

Deutsche Börse Group monitors every trade with Arista

Highlights

Challenge

Ensure lossless data capture, improved network monitoring, and precision timestamping of the co-location network.

Arista Solutions

60 Arista 7130 devices with 32GB deep buffers, embedded Xilinx Virtex 7 FPGA, running the MetaWatch application

Results

- Full insight into the colocation network
- Accurate reporting on traffic patterns & latency profiles
- Fair market access for all participants

Arista provides lossless data capture, improved network monitoring, and precision timestamping of Deutsche Börse's co-location network - providing the exchange with unprecedented insight into their network and ensuring fair market access.



Deutsche Börse Group

Project Background

Trading environments are becoming more challenging to monitor thanks to ever increasing data volumes, reduced jitter and latencies at nanosecond levels. Participants in the market demand increased performance and full transparency from the exchange. Additionally, network traffic at exchanges can be extremely variable with traffic levels dramatically rising during market volatility events. This makes packet capture, network monitoring, and accurate timestamping of transactions increasingly important and challenging.

In addition, Deutsche Börses' Eurex and Xetra markets were moving to single "partition specific" order entry gateways which reduced the number of parallel inbound paths. Monitoring the fairness and efficiency of these gateways requires accurate network-level monitoring as this can't be done at the application level.

The Challenge

Deutsche Börse Group had an existing packet capture and timestamping solution in place. With the major upgrade and redesign of the co-location network, and in response to increasing customer demands for market fairness and precision it needed to significantly enhance its network monitoring capabilities to obtain full visibility by capturing every packet entering and exiting their network. Deutsche Börse required a highly reliable solution that enabled them to monitor the network in real-time and alert clients to issues when they happen. The main solution criteria included:

1. Nanosecond-timestamping of all customer traffic in and out of the exchange to determine the precise order of trading events, in particular for clients co-located in the colocation data center
2. Ensuring fair market data distribution across all market switches by measuring the length of cables from customer's racks to the access points in the network
3. Capturing the production data flow reliably and in real-time to assess the health of the network, ensure reliability, and troubleshoot problems
4. Guaranteeing lossless capture during traffic bursts
5. Monitoring and measuring of latency data

The Solution

The network engineering and trading IT teams of Deutsche Börse evaluated a number of potential vendors and their products. After careful vetting and extensive testing, Deutsche Börse decided to roll out 60 devices of the Arista's 7130 Series in its data center in Frankfurt over a period of 6 months.

The 60 Arista 7130 devices are configured with 32GB deep buffers, an embedded Xilinx Virtex 7 FPGA and run the MetaWatch application. MetaWatch is a powerful application designed for Arista's 7130 Series devices. It combines several components of a traditional network monitoring solution into a single device: tapping, tap aggregation, Ethernet media conversion, precise time synchronisation

via NTP, PTP or PPS, nanosecond-accurate timestamping, and deep buffering. The goal is to allow cost-effective, precise monitoring of large numbers of network flows.

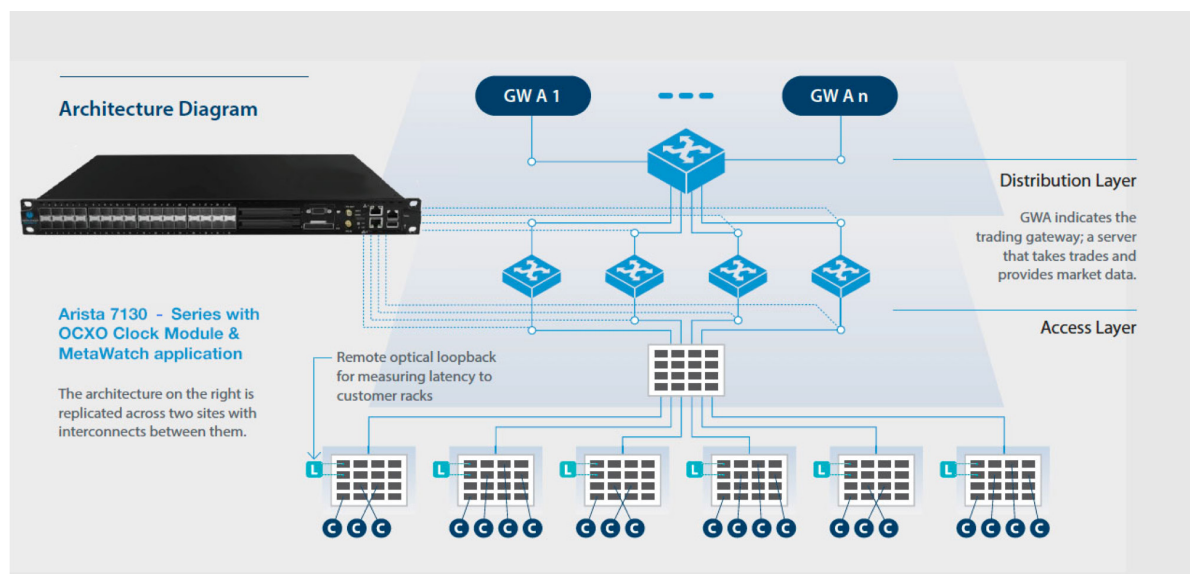
All Arista devices contained high-precision OCXO clock modules which are synchronized by an external, high-resolution PPS signal for highly accurate and reliable synchronisation between devices.

Every trade placed on the exchange is precisely monitored and measured by an Arista device making it an integral part of the Deutsche Börse infrastructure.

Deutsche Börse decided to use Arista for a number of critical reasons:

1. Lossless packet capture of a large number of 10 Gbit/s Ethernet lines
2. Nanosecond timestamp precision with resolution of only +/- 1 ns
3. Competitive cost
4. In-depth understanding of the industry and challenges faced by exchanges
5. Fast & efficient communication between Arista and Deutsche Börse (compared to the competition)
6. Extremely responsive Tech Support

Architecture Diagram – Where Arista fits in



- GWA indicates the trading gateway; a server that takes trades and provides market data
- The above architecture is replicated across two sites with interconnects between them

Conclusion

Deutsche Börse has seen numerous tangible improvements to its monitoring and capture network and the quality of service it can provide to its clients on the co-location network.

Notably Deutsche Börse can now...

- * Offer its clients the most reliable, high-quality network to trade on by:
 - Obtaining full insight into the customer facing part of the co-location network
 - Reporting accurately on microbursts and traffic patterns
 - Conducting more precise future planning e.g. capacity planning
- * Ensure fair and equal market access for all co-location trading participants by:
 - Precisely timestamp all network traffic (to nanosecond level)
 - Accurately determine the order of incoming orders/quotes
 - Ensure all market switches process messages in strict “first-in, first-out” order
- * See and analyse every, single packet crossing the network through lossless capture to diagnose or recreate any trading event
- * Capture critical latency data/metrics by reliably measuring the propagation latency
- * Obtain an accurate record of all trading network activity for troubleshooting purposes

Deutsche Börse is looking to leverage the telemetry features that are available on the Arista devices. It is planning to send network data to InfluxDB to monitor and visualise all aspects of the packet capture system and generate real-time alerts for any anomalous conditions detected at the network layer.

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