



The Highly-Scalable Router Performance Tester TeraRouting Tester™

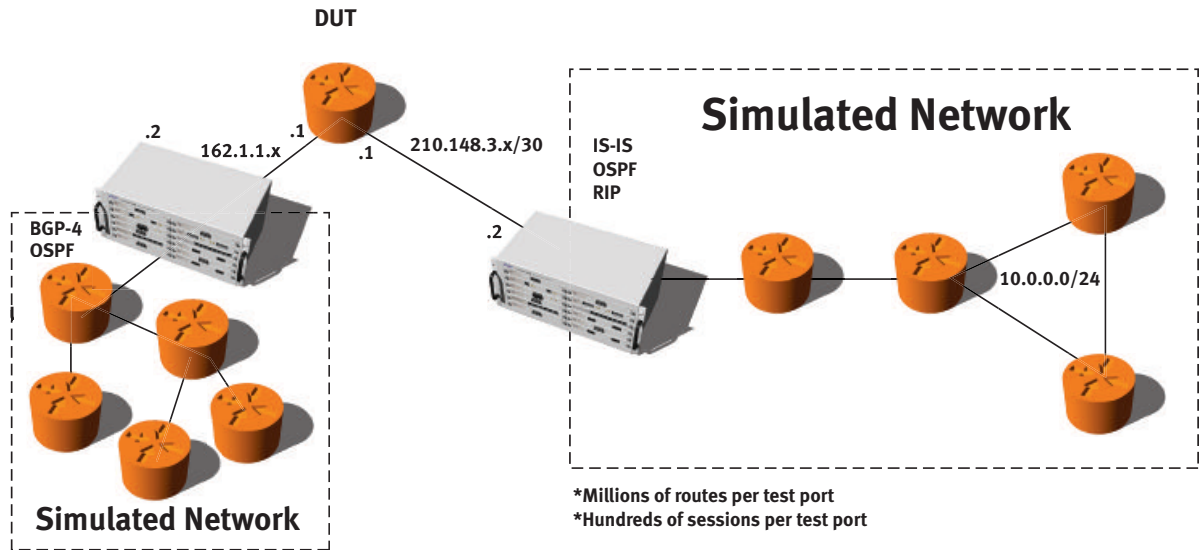
Product Overview

The SmartBits® TeraRouting Tester (TRT) application provides the first integrated control and data plane routing test that includes system-level configuration and analysis of routed networks. TRT is an easy-to-use application that allows network service providers and network equipment manufacturers to precisely determine the performance of a router under a variety of realistic and worst-case scenarios.

TRT exposes the true performance of a router by providing stress testing of the routing software, the data forwarding hardware, and the overall system architecture under both static and dynamic routing conditions. TRT is fully interactive, allowing the user to dynamically change control and data plane parameters. This provides immediate feedback in real-time results. Additionally, all of the tests can be saved as script files for simplified test automation. TRT is also a fully functional Layer 2 and 3 test application that allows users to test bridges and switches in addition to routers.

The TRT Application Is Designed:

- To allow the user to quickly set up large BGP, OSPF, IS-IS, RIP, MPLS, multicast, spanning tree or multi-protocol networks on all ports with data plane traffic going to each network advertised from all transmitting ports
- To evaluate key performance parameters of routers under typical or extreme traffic load conditions for minutes, hours, and days
- To evaluate key performance parameters of routers over time in response to common, yet undesirable, network events on the control plane using the Flap Scheduler and real-time graphs with the integrated events
- To qualify routers during development, quality assurance, and final regression testing
- To perform comparative analysis of routers
- To regression test routers after software or firmware upgrades



*Millions of routes per test port
*Hundreds of sessions per test port

TeraRouting Tester applications

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Analyze | Assure | Accelerate™

Test Description

TRT includes a routing stack that allows each SmartBits port to act as one or more peer routers to the device under test (DUT). These peer routers establish adjacencies with the DUT to exchange routing information, and in the process, determine basic routing protocol performance. Test data is then transmitted to the advertised routes at user-specified rates to determine the forwarding performance of the hardware. By simulating various network events (such as route, session, and link flaps), TRT then attempts to characterize the DUT behavior under various real-life stress conditions. With TRT, the user is able to determine convergence time by observing the receive rate and the average latency over time for both the traffic affected by flapped routes and the stable routes in the router.

IPv4 and IPv6 Protocols

TRT includes support for RIP v1/v2. Optional protocol packages include: BGP-4/4+, IS-IS v4/v6, MPLS (RSVP and LDP), OSPF v2/v3, multicast (PIM-SM, PIM-SSM, IGMP and MLD) and spanning tree (STP/RSTP). Multiple protocols can be used simultaneously on each port.

MPLS Testing

TRT provides the most comprehensive MPLS testing support in the industry. Thousands of incoming or outgoing RSVP-TE and LDP tunnels can be created. Full Layer-3 VPNs (RFC 2547bis and 6PE) are supported. Layer-2 VPNs (Martini and VPLS drafts) can also be emulated. Easy-to-use configuration wizards simplify the setup process for complex MPLS features and functions. TRT supports the emulation and testing of Customer Edge (CE), Provider Edge (PE), and Provider (P) routers in an MPLS network.

Test Results

TRT provides both real-time results and final test results using counters and graphical chart formats. These results can be exported in comma-delimited (.CSV) or HTML format. Charts can also be exported in bitmap image format for future analysis and reports.

TRT allows you to select from several tracking methods to track the data plane traffic. Options include:

- Tracking by prefix length, VPN, TOS, protocol, and/or destination UDP/TCP ports
- Tracking by user-defined tracking groups
- Up to 16 custom tracking groups can be configured
- Real-time test results include:
 - Detailed port counters
 - Receive frame rate counter and graph: per stream, port and tracking group
 - Average latency counter and graph: per stream, port and tracking group,
 - Percentage of expected frame rate counter and graph: per stream, port and tracking group
 - Routing protocol counters per session, adjacency, or emulated router
 - Event log with filtering for specific routing sessions

- Final test results include:
 - Final detailed port, port pair, stream and group counters
 - Final receive frame rate counter and graph per stream port and tracking group
 - Final average latency counter and graph: per stream, port and tracking group
 - Final minimum, average and maximum latency per stream, port pair and tracking group
 - Final minimum, average and maximum latency in/out of sequence per stream, port pair and tracking group
 - Final percentage of expected frame rate counter and graph: per stream, port and tracking group
 - Final best, typical and worst performing streams
 - Final best, typical and worst performing streams per transmit port
 - Final routing protocol counters per session, adjacency, or emulated router
 - Final event log that can be configured to filter per protocol and/or specific routing sessions
 - All final graphs include integrated flap events
 - View and/or save TX/RX control plane capture or RX control and data plane capture buffer

Key Features

- Easy-to-use GUI provides efficient configuration of routes and traffic
- GUI Pause Display and Reset Test buttons
- Resource monitor to view CPU, memory and RAM disk utilization per process on TeraMetrics modules
- Interfaces:
 - Supports multiple routing protocols per application, module, and port
 - Supports both Ethernet copper and fiber, plus POS (PPP/HDLC) and ATM
 - Interface speeds from 10 megabits to 10 gigabits
 - Multiple-user support on shared 6000x chassis
 - Configure each port for control plane only, data plane only, or both
- Traffic configuration:
 - Optionally use advertised routes for automatic traffic configuration
 - Optionally enable or disable streams
 - Optionally configure IP next protocol and QoS values
 - Optionally configure flows per traffic stream
 - VLAN IDs and priority per traffic stream
 - Filters for automatic traffic configuration
 - Customizable user streams
 - Dynamically and interactively modify traffic characteristics
- Test configuration:
 - Test duration: continuous, time burst, frame burst
 - Load units: percent of line rate, frames per second (fps), Mbps, Kbps or bps
 - Burst size in frames
 - Loads: fixed, stepped, random with min/max
 - Frame sizes: fixed, stepped, random with min/max
 - Save configurations as editable scripts for test automation purposes
- Flap Scheduler:
 - Create multiple protocol and/or data plane events with time delays
 - Flap through all the steps once or continuous
 - Each step can have multiple events

Supported Modules

Module	Description
ATM-3451A	ATM OC-3c (STM-1c), 2-port, multi-mode, 1300nm, TeraMetrics
ATM-3451As	ATM OC-3c (STM-1c), 2-port, single mode, 1310nm, TeraMetrics
ATM-3453A	ATM OC-3c/OC-12c (STM-1c/STM-4c), 2-port, multi-mode, 1300nm, TeraMetrics
ATM-3453As	ATM OC-3c/OC-12c (STM-1c/STM-4c), 2-port, single mode, 1310nm, TeraMetrics
LAN-3301A*	10/100/1000Base-T Ethernet, Copper, 2-port, TeraMetrics
LAN-3302A*	10/100Base-T Ethernet, Copper, 2-port, TeraMetrics
LAN-3306A	10/100Base-T Ethernet, Copper, 4-port, TeraMetrics XD
LAN-3311A*	1000Base-X Ethernet, GBIC, 2-port, TeraMetrics
LAN-3321A	10/100/1000 Mbps and Gigabit Ethernet Fiber, 2-port, TeraMetrics XD
LAN-3325A	10/100/1000 Mbps and Gigabit Ethernet Fiber, 4-port, TeraMetrics XD
LAN-3327A	10/100/1000 Mbps and Gigabit Ethernet Fiber, 1-port, TeraMetrics XD
POS-3505As	POS OC-48c (STM-16c), 1-port, single mode, 1310nm, TeraMetrics
POS-3505Ar	POS OC-48c (STM-16c), 1-port, single mode, 1550nm, TeraMetrics
POS-3511A	POS OC-3c/OC-12c (STM-1c/STM-4c), 2-port, multi-mode, 1300nm, TeraMetrics
POS-3511As	POS OC-3c/OC-12c (STM-1c/STM-4c), 2-port, single mode, 1310nm, TeraMetrics
POS-3519As	POS OC-192c (STM-64c), 1-port, 2-slot, single mode, 1310nm, TeraMetrics
POS-3519Ar	POS OC-192c (STM-64c), 1-port, 2-slot, single mode, 1550nm, TeraMetrics
XFP-3731A	10GBase Ethernet, XFP MSA, 1-slot, TeraMetrics
XLW-3721A	10GBase Ethernet, XENPAK MSA, 1-port, 2-slot, TeraMetrics

* Indicates end of life module that may not support certain features

Requirements

- A SmartBits 600x or 6000x chassis with the appropriate hardware modules
- A Pentium™ or greater PC running Windows® 2000/NT/XP, with mouse/color monitor

Ordering Information

SWF-1230A

TeraRouting Tester with RIP software module

SWF-1231A

OSPF software module for TRT

SWF-1232A

IS-IS software module for TRT

SWF-1233A

MPLS (RSVP-TE, LDP, VPN) software module for TRT

SWF-1234A

BGP software module for TRT

SWF-1235A**

IPv6 software module for TRT

SWF-1236A

Multicast (IGMP, MLD, PIM) software module for TRT

SWF-1237A

Spanning Tree (STP/RSTP) software module for TRT

SWF-1239A

All available software modules for TRT

SWF-1255A

SmartBits API and Scripting Automation Interface

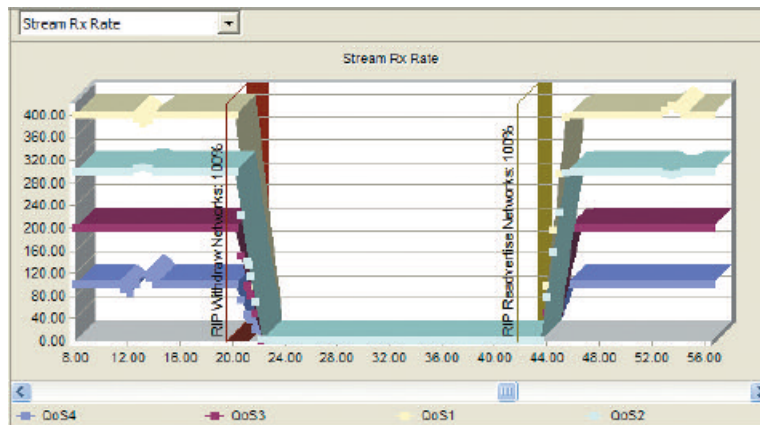
** This package is required for running IPv6 routing protocols

Spirent Global Services

Spirent Global Services provides a variety of professional services, support services and education services — all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirentcom.com/gs or contact your Spirent sales representative.

Tx/Rx Statistics										
Test	Tx Port	Stream	Expected Frames	Tx Frames	Lost Frames	% Loss	Expected	Rx Port	Rx Frames	Avg Latency
Test			59976	59976	23275	38.81			36701	211.653
	FA0	QoS4	5998	5998	2327	38.8			3671	211.1897
							yes	E0	3671	211.1897
	FA0	QoS3	11995	11995	4655	38.8			7341	211.6121
							yes	E0	7341	211.6121
	FA0	QoS1	23990	23990	9310	38.81			14580	211.7941
							yes	E0	14580	211.7941
	FA0	QoS2	17992	17992	6910	38.46			14580	211.7941

RIP					
Port	Tester IP	Received Advertisements	Sent Advertisements	Received Withdrawals	Sent Withdrawals
E0	10.1.1.3	0	26275	2	3000



TeraRouting Tester test result windows

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