PICO Corvil Analytics

ELECTRONIC TRADING
SOLUTION SHEET

Real-Time Monitoring of IT Infrastructure in Electronic Trading

Corvil Analytics is used by the world's top banks and exchanges to safeguard the orderly operations of their trading business. It handles the challenging demands of high-performance, low-latency, data-intensive IT environments.

CHALLENGES

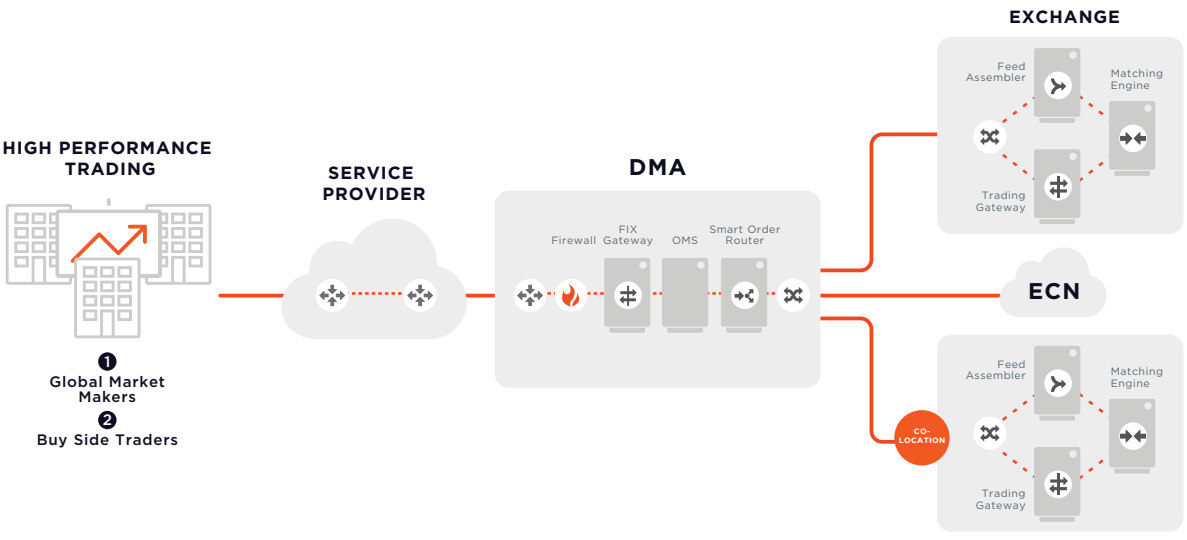
Electronic trading is critically dependent on IT infrastructure performance. It utilizes highly variable data volumes with massive peak rates. It is a dynamic environment with new trading sessions, strategies and venues simultaneously working together. Money can be lost very quickly and problem resolution must be fast! Clients demand transparency and reporting on performance.

SOLUTION

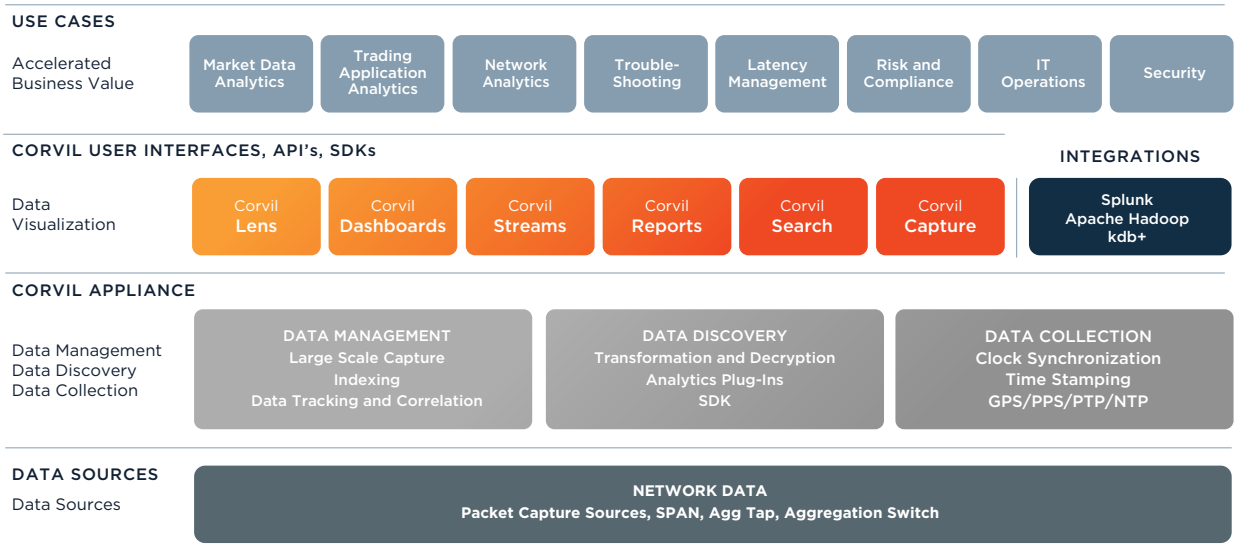
Corvil addresses these challenges by providing microsecond visibility, incident troubleshooting and operational intelligence for high-performance trading environments. Corvil captures all trading and market data directly from the network, with zero impact on the trading systems, and transforms it into business metrics for use by multiple teams including client reporting, trade support, market access and network infrastructure. The architecture's multi-layered approach enables users to consolidate infrastructure and business-level visibility on a single scalable and economically efficient platform.

KEY BENEFITS

- Improved customer retention with increased service transparency, reliable performance and faster troubleshooting
- Complete monitoring of all trading, market data and infrastructure components
- Non-intrusive zero-overhead solution
- Cost-effective single product supporting multiple teams - operations, trade support, compliance reporting
- Monitor client and venue connectivity performance
- 100% decode, capture and data streaming, for compliance and forensics
- Significantly reduce Mean Time to Resolve (MTTR)
- Reduce risk exposure from technology failure or anomalous trading events



Corvil Approach



Data Sources

Corvil uses network data as the authoritative record of what is happening in real-time and monitors packets as they cross the network. Traditional network monitoring tools cannot look much beyond the network headers, and ignore the fact that every detail of your trading systems' interactions with the market is carried in the packet payloads that follow those headers. Network data reveals in true sub-second real-time precisely which trading sessions are active, which markets they are accessing, what volume of activity they are driving, and which specific actions are being taken as well as the likely quality of their experience.

Data Collection

Simply plug Corvil into your network and capture a distributed, time-synchronized record of every packet, message, quote and order crossing the trading system. Data is stored at the point of observation and can be analyzed from a centralized access point.
The architecture offers:

- A range of high-performance capture and storage appliances
- Automated time-synchronization between Corvil appliances using patented algorithms
- Support for data timestamps from aggregation taps and switch vendors
- Detection and marking of any data where the quality may be compromised by overloaded SPANS and switches
- Deep Buffering: soak up traffic bursts without dropping, so you can size for the average rate of traffic rather than the peak rates

Corvil Discovery

Corvil's appliance ships with hundreds of plug-ins that auto-discover, decode, reconstruct and analyze your market data and order flows in real-time. Corvil makes sense of the unstructured network data, extracting the details and performance of each business transaction.

Corvil's Electronic Trading Plug-ins contain real-time decoders for native trading protocols and market data feeds across all major markets. Without additional cost there is an Enterprise Plug-ins package shipped with Corvil, allowing monitoring and analysis of non-financial applications if required – such as database, storage, VoIP and web services.

All plug-in packages are updated and released monthly by Corvil with new plug-ins and enhancements. These can be downloaded from Corvil's portal and installed independently of product software releases.

Corvil Software Development Kit (SDK)

The Corvil Software Development Kit is available to extend the "out of box" offering. Use it to decode proprietary applications and protocols and to define and implement your own real-time business analytics.

Data Management

The Corvil Capture module, running on a Corvil Appliance, can read stored network data in standard PCAP formats and analyze multiple terabytes per day. From this data, Corvil automatically discovers, decodes and reconstructs all details of application and business flows. All Corvil analytics and application/network performance results are then reported from your stored network data.

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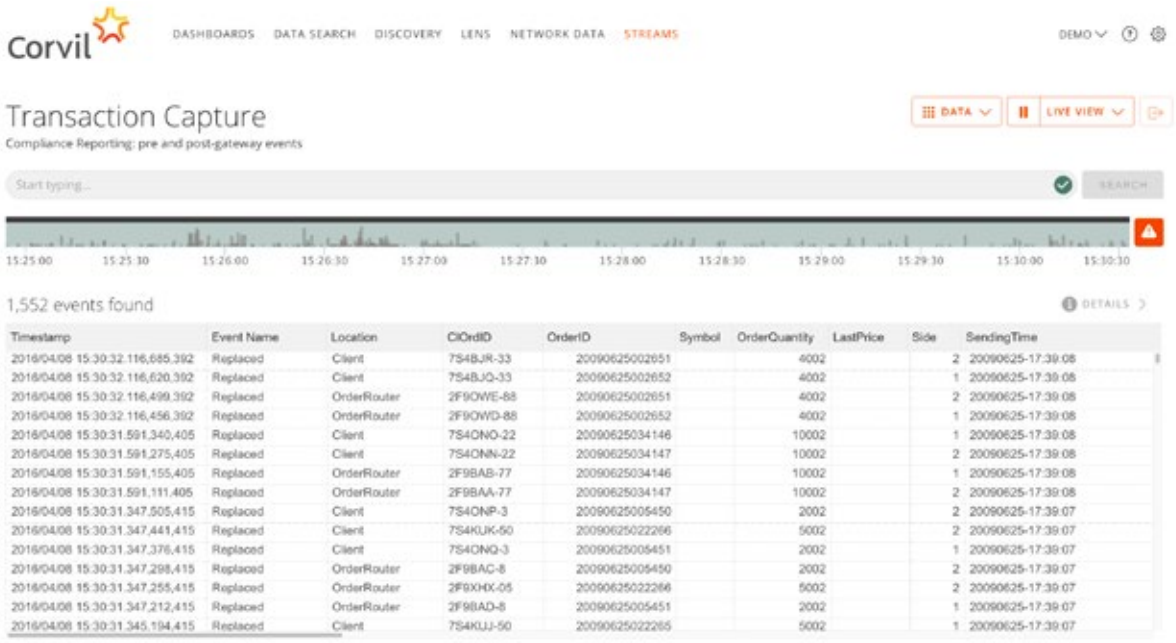

Corvil Streams

From the continuous flow of this trading and market data on your network, Corvil Streams pull out the key events for each session, generating a concise summary for each one. These events can be reviewed, filtered, and categorized in the Corvil UI or streamed in real-time to third-party systems such as Splunk, Apache Hadoop, kdb+, MongoDB, Tableau and ElasticSearch.

The analytics streams are designed for easy integration with other applications. An open and flexible API provides real-time access so that they can become an input to external dashboards, existing monitoring systems, or proprietary applications.

An analytics stream can easily be tuned — new event types can be added or existing events modified. Event fields can be populated from any of the decoded network data or the additional analytics provided by Corvil's Plug-ins suite. The streams are tuned to the needs of different users, providing the application ops team with details on sluggish response times, the trade support team with details of slow orders and the risk and compliance teams with a real-time drop copy.

Corvil Lens

Corvil Lens takes real-time analytics derived from the network data and presents users with an intuitive and concise view into key metrics such as fill rate, traded volume, order-to-cancel ratios, order types, latency profile, and session errors. These metrics can be aggregated and pivoted by customers, gateways, protocols, venues or any other user-defined grouping. Lens views are fully configurable with support to restrict access to individual trading sessions. All trading activity and performance measurements can be summarized in the trading activity dashboard within Lens. Lens also features a session table view providing real-time alerts of trading activity exceeding business thresholds and highlighting anomalous trading activity.

Corvil Dashboards

The Corvil Dashboards' simple point-and-click interface makes it easy to create visually appealing dashboards in minutes. Charts, topologies and tabular data elements containing analytics ranging from microburst rates to latency and user response analytics can be added. The dashboards update in real-time, highlight performance issues, and provide one-click drill-down navigation to troubleshooting screens.

Corvil Analytics

MARKET DATA ANALYTICS

Market Data Gap Detection
Detect, capture, report and alarm on message sequence gaps within market data feeds. Published in real-time to a dedicated live dashboard.

Feed Handler Latency
Real-time reporting of feed handler latency for all market data protocols and widely used feed handlers.

Relative Latency
Compare the relative latency of market data feeds including A vs. B, colocation vs. proximity, native feed vs. aggregated feed and cage A vs. cage B.

Market Data Latency
Use timestamps inserted by market data publishers to monitor the time taken to deliver the data.

NETWORK ANALYTICS

Microburst Detection
Detection of saturated network links and application processing bottlenecks.

Latency and Round Trip Times
Monitoring of one-way and round-trip network latency and loss both within the trading system and between remote sites.

TCP Analysis
Analysis of TCP protocol behavior, with detection of retransmitted and reordered data.

Messaging Middleware
Analyze middleware performance with detection of sequence gaps, NAKs and volume reporting against topics or groups. Support for Tibco Rendezvous, Informatica Ultra Messaging (LBM), Solace, IBM Websphere-MQ-LLM, Software AG Terracotta Universal Messaging (Nirvana).

TRADING APP ANALYTICS

Complete Latency Analysis
Transaction latency: correlates orders, modifies and cancels with their responses.

Measure processing delay across FX price servers, SORs or DMA gateways.

Business-critical latencies like order-to-tick or algorithm decision latency.

Order Lifecycle
View and report on all messages related to the full lifecycle of an order. Track whether filled, partially filled, rejected or canceled. Identify long-lived orders that may have multiple low-level messages and transactions occurring against them.

Multi-Hop Analysis
Monitors messages hop-by-hop across the trading infrastructure, including trading gateways, algorithms, smart order routers, etc. to identify where issues are occurring.

Complex Transformations
Analytics for complex transformations, multi-stage correlations, and one-to-many or many-to-one relationships that can occur in parent/child transactions, for example.

RISK AND COMPLIANCE ANALYTICS

Trading Behavior
Analyze order types and style, monitoring of cancel-replace ratios, order and trade volumes.

Trading Volumes and Rates
Analysis of trading outcomes, in terms of volume filled, value filled and counts of order types.

Real-Time Business Alerts
Alert on business events such as volumes and fills exceeding defined thresholds, a burst in message rates, or unexpected trading events.

Reg. 603a Reporting
Best practice compliance reporting proving that quotations for a NMS stock are sent to the securities information processor before being published on a proprietary feed.

Transaction Record
Historical reports of all trading activity available per venue, per session, per client, etc. All queries and reports are easily accessed via the GUI and integrated with other risk analysis platforms through the Corvil API.

MICROBURST VISIBILITY

Corvil Analytic's unique microburst visibility provides deep, real-time visibility into the interactions between networks, applications and customer experience at microsecond and millisecond timescales. Others measure application messages at 1-second rates (at best), systematically underestimating the network bandwidth and application processing rates required to meet the short timescale demand of high performance trading. Without Corvil, when microbursts occur, they fly under the radar, leaving a wake of intermittent, undiagnosed issues.