



Line Rate QoS Testing SmartFlow™

Product Overview

SmartFlow™ is a comprehensive SmartBits® software application designed to test QoS and analyze the performance and behavior of policy-based network devices. SmartFlow uses the analysis capabilities of SmartMetrics™ cards to generate traffic that represents different classes of service. It then analyzes the performance of each incoming stream to test a system's ability to forward large numbers of flows. SmartFlow also analyzes the system's ability to correctly handle policies and provisioned bandwidth.

SmartFlow measures the performance of each Class of Service, characterized by DiffServ, IP Precedence, VLAN priority, protocol, port number, etc. It transmits and tracks thousands of flows per port and provides results tracking per flow or per group of flows. Results are displayed so that the user can track all flows in each priority bucket and perform priority comparisons. Through the use of powerful setup wizards, the application lets you very easily create traffic patterns for full mesh, backbone, port pair, "waterfall," or user defined flows.

With SmartFlow, network managers, equipment manufacturer engineers, and testers at ISPs and telcos can answer the following questions:

- What is the impact of priority-based traffic vs. non-priority based traffic? Am I getting the bandwidth for which I paid a premium?
- How many priority queues are in the device?
- Under congestion or port over-subscription, what happens to low-priority traffic? Does the latency increase? Is there traffic loss?
- What happens to my network over extended periods of time? Are there timing issues or memory leaks?
- What happens in case of port failure? Is the traffic re-routed correctly?
- Are packets received out-of-sequence, possibly requiring upper layer re-transmits?
- Is IPv6 NAT or tunneling creating packet loss and latency? Is IPv6 throughput better or worse than IPv4?
- Is my IP Multicast traffic "slower" than the unicast traffic? How does my network scale with additional IP Multicast groups and subscribers?
- Will my network function differently after a firmware upgrade?
- Can data be handled between different interfaces such as LAN, WAN, ATM, and POS?

Test Descriptions

- **Throughput/Forwarding Rate** – Measures the throughput (maximum forwarding rate with zero packet loss) per flow and group. Provides user-defined acceptable loss and control over the search technique used during the test (binary or step).
- **Frame Loss** – Measures the frame loss per flow and group. Reports in- and out-of-sequence frames. What are the load tolerance limits? Do they vary depending on frame size and/or traffic that is randomly sent or randomly sized? Were frames lost evenly or in large blocks at the beginning or end?
- **Latency** – Measures the average, minimum, and maximum latency of each frame per flow/group based on intended or actual load (in case of flow control).
- **Jumbo Test** – Combines many tests into one, allowing you to measure what happens to latency while monitoring frame loss. This test, which uses timesaving histograms, shows latency distribution, latency, packet loss, and sequencing, and correlates the results. The test also shows bandwidth utilization per flow.
- **Latency Distribution** – Measures the latency standard deviation (jitter) and latency variation of a histogram per flow/group. Determines how traffic flow latency is distributed for each load, and how the latencies vary from one to another. Defines which groups to analyze and the bit buckets of time to monitor.
- **Latency Over Time** – Reports latency over user-defined periods.
- **Latency Snapshot** – Captures the latency of each packet for a snapshot in time, allowing the user to see the change in latency between flows.

General Highlights

- Rates are controllable per flow or per port.
- Supports IPv4 and IPv6 unicast flows, and IPv4 Multicast flows.
- Varying loads and frame sizes, including jumbo frames, to simulate real-world traffic. Traffic loads can be specified in Mbps, Kbps, bps, fps, or % utilization. Test results use these same units.
- Random frame sizes and loads within user-defined boundaries.
- Frame Size automation can be applied to each test iteration.

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Analyze | Assure | Accelerate™

- Multi-subnets/VLANs per port and multiple VLANs per subnet.
- Individually analyzes up to 64,000 totally unique streams per port.
- Transmits up to 8,000 Classes of Service per port.
- Supports IP, TCP, UDP, and ICMP flows.
- Set source and destination MAC/IP addresses and TCP/UDP ports.
- Set IP/DiffServ fields or IP/ToS precedence bits.
- Set IEEE 802.1 p/q VLAN priority fields.
- Continuous looping “traffic blaster mode,” with the ability to view results and frame rates while a test is running; allows extended duration testing.
- Performs both layer 2 and layer 3 packet learning, including ARPs before and during the test, and for transmit and/or receive ports.
- Supports fast-path learning with a sample iteration of test traffic.
- Multi-chassis (co-located or remotely located). Supports GPS.

Support Interfaces

- 10/100 Mbps Ethernet, Gigabit, and 10 Gigabit copper/fiber interfaces including dual media, plus USB.
- OC-3c/OC-12c ATM, using over 8,000 PVCs and streams per port.
- OC-3c/OC-12c/OC-48c/OC-192c POS with full PPP sessions, Cisco HDLC, and 16/32-bit CRC.
- Frame Relay, PPP, and Cisco HDLC headers using channelized DS3 WAN or clear channel.

IPv6 Highlights

- Stateful IPv6 with Neighbor Discovery to automate testing.
- Easy-to-compare differences between IPv4/IPv6 flows.
- Tracking between IPv4 and IPv6 flows for devices that support NAT.
- Dual Stack for IPv4 and IPv6 flows concurrently per SmartBits port.
- End-to-end testing over networks with 6to4 and 6over tunneling.
- QoS by Flow Label or Traffic Class.
- Flexible address formats.

IP Multicast Highlights

- Performance metrics on Multicast flows using VLANs on joins/leaves and flow data.
- Run all SmartFlow tests using a flexible combination of unicast and Multicast traffic.
- Test with IGMP versions 1 and 2.
- Configuration Wizard makes the setup of complex configurations fast and easy.

- Join verification and timers for controlled testing.
- Report on a Multicast group basis or on a per flow/group basis.
- Transmit from multiple sources to single or multiple groups.
- Subscribers may belong to more than one group; transmitter may also be a subscriber in another group.
- Thousands of Multicast groups per transmitter.

MPLS and BGP Highlights

- User flow data is automatically generated based on MPLS signaling.
- Supports ingress, transit, and egress LSR testing, individually or combined.
- Supports over 5,000 Label-switch Paths (LSPs) per MPLS test using dynamic and/or static labels.
- Supports the RSVP-TE protocol and dynamic timer options.
- Explicit routing and controlled load with configurable label contents such as EXP bits.
- Advertises 100K routes per port using optional BGP4 with route flapping.

Setup Wizards

- Group Wizard
- Rates per VLAN and CoS
- IP Multicast
- ATM VCs

Report Highlights

- Summary, detail, and graphic charts are automatically produced for each test.
- Save results in Excel, JPEG, or HTML/email format.
- A stray frame report on all tests indicates rogue frames.
- Reports receive port errors, including data integrity and CRC errors.
- Uses Access database, allowing for additional analysis and reporting of data.

Test Automation/Scripting and Auto-Gen Script Files From GUI

You can easily export the SmartFlow GUI configuration to a Script Automation Interface (SAI) file. Use SAI or TCL/tk to:

- Control tests with simple text files that can be Wizard-generated.
- Provide scalable support for configurations larger than those supported by the GUI.
- Decrease test setup and execution time; support quick tests that are repeatable.
- Combine tests with web-based L4-L7 test suites and router tests, including OSPF.
- Provide platform and language independence.

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Requirements

- A SmartBits 200/2000 or SmartBits 600/6000B/6000C chassis with the appropriate modules.
- The proper cabling for the test (for example, category 5, straight-through or crossover, depending on the DUT).
- An IBM or compatible Pentium™ PC running Windows® 98/2000/NT/XP, with mouse and color monitor.

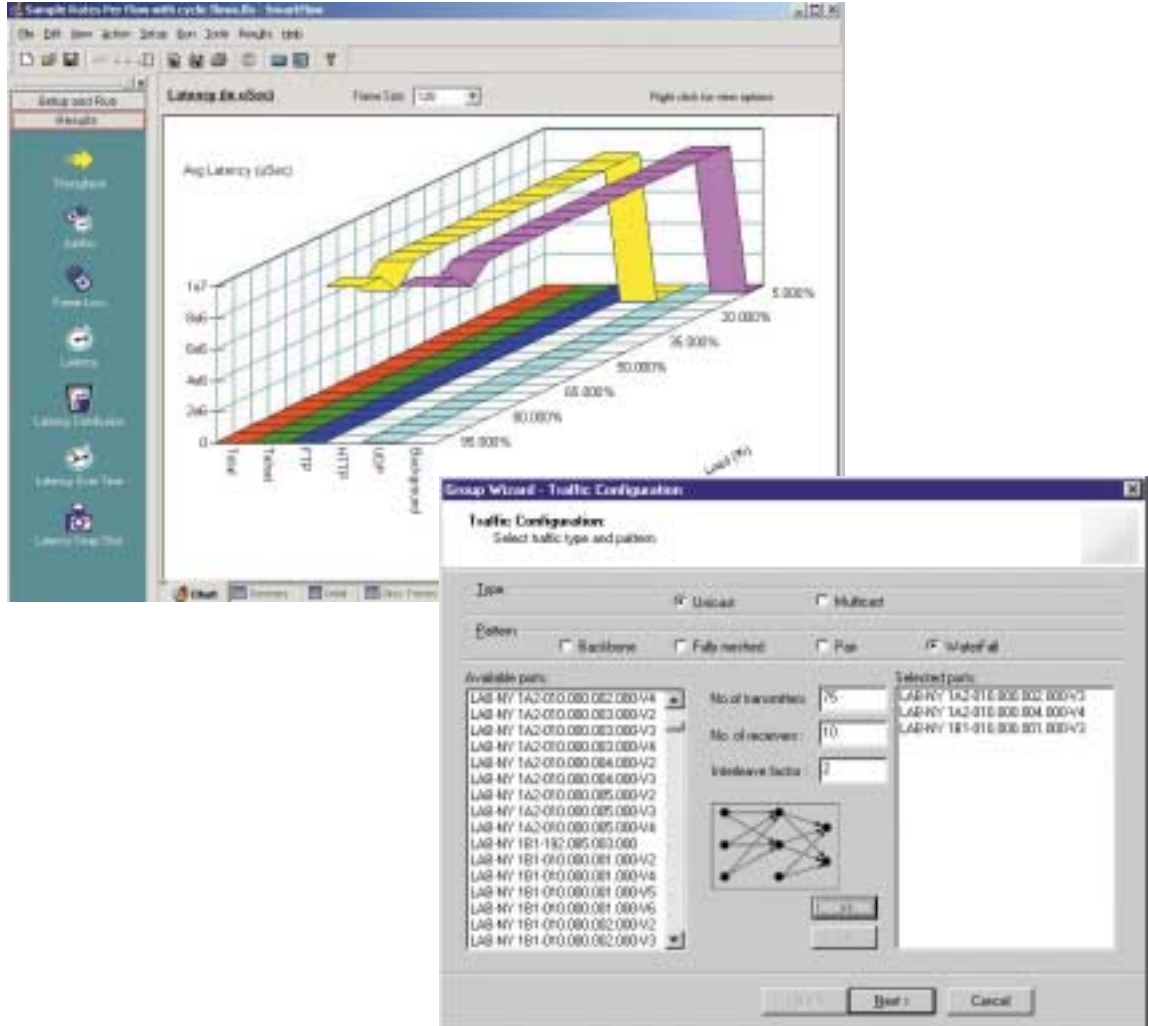
Ordering Information

SWF-1201A

SmartFlow Layer 3 QoS Performance Tester for IPv4, IPv6, and Multicast

SUS-SMB

12 months Software Update Support Service



SmartFlow test setup and results windows

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