TSX MOC MODERNIZATION

Detailed Guide

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CHAPTER 1 INTRODUCTION

Introduced in 2004, TMX's Market on Close ("TSX MOC") facility plays a vital role in Canada's equities markets and broader financial services industry: setting the official closing price for eligible Toronto Stock Exchange (TSX) and select TSX Venture Exchange (TSXV) listed issues.

Operating as an electronic call market, the TSX MOC facility aims to provide equal access and opportunity for investors looking to source liquidity and participate in trades at the closing price, efficiency and accuracy in setting the closing price, and reduced volatility at the close.

TMX is the definitive source for equities closing prices in Canada. End-of-day valuations determined via the TSX MOC facility serve the industry in a variety of important ways, including:

- Net Asset Value ("NAV") calculations for the fund management industry
- Portfolio and index balancing and valuations benchmarks for index related securities, swaps and options trades
- Daily reference prices for retail investors, advisors, and media outlets

This TSX MOC Proposal Detailed Guide details the new TSX MOC model and serves as a reference for the implementation of this model.

1.1 INTENDED AUDIENCE

The intended audience for this document are stakeholders that interact with and support the TSX MOC. This document was designed to help the reader understand the mechanics of the new TSX MOC model, including impacts on trading workflows, technical trading systems, and implementation approach.

1.2 EVOLUTION OF TSX MARKET ON CLOSE

The TSX MOC facility was first introduced in 2004 for the constituents of the S&P/TSX Composite Index. It was originally designed as a blind auction model to incent buy side participants to provide liquidity. While the model has remained essentially a blind auction at its core, incremental improvements have been made throughout in collaboration with the MOC Committee, composed of key users and stakeholders of the TSX MOC facility.

- **2004 - 2012**: Expanded TSX stock eligibility beyond the S&P/TSX Composite Index
- **2012**: Introduced to TSXV in 2012 to aid in portfolio and index rebalancing activities for Venture indices and index tracking ETFs
- **2015**: Introduced pre-imbalance MOC Limit orders and allowed mixed lot and odd lot MOC orders
- **2019**: Introduced Closing Offset orders and allowed dark orders to participate in MOC
- **2021**: Introduction of the new TSX MOC model in October with added transparency with continuous imbalance messages and new Freeze Period

1.3 TSX MOC MODERNIZATION

Financial markets continue to evolve at an unrelenting pace, and as a result, the day-to-day needs of investors and the challenges they face in remaining globally competitive in the midst of this ever-changing landscape are constantly shifting. The rise of passive investing and ETF trading over the last few years has resulted in increased trading volumes at the close of the market and served to highlight the growing importance of the closing price as a benchmark.

In 2019, based on industry feedback, TMX's equity markets team embarked on a large-scale consultation process to explore ways in which we could improve the TSX MOC facility. TMX's ongoing commitment to providing fair and transparent markets for all participants requires a measured and thoughtful approach, considering the interests of the full scope of participants and gauging the potential impacts proposed changes would have on the broader ecosystem.

Our process gathered valuable insights from a cross-section of stakeholders, including representatives from buy-side and sell-side institutions as well as proprietary trading firms via surveys, open forums, advisory committees, and one-on-one discussions. TMX and all stakeholders were unified in the key objective; to build a world-class closing auction that effectively meets the liquidity and execution needs of Canadian and global investors.

The consultation process served to identify three key areas to address in revamping the TSX MOC facility:

1. Transparency

Issue: *Traders need more information.* TSX MOC currently provides a single simple imbalance message at 3:40 p.m., 20 minutes prior to the close of the regular trading session at 4:00 p.m. with limited content.

Action: TMX explored a new TSX MOC communication framework to enable traders to make more informed decisions during the closing session, with increased frequency and additional content in messaging.

2. Alignment with Global Markets

Issue: *TSX MOC is a global outlier.* The TSX MOC model differs from similar facilities offered by global exchanges in some important ways, including frequency and detail of information communicated during the trading day. The current uniqueness of today's TSX MOC limits participation from international investors as well as some domestic institutions.

Action: TMX examined closing auction facilities around the world to gain an understanding of their unique features and incorporated our learnings in developing the new and improved TSX MOC. Bringing the TSX MOC model in line with global standards and adopting features most valuable to trading participants is designed to increase participation from outside of Canada.

3. Consistency of Execution

Issue: *Investors are not looking for surprises.* Some participants cited inconsistencies of TSX MOC liquidity that can erode participant confidence and deter them from utilizing the TSX MOC as a liquidity event.

Action: The new TSX MOC facility seeks to attract increased participation at the close by introducing mechanics to increase flexibility, give more visibility into the MOC, and dampen volatility. This will serve to

enhance the user experience and create reliable and representative closing price benchmarks, instilling confidence among traders and investors.

With increasing volume being pushed to the close and increasing importance of the closing price as a benchmark for passive investing, it is vitally important for Canada to have a closing auction that is transparent, efficient in setting a representative closing price that participants have confidence in utilizing. The modernization of the TSX MOC will create a better MOC facility to service all participants.

CHAPTER 2 NEW TSX MOC

The new Market on Close model is most similar to US standard closing auctions. While TMX had explored the option of adopting a fully transparent closing auction model similar to that employed by the London Stock Exchange, during the consultation process it became clear that this model would ultimately be less desirable in Canada due to a few key reasons:

- **Increase of overnight risk –** If Canada were to have a closing auction as a separate session after 4p.m. EST, by the time it closes (e.g. 4:10p.m. EST), there are far fewer continuous trading venues open for sourcing liquidity and could increase the number of overnight positions. This is less of an issue among European and Asian markets, as they do not close at the end of the global trading day.

- **Alignment with U.S.** – Due to the large number of interlisted securities trading on both U.S. and Canadian exchanges, any deviation in closing time from the U.S., which is currently at 4:00p.m. EST, would create challenges in valuation of these securities.

For these reasons, it is necessary to run the TSX MOC at the same time as continuous trading to allow for offsetting of liquidity, and align the closing time with the U.S. As a result, the prospect of a LSE-style fully transparent separate closing auction was put aside in favour of a U.S.-style closing auction.

2.1 CHANGES FROM CURRENT TSX MOC

The new TSX MOC facility introduces three high level changes, each designed to address the issues of transparency, alignment with global markets, and consistency of execution:

1. Enhanced Transparency
    - Increase imbalance message content and frequency of communication
    - Add 6 new fields of TSX MOC order book information (currently 4 fields only)
    - Imbalance message to be sent every 10 seconds (currently sent only once at the beginning of the MOC session)

2. Newly Defined Imbalance Period to Align with Global Models
    - Imbalance period starts at 3:50 p.m. (currently 3:40 p.m.)
    - Allow entry of new Market on Close orders, with no cancels or amends (currently no new MOC orders allowed)
    - Allow entry of Limit on Close orders on either side and with any volume, with no cancels and aggressive price amends only (currently limited to LOC orders with side, volume and price restrictions)

3. New Freeze Period
    - Designed to mitigate volatility and help prevent unexpected price and imbalance movements
    - Randomized start time to mitigate speed advantages

4. Removal of Closing Offset order type

- Closing offset order type deemed to be redundant with the Pegged LOC orders during the MOC Freeze Period
- Ability to cancel and modify closing offset orders up until the close works counter to the intent of the MOC Freeze Period

5. Introduction of Self Trade Management in the MOC Facility
   - Consistent with the current self-trade management feature on orders during continuous trading, any matched orders in the MOC with matching self-trade keys from the same Participation Organization will execute, however, it suppresses the trade from market data feeds.
   - This has been a key request by clients and should aid them greatly in preventing wash trades, which currently require manual cancellations at the end of the day.

See table below for detailed changes and rationale for each.

Table 1 - Existing TSX MOC vs New TSX MOC - Changes and Rationale

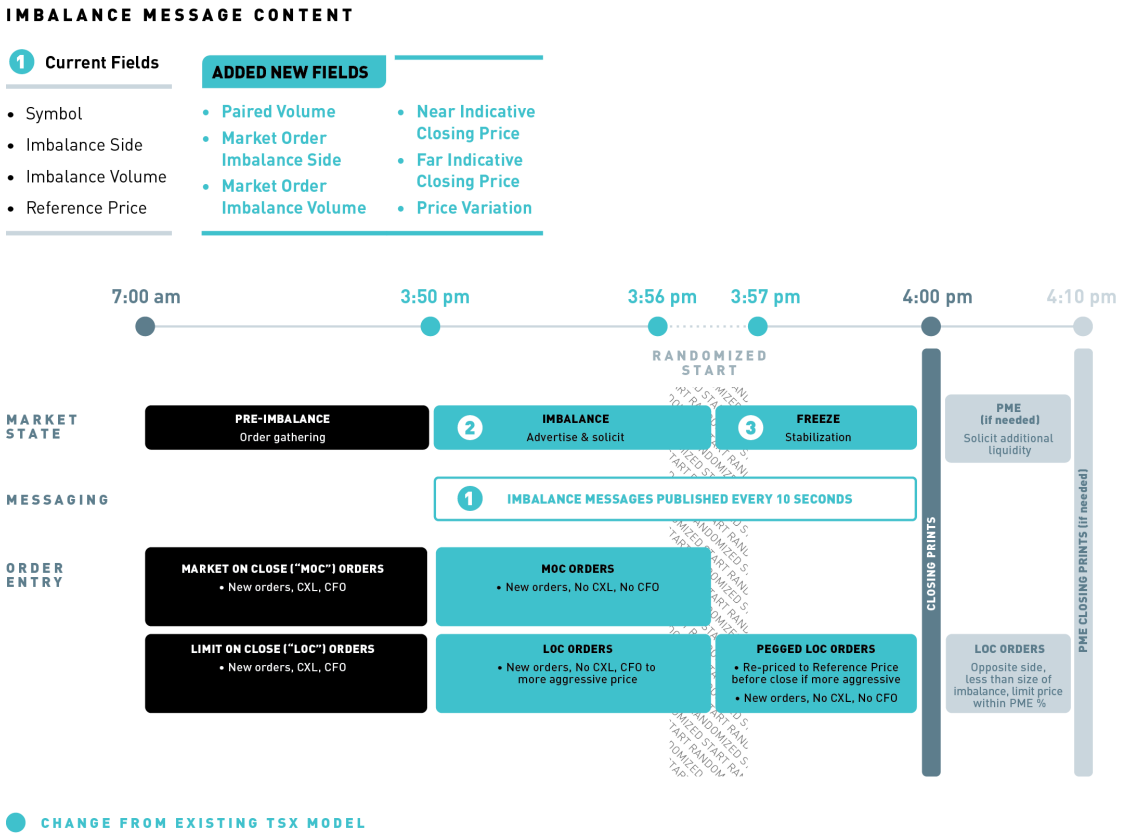
CHANGE	EXISTING TSX MOC	NEW TSX MOC	RATIONALE
Increase imbalance message content and frequency of dissemination	Single imbalance message at start of MOC Imbalance Period (3:40p.m.)	Imbalance message sent at set time intervals from the start of the MOC Imbalance Period (3:50 p.m.) to the close (4:00 p.m.)	Increased content and frequency will add transparency to MOC and provide clients additional insights into the MOC book.
	4 existing fields: 1. Symbol 2. Reference Price 3. Imbalance Side 4. Imbalance Volume	Added 6 fields in addition to existing: 1. Paired Volume 2. Market Order Imbalance Volume 3. Market Order Imbalance Side 4. Near Indicative Closing Price 5. Far Indicative Closing Price 6. Price Variation	
MOC Imbalance Period	MOC Imbalance Period starts at 3:40p.m.	MOC Imbalance Period start at 3:50p.m.	Later start time aligns with North American standards. Increases flexibility by allowing for entry of MOC orders and LOC without restriction on price, size or side.
	No MOC orders allowed.	New MOC orders are allowed. No MOC order cancels or modifications permitted.	
	LOC orders need to be on the opposite side, less than size of imbalance and limit price at or	New LOC orders permitted with no restrictions. No LOC order cancels permitted. Modifications to LOC order price	

CHANGE	EXISTING TSX MOC	NEW TSX MOC	RATIONALE
	within the PME % or 5 ticks of the Last Sale Price. No LOC order cancels or modifications contributing to imbalance.	only permitted to more aggressive price.	Increases flexibility by allowing aggressive price amends.
Introduction of MOC Freeze Period	No MOC Freeze Period.	MOC Freeze Period prior to close with a randomized start time as determined by TSX. New Pegged LOC orders allowed, will re-price to Reference Price before close if more aggressive for purposes of calculating the calculated closing price. At close of the MOC Freeze Period, Pegged LOC orders will be repriced to the closing reference price if more aggressive. No cancels or modifications allowed.	New MOC Freeze Period designed to mitigate volatility and help prevent unexpected price and imbalance movements leading up to the close. Randomized start time to mitigate speed advantages.
Remove Closing Offset order type	Closing Offset order type available.	Removal of Closing Offset order type.	Closing Offset order type becomes redundant and works counter to the intent of the new MOC Freeze Period. Its removal simplifies the new MOC.
Support for Self-Trade Management	No support for self-trade management during MOC.	Support for suppression of MOC executions from tape where MOC executions have matching self-trade prevention keys from the same broker.	This enhancement will provide relief from workflow burdens introduced by incidental wash trades within the MOC.

2.2 OVERVIEW AND TIMELINE

The new TSX MOC market states, messaging and order entry rules are depicted in the diagram below. Further details are given in the corresponding sections below.

Figure 1 - New TSX MOC - Market States and Order Entry



2.3 IMBALANCE MESSAGES

In order to increase transparency, TMX will introduce six (6) new fields to the current imbalance message. Imbalance messages will be published every ten (10) seconds beginning at the start of the Imbalance period until close.

Imbalance messages will be disseminated on the same market data feeds as they are today, which are all broadcast, level 1 and level 2 real-time market data feeds.

See Section 3.1.3 – Specification Changes for details of the feeds and messages impacted.

2.3.1 EXISTING IMBALANCE INFORMATION

The following four (4) fields are currently published on the existing imbalance message:

1. **Symbol** – Ticker of the TSX or TSXV-listed MOC-eligible security, which the imbalance message pertains to
2. **Reference Price** - TSX or TSXV Best-Bid-and-Offer (BBO) mid-point
3. **Imbalance Volume** - Imbalance volume after matching off MOC market orders and MOC limit orders that are priced equal to or more aggressive than the Reference Price
4. **Imbalance Side** - Side (buy or sell) of the Imbalance Volume

2.3.2 NEW FIELDS

The following six (6) fields will be added to the imbalance message. Together with the existing four (4) fields, the new TSX MOC imbalance message will have a total of ten (10) fields.

1. **Paired Volume** - The number of MOC and LOC shares that are able be matched at the Reference Price
2. **Market Order Imbalance Volume** - Indicates the share Imbalance when considering MOC orders only. Note this will not change from Freeze period as MOC orders are not allowed after this time.
3. **Market Order Imbalance Side** - Side (buy or sell) of the Market Order Imbalance Volume.
4. **Near Indicative Closing Price** - The calculated closing price that will maximize the number of shares matched based on on-close orders (MOC, LOC) and visible continuous market orders. Effectively, this is the price at which the closing print would occur at the time of publication.
5. **Far Indicative Closing Price** - The calculated closing price that will maximize the number of shares matched based on closing interest only (MOC, LOC). This calculation excludes continuous market orders.
6. **Price Variation** - This field indicates the absolute value of the percentage of deviation of the Near Indicative Closing Price from the Reference Price. This will alert traders of symbols that may close outside of the volatility parameters and encourage offsetting liquidity.

2.4 IMBALANCE PERIOD

The imbalance period is intended to advertise and solicit liquidity into the MOC book. In order to adhere better to global standards, and to provide our participants additional flexibility, TMX will move this period from 3:40p.m. to 3:50p.m., allowing an additional 10 minutes to contribute MOC volume with the option to cancel. The time extension will allow participants to accommodate later MOC interest, and reduce the lock-in period for MOC orders.

During the imbalance period, new MOC orders are allowed, and are locked in with no cancels or modifications permitted. Additionally, cancels of any previously entered MOC orders are not permitted.

New LOC orders can be entered with no restrictions on side or size. LOC orders placed prior to the imbalance period cannot be cancelled during the imbalance period; however, aggressive price amends are permitted.

Imbalance messages are published during the entire imbalance period at set time intervals of every ten (10) seconds.

2.4.1 AGGRESSIVE PRICE AMENDS

During the imbalance period, LOC orders cannot be cancelled. However, TMX has improved flexibility by allowing LOC orders to be amended to a more aggressive price (higher price for buys and lower price for sells/shorts) during this period. This additional flexibility allows LOC orders that were priced aggressively, but have since become passive due to price movements of the best bid and offer, to be re-priced aggressively once more while preserving the significance of the imbalance messages.

2.5 FREEZE PERIOD

With the increased frequency of imbalance messages comes the potential for participants to hold volume to the last moment before the freeze period in order to garner the most information before committing volume. In an effort to provide participants time to react to late commitments of volume without restriction, TSX will impose a randomized start to the freeze period, which will begin simultaneously across all symbols at a random point between 3:56 p.m. and 3:57 p.m.

The freeze period is intended to solicit last minute price stabilizing offsetting liquidity, and prevent unexpected price and imbalance movements. As such, aggressive Pegged LOC orders placed during this period will be repriced passively to the Reference Price on close so as to not impact the price of the auction aggressively.

It has been noted that repricing large quantities of Pegged LOC orders during the freeze period to the Reference Price, where that Reference Price is an invalid tick (e.g. half tick for single tick bid/ask spreads), may result in a calculated closing price that is at an invalid tick. In such cases, in order to maintain closing prices at valid ticks, the aggressive Pegged LOC orders will be re-priced to the nearest valid tick to the Reference Price such that the calculated closing price will be at a valid tick according to the current calculated closing price methodology. Please reference scenario A.3 CLOSING ALLOCATION – REFERENCE PRICE IS AT INVALID TICK in Appendix A for a sample scenario illustrating this rounding.

Imbalance messages are published during the entire freeze period at set time intervals of every ten (10) seconds.

2.6 CLOSING ALLOCATION

There are no changes to the general principles of allocation of MOC trades or the manner and time in which closing trades are disseminated in the new TSX MOC. This means that during allocation, MOC / LOC orders would continue to be prioritized by price, followed by broker, followed by time. Please refer to the TMX Order Types and Functionality Guide, Section 2.6.7 Closing Call Allocation for details on the current closing allocation priority.

For Pegged LOCs entered during the MOC Freeze Period, the price for prioritization of Pegged LOC orders would be either their limit price or the Reference Price right before close (the midpoint of the TBBO), whichever is less aggressive. Pegged LOC orders will be considered with other LOC orders at the same price level. Please see Appendix A – A4 for an example.

TSX will also introduce an additional step to the closing allocation that allows for increased MOC executions. Currently, there may be Pegged LOC orders where the re-priced limit price to the Reference Price is less aggressive than the Calculated Closing Price ("CCP"), preventing that order from being executed even when their entered limit price is equal to or more aggressive than the calculated closing price ("Passive Pegged LOC orders"). The additional allocation step will give such orders a chance to be traded at the CCP, in the event that there is unfilled volume remaining at the CCP. Passive Pegged LOC orders that are repriced to be less aggressive than the CCP will never impact the CCP. For an example of this feature, please see Appendix A – A5.

2.7 PRICE MOVEMENT EXTENSION

There are no changes to the Price Movement Extension ("PME") period messaging, functionality or its parameters as part of the new MOC model.

If a symbol goes into PME, the existing PME imbalance message will be sent out indicating the symbol, Reference Price (which is the Last Sale Price), Imbalance Side and Imbalance Volume. Offsetting orders will be accepted subject to the following rules:

- Must be opposite to the published imbalance at 4:00 pm
- Volume on each order must not exceed the published imbalance
- Limit price must be between the last sale price and the CPA range

Note that the PME imbalance message does NOT include any of the new fields.

While many participants indicated that they did not feel that the PME period added value within the context of the new model, and most were supportive of its eventual removal, TMX received consistent feedback indicating that a phased removal, based on observable lack of use, was preferable. For this reason, TMX will keep the PME period with the intention of continued evaluation and eventual removal if data supports this.

2.8 VOLATILITY PARAMETERS

There are no changes to the volatility parameters as part of the new MOC model as it is applied to the PME. Note that since there are no longer any restrictions on the price, volume or side of LOC orders entered during the Imbalance Period and Freeze Period, these parameters are not applicable prior to PME. For reference, the existing volatility parameters are:

MARKET	MOC ELIGIBLE SECURITIES	PME %	CPA %
TSX	Equities	3% or five trading increments	10%
TSX	Preferred Equities	1% or five trading increments	5%
TSX Venture	Equities	5% or five trading increments	15%

The PME % is used to determine if the CCP will be accepted as the MOC Closing Price. If the CCP compared to the Last Sale Price of the VWAP during the Imbalance Period (3:50pm - 4:00pm) is greater than the PME %, the symbol will go into PME.

The CPA % is used to determine the allowable price range for LOC orders accepted during the PME.

TMX will be evaluating these parameters upon launch of the new MOC and make changes as needed.

2.9 SELF-TRADE MANAGEMENT

TSX also reviewed the list of previously requested client enhancements to the MOC facility within the context of the new MOC facility. As a result, we will also implement the self-trade management feature on orders executed in the MOC. Consistent with the current self-trade management feature on orders during continuous trading, any matched orders in the MOC with matching self-trade keys from the same Participation Organization will execute, however, it suppresses the trade from market data feeds. This has been a main request by clients and should aid them greatly in preventing wash trades, which currently require manual cancellations at the end of the day.

In order to utilize this feature, clients will need to populate the self-trade key field and select self-trade management ("**EM**") as the self-trade option. Any other self-trade option, including cancel newest ("**NM**"), cancel oldest ("**OM**"), and decrement larger and cancel smaller ("**DM**"), will continue to be ignored during MOC allocation to preserve the integrity and accuracy of MOC imbalance messages and calculated closing price.

CHAPTER 3 IMPLEMENTATION OF NEW TSX MOC

3.1 TECHNICAL IMPACT

The following are major components to the TSX MOC changes:

- Market state changes and related order entry rules
  - Closing Offset order type will be removed as part of this change
- Additional fields to the imbalance message and more frequent dissemination
- Addition of self-trade management logic to closing auction

There are no technical changes to the allocation of MOC trades or the time or way closing trades are disseminated.

3.1.1 MARKET STATE AND ORDER ENTRY CHANGES

One new market state, the Freeze Period, will be added. See Section 2.5 - Freeze Period for details of the associated order entry rules of what orders and actions are allowed.

The existing MOC Imbalance period has been modified to start at 3:50 p.m. instead of 3:40 p.m. The orders and actions allowed during this time have also changed. See Section 2.4 - Imbalance Period for details of what orders and actions are allowed.

As part of these changes, the Closing Offset order type will be removed. Any Closing Offset orders, designated by TSXMarketInst (FIX = 7739) = "CO", will be rejected and no longer supported.

There are no technical changes to the tags used to enter in MOC and LOC orders. However, the TSXMarketInst(7739) FIX tag will also be added to all MOC execution reports that resulted from a LOC order, to indicate whether this was traded from a LOC order (TSXMarketInst(7739) = "LC") or a Pegged LOC order (TSXMarketInst(7739) = "PL").

Note that the Pegged LOC order is pegged to the MOC Reference Price, but there is no message sent out each time the MOC Reference Price changes. The MOC Reference Price is used as the price of aggressive Pegged LOC orders in the calculation of the Near Indicative Closing Price and Far Indicative Closing Price on the MOC Imbalance message, as well as the final Calculated Closing Price.

3.1.2 IMBALANCE MESSAGES ON FEEDS

TMX is proposing to add six (6) extra fields with additional information on the imbalance messages. See Section 2.4 - Imbalance Period for details of the new fields and imbalances. These new fields will be disseminated on the imbalance message on existing market data feeds every ten (10) seconds instead of just once at the beginning of the MOC Imbalance market state.

3.1.3 SELF-TRADE MANAGEMENT

Self-trade management will now be supported during the Market on Close. Instead of being ignored, the self-trade management instruction, designated by TSXNoTradeFeat (FIX = 7713) = "EM", will be applied during the closing auction. Closing trades may also contain the self-trade designation, TSXSelfTrade (FIX = 7733) = "Y", on closing trades matched between orders where the self-trade keys are identical from the same broker.

There are no specification or technical changes required from clients and vendors since self-trade management already exists. In order to utilize this feature, clients will need to populate the existing self-trade key field and select self-trade management ("**EM**") as the self-trade option. Any other self-trade option, including cancel newest ("**NM**"), cancel oldest ("**OM**"), and decrement larger and cancel smaller ("**DM**"), will continue to be ignored during closing allocation to preserve the integrity and accuracy of MOC imbalance messages and calculated closing price.

Note that this change is applicable to the closing auction only, and is not supported for the opening auction.

3.1.4 SPECIFICATION CHANGES

See table below for a high-level summary of potential specification changes related to the MOC changes from this proposal. Updated specifications, with details of new tags and acceptable values, will be published prior to GTE availability.

Table 2 – Functional and Summary of Specification Changes

CHANGE	EXISTING TSX MOC	NEW TSX MOC	SUMMARY SPECIFICATION CHANGES
Changes to MOC Imbalance Notification Message	Single imbalance message at start of MOC Imbalance Market State (3:40p.m.).	Imbalance message sent at set time intervals from the start of the MOC Imbalance Market State (3:50 p.m.) to the close (4:00 p.m.).	Market Data ▪ New transmission times updated on Broadcast, L1 and L2 feeds
	4 existing fields: 1. Symbol 2. Reference Price 3. Imbalance Side 4. Imbalance Volume	Added 6 fields in addition to existing: 1. Paired Volume 2. Market Order Imbalance Volume 3. Market Order Imbalance Side 4. Near Indicative Closing Price 5. Far Indicative Closing Price 6. Price Variation	Market Data ▪ 6 new fields added to the MOC Imbalance Notification message on Broadcast, L1 and L2 feeds

CHANGE	EXISTING TSX MOC	NEW TSX MOC	SUMMARY SPECIFICATION CHANGES
Changes to MOC Imbalance Market State	MOC Imbalance Market State starts at 3:40p.m.	MOC Imbalance Market State starts at 3:50p.m. MOC market state notification message will now be disseminated at 3:50 p.m. instead of 3:40 p.m.	Order Entry ▪ New MarketInst tag value "LC" for clients to optionally indicate if clients want to enter a normal LOC (non-Pegged LOC) order only. ▪ New order entry rules and MarketInst tag values reflected in applicable MOC / LOC sections in Section 4 Business Content Messages ▪ No stock state status notification message will be sent at beginning of MOC Imbalance Market State. LOC orders are accepted on all MOC-eligible symbols regardless of imbalance. Market Data ▪ BlindOffsetAccepted tag removed from Stock Status notification message on TBF feed
	No MOC orders allowed.	New MOC orders are allowed. No MOC order cancels or modifications permitted.	
	LOC orders need to be on the opposite side, less than size of imbalance and limit price at or within the PME % or 5 ticks of the Last Sale Price. No LOC order cancels or modifications contributing to imbalance.	New LOC orders permitted with no restrictions. No LOC order cancels permitted. Modifications to LOC order price only permitted to more aggressive price.	
New MOC Freeze Market State	No MOC Freeze Market State.	MOC Freeze Market State prior to close with a randomized start time as determined by TSX. New Pegged LOC orders allowed, will re-price to MOC Reference Price before close if more aggressive for purposes of calculating the calculated closing price. At close of the MOC Freeze Market State, Pegged LOC orders will	Order Entry ▪ New order entry rules and MarketInst tag values reflected in applicable MOC / LOC sections in Section 4 Business Content Messages ▪ New value of "MOC Freeze" added as a market state ▪ Market state message for "MOC Freeze" will be published at a random time between 3:56 p.m. and 3:57 p.m. for all stock groups. Market Data ▪ New value of MOC Freeze introduced as a market state on Broadcast, L1 and L2 feeds.

CHANGE	EXISTING TSX MOC	NEW TSX MOC	SUMMARY SPECIFICATION CHANGES
		be repriced to the closing reference price if more aggressive. No cancels or modifications allowed.	
Remove Closing Offset order type	Closing Offset order type available.	Removal of Closing Offset order type.	Order Entry: ▪ Removal of "CO" value from TSXMarketInst [7739]. Any CO orders will be rejected. ▪ Removal of Section 4.1.10 Closing Offset (CO) orders

Table 3 – Changes By Specification

SPECIFICATION	DESCRIPTION OF CHANGE	IMPACTED SECTIONS
TSX-FIX Specification and Business Design Guide **Order Entry** **Version 6.0.1**	▪ Changes related to new market states for Market on Close for Freeze Period ▪ Addition of new values for TSXMarketInst field to optionally designate type of LOC order (normal vs Pegged LOC order) ▪ Changes related to removing Closing Offset order type ▪ Added position 10 to TSXExchangeAdmin tag to indicate the order market state.	▪ 4 Business Content Messages ▪ 4.1.8 Market On Close (MOC) Order ▪ 4.1.9 Limit On Close (LOC) Order ▪ *REMOVED - 4.1.10 Closing Offset (CO) orders* ▪ 4.3 Order Cancel Request – Cancelling a MOC/LOC Order ▪ 4.4.8 Modify – Limit on Close (LOC) Order ▪ 4.7.1 Order – single acknowledgement ▪ 4.7.3 Execution Report – Replace ▪ 4.7.5 Execution Report – Cancelled ▪ 4.7.8 Execution Report – Partial or Complete Fill ▪ 4.7.9 Execution Report – Assign Time Priority to an Order ▪ 4.8.1 Market State: Session Notification ▪ 4.9 Description of Stock States and Order Entry ▪ 4.10 MOC/LOC order entry functionality for each market state ▪ 5 Field Definitions
Broadcast Feed Specification **TBF / CBF** **Version 9.0.2**	▪ Addition of note to indicate Blind Offset Accepted tag (490) will not be sent out at the start of MOC Imbalance state and will only be sent out at the start of PME when the stock is in "Closing Delayed" state.	▪ 5.5 Stock Status Notification Message ▪ 5.6 MOC Imbalance Notification Message ▪ 7 – 9 Field Definitions

SPECIFICATION	DESCRIPTION OF CHANGE	IMPACTED SECTIONS
	▪ Addition of 6 new fields to MOC Imbalance message ▪ New values for MarketState field ▪ Changes related to removing Closing Offset order type ▪ Added position 10 to Exchange-Admin to indicate the order market state.	
QRTMD TSX and TSXV Level 1 **TL1/CL1** **Version 2.7.2**	▪ Addition of 6 new fields to MOC Imbalance message ▪ Added TradingSystemTimeStamp to MOC Imbalance Notification message. ▪ New values for MOC Freeze MarketState field and MOC market state transmission times	▪ 3.3 Message Type C – MOC Imbalance Notification ▪ 3.9 Message Type S – Market State ▪ 5 Market On Close (MOC) ▪ 6.1 Transmission Times
QRTMD TSX and TSXV Level 2 **TL2/CL2** **Version 2.5.2**	▪ Addition of note to indicate Blind Offset Accepted tag (490) will not be sent out at the start of MOC Imbalance state and will only be sent out at the start of PME when the stock is in "Closing Delayed" state. ▪ Addition of 6 new fields to MOC Imbalance message ▪ New value of "Moc Freeze" for MarketState field	▪ 3.6 Stock Status Notification ▪ 3.10 MOC Imbalance Notification ▪ 5 - 7 Field Definitions
TSX & TSXV Level 1 TMX QuantumFeed Business Message Specifications **TQL1 / CQL1** **Version 2.5.2**	▪ Clarified timing of MOC Imbalance message ▪ Addition of 6 new fields to MOC Imbalance message	▪ 2.1 Business message types ▪ 3.5 MOC Imbalance ▪ 4 Field Definitions
TSX & TSXV Level 2 TMX QuantumFeed Business Message Specifications **TQL2 / CQL2**	▪ Addition of 6 new fields to MOC Imbalance message ▪ New value of "Moc Freeze" for market state field	▪ 2.1 Business message types ▪ 3.4.2 MOC Imbalance ▪ 4 Field Definitions

SPECIFICATION	DESCRIPTION OF CHANGE	IMPACTED SECTIONS
Version 3.5.1		

3.1.5 HIGHLIGHTS OF TECHNICAL CHANGES

1. **Introduction of TSXMarketInst on order entry and order acknowledgement**
   a. A Pegged LOC order is a special type of LOC order that is accepted during the MOC Freeze market state. It is entered in exactly the same way as a LOC order type (TimeInForce(59) = 7 (At the Close) + OrdType(40) = 2 (Limit)).
   b. If you do not want your LOC order to be a Pegged LOC order and are concerned that you may have sent your order after the market state has transitioned to MOC Freeze, you may enter TSXMarketInst(7739) = "LC". If this is received during the MOC Freeze, the order would be rejected.
   c. Regardless of whether the TSXMarketInst(7739) tag was entered on the new order, the **TSXMarketInst(7739) tag will be added to the Order-single acknowledgement message** with the value "PL" if it was processed as a Pegged LOC order and "LC" if it was a normal LOC order.
   d. The **TSXMarketInst(7739) tag will also be added to all MOC execution reports that resulted from a LOC order**, to indicate whether this was traded from a LOC order (TSXMarketInst(7739) = "LC") or a Pegged LOC order (TSXMarketInst(7739) = "PL").
   e. Note that the Pegged LOC order is pegged to the MOC Reference Price, but there is ***no message*** sent out each time the MOC Reference Price changes. The MOC Reference Price is used as the price of aggressive Pegged LOC orders in the calculation of the Near Indicative Closing Price and Far Indicative Closing Price on the MOC Imbalance message, as well as the final Calculated Closing Price.
   f. Example:
      i. Buy 1,000 sh ABC, TimeInForce(59) = 7, OrdType(40) = 2 is sent during the MOC Freeze market state. TSXMarketInst does not need to be sent.
      ii. Order-single acknowledgement will send back **TSXMarketInst(7739) = PL** in addition to other tags sent in
      iii. There is no other messaging sent out, even as the MOC Reference Price changes
      iv. When the order trades, the execution report will also have **TSXMarketInst(7739) = PL** in addition to normal execution report tags, it will execute at the closing price
   g. References:
      i. TSX-FIX Specification and Business Design Guide v6.0.1
         - 4.1.0 Limit on Close (LOC) Order
         - 4.7.1 Order - single acknowledgement
         - 4.7.8 Execution Report - Partial or Complete Fill

2. CFO LOC to more aggressive order during MOC Imbalance Period

a. To allow more flexibility in the MOC Imbalance Period, clients can now CFO their LOC order, to a more aggressive price only.
b. No other properties can be changed on the LOC order other than the price. If a client CFO's other properties in addition to a valid price change, the valid price change will be accepted but ***all other properties will be ignored***. This will be reflected in the order-single acknowledgement message.
c. Example:
    i. Buy ABC, TimeInForce(59) = 7, OrdType(40) = 2, OrderQty(38) = 1000, Price(44) = 10.00 is sent during MOC Imbalance market state.
    ii. CFO OrderQty to 1,500 sh (from 1,000 sh) and Price to $10.02 (from $10.00)
    iii. Order-single acknowledgement will show that the Price has been updated to $10.02 (Price(44) = $10.02), but order volume stays at 1,000 sh (OrderQty(38) = 1000)
d. References:
    i. TSX-FIX Specification and Business Design Guide v6.0.1
        1. 4.1.0 Limit on Close (LOC) Order
        2. 4.7.1 Order - single acknowledgement
        3. 4.4.8 Modify - Limit on Close (LOC) Order

3. Removal of Stock Status Notification (BlindOffsetAccepted) message at start of MOC Imbalance Period

a. Currently TSX sends out a stock status notification message at the start of the MOC Imbalance period for each symbol that has a MOC imbalance, that would be accepting offsetting orders (BlindOffsetAccepted (STAMP = 490) = "OffsetAcpt")
b. In the new MOC model, there is no such concept of only allowing offsetting orders during the Imbalance market state. New LOC and MOC orders are accepted for all MOC-eligible symbols regardless of imbalance during the new MOC Imbalance market state, making this message unnecessary. Thus, we have removed this Stock Status Notification message at the start of the MOC Imbalance market state, and also the tag BlindOffsetAccepted (STAMP = 490).
c. Note that the BlindOffsetAccepted (STAMP = 490) tag is also on the PME imbalance message, which will not be changed and will only continue to accept offsetting orders (side opposite to the imbalance, volume less than the size of the imbalance). This will be kept on the PME imbalance message **unchanged**.
d. References:
    i. Broadcast Feed Specification v9.0.2
        - 5.5 Stock Status Notification Message
    ii. QRTMD TL2/CL2 Functional Specifications v2.7.2
        - 3.6 Stock Status Notification

4. Self-Trade messaging after closing auctions

a. In order to support self-trade management, TSX will be publishing order cancels and re-book orders that traded in a self-trade in order that the order book is accurate. This happens currently during continuous trading. You will also now see this messaging added to the closing trade messages where there are self-trades involving visible orders.
b. Example:

i. The following orders are entered in the closing auction:

#	BUY ORDER	BUY VOLUME	SELL VOLUME	SELL ORDER	#
1	Iceberg - self-trade key "EM 111", broker 2	1,200 (2,000 total)	1,000	MOC - self-trade key "EM 111", broker 2	2
			500	MOC - no self-trade key, broker 2	3

ii. The messages that would be published are listed below. New messages are highlighted in yellow.

SEQ	PUBLIC / PRIVATE	MESSAGE TYPE	MESSAGE
1	Private	Trade Report - STM	Trade Report for Order 1 vs Order 2 @ 1000 sh, self-trade = Y. Displayed volume for Order 1 is 200.
2	Public	Cancel	Iceberg Order 1 - Cancelled confirmation for 1200 sh
3	Public	Book	Iceberg Order 1 - Booked confirmation for 200 sh remaining under a new public order number
4	Public	Trade Report	Trade Report for Order 1 vs Order 3 @ 500 sh, self-trade = N. Displayed volume for Order 1 is 0.
5	Public	Book	Order 1 - Booked confirmation for 500 sh (iceberg refresh) under a new public order number

3.2 IMPLEMENTATION APPROACH

The new TSX MOC facility will be implemented as a full launch on all symbols, i.e. "big bang". The new features are designed to work in concert, so a phased rollout of features may carry unintended consequences and risk.

3.3 TARGET TIMELINES

TMX has submitted our TSX MOC Modernization proposal to regulators for approval in September 2020 and have received regulatory approval for Toronto Stock Exchange and TSX Venture Exchange. Based on feedback received and results of an industry readiness survey, TSX will implement the new TSX MOC model in October 2021. TSX will continue to actively engage industry stakeholders to help enable participant readiness for the October launch.

APPENDIX A TRADING SCENARIOS

The trading scenarios below illustrate how the new TSX MOC facility would work.

A.1 FREEZE PERIOD – REPRICE TO REFERENCE PRICE (MID-POINT)

The following scenario illustrates how aggressive LOCs are re-priced and their impact on the indicative closing price during the freeze period. The last sale price is $10.03.

1. There is a 1MM share buy imbalance as the freeze period is initiated.

TBBO	9.98	/	10.00		Imbalance Messages	
BID			ASK			
MOC / LOC	CLOB	Price	CLOB	MOC / LOC	Reference Price	$ 9.990
1,500,000	-	BID MKT	-	-	Paired Sh	2,000,000
-	-	10.05	100	-		
-	-	10.04	2,500	-	Imbalance Sh	1,000,000
1,500,000	-	10.03	100	-	Imbalance Side	B
-	-	10.02	400	-		
-	-	10.01	200	-	MOC Imbalance Sh	300,000
-	-	10.00	300	10,000	MOC Imbalance Side	S
-	-	9.99	-	-		
-	200	9.98	-		Far Indicative Close	$ 10.03
-	400	9.97	-	9,700	Near Indicative Close	$ 10.03
-	300	9.96	-	190,000		
-	200	9.95	-	300	Price Variation Indicator	0.40%
-	-	ASK MKT	-	1,800,000		

2. An additional 5 million to buy is entered during the freeze period. This order cannot affect the closing price, but acts as an advertisement for block execution.

TBBO	9.98	/	10.00		Imbalance Messages			
BID			ASK			Value	Previous Value	Change
MOC / LOC	CLOB	Price	CLOB	MOC / LOC	Reference Price	$ 9.990	$ 9.990	$ -
1,500,000	-	BID MKT	-	-	Paired Sh	2,000,000	2,000,000	-
-	-	10.05	100	-				
-	-	10.04	2,500	-	Imbalance Sh	6,000,000	1,000,000	5,000,000
1,500,000	-	10.03	100	-	Imbalance Side	B	B	FALSE
-	-	10.02	400	-				
-	-	10.01	200	-	MOC Imbalance Sh	300,000	300,000	-
-	-	10.00	300	10,000	MOC Imbalance Side	S	S	FALSE
5,000,000	-	9.99	-	-				
-	200	9.98	-	-	Far Indicative Close	$ 10.03	$ 10.03	$ -
-	400	9.97	-	9,700	Near Indicative Close	$ 10.03	$ 10.03	$ -
-	300	9.96	-	190,000				
-	200	9.95	-	300	Price Variation Indicator	0.40%	0.40%	0.00%
-	-	ASK MKT	-	1,800,000				

3. The advertisement is offset, mitigating price impact to the midpoint, and executing an additional 6MM shares.

TBBO	9.98	/	10.00	
BID			ASK	
MOC / LOC	CLOB	Price	CLOB	MOC / LOC
1,500,000	-	BID MKT	-	-
-	-	10.05	100	-
-	-	10.04	2,500	-
1,500,000	-	10.03	100	-
-	-	10.02	400	-
-	-	10.01	200	-
-	-	10.00	300	10,000
5,000,000	-	9.99	-	6,000,000
-	200	9.98	-	-
-	400	9.97	-	9,700
-	300	9.96	-	190,000
-	200	9.95	-	300
-	-	ASK MKT	-	1,800,000

Imbalance Messages	Value	Previous Value	Change
Reference Price	$ 9.990	$ 9.990	$ -
Paired Sh	8,000,000	2,000,000	6,000,000
Imbalance Sh	-	1,000,000	(1,000,000)
Imbalance Side		B	TRUE
MOC Imbalance Sh	300,000	300,000	-
MOC Imbalance Side	S	S	FALSE
Far Indicative Close	$ 9.99	$ 10.03	$ (0.04)
Near Indicative Close	$ 9.99	$ 10.03	$ (0.04)
Price Variation Indicator	0.00%	0.40%	-0.40%

A.2 FREEZE PERIOD – IMBALANCE CHANGE DUE TO QUOTE MOVEMENT

1. The following scenario illustrates how the imbalance volume and side can change during the freeze period due to CLOB best bid and offer changes, which changes the Reference Price. The last sale price is $10.03. Freeze period begins with small buy imbalance

TBBO	9.98	/	10.00	
BID			ASK	
MOC / LOC	CLOB	Price	CLOB	MOC / LOC
500,000	-	BID MKT	-	-
-	-	10.05	100	-
-	-	10.04	2,500	-
1,500,000	-	10.03	100	-
-	-	10.02	400	-
-	-	10.01	200	-
-	-	10.00	300	10,000
-	-	9.99	-	-
-	200	9.98	-	
-	400	9.97	-	9,500
-	300	9.96	-	190,000
-	200	9.95	-	300
-	-	ASK MKT	-	1,800,000

Imbalance Messages	
Reference Price	$ 9.990
Paired Sh	1,999,800
Imbalance Sh	200
Imbalance Side	B
MOC Imbalance Sh	1,300,000
MOC Imbalance Side	S
Far Indicative Close	$ 10.03
Near Indicative Close	$ 10.00
Price Variation Indicator	0.10%

2. CLOB quote movement causes sell limit order placed prior to freeze period to become aggressive, flipping the imbalance.

TBBO		9.99	/	10.01			Imbalance Messages			
BID				ASK				Value	Previous Value	Change
MOC / LOC	CLOB		Price	CLOB	MOC / LOC		Reference Price	$ 10.000	$ 9.990	$ 0.010
500,000	-		BID MKT	-	-		Paired Sh	2,000,000	1,999,800	200
-	-		10.05	100	-					
-	-		10.04	2,500	-		Imbalance Sh	9,800	200	9,600
1,500,000	-		10.03	100	-		Imbalance Side	S	B	TRUE
-	-		10.02	400	-					
-	-		10.01	200	-		MOC Imbalance Sh	1,300,000	1,300,000	-
-	-		10.00	-	10,000		MOC Imbalance Side	S	S	FALSE
-	200		9.99	-	-					
-	200		9.98	-	-		Far Indicative Close	$ 10.03	$ 10.03	$ -
-	400		9.97	-	9,500		Near Indicative Close	$ 10.00	$ 10.00	$ -
-	300		9.96	-	190,000					
-	200		9.95	-	300		Price Variation Indicator	0.00%	0.10%	-0.10%
-	-		ASK MKT	-	1,800,000					

A.3 REFERENCE PRICE IS AT INVALID TICK

The following scenario illustrates what happens if the Reference Price and Indicative Closing Prices are at an invalid tick going into closing allocation. The last sale price is $10.02.

1. MOC order book with Reference Price at a half tick

TBBO	9.99	/	10.00		Imbalance Messages	
BID			ASK			
MOC / LOC	CLOB	Price	CLOB	MOC / LOC	Reference Price	$ 9.995
1,500,000	-	BID MKT	-	-	Paired Sh	2,000,000
-	-	10.040	100	-		
-	-	10.030	2,500	-	Imbalance Sh	1,000,000
1,500,000	-	10.020	100	-	Imbalance Side	B
-	-	10.010	400	-		
-	-	10.000	200	10,000	MOC Imbalance Sh	300,000
-	-	***9.995***	-	-	MOC Imbalance Side	S
-	1,000	9.990	-	-		
-	200	9.980	-		Far Indicative Close	$ 10.02
-	400	9.970	-	9,700	Near Indicative Close	$ 10.02
-	300	9.960	-	190,000		
-	200	9.950	-	300	Price Variation Indicator	0.25%
-	-	ASK MKT	-	1,800,000		

2. During the freeze period, aggressive Pegged LOC orders are re-priced to Reference Price and Indicative Closing Prices are also at Reference Price

TBBO	9.99	/	10.00			Imbalance Messages			
BID			ASK				Value	Previous Value	Change
MOC / LOC	CLOB	Price	CLOB	MOC / LOC		Reference Price	$ 9.995	$ 9.995	$ -
1,500,000	-	BID MKT	-	-		Paired Sh	7,000,000	2,000,000	5,000,000
-	-	10.040	100	-					
-	-	10.030	2,500	-		Imbalance Sh	1,000,000	1,000,000	-
1,500,000	-	10.020	100	-		Imbalance Side	B	B	FALSE
-	-	10.010	400	-					
-	-	10.000	200	10,000		MOC Imbalance Sh	300,000	300,000	-
5,000,000	-	9.995	-	5,000,000		MOC Imbalance Side	S	S	FALSE
-	1,000	9.990	-	-					
-	200	9.980	-	-		Far Indicative Close	$ 9.995	$ 10.020	$ (0.025)
-	400	9.970	-	9,700		Near Indicative Close	$ 9.995	$ 10.020	$ (0.025)
-	300	9.960	-	190,000					
-	200	9.950	-	300		Price Variation Indicator	0.00%	0.25%	-0.25%
-	-	ASK MKT	-	1,800,000					

3. During the calculation of the Calculated Closing Price, aggressive Pegged LOC orders are re-priced to the nearest valid tick by rounding up for buy Pegged LOC orders to $10.00 and rounding down for sell Pegged LOC orders to $9.99 to maximize matches at a valid tick. The resulting Calculated Closing Price is $10.00, a valid tick.

TBBO	9.99	/	10.00			Imbalance Messages			
BID			ASK				Value	Previous Value	Change
MOC / LOC	CLOB	Price	CLOB	MOC / LOC		Reference Price	$ 9.995	$ 9.995	$ -
1,500,000	-	BID MKT	-	-		Paired Sh	7,000,000	7,000,000	-
-	-	10.040	100	-					
-	-	10.030	2,500	-		Imbalance Sh	1,000,000	1,000,000	-
1,500,000	-	10.020	100	-		Imbalance Side	B	B	FALSE
-	-	10.010	400	-					
5,000,000	-	10.000	200	-		MOC Imbalance Sh	300,000	300,000	$ -
-	-	9.995	-	-		MOC Imbalance Side	S	S	FALSE
-	1,000	9.990	-	5,000,000					
-	200	9.980	-	-		Far Indicative Close	$ 10.000	$ 9.995	$ 0.005
-	400	9.970	-	9,700		Near Indicative Close	$ 10.000	$ 9.995	$ 0.005
-	300	9.960	-	190,000					
-	200	9.950	-	300		Price Variation Indicator	0.05%	0.25%	-0.20%
-	-	ASK MKT	-	1,800,000					

A.4 CLOSING ALLOCATION – PEGGED LOC ORDERS

The following scenario illustrates how a Pegged LOC orders are prioritized during closing allocation. The last sale price is $10.01.

1. The following orders are entered during the Imbalance Period:
   - Order A: Sell LOC 500K sh @ $10.00, broker 5
   - Order B: Buy LOC 500K sh @ $10.02, broker 10
2. The following Pegged LOC orders are entered during the Freeze Period:
   - Order C: Buy 200K sh @ $10.05 @ 3:57pm, re-priced to reference price of $10.01, broker 7
   - Order D: Buy 300K sh @ $10.50 @ 3.58pm, re-priced to reference price of $10.01, broker 5
   - Order E: Sell 400K sh @ $9.99 @ 3:59pm, re-priced to reference price of $10.01, broker 5
3. The resulting MOC book is as follows:

TBBO	10.00	/	10.02			Imbalance Messages	
BID			ASK				
MOC / LOC	CLOB	Price	CLOB	MOC / LOC		Reference Price	$ 10.010
-	-	*BID MKT*	-	-		Paired Sh	900,000
-	-	*10.05*	-	-			
-	-	*10.04*	-	-		Imbalance Sh	100,000
-	-	*10.03*	-	-		Imbalance Side	B
500,000	-	*10.02*	*100*	-			
500,000	-	*10.01*	-	*400,000*		MOC Imbalance Sh	-
-	*100*	*10.00*	-	*500,000*		MOC Imbalance Side	
-	-	*9.99*	-	-			
-	-	*9.98*	-			Far Indicative Close	$ 10.01
-	-	*9.97*	-	-		Near Indicative Close	$ 10.01
-	-	*9.96*	-	-			
-	-	*9.95*	-	-		Price Variation Indicator	0.00%
-	-	*ASK MKT*	-	-			

4. At the close, the Calculated Closing Price is $10.01 and the Reference Price is $10.01. Resulting orders are displayed below:

Order #	Order Type	Broker	Entered Limit Price	Limit Price	Buy Vol	Sell Vol	Limit Price	Entered Limit Price	Broker	Order Type	Order #
B	LOC	10	$10.02	$10.02	500 K	500 K	$10.00	$10.00	5	LOC	A
C	Pegged LOC	7	$10.05	$10.01	200 K	400 K	$10.01	$9.99	10	Pegged LOC	E
D	Pegged LOC	5	$10.50	$10.01	300 K						

Note that Order C and Order D are both considered at Reference Price of $10.01 despite their entered limit price. Order C has priority over Order D as it was entered earlier (time priority).

5. The trades are allocated as follows:

Trade #	Remaining Vol	Buy Broker	Buy Order #	Trade Vol	Sell Order #	Sell Broker	Remaining Vol
1	0	10	B	500 K	A	5	0
2	0	7	C	200 K	E	10	200 K
3	100 K	5	D	200 K	E	10	0

A.5 CLOSING ALLOCATION – PASSIVE PEGGED LOC ORDERS

The following scenario illustrates how Passive Pegged LOC orders are prioritized during closing allocation.

1. The following orders are entered during the Imbalance Period:
   - Order A: Sell LOC 500K @ $10.05, broker 5
   - Order B: Buy LOC 500K @ $10.05, broker 10
2. The following Pegged LOC orders are entered during the Freeze Period:
   - Order C: Buy 200K sh @ $10.03 @ 3:56pm, re-priced to reference price of $10.01, broker 7
   - Order D: Buy 200K sh @ $10.05 @ 3:57pm, re-priced to reference price of $10.01, broker 7
   - Order E: Buy 300K sh @ $10.05 @ 3.58pm, re-priced to reference price of $10.01, broker 5
   - Order F: Sell 400K sh @ $9.99 @ 3:59pm, re-priced to reference price of $10.01, broker 5
3. The resulting MOC book is as follows:

TBBO	10.00	/	10.02			Imbalance Messages	
BID			ASK				
MOC / LOC	CLOB	Price	CLOB	MOC / LOC		Reference Price	$ 10.010
-	-	*BID MKT*	-	-		**Paired Sh**	400,000
500,000	-	*10.05*	-	*500,000*			
-	-	*10.04*	-	-		**Imbalance Sh**	800,000
-	-	*10.03*	-	-		**Imbalance Side**	B
-	-	*10.02*	*100*	-			
700,000	-	*10.01*	-	*400,000*		**MOC Imbalance Sh**	-
-	*100*	*10.00*	-	-		**MOC Imbalance Side**	
-	-	*9.99*	-	-			
-	-	*9.98*	-			**Far Indicative Close**	$ 10.05
-	-	*9.97*	-	-		**Near Indicative Close**	$ 10.05
-	-	*9.96*	-	-			
-	-	*9.95*	-	-		**Price Variation Indicator**	0.40%
-	-	*ASK MKT*	-	-			

4. At the close, the Calculated Closing Price is $10.05 and the Reference Price is $10.01.
   Passive Pegged LOC orders are:
   - Order D - Reference Price $10.01 < CCP $10.05, entered limit $10.05 = CCP $10.05
   - Order E - Reference Price $10.01 < CCP $10.05, entered limit $10.50 > CCP $10.05

   Order C has an entered limit of $10.03, which is less aggressive than the CCP of $10.05 and is not eligible to trade.
   Therefore, Order D and E are re-priced to $10.05 and considered Passive LOC orders:
   - Order D - repriced to Buy 200K sh @ $10.05 as Passive Pegged LOC
   - Order E - repriced to Buy 300K sh @ $10.05 as Passive Pegged LOC

   Both orders are now eligible to trade in allocation and accounted for in overall calculation
   Resulting orders are displayed below:

Order #	Order Type	Broker	Entered Limit Price	Limit Price	Buy Vol	Sell Vol	Limit Price	Entered Limit Price	Broker	Order Type	Order #
B	LOC	10	$10.05	$10.05	500K	400K	$10.01	$9.99	7	Pegged LOC	F
C	Psv Pegged LOC	7	$10.03	$10.01	200K	500K	$10.05	$10.05	5	LOC	A
D	Psv Pegged LOC	7	$10.05	$10.05	200K						
E	Psv Pegged LOC	5	$10.50	$10.05	300K						

5. The trades are allocated as follows:

Trade #	Remaining Vol	Buy Broker	Buy Order	Vol Matched	Sell Order	Sell Broker	Remaining Vol
1	100 K	10	B	400 K	F	7	0
2	0	10	B	100 K	A	5	400 K
3	0	5	E	300 K	A	5	100 K
4	100 K	7	D	100 K	A	5	0

Note that Order E trades ahead of Order D due to broker preferencing, as Order E and Order A are both from broker 5. Order C does not trade as its entered limit price of $10.03 is less aggressive than the Calculated Closing Price of $10.05.

APPENDIX B VERSION HISTORY

VERSION	DATE	DESCRIPTION OF CHANGES
2.5	Sept 2021	• Added self-trade management in closing auctions – this will be released with the new TSX MOC • Removed references to "proposal" – this has been approved • Added detail on existing PME functionality in Section 2.7 – Price Movement Extension and Section 2.8 - Volatility Parameters • Added technical detail to Section 3.1.1 - Market State and Order Entry Changes • Updated TSX-FIX Specification version number • Updated Section 3.1.5 - Highlights of Technical Changes and added detail on self-trade management messaging • Updated Appendix A examples with Last Sale Price in each example • Corrected type of Order E in Appendix A – A5

2.4	June 2021	• Updated 3.1.3 Specifications Changes
		  ○ Updated Table 2 - Functional and Summary of Specification Changes
		  ○ Added Table 3 - Changes By Specification
		  ○ Added Section 3.1.4 Highlights of Technical Changes
		• Updated Appendix A - A3 – Reference Price is at Invalid Tick
		• Corrected order numbering in Appendix A – A5 – Closing Allocation – Passive Pegged LOC Orders

2.3	April 2021	• Renamed new MOC imbalance field "Price Variation Indicator" to "Price Variation" • Removed self-trade management in auctions – this will be addressed in other documentation as it's not directly part of the MOC Modernization initiative
2.2	March 2021	• Removed mention of COO from Section 2.3 Imbalance Messages • Updated 3.1.4 Specification Changes with Impacted Sections • Removed "proposed" language to indicate that these changes have been approved and will be implemented
2.1	January 2021	• Updated terminology of LOC orders entered during the Freeze Period to "Pegged LOC" orders • Updated 2.6 Closing Allocation to clarify Pegged LOC orders • Added 3.1.3 Self-Trade Management to 3.1 Technical Impact • Added examples to Appendix A - A.4 CLOSING ALLOCATION – PEGGED LOC ORDERS and A.5 CLOSING ALLOCATION – PASSIVE PEGGED LOC ORDERS.
2.0	October 2020	Updated to reflect removal of Closing Offset order type, addition of self-trade management to MOC, and volatility parameters. • Updated 2.1 Changes from Current TSX MOC • Updated 2.2 Overview and Timeline • Added 2.8 Volatility Parameters • Added 2.9 Self-Trade Management

		• Updated 3.1.3 Specification Changes
1.0	July 2020	Initial version

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