame rates,** and the **Current** and **Average Out of Duplicate SN Error bandwidth utilization** statistics.

Where do you want to go next?

IP Test Setup
Ping Trace Route Results
Working Desktop
index

Loopback Testing

Loopback Diagram



Loopback Mode Diagram

Where do you want to go next?

Loopback Test Profile

Loopback Test Profile

Perform Loopback testing. The signal graphic both reflects the Ethernet frame and gives you access to the associated configuration screens.

To Configure a Loopback

1. Choose Loopback Test from the Test Profiles, then press **Setup**.
2. Configure the loopback.
   - If desired, configure the Capture Filter and/or Measurement Setup.
- Press **START**, then **TEST RESULTS**.

To send loopback commands in a test, press the **L2 Control** button in the Action Bar.
See the application diagram.

Press **L2Control** to bring up the Loopback Control pop up to send loopback commands in a Throughput or RFC2544 Test Mode, as configured in this Loopback window. Making changes one of these windows affects the other.
Select LOOP BACK on the Test Profile. RxT 10GE can Control a loopback or act as a loopback responder.
Where do you want to go from here?
Loop Control
Throughput Test Setup
Throughput Summary Results
Working Desktop

index

Loopback Test Setup

Once you have selected Loopback as the Test Profile, configure the setup. The signal graphic both reflects the port and test setup, and gives you access to the associated configuration screens.

Use caution when using loopback mode, because some network equipment may not allow the loopback of some frames. It can cause such equipment to shut down the port.

Parameter	Options	Details
Loopback Test Type	Manual, Responder	**Manual**: Send a loop up/down command to a Sunrise Telecom Ethernet tester, such as another RxT 10GE module, an RxT 10GE or a SunSet MTT -28, -29, or -50 module. See Loop Control. **Respond**: RxT 10GE respond to loopbacks.^
Layer	Layer 1, Layer 2/3	Select the test layer format for the loop up and loop down frames • **Layer 1**: The test set can transmit a Layer 1 loop up or loop down command to a remote test set configured as a responder. Upon receiving the Layer 1 loop up command, the remote test set will retransmit the incoming frames without modifying them. • **Layer 2/3**: The test set can transmit a Layer 2 or Layer 3 loop up or loop down command to a remote test set configured as a responder. Upon receiving the Layer 2/3 loop up command, the remote test set will retransmit the incoming frames and swap the source and destination MAC address fields, adding IP addresses for Layer 3 • Sunrise Telecom STT and MTT Ports Note
*10%, since 1 Gigabit Ethernet is 10% of the bandwidth of 10 Gigabit Ethernet.		
^ • Configure the Address Setup if required. • Configure VLAN if required. • RxT 10GE will *not* respond to any loop commands until you press **START**. Once the test has started, RxT 10GE will go into a waiting for loopback command state. A screen message informs you that the test set is in the waiting for loopback command state. • The test set's MAC and IP address appear, as appropriate. • Once RxT 10GE receives a loop-up command from the received traffic, it will begin looping back frames based on the layer indicated in the loop command frame: Layer 1, Layer 2, or Layer 3. • A screen message appears, informing you that the test set is in an active loopback state. • When RxT 10GE receives a loop-down command from the received traffic, it will cease looping back frames and re-enter the waiting for loopback command state. • Once you stop the test, RxT 10GE will return to the waiting for loopback command state.		

Where do you want to go from here?
Loop Control
Throughput Test Setup
Throughput Summary Results
Working Desktop
index

Loopback Responder

To have RxT 10GE respond to loopbacks, once you have selected Loopback as the Test Profile, configure the Test Setup, setting Responder as the Type. The signal graphic both reflects the port and test setup, and gives you access to the associated configuration screens.
RxT 10GE will enact a Layer 1, Layer 2, or Layer 3 loopback as instructed in the command.
Use caution when using loopback mode, because some network equipment may not allow the loopback of some frames. It can cause such equipment to shut down the port.

- The graphic on the Signal window shows how Loopback mode works. In Loopback mode, a red 'LB' status banner appears in the Status Bar, reporting status such as "LB Running" or "LB Waiting."
- The test set will only respond to those loop commands addressed to it.
- In this mode the layer is NOT selected.
- RxT 10GE will *not* respond to any loop commands until you press **START**. Once the test has started, RxT 10GE will go into a waiting for loopback command state. A screen message informs you that the test set is in the waiting for loopback command state.
- The test set's MAC and IP address appear, as appropriate.
- Once RxT 10GE receives a loop-up command from the received traffic, it will begin looping back frames based on the layer indicated in the loop command frame: Layer 1, Layer 2, or Layer 3.
- A screen message appears, informing you that the test set is in an active loopback state.
- When RxT 10GE receives a loop-down command from the received traffic, it will cease looping back frames and re-enter the waiting for loopback command state.
- Once you stop the test,RxT 10GE will return to the waiting for loopback command state.

Where do you want to go next?

Loopback Test Setup
Loop Control
IP Test Setup
Throughput Test Setup
RFC2544 Applications
Working Desktop
index

Loop Control Setup

To perform loopback testing, select Loopback Test as the test type on the Test Profile, then press Test Setup. Touch the graphic to configure the Address Setup. Alternately, press **L2 LOOP** in the Action Bar to access the Loopback Control Setup screen, in a BER test or RFC2544 test. The commands are sent as configured here, on the Loop Control tab.
See Loopback Test Setup for details on using the loopback test mode.
RxT 10GE can loop-up and loop-down Sunrise Telecom Ethernet testers, using the standard Sunrise Telecom loop commands.
Ethernet Settings
Layer: Select the format for the loop up and loop down frames. This selection determines which of the remaining items need to be configured.
Ethernet Options: Layer 1, Layer 2/3

- **Layer 1**: The test set will transmit a Layer 1 loop up or loop down command to a remote test set configured as a responder.
  Upon receiving the Layer 1 loop up command, the remote test set will retransmit all incoming frames (including frames with CRC errors) without modifying them.
- **Layer 2/3**: The test set will transmit a Layer 3 loop up or loop down command to a remote test set configured as a responder.
  Upon receiving the Layer 2/3 loop up command, the remote test set will swap the MAC/IP addresses, and loop the frame if it is not destined for that specific test port.
  These frames will not be looped: Errored Frames, MAC Broadcast, MAC Multicast, Frames with identical Source and Destination MAC Addresses (such as a keep alive frame), IP Broadcast, IP Multicast, IP Multicast, Frames with identical Source and Destination IP Addresses.

For a standard Ethernet test, press 'ARP' to have the RxT 10GE is ARP for the MAC address of the remote RxT 10GE unit which is set in Loopback Responder mode.

Parameter	Details
MAC/IP Source	The Source addresses are those used by the test port sending the command.
MAC/IP Destination	The Destination addresses must match the MAC and IP addresses of the port or unit to be looped. An IP Destination may need to be entered even for a Layer 2 loopback. Press **ARP** to send a request; a pop up window shows the ARP status.
Gateway	Required if the device to be looped is outside the local subnetwork.
Subnet Mask	Specify the subnet mask.
VLAN	For a Layer 2/3 loopback, touch VLAN-1/-2/-3 to turn the VLAN tag on. Next, enter the VLAN Priority level (UPI), CFI and ID information. See Stream - VLAN - Setup.

Start Loopback Control

Press **Apply** to confirm the settings.
Press **Loop Up** or **Loop Down** to send the indicated command from the Control tab.
The Status field reports on the status of the loop.

- The loop-up command indicates the layer:1, or 2/3.
- The loopback command contains the MAC and IP address of the test set to be looped, as appropriate.

When the test has started, the Summary and Aggregate results windows appear.

Possible Status Messages

You may see these for each test layer:

- Waiting for response....
- Timeout
- Loopup Successful!
- Loopdown Successful!

Where do you want to go next?

Loopback Test Setup
Throughput Test Setup
RFC2544 Applications
Working Desktop
index

Loopback Ports Note

Different ports on the Sunrise Telecom RxT, XTT, STT and MTT behave differently in Loopback mode, based on the type of MAC frame received.

Frame	STT FE	STT GE	STT 10GE	MTT-28/-29
MAC	Yes	Yes	Yes	Yes
Unicast	Yes	No	No	No
Multicast	Yes	Yes	No	No
Broadcast	Yes	Yes	No	No
Keepalive*	Yes	Yes	No	No
Yes: The frame will be looped back. No: The frame will not be looped back *Identical Source and Destination addresses				

Loopback Mode and MAC Frames

Where do you want to go next?

Loopback Test Setup
index

Loopback Query

To perform loopback testing, choose Loopback Test from the Test Profiles, then press **Setup**. RxT 10GE can Control a loopback, Query to see if a loopback is in place, or work as a loopback responder.

To start the query process, press **Loop Query** at the bottom of the loopback Query tab. Results appear in the field.

The loop-query command is used by the control unit to determine the loop state of the far end unit, which will respond to the loop-query whether it is in manual or responder mode.

The query response indicates the loopback mode, state, and layer of the far end unit.

State

Looped Up
Looped Down (Manual)
Waiting (Responder)

Layer

Layer 1
Layer 2
Layer 3
Unknown (Waiting Responder)

Where do you want to go next?

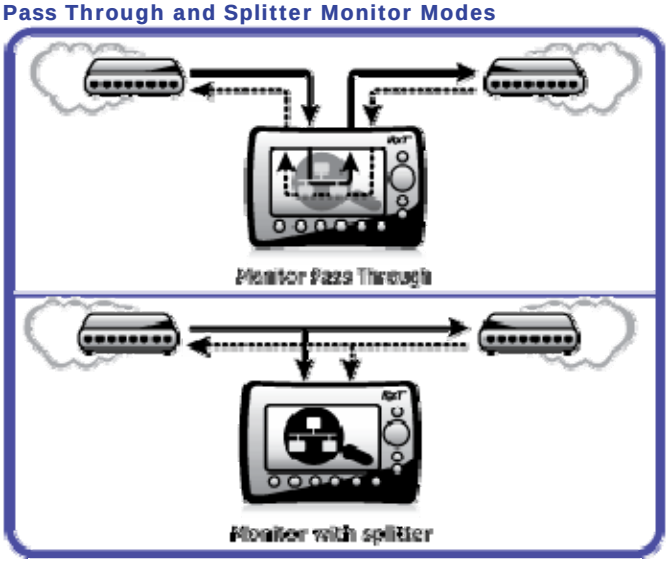
Loopback Test Setup
Throughput Test Setup
IP Test Setup
RFC2544 Applications
index

Monitor Applications

Monitor Test Mode can be used in either of the following two configurations.

- Pass Through mode: the test set is inserted between two devices, to monitor the frames in both directions.
- Splitter mode: the test set is inserted between two devices using splitters. In this mode you can insert and remove the test set without interrupting the traffic.

Pass Through and Splitter Monitor Modes



In monitor mode (Pass Through or using a splitter), the module is nonintrusive, and will not generate traffic (BER or PING testing).

Where do you want to go next?

Monitor Setup
Summary Results
Index

Monitor Test Profile

Monitor live network traffic. Framed traffic is required. Monitor mode does not modify the frames as they pass through the test ports. The monitoring ports will not drop or correct errored frames; such frames will be retransmitted bit-for-bit. Nor will the ports inject errors into monitored traffic.
Touch the **XFP** port if you need to change port information, or **Capture Filter** to configure capturing. The 'M' on the graphic shows where measurements are taken.

To Configure a Monitor Test

1. Choose Monitor from the Test Profiles, then press **Setup**.
2. Configure the loopback.
   Monitor Test Type - The graphic reflects the test setup.
   - Single Through: A single RxT 10GE port is looped.
   - Dual Through: Traffic transmitted from one RxT 10GE port is received and measured..... looped
   - Bidirectional: Traffic is looped port to port, and measurements are taken on each side.....
3. Press **START.** TEST RESULTS appear**.**

See the diagrams.
To send loopback commands in a test, press the Loop Control button in the Action Bar.

Where do you want to go next?

Monitor Setup
Summary Results
Working Desktop
Index

Monitor Test Setup

To monitor traffic, select Monitor as the Test Profile, then configure this window.

- It is not necessary to physically connect the Tx port.
- RxT 10GE loops back the traffic to itself, for you to monitor.
- Press **START** on the Action Bar to begin monitoring.
- You can only view one port (the active one) at a time.

The graphic shows how MONITOR mode works. Frames received on one port will be transmitted out its linked port. A signal is received at each port in use, and measurements are taken on the signals (at the M in the graphic).
See the diagrams.

Dual Mode

Typically, RJ-45 or SFP monitor tests are run using both ports 2 and 3; on the graphic, ports 2 and 3 are connected. Starting monitor on two ports (ports 2 and 3) starts the taking of statistics on both ports 2 and 3.
When you press 'Stop', data for the active port (for example, Port 2) is saved. However, this data also includes results for the other port (Port 3).

Single Mode

The XFP port by default works in single mode; data is transmitted and received on the same port. The RJ-45/SFP ports can optionally be set to also work in single mode; on the graphic, connect a port straight across. For example, set port 2 to both TX and RX.

Summary and Aggregate results tabs are available.

Where do you want to go next?

Monitor Applications
Summary Results
Working Desktop
Index

Glossary

0

0000: Industry-standard all zeros test pattern.

1

1010: Industry-standard alternating ones and zeros test pattern.

1111: Industry-standard all 1s test pattern.

2

2e15-1, 2^15: Industry-standard 215-1 pseudo random bit sequence. This signal is formed from a 15-stage shift register and is not zero constrained. This pattern contains up to 14 zeros in a row.

2e20-1, 2^20: Industry-standard 2e20-1 pseudo random bit sequence. This signal is formed from a 20-stage shift register and is not zero constrained. This pattern contains up to 19 zeros in a row.

2e23-1, 2^23: Industry-standard 2e23-1 pseudo random bit sequence. This signal is formed from a 23-stage shift register and is not zero constrained. This pattern contains up to 22 zeros in a row.

2e31-1, 2^31: Industry-standard 2e31-1 pseudo random bit sequence. This signal is formed from a 31-stage shift register and is not zero-constrained. This pattern contains up to 30 zeros in a row.

A

Avg: Average

B

BERT: Bit Error Rate Test.

C

CFI: Canonical Format Indicator

CJPAT: Continuous Jitter Test Pattern is used for jitter measurements. It is intended to expose a receiver's CDR (Clock and Data Recovery circuit) to large instantaneous phase jumps. The pattern alternates repeating low transition density patterns with repeating high transition density patterns.

CRC: Cyclic Redundancy Check

CRPAT: Continuous Random Test Pattern is intended to provide broad spectral content and minimal peaking that can be used for the measurement of jitter at either a component or system level.

D

DEC: Decrease

DHCP: Dynamic Host Configuration Protocol; a network application protocol used by devices (DHCP clients) to obtain configuration information for operation in an Internet Protocol network.

DNS: Domain Name System: Internet system to translate names into IP addresses.

DSCP: Differentiated Services Code Point

DUT: Device Under Test

F

FTP: File Transfer Protocol; network protocol used to transfer data from one computer to another through a network (Internet).

G

GigE: Gigabit Ethernet

GUI: Graphic User Interface

H

H.323: H.323 is an umbrella Recommendation from the ITU Telecommunication Standardization Sector (ITU-T) that defines the protocols to provide audio-visual communication sessions on any packet network.

I

INC: Increase

IP: Internet Protocol

IPG: Inter Packet Gap; The gap of time between the end of one frame and the start of the preamble for the next frame is also called the inter frame gap (IFG).

K

kbps: A unit of data transfer rate equal to 1,000 bits per second.

L

LAN: Local Area Network

LFS: Link Fault Signalling; 10G fault indicator, Remote or Local.

LLC: LLC (Logical Link Control) IEEE Public Listing; upper sublayer of the OSI data link layer.

LOF: Loss Of Frame occurs when 4 or 5 consecutive frames are received with errored framing patterns.

LOP: LOP occurs when N invalid pointers or New Data Flags are received. Available for Administrative and Tributary Units (SDH), and for STS Path and Virtual Tributary (SONET).

M

MPLS: Multi Protocol Label Switching; provides a unified data-carrying service for both circuit-based clients and packet-switching clients providing datagram service model; carries Ethernet frames.

R

RX: Receive

S

SFP: Small form-factor plugable optical transceiver, for rates up to but not including 10G.

T

TCP: Transmission Control Protocol (TCP) is one of the core protocols of the Internet protocol suite. It manages the individual conversations between web servers and web clients.

TX: Transmit

U

UDP: User Datagram Protocol; timely data protocol, oft used for real-time service such as VOIP.

URL: Uniform Resource Locator; often used to mean a website address.

V

VLAN: Virtual LAN; a network of hosts not actually on the same physical LAN, but grouped that way.

VOIP: Voice over IP. A protocol optimized for the transmission of voice through the Internet or other packet switched networks.

W

WAN: Wide Area Network

WEP: Wired Equivalent Privacy

WPA: Wifi Protected Access; 802.1X-compliant

WPA2: Wifi Protected Access; 802.11i compliant

X

XFP: 10G Small Form Pluggable hot-swappable optical transceiver.

Index