SOLUTION BRIEF

Real-Time Market Monitoring for Fast-Paced Electronic Markets

KEYSIGHT

The Importance of Network Monitoring and Analytics

Trading companies rely on electronic systems to process a high volume of financial transactions, and therefore it's crucial for them to ensure that these systems are performing efficiently and securely. Network monitoring and analytics can provide trading companies with a detailed understanding of their network's performance, security, and compliance status, enabling them to proactively identify and resolve any issues that may impact the reliability and security of their electronic trading systems.

Some of the reasons why trading companies should do network monitoring and analytics include:

- **Performance optimization:** Network monitoring and analytics can help trading companies identify bottlenecks, latency, and other performance issues that may affect the speed and accuracy of their trading systems. By addressing these issues, they can optimize their network's performance, improve the speed and accuracy of their trading systems, and reduce the risk of financial losses.
- **Security:** Network monitoring and analytics can help trading companies detect and respond to security threats such as intrusion attempts, malware, and unauthorized access.

> **The collection, examination, and representation of data, which is crucial to the success of any organization, is now more essential than ever**

By identifying and mitigating these threats, they can protect their trading systems and the sensitive financial data they contain from unauthorized access and breaches.

- **Compliance**: Many regulatory bodies require trading companies to maintain detailed records of their electronic trading systems' performance and security status. Network monitoring and analytics can provide trading companies with the data they need to demonstrate compliance with these regulations and avoid costly penalties
- **Cost savings:** By identifying and resolving network issues proactively, trading companies can reduce the need for expensive troubleshooting and repairs, ultimately saving them time and money.

Packet2Disk, the most advanced capture and analytics tool available on the market today and Keysight, the market leader in network monitoring and visibility have partnered to offer financial market companies a comprehensive solution for decoding, storing, analyzing, and reporting financial market and trading message data.

This partnership guarantees full network visibility and zero-loss advanced packet processing.

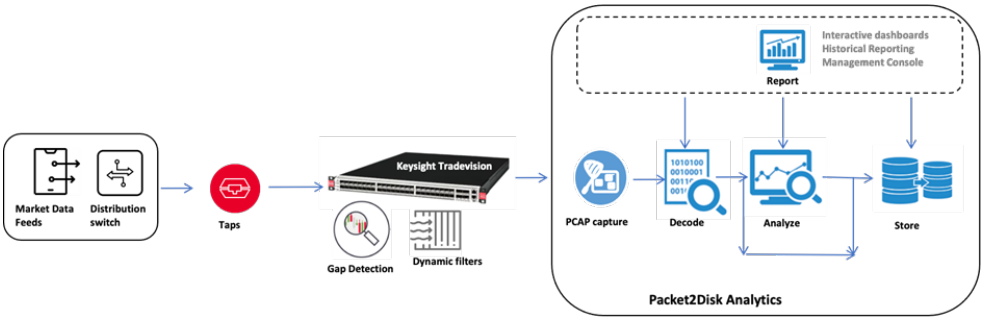
PACKETS2DISK

Financial institutions use Packets2Disk software and Keysight visibility products to monitor their electronic trading networks.

Packets2Disk Analytics provides control and visibility across networks, market data, and trading systems. Raw packets are captured using Keysight optical taps and packet brokers and fed into Packet2Disk software for analysis.

In this partnership, Keysight is bringing its advanced market data analytics solutions, Tradevision and Tradestack, which are supported on next-generation network packet brokers. With Tradevision / Tradestack ability to handle high throughput of up to 1000 Gbps and perform line rate analysis of market data, financial institutions can make faster and more informed trading decisions than ever before. For example, the combined solution can be used to filter out irrelevant market data, leaving only the most important and actionable information for analysis.

Example of how the combined solution is applied



In this network setup, Keysight's TradeVision / Tradestack packet brokers are positioned between network access points and Packet2Disk Analytics. They aggregate and direct traffic from various sources such as taps to the Packet2Disk Analytics.

Trade Vision receives market data feeds, performs multi-gap detection which means that it quickly detects gaps in multicast data by alerting other tools and systems to market feed network problems and then applies dynamic filters.

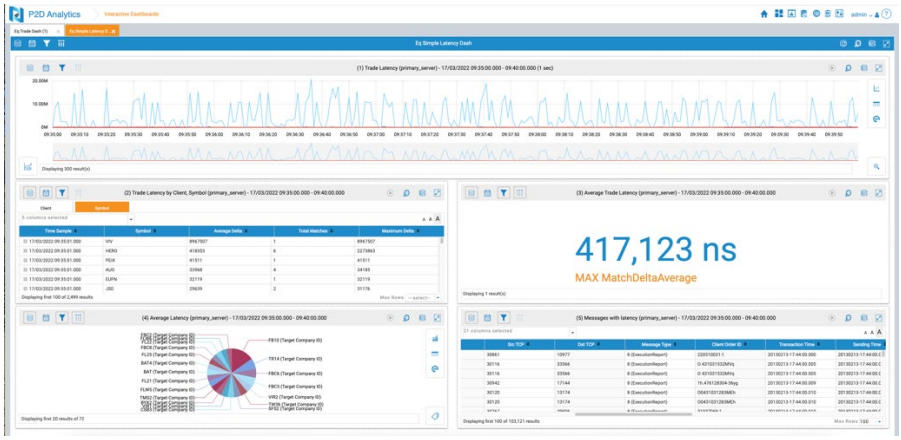
Other key configurable features include:

- One Way (OWL), Two-Point (TPL), and Synthetic Mesh Latency (SML) analytics
- Feed and Channel Health detects the lack of traffic on market data feeds so that network operations staff can address without having to wait to be alerted by application IT staff
- Microburst Detection detects excessive traffic and sends alerts to other tools and systems, so that network congestion issues can be quickly addressed.
- Tradestream streams high-resolution traffic statistics to Big Data applications for capacity planning, incident management and historical traffic analysis.
- Nanosecond Time Stamping taps the network pipes that carry the electronic trading communications and time stamps the messages directly off the wire using nanosecond resolution time stamping with sub microsecond accuracy to UTC.
- Pre-programmed Exchange Feeds populated with over 30,000+ unique IP address and destination ports.
- AppStack classifies traffic in real time and directs it to the correct tool according to parameters such as application type, geolocation, or even handset type—so tools get just the traffic type they need, again optimizing your investment in tool infrastructure
- Sophisticated Load Balancing distributes traffic across several tools for monitoring in serial or parallel to maximize up-time and ensure that no critical data is lost.
- Ixia Fabric Controller (IFC) enables single pane-of-glass management of multiple Vision-series packet brokers in same or geographically distributed networks to be managed as a cluster via a single web console login.
- Visual Dashboards and End-of-Day Reports simplify issue identification and remediation by displaying relevant event meta-data with high-precision drill-down into associated local syslog viewer event metadata for progressive disclosure and rapid problem resolution.
- Powerful GUI allows you to focus on market feed data management rather than configuration the industry-leading user interface and patented filter compiler make configuration simple.
- Drag and Drop Configuration allows complex scenarios to be rapidly deployed. For example, Multicast traffic can be sent to inbuilt gap detection capabilities, whilst TCP/IP traffic is routed to trade analytics tools.
- Auto Detection of Channels allows the user to scan selected feeds or individual channels for presence of data on the wire.

Then Travedison forwards the traffic to Packet2Disk Analytics for packet capture and analysis. The captured packets are decoded, analyzed and stored on disk for generating reports on network performance, security, and compliance.

- Decoding engine received the packets, decodes timestamped messages for market data and trading flows
- The data is then sent to the analytics engine which correlate, enriches it and generates metrics
- The data can then be exported and stored in multiple formats for real-time and historical analysis
- The reporting element of P2D Analytics is how to view all the data that has been received, filtered, correlated and turned into the metrics you need. The P2D Analytics web-based GUI, with its highly

customizable dashboards and views by user and/or group, enables an easy configuration of what is needed.



The Packet2Disk and Keysight combined solution offers a range of benefits for monitoring and analyzing electronic market environments, including:

- The widest range of optical taps and packet brokers available, with options for speeds ranging from 10Gbps to 400Gbps, including low latency models and tap aggregators.
- Industry-leading 400G NPB (network packet broker) that supports all QSFP-DD speed permutations, including 1 x 400G, 2 x 200G, (1,2,4) x 100G, (4,8) x 50G, (1,2) x 40G, 8x25G, 8x10G.
- Accurate timestamping with sources from NTP, 1588 PTP, precision or 1PPS+ToD (G.8271) with
- two independent 1PPS.
- Nanosecond-level timestamping, making it ideal for high-frequency trading.

Resilient, active-active inline and out-of-band capabilities with packet transformation features on every port including header stripping, timestamping, and tunnel creation/termination.

- Built-in line-rate filtering and lossless processing capabilities, full-duplex, non-blocking, and line rate L2 forwarding of 9.2 Tbps.
- High-performance capabilities, including 100 Gbps sustained capture rates and 100 billion messages per day decode and analytics capability.
- Multi-core, multi-threaded software-only architecture, which allows for deployment on industry-standard hardware, combining minimal deployment overhead with maximum flexibility and ease of use.
- Network analytics capabilities including utilization, microburst, and TCP error analysis.
- Latency analytics and gap detection, including Trade latency, Multi-hop latency, Tick-to-Trade, Trade-to-Tick, A-B latency, and Market data gaps.

About Packet2Disk

Packet2Disk is a powerful tool that allows for the capture, decoding, analysis, and export of trading and market data. Its nano-second timestamp accuracy provides a precise and independent record of financial data, meeting both internal and external regulatory compliance needs. It supports all major financial protocols and has an in-built API for creating custom decodes if needed.

About Keysight

The use of Keysight's packet-level visibility streamlines performance and security analysis by providing:

- Advanced, reliable packet processing with zero data loss
- Market data gap detection
- Aggregation and load balancing of traffic from all needed access points
- Elimination of duplicate packets and unnecessary traffic to optimize resource consumption, throughput, and storage capacity
- User-friendly interface and Dynamic Filter Compiler for easy operation and rule definition
- SSL decryption to detect hidden threats
- Support for both physical and virtual networks across a unified infrastructure
- Complete visibility across on-premises data centers and public and private clouds such as Amazon Web Services, Microsoft Azure, and Google

In summary, network monitoring and analytics are critical for trading companies to ensure the reliability, security, and compliance of their electronic trading systems and protect their business from potential losses. Packet2Disk and Keysight solution offers the most comprehensive and high-performance solution for monitoring and analyzing electronic market environments.

KEYSIGHT

For more information on Keysight Technologies' products, applications, or services, please visit: www.keysight.com

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