

Avalanche SmartBits

Network Edition

Avalanche SmartBits® is a performance analysis test platform that provides unified, protocol-accurate L2-7 stress testing under high loads, ensuring that your device, application or infrastructure will excel under real-world conditions. Based on Spirent Communications' SmartBits® TeraMetrics architecture, Avalanche SmartBits allows you to combine TeraMetrics hardware and Avalanche™ and Reflector™ software to simulate real Internet conditions and load from a single SmartBits chassis.

With support for protocols such as HTTP, SSL, RTSP/RTP (QuickTime and RealNetworks), MMS (Windows Media), FTP, SMTP, POP3, DNS and Telnet, Avalanche SmartBits gives you the user and network realism you need to accurately test large application and network infrastructures, content-aware

devices that use upper-layer protocols, and Layer 2-3 devices such as switches and routers—all on the same platform.

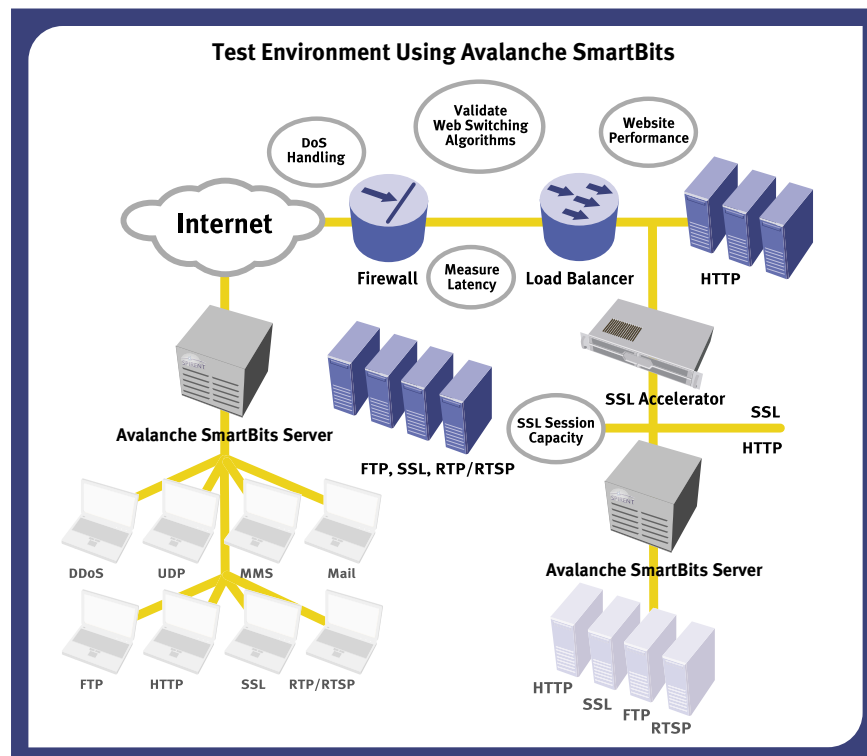
Flexibility for all your load testing needs.

With Avalanche SmartBits, you can interchangeably assign TeraMetrics modules to function as either Avalanche or Reflector systems in the SmartBits chassis, giving you a high degree of flexibility to configure a test platform that meets your specific needs—and to leverage a single hardware investment for many different purposes.

By aggregating Avalanche, Reflector, SmartFlow™ and TeraRouting Tester (TRT) applications with the SmartBits platform, you can run load tests on both Layer 4-7 and Layer 2-3 equipment. Avalanche modules generate high levels of realistic

network and user traffic, while Reflector modules enable the creation of virtual Web, mail, streaming, FTP, DNS and Telnet server clusters, allowing realistic and accurate network application infrastructure emulation. By generating accurate and consistent multiprotocol responses to Avalanche's high volume of realistic user requests, Reflector tests to capacity any equipment or network you connect between the two systems.

In addition, multiple users can run different tests on the Avalanche SmartBits platform at the same time using different modules, allowing you to maximize productivity and get the most from your investment. The TeraMetrics modules can be reconfigured for each test as either an Avalanche or Reflector without the need to update the software loaded on the modules.



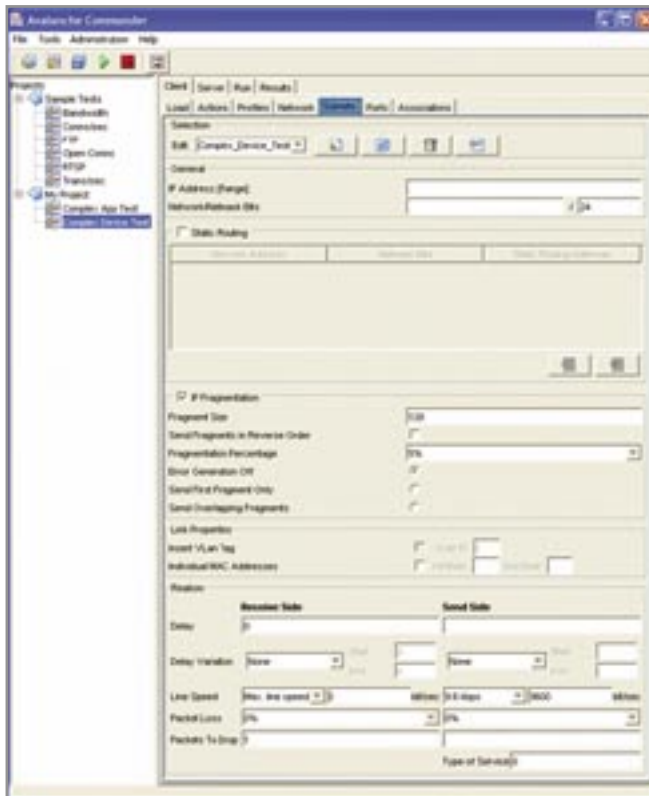
Avalanche SmartBits gives you the user and network realism you need to accurately test large application and network infrastructures, as well as Layer 4-7 and Layer 2-3 network devices, all on the same platform.

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Avalanche SmartBits gives you a high degree of flexibility to configure load tests that meet your specific needs.

Performance that puts your capacity to the test.

Avalanche SmartBits platform can generate application-layer traffic at rates of more than 250 Mbps per module; an Avalanche SmartBits chassis loaded with 12 modules can generate real application-layer traffic at more than 3 Gbps. Avalanche SmartBits can generate more than 10,000 HTTP requests per second per module while simulating realistic user traffic traversing multiple, different Web sites at varying connection speeds. A fully loaded Avalanche SmartBits chassis can generate over 120,000 HTTP requests per second.

The AfterBurner™ TCP acceleration engine is an optional add-on feature for TeraMetrics XD modules that generates high-rate TCP traffic of more than 300,000 connections per second, per port, and over 150,000 HTTP transactions per second, per port—at rates that near 1 Gbps per port. AfterBurner allows you to generate high amounts of background TCP traffic that can be mixed in with application and DDoS traffic, so you can see how devices such as high-end server load balancers and firewalls perform under extremely high loads.

More than a million concurrent connections.

With IP and MAC masquerading, Avalanche SmartBits can simulate more than 250,000 concurrent connections per module, each appearing to come from a different IP or MAC address. This allows realistic and accurate load testing of devices such as routers, firewalls, load-balancing switches, intrusion detection systems, SSL accelerators, and Web, application and database servers. It helps you identify potential bottlenecks from the router connection all the way to the database.

Layer 4–7 realism.

With support for HTTP/1.0, HTTP/1.1, SSL, RTSP/RTP (QuickTime and RealNetworks), MMS, SMTP, POP3, DNS, Telnet and FTP protocols, as well as HTTP redirects Avalanche SmartBits emulates a realistic mix of users interacting with Web applications, sending and receiving mail, viewing streaming media and downloading files. It also enables you to simulate Web, mail, streaming, FTP, DNS and Telnet servers.

To enable more accurate load simulations across multi-tiered Web site architectures, the system also lets you configure extremely realistic user behaviors—such as think times, click streams, HTTP aborts (“click-aways”) and HTTP basic and proxy authentication—that cause Web servers to terminate connections while back-end application servers continue to process requests.

In addition, by configuring the modules in Streamliner™ mode, you can configure a full TCP stack in order to generate simple HTTP-only sessions for testing high-performance Layer 4–7 devices with additional application-layer traffic.

Streaming media testing.

Avalanche SmartBits enables the generation of more than 2,000 concurrent RTSP/RTP streams per module (or approximately 25,000 per chassis), including QuickTime streams over TCP, UDP and HTTP; RealNetworks over TCP and UDP. This allows you to accurately assess the real-world capacity of large RTSP/RTP server farms with Apple QuickTime® Streaming Servers, RealNetworks® Servers and Windows Media Servers. Reflector modules let you emulate QuickTime and MMS streaming media servers.

Mail testing.

Avalanche SmartBits allows you to accurately assess the real-world capacity of your email infrastructure, eliminating the need to setup farms of PCs with mail clients. SMTP and POP3 support in Avalanche SmartBits lets you simulate large numbers of users sending and receiving messages, as well as servers. Avalanche SmartBits can support SMTP and POP3 protocols with all major mail servers and supports email attachments, including valid documents and viruses.

DDoS testing.

Avalanche SmartBits allows you to generate inline Distributed Denial of Service (DDoS) attacks along with normal multiprotocol Avalanche application traffic, all on the same port. This degree of functionality allows you to accurately test your infrastructure’s readiness against DDoS attacks without incurring the high costs associated with traditional, hard-to-maintain solutions.

Network realism.

Avalanche SmartBits delivers a high degree of network realism, even down to the subnet level, so that you can simulate the conditions that most seriously affect performance. Capabilities include:

- Network delay settings. Avalanche SmartBits includes a high-accuracy delay factor that mimics latencies in users’ connections by simulating the long-lived connections that tie up networking resources.
- Packet loss simulation. Avalanche SmartBits gives you the unique ability to specify the level of packet loss during a given test.



Avalanche SmartBits allows you to run load tests on both Layer 4–7 and Layer 2–3 network equipment, and provides real-time as well as end-of-test results. Multiple users can run different tests at the same time, on the same platform.

- **TCP/IP stack characteristics.** Avalanche SmartBits provides control over maximum segment size, slow/start congestion avoidance, VLAN tagging, IP fragmentation and reassembly and TCP timeout behavior for the most thorough, realistic TCP/IP stack testing. No other system gives you this degree of granular control.

Flexible load metrics.

To allow you to focus on the metrics relevant to you, Avalanche SmartBits provides a highly flexible adaptive load-generation feature. You can specify load using user sessions, user sessions per second, transactions, transactions per second, connections, or connections per second—all the while benefiting from the rich user profiles that Avalanche SmartBits supports. The system’s graduated load-stressing capabilities enable you to set up parameters just once to perform tests at multiple load levels.

Quick setup and intuitive controls.

You can access Avalanche SmartBits’ sophisticated capabilities directly from Avalanche Commander, a desktop Java-based GUI that lets you easily provision the SmartBits chassis and modules, configure and run tests with different user scenarios, and analyze results. The Avalanche SmartBits software allows you to configure modules in either Avalanche or Reflector mode for each test, without loading new software.

You can also control tests and create complex network and infrastructure testing scenarios using scripting—in Python, Tcl and Perl. Using Avalanche SmartBits’ test validation mode and PCAP trace, users can ensure that the test is configured properly and capture the packet level traffic for debugging.

Real-time test results.

Avalanche SmartBits provides real-time statistics for critical variables—across all protocols—so you can determine how your equipment or infrastructure holds up while testing is in progress. Server load balancer (SLB) binning allows you to verify that server load balancers are distributing load correctly. Comprehensive reporting capabilities give you an integrated picture of all relevant statistics in a single report.

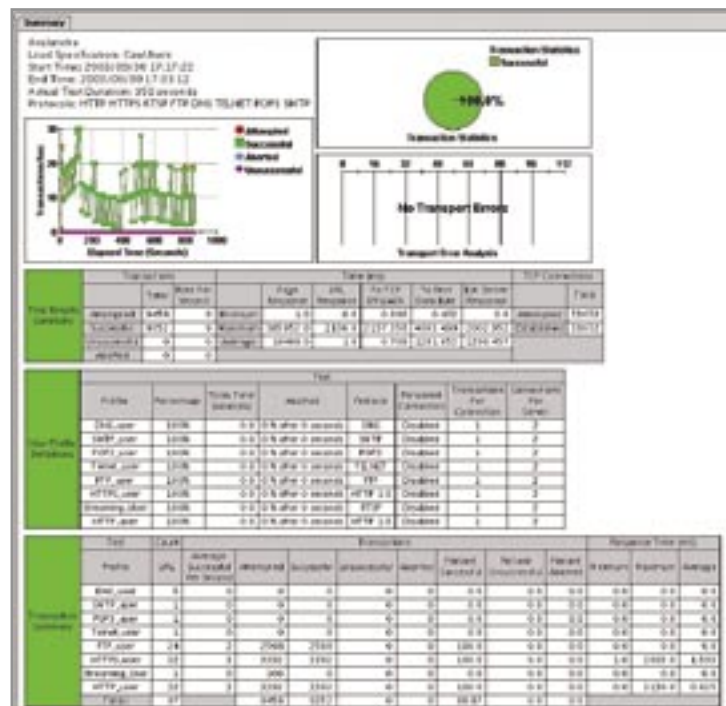
Make the most of existing testing products.

Avalanche SmartBits can be run in conjunction with your current software-based regression testing tools, protecting your current investment and enhancing its value. By simulating high traffic volumes, Avalanche SmartBits helps you spot functional problems with network devices that might not be apparent at lower load levels—even with the most advanced regression testing.

For companies that currently use Layer 2–3 test tools but need to test at Layers 4–7, Avalanche SmartBits supplements existing test tools by allowing Layer 2–3 traffic to run in conjunction with intelligent Layer 4–7 traffic.

Avalanche SmartBits applications.

- Avalanche SmartBits is an ideal solution for equipment vendors and service providers to:
 - Diagnose functional faults arising from end-user behaviors.
 - Verify the performance of sophisticated L7, content-aware algorithms.
 - Perform capacity measurements and determine the peak session processing capability of stateful load distribution and security devices.
- Avalanche SmartBits is also useful for testing large enterprise networks and web infrastructures. It allows IT professionals to:
 - Measure end-user experience with session-based metrics such as response time.
 - Uncover potential end-to-end network bottlenecks before deploying new services.
 - Perform a capacity assessment of large websites with complex web acceleration and security devices.
 - Verify the business logic of back-end, application and database servers under high load.



Flexible, extensive reporting and analysis: Avalanche Analyzer allows you to analyze and display data generated by load testing, enabling you to spot problems or trends at a glance.

Avalanche SmartBits Specifications

Integrated Hardware and Software

- Avalanche SmartBits supports SmartBits 600 and 6000 chassis; TeraMetrics, TeraMetrics XD and XENPAK modules, and Avalanche and Reflector software.
- Includes ability to configure each TeraMetrics module as either an Avalanche or Reflector.
- Allows for multi-port setup and control for Avalanche and Reflector.

High Performance

- Avalanche modules:
 - Simulate more than 250,000 simultaneously connected users.
 - Generate in excess of 10,000 requests per second (HTTP 1.0 with no persistence) and over 15,000 requests per second (HTTP 1.1 with persistence) per module.
 - Sustain over 2,500 HTTPS requests per second per module with no SSL session ID re-use.
 - Generate more than 2,000 streaming requests per module.
- Reflector modules:
 - Manage 250,000 open connections per chassis.
 - Handle in excess of 10,000 requests per second (HTTP 1.0 with no persistence) and over 15,000 requests per second (HTTP 1.1 with persistence) per module.
 - Manage more than 10,000 streaming requests per module.
- AfterBurner™ TCP acceleration engine on Avalanche/Reflector modules:
 - Generates more than 300,000 connections per second per port.
 - Generates over 150,000 HTTP transactions per second per port.

Network Realism

- Generates HTTP/1.0, HTTP/1.1 and HTTPS (including persistence and simultaneous connection settings); RTSP/RTP (QuickTime and RealNetworks); Microsoft Media Streaming; FTP; SMTP (including attachments) and POP3; DNS; and Telnet traffic.
- Supports SSL versions V2, V3 and TLS V1, and SSL protocol parameters (version selection, cipher suites and session ID re-use).
- Supports simulation of Distributed Denial of Service (DDoS) attacks.
- Enables realism parameters on a per-subnet basis including packet loss and link-speed emulation (from 9600 bps to gigabit LAN speeds).
- Handles multi-level HTTP redirects.
- Supports HTTP proxies and proxy caches.
- Enables network delay settings.
- Allows simulation of TCP/IP stack characteristics and control over:
 - Maximum segment size.
 - Slow start/congestion avoidance.
 - VLAN tagging
 - IP fragmentation and reassembly
 - TCP timeout behavior.
- Includes Streamliner™ mode which allows for configuration of a full TCP stack for HTTP-only sessions.

User Realism

- Allows flexible load specifications that can be applied globally or per user profile: user sessions, new sessions per second, transactions, transactions per second, connections or new connections per second.
- Supports IP and MAC masquerading.
- Emulates multiple browser types.
- Supports cookies, session IDs, HTML forms, HTTP posts and HTTP basic and proxy authentication.

- Simulates user click patterns with configurable “think times.”
- Simulates user click-aways (HTTP aborts).

Virtual Server Emulation

- Web server emulation:
 - Protocol support: HTTP/1.0 and HTTP/1.1, SSL.
 - Responds to both static and dynamic URL requests.
 - Provides control over server characteristics such as:
 - Server headers.
 - IP addresses.
 - Size of returned data with configurable size distributions.
 - MIME type of returned data.
 - Application status codes returned.
 - Embedded text within returned data.
 - Last modified and expired header.
- Mail server emulation:
 - Protocol support: SMTP, POP3.
 - Accepts SMTP mail from clients, optionally with attachments.
 - Returns mail to clients, optionally with attachments.
- Streaming server emulation:
 - Protocol support: RTSP/RTP (QuickTime) over TCP/UDP/HTTP, MMS.
 - Serves streams with uploaded content.
- FTP, DNS and Telnet server emulation.

Intuitive Operation

- Avalanche Commander provides an integrated, Java-based GUI for provisioning, configuration and running of tests, and results analysis.
- Support for PCAP trace and SLB binning.
- Supports automated testing with Python, Tcl and Perl scripts.
- Provides real-time statistics for instant feedback on performance.

Supported SmartBits Modules

Module	Description
LAN-3302A	10/100Base-T Ethernet copper, 2-port, TeraMetrics module
LAN-3301A	10/100/1000Base-T Ethernet copper, 2-port, TeraMetrics module
LAN-3311A	1000Base-FX Ethernet GBIC, multi-mode, 2-port, TeraMetrics module
XLW-3721A	10 GbE XENPAK, 1-port, TeraMetrics module
STC-LAN-3327A	Dual media (10/100/1000 and GBIC), 1-port TeraMetrics XD module
STC-LAN-3325A	Dual media (10/100/1000 and GBIC), 4-port TeraMetrics XD module
STC-LAN-3321A	Dual media (10/100/1000 and GBIC), 2-port TeraMetrics XD module

Requirements

- A SmartBits 600/6000B/6000C chassis.
- IBM or compatible Pentium™ PC running Windows® 98/2000/NT/XP, or a workstation running Solaris or Linux, plus a mouse and color monitor.

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