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Contact Us +1 844 GO VIAVI | (+1 844 468 4284)

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DATASHEET

Autonomous Flow Tracking

Autonomous Flow Tracking Introduction

The demand for Core Transport networking is expanding rapidly to meet the needs of today and tomorrow. Emerging use cases like AI workloads, 5G, VPN services, Cloud, IoT/TSN, and Industry 4.0 are increasingly moving to the network core, requiring an unprecedented scale of information exchange. This shift calls for massive increases in flow volume, pushing common transport networks to their limits. With this surge in complexity, effective testing, validating network services, and quickly pin pointing problems have become a critical challenge.

The new **Autonomous Flow Tracking (AFT) solution** from Spirent TestCenter redefines how network streams are defined for testing, enabling customers to test and monitor massive volumes of network flows through their devices or systems under test (DUT/SUT). AFT supports highly complex use cases that were previously impossible with traditional stream-based testing statistics, such as BGP Router Import scenarios. In these cases, customers can import millions of IPv4 and IPv6 routes and use AFT to track each flow endpoint, monitor their performance, pinpoint issues, and troubleshoot in real time.

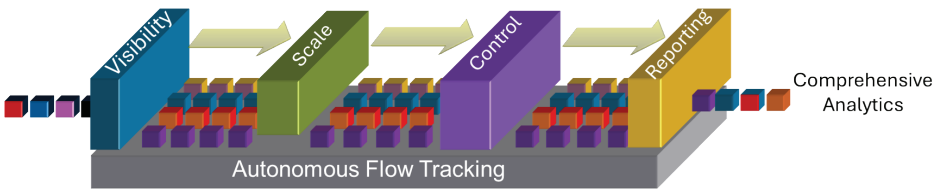
AFT also seamlessly integrates with Spirent's TCIQ, a web-based result analytics tool that offers a streamlined, zero-touch navigation of flow results. By using TCIQ with AFT, customers can view flow statistics in a single, consolidated dashboard, significantly reducing troubleshooting time from hours to minutes. TCIQ's auto-sorting mechanisms, condition-based filtering, and drill-down capabilities provide quick insights into specific flows or stream blocks, greatly improving test results analysis efficiencies.

Applications

Bandwidth demands continue to grow, leading to an exponential increase in traffic types and endpoints—To meet and validate these massive scaling needs, users must test complex routing, data center, and access protocols on switches and routers, while measuring QoS metrics across millions of flows at line rate. .

Common Core Transport Network Testing—Gain complete visibility into traffic flows from end to end, across any transport medium. Validate the performance of next-generation, multi-terabit cloud and data center fabrics with confidence. Gain complete visibility into traffic flows from end to end, across any transport medium. Validate the performance of next-generation, multi-terabit cloud and data center fabrics with confidence.

Monitor and troubleshoot flow performance—Benefit from real-time flow recognition and SLA monitoring, offering actionable insights into network health for proactive troubleshooting and optimal performance.



Features

- Flow-aware QoS and multi-path testing for mission-critical traffic, ensuring reliable performance
- Routing Convergence Testing to assess flow behavior during network convergence events
- Detailed visualization of traffic flows, including timestamps, flow metadata, and VPN traffic through the core
- Scalable endpoint recognition, supporting over 2 million endpoints or paths
- Autonomous Flow Tracking (AFT) is available on FX3 100G 4- and 6-port, MX3 100G 4-port, and B3 800G 8-port appliances. AFT support on the B3 800G 4-port will be available soon.

Benefits

- Quickly and easily visualize network flows at scale, with detailed per-flow statistics.
- Monitor network test health with user-defined failure indicators such as packet loss, latency, and complete flow disruption.
- Gain instant actionable insights with real-time statistical analysis of user-defined failures, enabling rapid troubleshooting during test execution.
- High-scale support for millions of traffic endpoints, offering common stats to quickly pinpoint network issues.

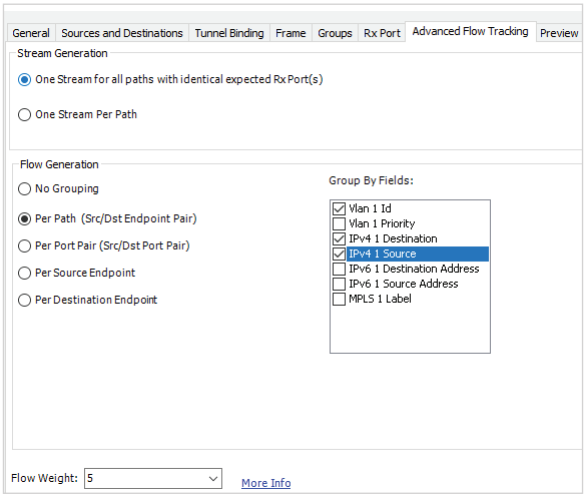
AFT Features

- AFT tracks flows based on L2/L3 and L4 header fields, such as: VLAN ID, MPLS, SRv6 SID, IPv6. address, and more.
- Supports the tracking of massive flow scale tuples simultaneously, including those with VLAN ID, QoS, SID, IPv6, and application protocols providing details even in the most complex of traffic patterns.

Global Flow Results (Not Saved) LIVE

Stream Block ...	VLAN 1 ID	IPv4 1 Source	IPv4 1 Destination	Tx Cou... (frames)	Rx Co... (frames)	Tx Rate (fps) ▾1	Rx Rate (fps)	Frame Loss (frames) ▾2	Frame Loss (%)
DSCP-88	103	100.4.1.1	200.5.245.1	272,040,525	271,366,882	844,598	844,597	0	0
DSCP-88	103	100.4.2.1	200.5.246.1	272,040,525	271,366,863	844,598	844,597	0	0
DSCP-88	103	100.4.3.1	200.5.247.1	272,040,524	271,366,884	844,598	844,598	0	0
DSCP-88	103	100.4.6.1	200.5.250.1	272,040,523	271,366,871	844,598	844,597	0	0
DSCP-88	103	100.4.7.1	200.5.251.1	272,040,523	271,366,882	844,598	844,597	0	0
DSCP-88	103	100.4.8.1	200.5.252.1	272,040,523	271,366,874	844,598	844,597	0	0
DSCP-88	103	100.4.9.1	200.5.253.1	272,040,523	271,366,885	844,598	844,597	0	0
DSCP-88	103	100.4.10.1	200.5.254.1	272,040,523	271,366,888	844,598	844,597	0	0

- Auto sorts flow results by frame loss and offers filters, allowing users to customize test results and quickly pinpoint problem areas.
- User-defined health indicators provide real-time health monitoring of flows and error isolation, o users to accurately and quickly identify errors even in the most complex test configurations.
- Customizable time series charts are available, overlaid with events, correlate real-time metrics with system events, enabling rapid debugging and improving development efficiencies.
- Grouping and aggregation features aggregate flow results based on VLAN ID, VPN ID, QoS values and more for efficient report visualization.



- Drill-down from Stream Block to flow view simplifies debugging of specific flows results.
- Drill-down flow view enables setting filters or Boolean logic to narrow down flow errors.
- Supports customized view, stats, and math conditions.
- Routing Convergence Test measures convergence time at the per-prefix level.
- AFT mode significantly simplifies the number of streams required for analysis.
- Measures Unicast and Multicast frame loss in a single flow result view.
- AFT profile view in Spirent TestCenter TCIQ analysis solution provides easy navigation of flow results.
- Delivers more results with tight correlation between control and data-plane.
- Supports on-the-fly changes to flow rate, frame size, and more.
- Supports flow weight mechanisms that track oversubscribed flows, focusing on the most relevant flows.

Spirent TestCenter (STC) Mode Comparison: Default vs. AFT

	Default Mode	AFT mode
Supporting endpoints as flows	No	Yes
Support for grouping flows	No	Yes
Detecting dead flows	No	Yes
Testing Unicast/MC w frame-loss stats	No	Yes
Support for stream to flow drill down view	NA	Yes
Number of tuples per flow	NA	On 4- and 6-port FX3 100G, 4-port MX3 100G, On 8-port B3 800G: 10
Number of Tx flows	NA	10M
Number of Rx flows	NA	512K
Number of paths	4K	10M
Support for filtering of flows	NA	Yes
Flow tracking based on MPLS/uSID	No	Yes

AFT Supported Metrics

4- and 6-port FX3 100G & 4-port MX3 100G		
PGA Mode	AFT Mode	
Tx Stream / Flow-ID (Trackable)	2K Streams 2K Flows with PFC 10M flows without PFC	
Rx Stream / Flow-ID (Trackable)	2K Streams 512K Flows per port	
Number of Paths supported	10 million paths per port	
Statistics per Stream	Tx frames, Rx frames Tx Bytes, Rx Bytes Max/Avg/Min Latency First/Last Timestamp Lost frames (Tx-Rx) In/Out of Sequence Threshold Flag	FCS Error Flag Latency Threshold Error Flag IP Checksum Error Flag PRBS Error Frame Flag TCP/UDP Checksum Error Flag
Statistics per Flow	Tx/Rx Frame Count and Rate Max/Avg/Min Latency First/Last Timestamp Lost frames (Tx-Rx) In/Out of Sequence Threshold Flag	FCS Error Flag Latency Threshold Error Flag IP Checksum Error Flag PRBS Error Frame Flag TCP/UDP Checksum Error Flag
Statistics per PORT	Tx Bytes Tx Frames Tx L1 Bytes Tx Signature Frames Tx PFC Counters	Rx Bytes Rx Frames Rx L1 Bytes Rx Signature Frames Rx PFC Counters
8-port B3 800G		
Tx trackable flow count	Millions (SW-capped)	
Rx trackable flow count	4K	
HW stream blocks	128	
Max RIT table entries	128K	
Adv Out of Sequence	Supports Out of Seq packer per flow level	

Ordering Information

Part Number	Description
Base Packages	
BPK-1407	Autonomous Flow Tracking (AFT) Package

Requirements

- Spirent TestCenter platform with compatible 4-port FX3 100G (100G speed mode only) and 8-port B3 800G appliances.
- Spirent TestCenter IQ System requirements:

System Test	Recommended System
General Functional Testing at low port (< 20) and stream density and/or low protocol scale (100s of emulated endpoints)	• Intel® i3 CPU (or equivalent) – 2.9 GHz or better • 3GB RAM • 50GB of free disk space
Scaling Testing with higher ports and/or single or multi-dimensional protocols scale	• Intel® i7 CPU (or equivalent) – 2.9 GHz or better • 8 cores CPU • 32GB RAM • 100GB of free disk space • 500GB DC Quality SSD

- Windows-based workstation with 10/100/1000 Mbps Ethernet NIC; mouse and color monitor required for GUI operation.
- Linux- or Windows-based workstation for automation scripting.
- Mac, Linux, or Windows-based workstation for Rest API support.

About Spirent Communications
Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information visit: **www.spirent.com**

Americas 1-800-SPIRENT
+1-800-774-7368 | sales@spirent.com

Europe and the Middle East
+44 (0) 1293 767979 | emeainfo@spirent.com

Asia and the Pacific
+86-10-8518-2539 | salesasia@spirent.com

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