

Precision Time Protocol (PTP)

Enabling the Financial Services Industry to meet all MiFID 2 market regulations

The Financial Services Industry (FSI)

In the space of a second the FSI can see several thousand orders and transactions pass through a trading venue. With trillions of dollars at stake, the ability to audit and reconstruct all of these events is paramount.

In early 2018 the European Commission will implement the *Markets in Financial Instruments Directive 2* (MiFID 2), providing regulators with the ability to reconstruct all events relating to the lifetime of each order in an accurate time sequence.

How many clocks does it take to measure a millisecond?

The IEEE 1588v2 PTP standard time-stamps data and defines the system-wide method for exchanging and hard time-stamping messages between clocks. The clocks are defined as grandmaster, boundary, and transparent, and they use enterprise profile multicast over IPv4 and IPv6 to transport PTP messages.

NOTE: Transparent clocks measure and adjust for packet delay. The transparent clock computes the variable delay as the PTP packets pass through the device.

The Juniper QFX Series

The Juniper QFX Series meets the needs of today’s most demanding FSI environments. Designed for top-of-rack, end-of-row, and spine-and-core aggregation deployments in modern data centers, the QFX Series can be deployed as 10GbE, 40GbE, or 100GbE access, spine, core, or aggregation devices in IP CLOS, Virtual Chassis, Virtual Chassis Fabric, Multi-Chassis LAG, and Junos Fusion architectures.

The QFX10000 switch implements both boundary clocks and transparent clocks supporting multiple PTP connections while acting as both source and client using the Best Master Clock Algorithm (BMCA) to select the best master clock source.



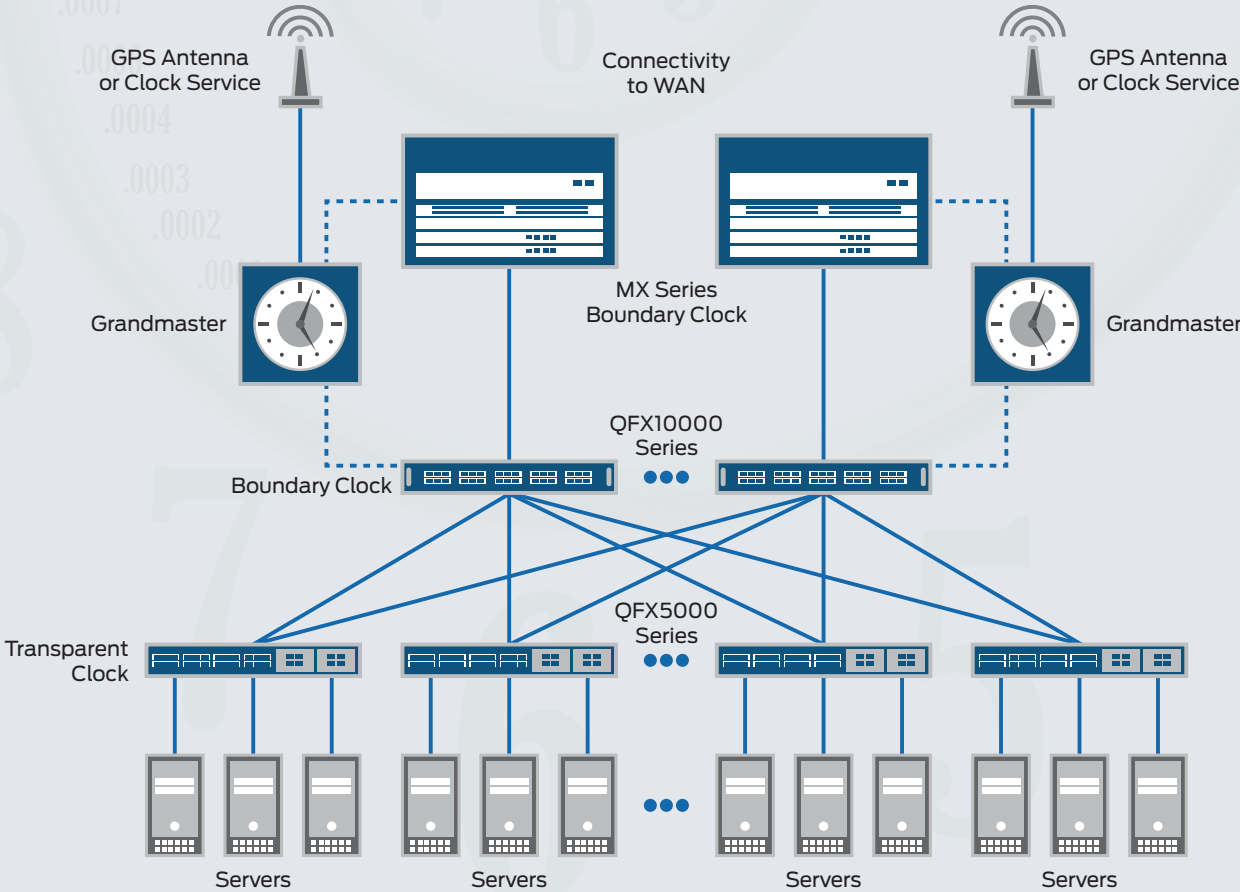
Trading Type	Description	Maximum Divergence from UTC	Granularity of the Timestamp
HFC	High-frequency algorithmic trading technique.	2018 - 100 Microseconds	1 Microsecond or better
Voice	Voice trading systems in respect to bonds, structured financial products, etc.	2018 - 1 Second	1 Second or better
Activity on Request for Quote	Response requires human intervention or the system does not allow algorithmic trading.	2018 - 1 Second	1 Second or better
Concluding Negotiated Transactions	A share, depositary receipt, ETF, certificate, or other similar financial instrument transaction negotiated privately but reported under the rules of a trading venue.	2018 - 1 Second	1 Second or better
Any Other Trading Activity	All other trading activity.	2018 - 1 Millisecond	1 Millisecond or better

MiFID 2 requires all FSI companies to provide accurate time stamping at all points in a data network by drastically tightening the requirements for time stamping from one second down to 100 microseconds for high-frequency computer (HFC) trading.

Clock Flexibility

The Juniper QFX Series provides flexibility to deploy clocking in different layers of the network. In the example below, the QFX10000* devices act as boundary clocks at the spine layer, with a mixture of QFX5000 devices as leaf layer top-of-rack switches for the transparent clocks. The grandmaster connects to slave ports on the spine layer of the solution.

Different implementations of clock-based topologies that meet all the demands of the new MiFID 2 directive already exist in Juniper’s IP CLOS architectures.



*The QFX10008 and QFX10016 do not include boundary clock at the time of this poster's publication.

For additional technical resources, please visit: www.juniper.net/documentation/



Web page. TechLibrary documentation. PTP overview, configuration samples, and examples.
http://www.juniper.net/techpubs/en_US/junos/topics/concept/ptp-overview.html



Web Page. Compare QFX5000 and QFX10000 Series devices.
<http://www.juniper.net/us/en/products-services/switching/qfx-series/compare/#a=P10000,P3500,P3600,P5100,P5200&p=>



Web page. QFX Series. Landing page for the QFX Series.
<http://www.juniper.net/us/en/products-services/switching/qfx-series/>



Web page. European Commission. Official pages for the MiFID 2 directive.
http://ec.europa.eu/finance/securities/isd/mifid2/index_en.htm