



# **TMX Quantum XA Frequently Asked Questions**

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## General:

### 1. What is TMX Quantum XA?

As part of TMX Group's technology roadmap, TMX Quantum XA is the next generation of our Quantum equity trading platform, designed to offer a material improvement in performance, representing twenty-fold reduction in median latency over the current system, to sub-100 microseconds (0.1 milliseconds roundtrip from customers' demarcation point) on order executions. This means TMX Quantum XA will position TMX as a leader in the Canadian and global marketplace as a provider of high performance trading technology. TMX Select was the first TMX marketplace to successfully migrate to TMX Quantum XA in July 2013 followed by TSX in June 2014. TSX Venture is the next TMX marketplace scheduled to complete the migration to TMX Quantum XA in September 2014.

### 2. What does the name 'TMX Quantum XA represent?

TMX Quantum XA stands for TMX Quantum Express Accelerated, representing the latency reduction that will result from this hardware acceleration upgrade.

### 3. What are the differences between TMX Quantum and TMX Quantum XA?

	TMX Quantum	TMX Quantum XA
Latency	2.3 milliseconds median order processing latency	Sub-100 microseconds (0.1 milliseconds) median order processing latency
Protocol requirements	FIX 4.2 or STAMP 6.1	FIX 4.3 or STAMP 7.03
Routing Methodology	TMX Quantum Gateway routes order to appropriate partition and market based on symbol.	Customers will route orders by symbol through separate session bundles.

### 4. What are the benefits of TMX Quantum XA?

TMX Quantum XA repositions TMX as a world leader in trading technology offering customers superior performance vis-à-vis reduced latency, lower latency variability (jitter), quicker response times, as well as increased availability and reliability.

### 5. What is jitter?

The term jitter (also referred to as 'latency determinism') describes the latency variability or consistency. High jitter means the range of the order flow latency is high. As jitter is reduced, the latency becomes more consistent and thus more predictable. Jitter is reduced by avoiding operating system scheduling through the use of hardware acceleration and other techniques.



**6. Will TMX Quantum XA impact jitter?**

Jitter (ie. latency variability) is expected to significantly improve as a result of TMX Quantum XA both in absolute terms and as a percentage.

**7. Why was the TMX Select migration to TMX Quantum XA scheduled before the TSX, TSX Venture and Alpha migrations?**

There are a number of reasons why TMX Select migrated to TMX Quantum XA prior to the other TMX marketplaces. As communicated during the launch of TMX Select, the alternative marketplace was designed to provide a nimble and innovative platform that will meet the rapidly evolving needs of the Canadian equities market. In addition, customer impact during the TMX Select upgrade was reduced as it only required one new connection to TMX Quantum XA (compared to multiple connections required for TSX and TSX Venture), and thus limiting the risk to the industry. Finally, lessons learned during the TMX Select upgrade were used to optimize the migration of TSX and TSX Venture to TMX Quantum XA.

**8. Why is there a one year gap between the migration of TMX Select to TMX Quantum XA and the migration of TSX/TSX Venture to TMX Quantum XA?**

Recognizing that the TMX Quantum XA upgrade may have a substantial impact to some customers, TMX has endeavored to provide an appropriate timeframe to facilitate client readiness for both the TMX Select and TSX/TSX Venture migrations. In addition, the scope of work for TMX to prepare and implement Quantum XA for TSX and TSX Venture is considerably larger than for TMX Select given the respective sizes of these markets and the technology used to support them. As such, that time is required for TMX to successfully roll out this new technology.

**9. Who will benefit from the TMX Quantum XA upgrade?**

The significant reduction in roundtrip order processing latency and jitter will benefit the Canadian equities market as a whole, in that it will lead to improved market quality and efficiency, increased order flow and turnover, and additional size at the top of the book and tighter spreads, while operational risks are decreased.

**10. Who will be impacted by the TMX Quantum XA upgrade?**

Anyone with a direct connection to TSX, TSX Venture, Alpha or TMX Select with a certified order entry application will be impacted and required to make changes as a result of the TMX Quantum XA upgrade. This includes, but is not limited to:

- Service Bureau vendors
- Participating Organizations, Members, or Subscribers with in-house proprietary systems
- Software providers

Customers that access TSX, TSX Venture, Alpha or TMX Select through a service bureau vendor will not be required to make changes for the TMX Quantum XA upgrade.

TMX representatives have contacted all customers with a direct connection to further discuss the Quantum XA implementation.



**11. How will customers using FIX 4.2 protocol to directly connect to TMX Quantum be impacted?**

Customers using FIX 4.2 protocol will be required to use FIX 4.3 protocol to connect to TMX Quantum XA. This means during the gradual migration of TSX Venture symbols to TMX Quantum XA, customers will have a separate connection each for TSX Venture symbols trading on TMX Quantum (via FIX 4.2 protocol) and TSX Venture symbols trading on TMX Quantum XA (via FIX 4.3 protocol). FIX 4.3 protocol will provide an additional level of security via an authentication key. Once the TSX Venture symbol migration to TMX Quantum XA is complete (approximately one week after symbol migration inception), FIX protocol users will connect to TSX only via FIX 4.3, while continuing to connect to Alpha via their current FIX 4.2 connections.

**12. How will STAMP customers using STAMP 6.1 protocol to connect to TMX Quantum be impacted?**

STAMP protocol users will be required to upgrade to version 7.03 to complete the TSX Venture migration to TMX Quantum XA. In STAMP version 7.03, there will be a minor optional change to the session login code. The message authentication tag will become optional for STAMP customers who wish to further reduce their latency. Moreover, during the TSX Venture migration period, customers will be required to establish an additional STAMP connection to TMX Quantum XA to be able to trade all symbols on all markets.

**13. Will all market participants have an equal opportunity to trade on the new TMX Quantum XA platform?**

Yes, all market participants will have an equal opportunity to access TMX Select, TSX and TSX Venture on TMX Quantum XA.

**14. What's the difference between EEP2 and TMX Quantum XA?**

Enterprise Expansion 2 is the scaling up of our systems through partitioning that resulted in doubling the capacity of the order processing throughput. The primary goal of EEP2 was to increase the throughput and capacity designed to accommodate 40,000 order messages per second. TMX Quantum XA optimizes the message processing in the TMX gateway and the trading engine in order to substantially improve the roundtrip order processing latency. Combined, these initiatives support TMX's advancement of technology to ultimately increase performance through latency (TMX Quantum XA) and throughput (Enterprise Expansion 2).

**15. How will TMX communicate the TMX Quantum XA upgrade to the industry?**

TMX will continue to provide frequent and comprehensive updates to the industry through various communication channels with customers, including PO Notices, one-to-one customer meetings, media releases, and if needed TMX hosted lunch & learn sessions, and regional roadshows. We also encourage anyone interested in more information to visit our [website](#) on a regular basis for ongoing updates.

**16. Will customers be required to sign any Agreements?**



No. Customers will not be required to submit any new Agreements as part of the TMX Quantum XA upgrade.

**17. Will customers who have already certified for the TMX Select and TSX migrations to Quantum XA be required to recertify their existing TSX Venture application?**

For those who have already completed application certification in GTE as part of the TMX Select and TSX migrations to TMX Quantum XA, nothing further will be mandated. All others with direct order entry connection to TSX Venture are required to complete the TMX Quantum XA certification process. However, we strongly recommend that all market participants validate their code against the TMX testing environment.

**18. What is the impact to Members who do not directly connect to the existing TMX Quantum platform for order routing?**

Customers who do not directly connect to the TMX Quantum platform will continue to route their orders to their access vendor. The access vendor will be required to make the upgrade to TMX Quantum XA. Customers should contact their access vendor to ensure system readiness. As always, TMX will continue to work closely with all access vendors to ensure they are supported during the upgrade.

**19. Are there any planned changes to the existing order types?**

New trading functionality will not be introduced as a direct result of the TMX Quantum XA upgrade.

**20. Have the regulators been consulted in regards to TMX Quantum XA?**

TMX has engaged the regulators and will continue to keep them fully informed on the TMX Quantum XA initiative.

**21. Who can customers approach for more information about TMX Quantum XA?**

Customers with questions or feedback are encouraged to contact their TMX Equity Markets Account Manager, or the Market Operations team at 416-947-4705 [vendor\\_services@tsx.com](mailto:vendor_services@tsx.com).

**22. Have the FIX 4.3 and STAMP 7.03 order entry specifications for TMX Quantum XA been published?**

Yes, FIX 4.3 and STAMP 7.03 order entry specifications applicable to TMX Quantum XA are available through the TMX Equity Markets Documentation Portal at <http://tmx.com/en/login.html>.

**Schedule:**

**23. When will testing be available for the TSX Venture upgrade to Quantum XA?**



The TSX Venture upgrade to TMX Quantum XA is currently available for testing in TMX's Gateway Testing Environment (GTE).

**24. What is the migration plan for the launch of TMX Quantum XA on TSX Venture?**

Symbols trading on TSX Venture will be migrated onto TMX Quantum XA over two phases commencing Monday, September 15th, 2014. The following symbols/symbol groups will be migrated to TMX Quantum XA on the following dates:

- **Phase 1:** Monday, September 15th - all symbols with the Letters A through L
- **Phase 2:** Monday, September 22nd - all remaining symbols beginning with the letters M through Z

**Phase 1 :** Partial TSX Venture Symbol migration from TMX Quantum to TMX Quantum XA

**Customer Impact:** Customers will be required to:

- A. Complete a certification process on TMX Quantum XA (if it hasn't already been completed as part of the TMX Select upgrade)
- B. Send orders to TSX Venture on TMX Quantum XA using FIX 4.3 protocol for customers currently using FIX or STAMP version 7.03 for customers using STAMP. Orders for symbols that have migrated to TMX Quantum XA will need to be routed via FIX 4.3 or STAMP 7.03 protocol, while orders for symbols that have not migrated are to be routed via the existing FIX 4.2 or STAMP 6.1 protocol.
- C. Ensure orders can be routed to TSX Venture by symbol and IP address. Orders for symbols migrated to Quantum XA must be sent to a different destination IP address than orders for symbols that have yet to migrate.
- D. Provide a new session bundle to access TMX Quantum XA that will run in parallel with existing connections to TSX Venture and Alpha on Quantum.
- E. Continue sending orders to TSX Venture and Alpha via existing protocols with existing sessions.

**Phase 2:** Complete symbol migration to TSX Venture on TMX Quantum XA

**Customer Impact:** Customers will be required to:

- A. Provide 2 new session bundles to access TSX Venture on TMX Quantum XA that will run in parallel with existing connections to Alpha Quantum.
- B. Continue to route orders to Alpha via FIX 4.2 or STAMP 6.1 protocols. TMX Select, TSX and TSX Venture orders will only be routed via FIX 4.3 or STAMP 7.03 protocol.

**25. When will order entry sessions be distributed for the production migration of TSX Venture to TMX Quantum XA?**

Production Order Entry sessions are currently being distributed. This will allow for validation of client internal firewall changes and session authentication in a controlled fashion.



## **Technical:**

### **26. How often will a symbol ‘destination’ be modified?**

Similar to the partitioning of symbols on EEP2, the symbol ‘destination’ is not expected to be altered, unless required for load balancing purposes.

### **27. Will there be parallel run during the TSX Venture migration where customers can route symbols that migrated to TMX Quantum XA to the TMX Quantum platform as well (ie. Will there be backward compatibility)?**

No. Once TSX Venture symbols are migrated to the new TMX Quantum XA platform, they will no longer be available on TMX Quantum.

### **28. Does TMX Quantum XA impact the Quantum Gateway?**

While TMX Quantum XA is a separate system from TMX Quantum and will not directly impact the TMX Quantum Gateway, it will eventually replace the TMX Quantum platform.

### **29. Will there be an immediate impact to latency?**

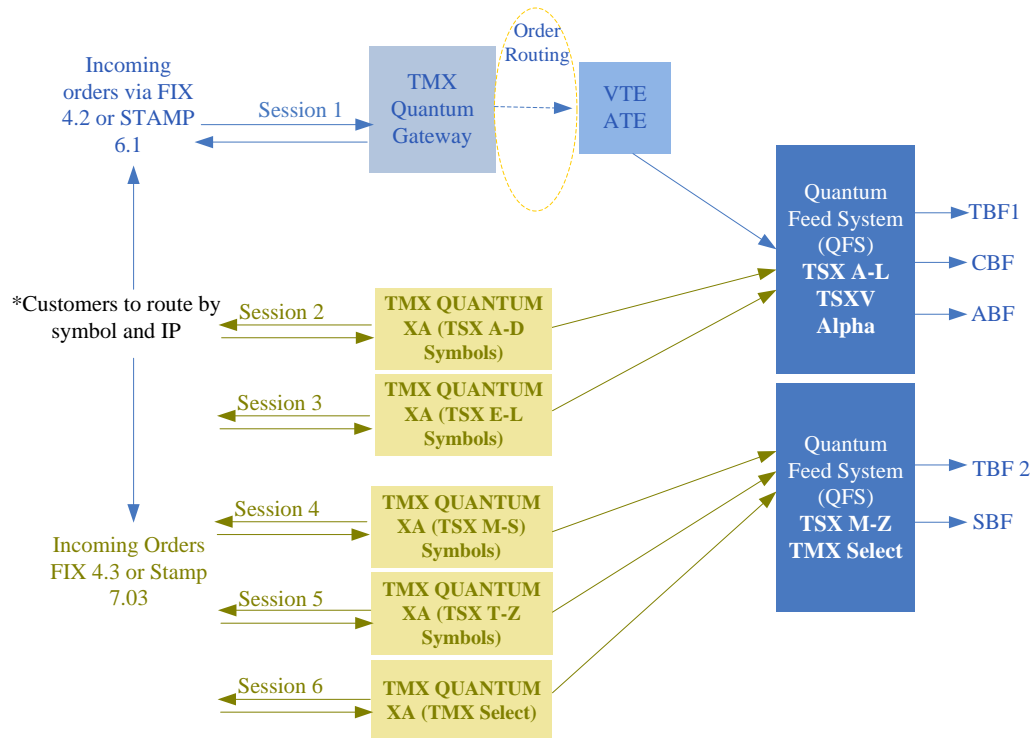
Yes. The significant latency reduction for TSX Venture orders will be experienced immediately upon the TSX Venture symbol migration to TMX Quantum XA.

### **30. What impact will TMX Quantum XA have on the existing trading engine partitions?**

TMX Quantum XA will not impact the existing trading engine partitions. However, customers will be required to modify their order routing methodology. Currently, the TMX Quantum Gateway routes the orders to the appropriate trading engine partition on behalf of customers. As soon as symbols begin migrating to the TMX Quantum XA platform, customers will be required to route their orders to TMX Quantum XA by symbol and market through separate session bundles for each TMX Quantum XA node (see diagram below).



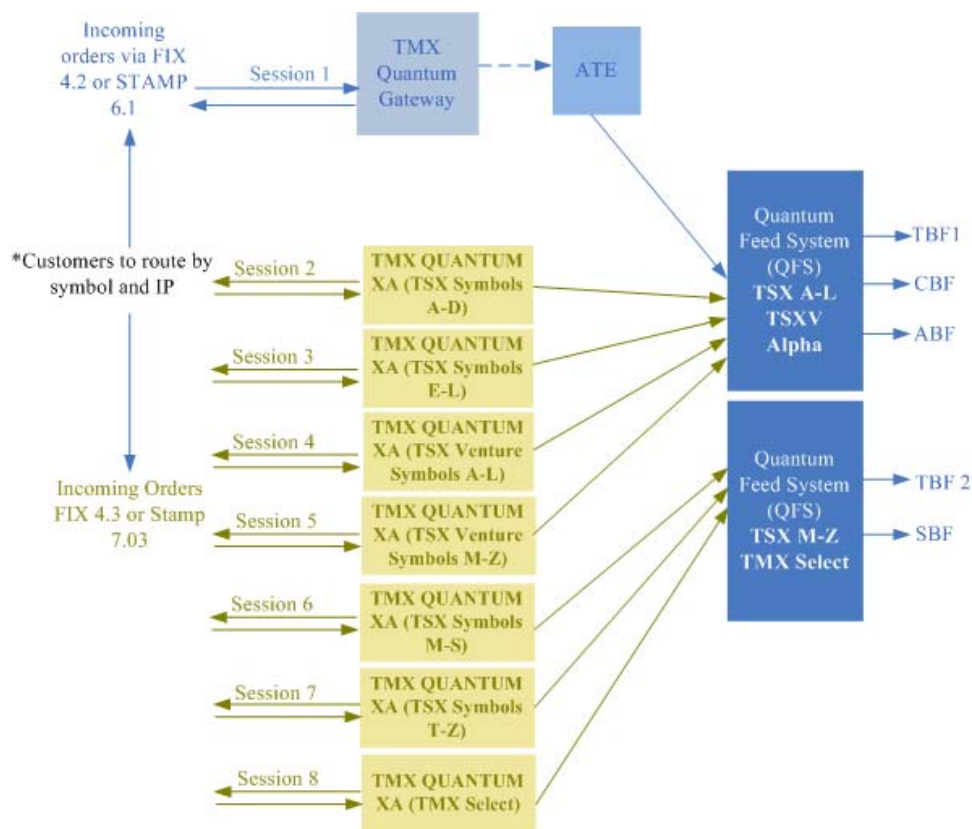
**Current State (post TMX Select, TSX migration to TMX Quantum XA):**



\* Customers must route TSX Venture and Alpha orders on TMX Quantum using FIX 4.2 or STAMP 6.1 protocols. Separate session bundles are required to route orders to TMX Select and TSX on TMX Quantum XA.



**End State (post TMX Select, TSX migration, TSX Venture to TMX Quantum XA):**



\* Customers will be required to route their orders to TMX Quantum XA by symbol and IP through separate session bundles for each TMX Quantum XA node.

\*\* The above diagram has been created for illustrative purposes only. The number of nodes and the allocation of symbols for the TSX Venture migration will be confirmed at a later date.

**31. How will customers know which session/IP address to route their orders to?**

During stage 1 of the TSX Venture migration, customers will be advised in advance via PO Notices as to where to route each TSX symbol (TMX Quantum vs. TMX Quantum XA). Once the symbol migration for TSX Venture to TMX Quantum XA has been completed (mid September 2014), all TSX Venture orders will need to be routed to TMX Quantum XA, while all Alpha orders will need to be routed to the original Quantum platform.

**32. What is the difference between FIX protocols 4.2 and 4.3?**

The main difference between FIX protocols 4.2 and 4.3 is that FIX protocol 4.3 adds a layer of security by offering session authentication that will validate the customer connection to TMX Quantum XA through an authentication key. Changes to tags are expected to be minimal.



**33. Will there be an impact to customers' network connection as a result of TMX Quantum XA?**

From a network perspective, there will not be an impact to customers' network connection. However, TMX is offering an optional 10G network connection for customers.

**34. Will TMX Quantum XA impact the reliability or redundancy of the TMX technology?**

TMX Quantum XA is expected to be more reliable as it contains fewer points of failure while maintaining the current availability and disaster recovery targets. Failover rates are expected to improve as well. Redundancy will not be impacted. The TMX technology team has undertaken extensive research and development (R&D) and quality assurance (QA) efforts over a two year period to ensure the TMX Quantum XA achieves the best possible latency outcome with the least amount of risk to TMX and the industry.

**35. Will TMX be throttling message rates?**

As per our current design, safeguards will be in place to protect against extreme inbound message bursts.

**36. Will there be any impact to the Daily Diary Reports?**

Yes. During the TSX Venture symbol migration phase, TSX will produce 2 sets of Daily Diary reports, one for the TMX Quantum partition, and one for the TMX Quantum XA partitions. After the complete TSX Venture symbol migration to TMX Quantum XA, TSX Venture will produce one set of Daily Diary reports.

**Market Data Feeds:**

**37. Does TMX Quantum XA impact the market data feeds?**

There will be no functional changes to the existing market data feeds. However, additional stream IDs will be included on the TMX QuantumFeed (binary feeds: VQL1 and VQL2).

**38. Will there be an impact on drop copies?**

Drop copies will continue to be disseminated based on customers' order entry sessions. This means customers will receive two drop copies for their TSX Venture sessions on TMX Quantum XA.

**39. Will there be any impact to the feed recovery/retransmission?**

No, the recovery/retransmission process will not be impacted by TMX Quantum XA.