

ExchangeApp

Inline timestamping enables exchange fairness



Low-Latency of < 200ns



Deterministic



Timestamp precision



Integrated Tap/Agg

The markets aren't perfect. And technology can help.

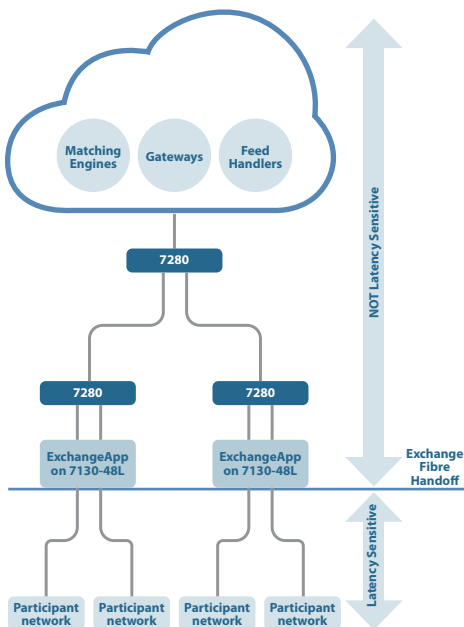


Figure 1.1 Example Network using ExchangeApp

Arista ExchangeApp is a network application that runs on the Arista 7130L devices and performs highly accurate, low-latency, inline packet timestamping.

By providing exchange software systems with the precise arrival times of trading orders, ExchangeApp makes it possible to build fairer financial markets.

ExchangeApp applies an inline timestamp at the exchange edge and appends it to each packet before that packet is forwarded out of a low latency interface. On this low-latency passthrough path, packets are received, timestamped and output with < 200ns.

By placing synchronised ExchangeApp devices at the network edge, it becomes possible to precisely measure the time of packet arrival/departure to/from the network. Nodes deeper in the network can then inspect the ExchangeApp timestamp and process packets in network edge arrival order, reordering packets if necessary. Once the exchange software can interpret these timestamps, it removes the network as a potential source of entropy and creates a more deterministic, fair exchange venue for clients.

As well as timestamping in-line, ExchangeApp also includes an aggregation path with deep buffering features to capture a copy of the traffic directly from the low latency path. This data can be made available to analytics tools, and packet recorders, and subsequently to clients for packet replay or market simulations.

ExchangeApp allows for a paradigm where minimising network latency is no longer the primary driver of the network design, which facilitates the creation of simpler, more robust, enterprise-style network architectures.

Technologies like virtualisation, containerisation, cloud and garbage collection can be used without concern for the determinism issues they create -- the time of arrival is measured by ExchangeApp at the edge of the network, rather than by the software that processes the packets. By relying on ExchangeApp for determinism, Exchanges can innovate faster and provide a better, more reliable, product.

Optimized for

- Arista 7130L Series with embedded Xilinx Ultrascale/Ultrascale+ FPGA(s).

FEATURES	BENEFITS
Low latency	< 200ns passthrough latency to apply the timestamp on up to 48 10GbE ports
High-resolution timestamping	Timestamp each incoming frame with ultra-high precision by a clock disciplined via NTP or PTP, optionally coupled with PPS.
Time synchronisation monitoring	Monitor and record the synchronisation to a time source using a comprehensive time-series and alerting infrastructure based on InfluxDB, allowing for compliance monitoring and alerting.
Flexible time synchronisation	Synchronise the internal OCXO to PPS, PTP or NTP, with an optional Rubidium Oscillator to provide long-term holdover, creating a robust time synchronisation solution.
Deep buffering	Aggregate all of the edge traffic to monitoring tools via ExchangeApp's large 32GB buffers, providing capture for dashboards, monitoring and audit.
Detailed per-port Ethernet statistics	Monitor the quality of the source interface directly for light levels and frame statistics.
Built in network monitoring	Eliminate the need for optical taps by using the in-built tap/aggregation functionality. Save rack space and remove unreliable, expensive and complex cabling.
Industry standard timestamp formats	Leverage standard absolute timestamp formats, not requiring keyframes, making development and integration easier. Also supported by major capture and analytics platforms.
Capture device, port information and other metadata	Track device ID and incoming port ID included in the appended trailer for every frame that traverses ExchangeApp. Other metadata such as sequence number can also be configured.

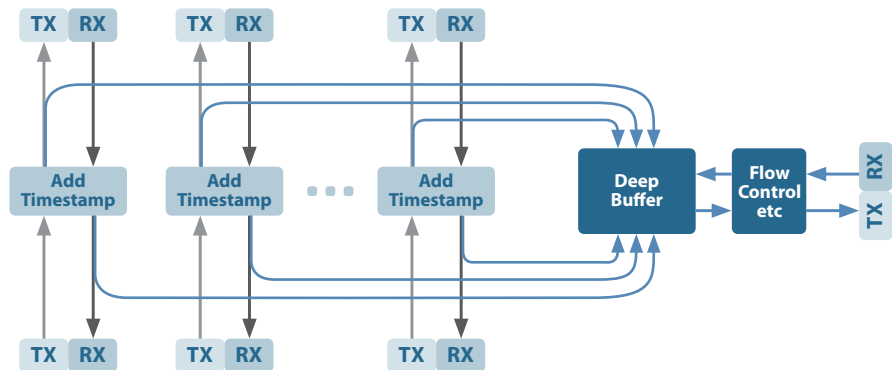


Figure 1.2 Example configuration of ExchangeApp, appending timestamp information to packets on the "TX" path, and capturing all flows to analytics tools via a deep buffer.

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