MIAX Sapphire Options Exchange

MIAX Express Orders

Binary Orders for Trading Options

MEO Interface Specification

Revision Date: 01/15/2026
Version: 1.2

7 Roszel Rd | Princeton, NJ 08540

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1. Overview

MIAX Express Orders (**MEO**) interface is a messaging interface that MIAX Sapphire™ (referred to as Sapphire for the rest of the document) Members use to submit binary orders for trading on the Sapphire Options Market.

MEO Features:

MEO messaging and the system architecture is designed for low latency and high throughput messaging. Some of the key features of the interface are:

- MEO uses binary numeric fields, fixed length ASCII fields and variable length bulk messages in order to utilize bandwidth efficiently and assist in achieving **low latency**.
- MEO allows for bulk order entry, multiple connections per firm and the mixing of MPIDs and series of various underlying instruments available on each matching engine in a single bulk order message in order to facilitate **high throughput**. MEO supports many orders in a bulk message there by allowing firms to prioritize the important orders and sides ahead of other order updates.
- MEO requires the use of TCP IP protocol in order to provide a guaranteed delivery mechanism for the order packets. Order acknowledgements and Order Cancel acknowledgements come directly from the Matching Engine allowing for enhanced determinism of delivery and processing.
- Message formats are designed to use **minimal bandwidth**. Use of Product IDs in place of a full canonical symbol is an example.
- Sapphire allows Market Makers to self-assign symbols to provide liquidity.
- Sapphire provides some of the industry's best risk protection mechanisms such as:
    - Atomically cancels simple orders of an MPID for all series of a given underlying instrument when the MPID reaches *Aggregate Risk Management (ARM)* threshold
    - Cancel all simple orders on Disconnect
    - Single Side Liquidity Protection
    - Availability of Priority Mass Cancel ports for prioritized Mass Cancels of resting liquidities
    - Sapphire ARM^2 Protection
- MEO notifications provide current **electronic system status** allowing the firms to take necessary actions immediately.

This specification is intended for the use for Sapphire Market Makers only.

1.1 Exchange Related Information

1.1.1 Hours of Operation for Sapphire Options Exchange

Please visit the MIAX website for details about the times for each of these events/periods.

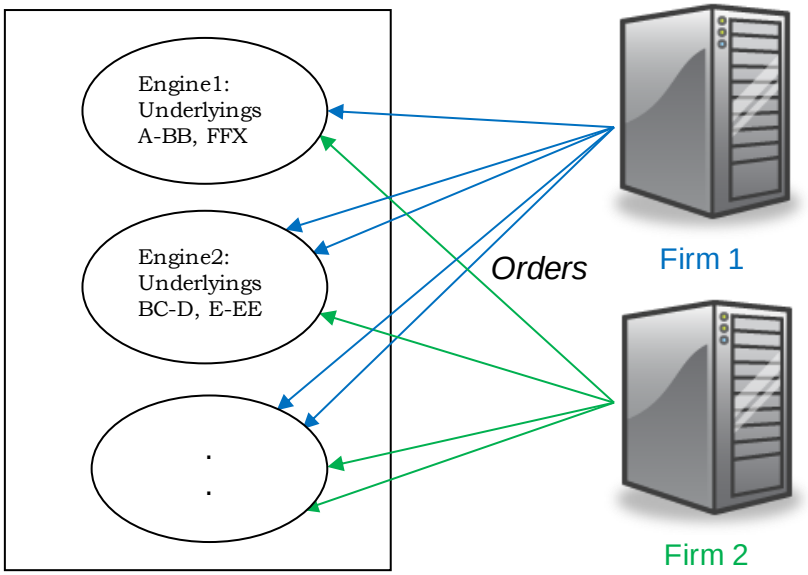
Note: Times specified in the website are in United States Eastern Time zone.

7:00 am	**Firm Interface Start up time** Firms are allowed to connect to MEO and download products. If Firms send any application messages, it will result in a disconnect.
7:30 am	**Live Order Window (LOW)** Start of acceptance of messages (including Orders). Orders received at or after this time will be accepted by Sapphire.
9:30 am	**Opening Process** Start of Sapphire Opening process.
9:30 am to 4:00 pm	**Trading Session for Equity Options** (ends at 1:00 pm on early closing days) Sapphire stops accepting orders in these classes at the end of this trading session. Sapphire may send trade related data following the end of the trading session for various operational reasons as needed.
9:30 am to 4:15 pm	**Trading Session for ETF and Index Options** (ends at 1:15 pm on early closing days) Sapphire stops accepting orders in these classes at the end of this trading session. Sapphire may send trade related data following the end of the trading session for various operational reasons as needed.
4:25 pm	End of LOW Stop accepting messages.
5 pm (approx.)	**End of Session** (ends at 2 pm on early closing days) MEO has completed sending all messages and Firms will soon be disconnected

1.1.2 Obtaining more information

Information such as (but not limited to) membership, rules, fees and support can be obtained by sending an email to Trading Operations or by visiting the MIAX website

1.2 MEO Architecture



Sapphire Matching

Highlights:

- Sapphire trading architecture is highly scalable and consists of multiple trade matching environments (clouds). Each cloud handles trading for all options for a set of underlying instruments. The underlying sets may not be contiguous ranges of underlyings and could be organized in any manner as assigned by the exchange. For the most part, the underlying assignments will be static in terms of allocation to a trading environment. However, if reallocation of underlyings to various trading environments is needed, such changes would be communicated to the firms with ample notice prior to the actual implementation.
- Firms can connect to one or more pre-assigned servers on each cloud. Firms interacting with multiple clouds are required to route orders to the appropriate clouds for the symbols they are trading.
- This architecture offers low latency, high throughput, small fault domains and high resiliency.
- Product IDs and Underlyings sent in the message must be supported by the Engine servicing the connection through which the message was sent.

1.3 Certification for Trading via MEO

Please contact MIAX Trading Operations to obtain more information about certification testing and the details about the test environment.

When Firms are ready with their application, they must certify their application with Sapphire. This certification testing is a manual process. In order to schedule a certification test, please email MIAX Trading Operations.

1.4 Hot Topics

Membership: Contact MIAX Member services for details about Sapphire membership. As a part of the on-boarding process, each Member will be assigned unique MPIDs and an MPID will have to be sent in every message as required by the message format.

Live Order Window (LOW): Official order acceptance starts at 7:30 am. Any orders entered before that time will be rejected. All orders received after 7:30 am will be in-play for opening and trading.

Liquidity Type: All member firms have the option to send FIX orders via the FIX interface. Market Making Members are allowed to send bulk Simple binary orders and Complex binary orders via the MEO interface.

- *Simple Bulk Binary Orders*: MEO provides a bulk order message that can be used to send orders with low latency and high throughput. A bulk order message may carry many **Auto-Replace (AR) orders** (orders that replace existing AR orders for the MPID) **or Standard orders** (New Order, Order replace and Order cancel messages are separate).
- *Complex Binary Orders*: MEO provides Complex binary order entry mechanism. This liquidity provides member firms with flexibility to interact with Complex order markets.

Port Setup: Member firms have flexibility in setting up MEO ports to cater to their architecture.

- Port Types:
    - **Full Service Port Bulk (FSP_B)** – Supports all MEO input message types and Simple and Complex bulk Binary order entry.
    - **Limited Service Port (LSP) -** Supports all MEO input message types, but does not support Simple bulk order entry and only supports IOC/ISO order types.
    - **Priority Mass Cancel Port -** Supports only Liquidity Mass Cancel requests (also referred to as Mass Cancel Request). Refer to Appendix C for a description of the Priority Mass Cancel processing.

    Notes:
    - A Mass Cancel Request is supported on all port types: Full Service, Limited Service and Priority Mass Cancel ports. Firms should consider their unique needs and how they transmit Mass Cancels to ensure their actions best meet their requirements.
    - Receipt of unsupported messages or Exchange defined excessive number of Mass Cancels on the Priority Mass Cancel ports will result in a forced disconnect followed by a brief pause in the ability to reconnect. Please contact Trading Operations for the current settings for excessive Mass Cancels.

- *Port Grouping*: MEO allows firms to define port groups to control the "cancel on disconnect" feature. Priority Mass Cancel ports do not support cancel on disconnect and therefore are excluded from any port grouping configurations.

Cancel on Disconnect:

- *Default Setup*: All the orders entered by a firm to an engine will be removed upon disconnect of that firm's last MEO connection to that engine. E.g.: Let us say Firm1 has two connections to cloud1 and Firm1 uses MPID1 and MPID2 on both of these connections. When connection1 of Firm1 goes down, it can still use connection2 to submit orders and cancels. But, when both connections go down, MEO cancels all orders for MPID1 and MPID2 on that engine. Priority Mass Cancel ports do not support cancel on disconnect.
- *Port Grouping Setup*: Separate port groups can be defined for full service ports and limited service ports. For e.g., Firms can have Sapphire setup a limited service port group to not clean up on disconnect. If the cancel-on-disconnect feature is enabled on a port group, upon disconnect of all ports in that group, all orders entered

by the firm will be removed regardless of the port group source. Please refer to the examples in the Appendix B.

Data feeds: Sapphire has several value-adding data feeds. Details of the feeds and their content can be obtained by visiting the MIAX website or emailing Trading Operations.

Symbol management: Firms will get the list of all option symbols that will be traded via MEO at the start of every session. The Sapphire assigned Product ID of each option will be sent in every message so that firms can tie each message to an option symbol.

Bulk order blocking, latency & throughput: Densely packaged order blocks leads to high throughput and less bandwidth usage. Firms are encouraged to consider packaging the order block as densely as possible. Additionally, Firms can package more than one order block in a single MTU to more effectively use I/O bandwidth.

Flow control: MEO is a synchronous messaging interface. Upon receipt of a bulk order or mass order cancel request, MEO will not read the firm facing port until it sends out the response. Firms that do not strictly follow a one-in-flight paradigm are advised to limit the number of in-flight liquidity blocks to less than 20 for optimal TCP protocol performance; i.e. under certain limited circumstances, exceeding this limit could result in shrinking window size and/or dropped packets. In order to avoid race-condition issues, firms are advised to wait for responses before sending in cancels or replaces on a connection other than the one through which the original order request was sent. Similar care should be taken for sending many simultaneous orders for same product across multiple ports.

Handling of Orders that are locking or crossing BBOs:

- Self-trade prevention: Market Maker orders receive self-trade prevention at the firm level across all MPIDs of the firm. If a Market Maker order locks or crosses the opposite side interest of the same firm for the same product, it will be accepted and the contra side will be canceled. In the interest of achieving the best performance for latency and throughput, firms can consider avoiding the latency of such cancel processing by changing the side being moved into first. E.g. if the Bid is edging toward the offer, firms can move the offer first and then the bid. This can be accomplished within the same order block. Ultimately, the Firms should consider the functional impact of this approach, or variants like it, and determine the best approach for their functional needs.
- Order management: Sapphire manages orders to opposite side ABBO in order to prevent locking or crossing the ABBO. Please refer to the Sapphire rules for further details on order management.

Size decrementing: When trades occur against orders, order size will automatically be decremented.

Sapphire Protections Availability:

- Sapphire ARM Risk Protection.
- Cancel on Disconnect - Upon MEO disconnect, the Sapphire Engine cancels all orders from the system as required by firm configuration.
- Single Side Liquidity Protection – Provides optional protection mechanism for single side of an option or complex strategy. Market Maker firms can enable this protection for an MPID by contacting MIAX Trading Operations
- Sapphire ARM^2 – This mechanism provides Market Makers additional protections on top of the ARM functionality.
- Self-trade protection at the firm level.

ARM Risk protection: Firms can set up their ARM settings at Sapphire and Sapphire will use those settings every day. Firms can change their settings electronically throughout the day. All binary order executions, with the exception of executions of IOC and ISO Simple orders and IOC Complex Binary orders, are counted towards ARM protection. Executions of FIX Simple and Complex orders are not counted towards ARM protection. ARM protection scope encompasses all options of the underlying including those of various security symbols that are mapped to the underlying such as mini options. Sapphire engine atomically cancels resting orders of an MPID for all series of a given underlying instrument when the MPID reaches Aggregate Risk Management (ARM) threshold. ARM Trigger will block all binary orders except IOC and ISO (immediate) orders.

ARM^2 Risk protection: Provides an additional protection mechanism on top of ARM.

- Firm Level ARM^2 protections can be set up by contacting MIAX Trading Operations. The ARM^2 Firm Level Protection, once configured, will cancel all resting orders, on a best effort basis, and disallow automatic reset/reentry if the number of unique classes that trigger ARM reach a configured threshold within a configurable amount time across the entire trading system environment for a given firm.
- ARM^2 Underlying Level protection settings can be set up by the firms via MEO. Firms can change their settings for the Underlying Level protections electronically throughout the day. The ARM^2 Underlying Level protection, once configured, will atomically disallow automatic reset/reentry if the number of ARMs reach a configured threshold within a configurable amount time for a given underlying for a given firm.

  Once ARM^2 is triggered, Firms must call MIAX Trading Operations to reset the ARM^2 trigger for the effected Underlyings which in turn will allow the firm to perform an order protection reset and resume sending orders.

Single Side Liquidity Protection: Provides protection mechanism for single side of an option or complex strategy. Market Makers can enable Single Side Liquidity Protection per MPID by contacting MIAX Trading Operations. If protection is enabled, the Sapphire Options Exchange will provide the following protections for the MPID:

- Simple Binary Day and IOC orders (except ISO) will be subject to the Single Side Liquidity Protection. If the full remaining size of an IOC or Day Binary Order is exhausted by a trade, there will be a Single Side Liquidity Protection Trigger for the traded side of that Option. The purpose is to prevent trading of multiple liquidities for the same MPID on the same side of the same Option. Upon a trigger, the system will, for that (sell or buy) side of that Option, cancel all resting Binary Orders, block all new Binary Day and IOC (except ISO) orders, notify the member and require the member to send a Single Side Liquidity Protection Reset message before reentering the market with new Binary Day or IOC orders on that (sell or buy) side of that Option. Single Side Liquidity Protection triggers and resets for Options are independent from all other available protections.
- Single Side Protection for Complex Strategies: A Market Maker's IOC Complex Binary Order will be subject to the Single Side Liquidity Protection. If the full remaining size of an IOC Complex Binary Order is exhausted by a trade, there will be a Single Side Liquidity Protection trigger for the traded side of that Strategy. The purpose is to prevent trading of multiple liquidities for the same Market Maker on the same side of the same Strategy. Upon a trigger, the system will notify the Market Maker and require the Market Maker to send a Single Side Liquidity Protection Reset Message to re-enter the market with Complex binary order on that (sell or buy) side of that Strategy. Single Side Liquidity Protection triggers and resets for complex strategies are independent from all other available protections.

Selective Liquidity Auto Purge (SLAP): SLAP is a targeted (selective liquidity) Mass-Cancel. SLAP Purge request will cancel liquidities for a given MPID and Underlying pair that match any of the specified SLAP codes

- Each submitted liquidity can optionally be associated with up to 8 SLAP codes.
- SLAP codes of resting liquidity can be modified without losing allocation priority.
- SLAP codes cannot be specified for immediate orders (including ISO) or on order cancel.
- SLAP Purge request specifies a list of SLAP codes for an MPID and Underlying pair. The system will atomically cancel all the resting liquidity that match the specified SLAP codes for the MPID and Underlying pair.
- When SLAP purge is in effect, the system will block new or modify liquidity requests of an MPID and Underlying pair that contain one or more impacted SLAP codes until SLAP reset is received.
- SLAP reset is required to accept incoming liquidities that contain the impacted MPID and Underlying pair and affected SLAP codes.
- Standard/Hybrid Mass-Cancel events (ARM/Line Disconnect and etc) always take precedence over a SLAP purge event.
    - Since a Standard/Hybrid Mass-Cancel event overtakes an existing SLAP event, if present, a SLAP reset is not required following any Standard/Hybrid Mass-Cancel event (all SLAP codes are reset automatically as part of the Mass Cancel event).

Backup Ports: Firms will be assigned backup MEO ports on backup infrastructure. These are slated to be used in the event of failure of primary MEO infrastructure. These backup MEO ports will not accept any messages while operating in the backup mode and are solely used for connection verification while in this mode. Note that these backup ports will have separate IP addresses than the primary ports.

Cloud failure: In the case of a cloud failure where the SesM session is changed, MEO orders are not carried forward to the new session. Firms are recommended to carefully consider the effects of this.

Executions/Busts/Adjustments: All executions are conveyed to firms via MEO. Trade busts (cancels) and adjustments (corrections) are NOT conveyed to firms via MEO. Firms interested in getting this information can refer to the Clearing Trade Drop (CTD) interface specification.

1.5 Data Types

The following table describes the data types used in MEO messaging:

Note: Time fields in all messages are as per timings of United States Eastern Time zone.

Data Type	Description
BinaryU	Unsigned, Intel x86 byte-ordered (**little-endian**), binary encoded numbers
BinaryS	Signed, Intel x86 byte-ordered (**little-endian**), binary encoded numbers
BinaryPrc4U	BinaryU Field with the last 4 (right most) digit places being decimal places
NanoTime	BinaryU field that contain transaction time in nanoseconds since past midnight
TimeStamp	BinaryU 8 bytes that contains timestamp in nanoseconds since Epoch
Alphanumeric	Each place can contain characters or numbers. Left justified and space-padded on to the right

1.6 Configuration

Notifications: All the notifications listed in this specification can be enabled on each Full service or Limited service MEO connection/port. While requesting MEO ports, Firms can request Sapphire to enable or disable some or all the notifications on each port.

Execution Notifications and Cancel Notifications can be configured by Firms to be sent

- solely on the individual port that originated the last successful request (new/replace/cancel) for the order
- multiple ports for a given Matching Engine environment

Firms can request one of the following configurations for Execution Notifications and Stock Leg Execution Notification on a particular port:

1. **All** - Always receive the notification
2. **Originator Port** - Only receive the notification when this port originated the last successful request for the order
3. **Never** – Never receive the notification on this port

Firms can request one of the following configurations for Cancel Notifications:

1. **Limited** - Always receive the notification. Standard/Hybrid Mass Cancel and SLAP events are excluded (See Notes section for limited cancel notifications)
2. **Limited Originator Port** – Only receive the notification when this port originated the last successful request for the order. Standard/Hybrid Mass Cancel and SLAP events are excluded. (See Notes section for limited cancel notifications)
3. **Never** – Never receive the notification on this port

Notes:

- Sapphire requires that each notification, with the exception of the cancel notification, be received on at least 1 port per cloud.
- Firms can choose to disable cancel notifications or enable limited cancel notifications on any of their ports. The limited and limited Originator Port cancel notifications feature filters out order level cancel notifications due to Firms' actions (cancels or replaces) and the following underlying level protections: Firm or Exchange initiated Standard/Hybrid Mass Cancel and SLAP, ARM protection or ARM^2 initiated Mass Cancels. Underlying level notifications of these events are conveyed via the order protection notification.
- Receiving each notification on multiple ports can achieve required resiliency, but result in duplicate notifications. Firms are advised to take that into consideration while deciding on their port set up.
- The Cancel notification message is unsequenced (cannot be replayed back) by default. Firms can request this notification to be sequenced so that they can retrieve/replay prior notifications using the SesM-TCP login request. Note that there could be lot of cancel notifications and hence a huge backlog of messages to be replayed depending on a given firm's activity.
- Notifications and Administrative Messages are not supported on Priority Mass Cancel Ports.
- The last port issuing successful new, replace or cancel operation for the individual order will become the Originator Port for the order. Standard/Hybrid Mass Cancel and SLAP requests or system-initiated cancels will not change Originator Port for the impacted orders.

Port Types:

MEO supports the following port types:

- **Full Service Port Bulk (FSP_B)** – Supports all MEO input message types and Simple and Complex bulk Binary order entry.
- **Limited Service Port (LSP) -** Supports all MEO input message types, but does not support Simple bulk order entry and only supports IOC/ISO order types.
- **Priority Mass Cancel Port -** Supports only Liquidity Mass Cancel Requests (i.e. Standard/Hybrid Mass Cancel and SLAP requests). Refer to Appendix C for a description of the Priority Mass Cancel processing.

All MEO output message types are supported on all of these port types (FSP_B and LSP).
Limited Service Ports (LSP) are restricted to 14 LSPs per Matching Engine environment.

Port groups: Firms can choose to have Sapphire configure their ports into one or more groups. For example, separate port groups can be defined for full service ports and limited service ports. Each port group can have unique or shared MPIDs. Each group can be configured to cancel on disconnect.

Cancel on disconnect feature: Firms opting for port group setup can choose to disable cancel on disconnect feature for one or more of their port groups. By default, the full service port group will have the cancel on disconnect feature enabled. Priority Mass Cancel ports do not support cancel on disconnect.

ARM Settings: Firms can set up their ARM parameters via the ARM messages supported by the MEO Interface. All subsequent firms' settings messages received from MEO will overwrite the prior settings for the current trading session. **Note: The latest settings at the end of each trading session will be carried over to the next trading session.**

ARM^2 Settings: ARM^2 Underlying Level protections settings can be sent via MEO. The Underlying Level ARM^2 configuration settings work similarly to that of the ARM settings above. The ARM^2 Firm Level protection settings must be set up manually via coordination with MIAX Trading Operations.

2. Session Management Messages

Please refer to latest TCP Session Management document (available at the MIAX website) for details about **SesM-TCP (MIAX proprietary session management Protocol)**. This protocol layer offers session management capabilities such as authentication, application messaging over TCP/IP, sequencing of messages, heartbeats and gap fills. Some of the messages that are sent over MEO are considered to not be of any value for refreshing after reconnecting and hence those are unsequenced messages.

Note: Upon receipt of an unknown, malformed or illegal application message or session message, MEO will send a SesM “Goodbye Packet” with a human readable reason text string and MEO will disconnect the line.

3. Administrative Messages

This section consists of administrative messages such as those that are used to send Options Product list and synchronize ARM settings.

3.1 Series Update

This is the message format that will be used to disseminate all Option series traded on Sapphire for the current session on the cloud associated for this connection.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SU"
Product Add/Update Time	8	NanoTime	Time at which this product is added/updated on Sapphire system today.
Product ID	4	BinaryU	Sapphire Product ID mapped to a given option. It is assigned per trading session and is valid for that session.
Underlying Symbol	11	Alphanumeric	Stock Symbol for the option.
Security Symbol	6	Alphanumeric	Option Security Symbol
Expiration Date	8	Alphanumeric	Expiration date of the option in YYYYMMDD format
Strike Price	4	BinaryPrc4U	Explicit strike price of the option. Refer to data types for field processing notes
Call or Put	1	Alphanumeric	Option Type "C" = Call "P" = Put
Opening Time	8	Alphanumeric	Expressed in HH:MM:SS format. e.g.: 09:30:00
Closing Time	8	Alphanumeric	Expressed in HH:MM:SS format. e.g.: 16:15:00
Restricted Option	1	Alphanumeric	"Y" = Sapphire will accept position closing orders only "N" = Sapphire will accept open and close positions
Long Term Option	1	Alphanumeric	"Y" = Far month expiration (as defined by Sapphire rules) "N" = Near month expiration (as defined by Sapphire rules)
Active on Sapphire	1	Alphanumeric	Indicates if this symbol is tradable on Sapphire in the current session: "A" = Active (tradable) on Sapphire "I" = Inactive (not tradable) on Sapphire
Sapphire BBO Posting Increment Indicator	1	Alphanumeric	This is the Minimum Price Variation as agreed to by the Options industry (penny pilot program) and as published by Sapphire

Indicator	BBO Increments	
	Price <= $3	Price > $3

<table>
<tr><th>Field Name</th><th>Length</th><th>Data Type</th><th>Notes</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>“P”</td><td>Penny (0.01)</td><td>Penny (0.01)</td></tr>
<tr><td>“N”</td><td>Penny (0.01)</td><td>Nickel (0.05)</td></tr>
<tr><td>“D”</td><td>Nickel (0.05)</td><td>Dime (0.10)</td></tr>
</table>
</td></tr>
<tr><td>Order Acceptance Increment Indicator</td><td>1</td><td>Alphanumeric</td><td>This is the Minimum Price Variation forOrder acceptance as per Sapphire rules
<table>
<tr><th rowspan="2">Indicator</th><th colspan="2">Order Increments</th></tr>
<tr><th>Price <= $3</th><th>Price > $3</th></tr>
<tr><td>“P”</td><td>Penny (0.01)</td><td>Penny (0.01)</td></tr>
<tr><td>“N”</td><td>Penny (0.01)</td><td>Nickel (0.05)</td></tr>
<tr><td>“D”</td><td>Nickel (0.05)</td><td>Dime (0.10)</td></tr>
</table>
</td></tr>
<tr><td>Opening Underlying Market Code</td><td>1</td><td>Alphanumeric</td><td>Options opening will be triggered on receipt of Opening quote/trade from this Underlying market:
<table>
<tr><th>Market Code</th><th>Description</th></tr>
<tr><td>A</td><td>NYSE Amex</td></tr>
<tr><td>B</td><td>NASDAQ OMX BX</td></tr>
<tr><td>C</td><td>National Stock Exchange</td></tr>
<tr><td>D</td><td>FINRA ADF</td></tr>
<tr><td>E</td><td>Market Independent (Any market that
opens first)</td></tr>
<tr><td>H</td><td>MIAX Pearl Equities</td></tr>
<tr><td>I</td><td>International Securities Exchange</td></tr>
<tr><td>J</td><td>EDGA Exchange, Inc.</td></tr>
<tr><td>K</td><td>EDGX Exchange, Inc.</td></tr>
<tr><td>L</td><td>LTSE</td></tr>
<tr><td>M</td><td>Chicago Stock Exchange</td></tr>
<tr><td>N</td><td>NYSE Euronext</td></tr>
<tr><td>P</td><td>NYSE Arca Exchange</td></tr>
<tr><td>Q</td><td>NASDAQ OMX (via UTP Feed)</td></tr>
<tr><td>T</td><td>NASDAQ OMX (via CTA Feed)</td></tr>
<tr><td>U</td><td>MEMX</td></tr>
<tr><td>V</td><td>IEX</td></tr>
<tr><td>W</td><td>CBOE Stock Exchange (CBSX)</td></tr>
<tr><td>X</td><td>NASDAQ OMX PHLX</td></tr>
<tr><td>Y</td><td>BATS Y-Exchange, Inc.</td></tr>
<tr><td>Z</td><td>BATS Exchange Inc.</td></tr>
</table>
</td></tr>
<tr><td>Reserved</td><td>12</td><td>BinaryU</td><td>**Reserved for future use**</td></tr>
</table>

Points to note:

- This is a sequenced message and hence these messages can be replayed upon reconnection.
- Entire Options list will be disseminated at the start of day.

- In each connection, firms will only receive the series associated with the Engine that is servicing that connection.
- Intra-day updates will also be published as they occur.
- In case of an intra-day reconnection, Firms can replay all sequenced messages starting at a specified SesM sequence number.

When an active series is made inactive, the firms will be informed using this Series Update message format.

3.2 ARM Settings Update Request

Firms can use this message format to set up their ARM protection settings for each session. Changes to these settings can be made throughout the day.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"AS"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Action	1	Alphanumeric	Valid values: 'S' – Set (add or update) ARM settings 'D' – Delete ARM settings
Underlying Symbol	11	Alphanumeric	Underlying symbol for which this ARM protection is applicable **Optional:** If this is filled with spaces, this ARM protection setting will be used as a default setting for this MPID.
Allowable Engagement Percentage	4	BinaryU	Percentage of order size at which the Member wants Sapphire to trigger ARM protection for this underlying. Please refer to the rules for details of ARM. Minimum value is 1 (1%). Maximum is 65,535 (65,535%).
Counting Period	2	BinaryU	Duration (in number of milliseconds) in which Engagement percentage is calculated in order to determine if the MPID should be put on ARM protection for this underlying. Allowable Range: 100 to 15,000 milliseconds Must be a multiple of 100 milliseconds.

Points to note:

- As of the date of this spec release, Sapphire will have an ARM setting global default
  - Allowable Engagement Percentage = 105%
  - Counting Period = 1,000 milliseconds (1 seconds)

  Important: Firms are advised of the default ARM settings and their ARM settings for the given trading session via the ARM Protection Notification message.

- Executions of FIX orders are not counted towards ARM protection. Only executions resulting from binary orders are counted towards ARM protection.
- e.g.: If the setting is 100%, IBM Jan 50 Call order size is 100 and IBM Jan 60 Call order size is 10, execution of 70 (+70%) of the IBM Jan 50 Calls and 3 (+30%) of the IBM Jan 60 Calls, within the Counting period, triggers ARM protection.
- **Sapphire will carry over all ARM settings across trading sessions. If firms desire a different setting, they must reset their ARM settings. Note that the last MPID level setting sent across any cloud is the single setting that gets carried over and applied to all clouds the next day. If the firm needs to have different MPID level settings on each cloud, the firm needs to send these settings at the beginning of each day.**
- Sapphire will use the following priority for ARM settings:
  - Use MPID's ARM setting for the underlying
  - If that is not set, use MPID's default setting
  - If that is not set, use Sapphire global default setting (for MM only)

  Therefore, if a firm deletes a setting, other remaining MPID settings or Sapphire global default settings apply.
- These settings are applicable for the entire trading session and hence the firm does not have to set these up with intra-day reconnections for the same trading session.
- Settings changes does not trigger ARM recalculation or ARM protection. Subsequent trades will take the new settings into consideration.
- ARM protection scope encompasses all options of the underlying including those of various security symbols that are mapped to the underlying.

3.3 ARM Settings Update Response

Sapphire uses this format to respond to the firm with a status of their ARM protection settings request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"AA"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Underlying Symbol	11	Alphanumeric	Underlying sent in the request. Firms can use this to know which underlying setting did not take into effect in case of an error.
ARM Settings Update Status	1	Alphanumeric	" " = Settings applied successfully "A" = Invalid Action "P" = Invalid Allowable Engagement Percentage "D" = Invalid Counting Period "M" = Unknown MPID "U" = Invalid Underlying "N" = No such ARM settings "Z" = Undefined error

Field Name	Length	Data Type	Notes
			"*" = Downgraded from older version

Points to note:

- This is not a sequenced message.
- If the firm did not get a response due to disconnect, firm is encouraged to send the setting request again after connecting.

3.4 ARM^2 Underlying Level Protection Settings Update Request

Firms can use this message format to set up their ARM^2 Underlying Level protection settings for each session. Changes to these settings can be made throughout the day.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"2S"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Action	1	Alphanumeric	Valid values: 'S' – Set (add or update) ARM^2 settings 'D' – Delete ARM settings
Underlying Symbol	11	Alphanumeric	Underlying symbol for which this ARM^2 protection is applicable
ARM Threshold Count	4	BinaryU	Number of ARM triggers for the Counting Period for the specified underlying that will trigger ARM^2 Underlying level protection. Minimum: 3 Maximum: 99
Counting Period	4	BinaryU	Duration (in number of milliseconds) for which ARM triggers are counted in order to determine if they don't exceed the specified ARM^2 Threshold. Allowable Range: 1000 to 24,300,000 milliseconds Must be a multiple of 1,000 milliseconds.

Points to note:

- ARM^2 is built upon the ARM protection mechanism. That is, the ARM^2 Underlying Leveland Firm Level protections are triggered based on the number of ARM triggers for eachunderlying the firm trades.
- As of the date of this spec release, there are no default settings for ARM^2. Firms must configure the ARM^2 settings in order for the functionality to operate. Note: ARM and ARM^2 settings require explicit configuration for each feature.
- Sapphire will carry over all ARM^2 settings across trading sessions. If firms desire a different setting, they must

reset their ARM^2 settings.

- These settings are applicable for the entire trading session and hence the firm does not have to set these up with intra-day reconnections for the same trading session.
- Intraday setting changes do not trigger ARM^2 recalculation or ARM^2 Protection. Subsequent trades will take the new settings into consideration.
- ARM^2 protection scope encompasses all options of the underlying including those of various security symbols that are mapped to the underlying such as mini options. For example, for underlying AAPL which has security symbols AAPL and AAPL7, ARM^2 protection is triggered under the scope of the underlying which includes AAPL and AAPL7. Once ARM^2 protection is triggered, it would be engaged for both AAPL and AAPL7.

3.5 ARM^2 Underlying Level Protection Settings Update Response

Sapphire uses this format to respond to the firm with a status of their ARM^2 Underlying level protection Settings Update Request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"2R"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Underlying Symbol	11	Alphanumeric	Underlying sent in the request. Firms can use this to know which underlying setting did not take into effect in case of an error.
ARM2 Settings Update Status	1	Alphanumeric	" " = Settings applied successfully "A" = Invalid Action "P" = Invalid ARM Threshold "D" = Invalid Counting Period "M" = Unknown MPID "U" = Invalid Underlying "N" = No such ARM^2 setting "Z" = Undefined error "*" = Downgraded from older version

Points to note:

- This is not a sequenced message.
- If the firm did not get a response due to disconnect, firm is encouraged to send the setting request again after connecting.

3.6 Series Assignment Request

Market Making firms can use this message format to communicate to Sapphire which of their MM MPIDs is assigned or unassigned in a product.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SA"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Product ID	4	BinaryU	Product ID mapped to a given Option assigned by the Sapphire for the current session. Assignment requests for a series must be made using product IDs of Call-Options only. Assignment requests for Put-Options are rejected.
Action	1	Alphanumeric	Valid values: 'A' – Assign/Reassign an MPID to be an MM in a Product 'U' – Unassign

Points to note:

- Requests are accepted only till the time stated in Sapphire rule book. All requests sent after that are rejected.
- The assignment will remain in effect for the remainder of the trading day. Assignments are not persistent across days and hence Firms must send their assignment requests for each trading session.

3.7 Series Assignment Response

Sapphire uses this format to respond to the firm assignment request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"AR"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker

Field Name	Length	Data Type	Notes
Assignment Settings Status	1	Alphanumeric	" " = Settings applied successfully "A" = Invalid Action "M" = Unknown MPID "T" = Settings not permitted (only allowed during settings window) "I" = Invalid product code "P" = Assignment cannot be for Put Options. Assign in Call Options assigns for entire series. "Z" = Undefined error "*" = Downgraded from older version

Points to note:

- This is not a sequenced message.

4. Application Messages

This section consists of application messages such as Orders and Notifications.

4.1 Liquidity Messages

4.1.1 Simple Bulk Liquidity Message

Firms can use this message format to send up to 25 orders, cancels or cancel replaces. The orders are processed in the sequence according to their position in the message. This enables the firms to prioritize the update of more important orders ahead of other orders.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"lm"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
Client Send Time	8	TimeStamp	Firm's send time for the Liquidities. Nanoseconds since Epoch.
Liquidity Unit Count	1	BinaryU	Number of Orders, Cancels, Replaces in this bulk message
**** Reserved ****	4	BinaryU	** Reserved for future use. **
1 to 25 single-side Order, cancel or replace			
Liquidity Unit	40	BinaryU	Can contain 1 AutoReplace Order, Standard Order, Standard Order Cancel or Standard Order Replace in each unit. Number of units should match the count specified in the count field.

Points to note:

- Various types of Liquidity Units such as AutoReplace Order, Standard Order, Standard Order Cancel, and Standard Order Cancel/Replace can be combined in a single *Bulk binary liquidity* message.
- Each Liquidity Unit can be for any of the Firm MPIDs and for any product traded on the Engine servicing the connection through which the message was sent.
- Sapphire requires that the Firms use unique *Client Message ID*s for all bulk messages so as to map execution and cancel notifications back to the corresponding liquidity.
- The Bulk Liquidity Message will be rejected if the order count is different than actual number of orders. Such a bad order block will result in Sapphire disconnecting the client session on which the block was received.
- Sapphire will internally assign a ***Bulk order Index*** (1 byte binary field) starting with 0 for each order in this Bulk liquidity message (meaning Bulk order Index is unique in a single Bulk message and not across different bulk messages). Both the *Bulk order Index* and the *Client Message ID* will be reflected in *cancel notification* and *execution notification.* Firms can use the IDs together as a unique ID for each order. This can help in identifying two different orders for the same product in a single bulk liquidity message.

- A single order request can execute at multiple price levels with resting orders. Separate executions will be sent for each such execution.
- It is mandatory for Market Making firms to fill in the Client Send Time field with a valid send time.

4.1.1.1 AutoReplace (A-R) Order

Firms can use this format to send a single AutoReplace Order in the Liquidity Unit field of the Bulk Liquidity message.

Message Direction: Firm to Sapphire

Field Name	Length	Replaceable	Data Type	Notes
Liquidity Unit Type	1	N	Alphanumeric	'A'
Client Order ID	4	N	BinaryU	Client order ID should be 1, any other value will result in a reject.
MPID	4	N	Alphanumeric	Sapphire assigned ID of the Member
Product ID	4	N	BinaryU	Product ID mapped to a given Option assigned by the Sapphire for the current session
Time In Force(TIF)	1	N	Alphanumeric	Valid values: 'D'=DAY
Order Instruction	1	N	Alphanumeric	Valid values: 'R'=Regular
MVP	1	N	BinaryS	Number or price levels up to which the order will trade from the initial market price at time of arrival. After that, order will be canceled back to the firm. Negative value indicates MEO to use Exchange default value.
Price	4	Y	BinaryPrc4U	Limit order price. Max Price is defined in Regulatory Circulars.
Size	4	Y	BinaryU	Number of contracts. Max size: 999999
Side	1	N	Alphanumeric	B=Buy, S=Sell
SLAP Codes	1	Y	BinaryU	Optionally associates each liquidity with up to 8 SLAP codes when corresponding bit is set: • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.

Points to note:

- An order with a price of zero **and** size of zero cancels the existing order for the Member for the specified side of that option. Upon receipt of such an order, if there are no prior open orders, the request will be rejected. Specified SLAP codes are ignored for A-R orders with price of zero and size of zero.
- When replacing an existing order for a product, the ClientOrderID must be the same as the order in the system for that product, side and MPID. If a new order needs to be placed in the system or a new tier established without replacing the existing order, a new ClientOrderID can be used.
- When replacing an order, the quantity specified in the *Size* field in the latest AR order will be the new open contracts for that product, MPID, side and ClientOrderID.
- Please refer to the Regulatory circulars for the maximum price and size accepted by the system. Additionally, Firms can request configuration of maximum order size applicable to their orders.

4.1.1.2 Standard Binary Order – New

Firms can use this format to send a single Standard Order in the Liquidity Unit field of the Bulk Liquidity message.

Message Direction: Firm to Sapphire

Field Name	Length	Replaceable	Data Type	Notes
Liquidity Unit Type	1	N	Alphanumeric	'O'
Client Order ID	4	N	BinaryU	Client order ID. Must be unique for the MPID. 0 results in a reject.
MPID	4	N	Alphanumeric	Sapphire assigned ID of the Member
Product ID	4	N	BinaryU	Product ID mapped to a given Option assigned by the Sapphire for the current session
Time In Force(TIF)	1	N	Alphanumeric	Valid values: 'I'=IOC 'D'=DAY
Order Instruction	1	N	Alphanumeric	Valid values: 'R'=Regular 'S'=ISO
MVP	1	N	BinaryS	Number or price levels up to which the order will trade from the initial market price at time of arrival. After that, order will be canceled back to the firm. Negative value indicates MEO to use Exchange default value.
Price	4	Y	BinaryPrc4U	Limit order price. Max Price is defined in Regulatory Circulars
Size	4	Y	BinaryU	Number of contracts. Max Size: 999999
Side	1	N	Alphanumeric	Valid values: 'B'=Buy 'S'=Sell
SLAP Codes	1	Y	BinaryU	Optionally associates each liquidity with up to 8 SLAP codes when corresponding bit is set:

Field Name	Length	Replaceable	Data Type	Notes
				• Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.

Points to note:

- A single *Bulk Liquidity* message can have orders for any underlying supported by the Engine servicing the connection through which the order was sent.
- An order with a ClientOrderID same as an open order in the system will result in a reject as every Standard Order needs to have unique ClientOrderID.
- New standard orders do not replace any existing order in the system. A Standard order cancel/replace message is needed to replace them.
- Please refer to the Regulatory circulars for the maximum price and size accepted by the system. Additionally, Firms must provide a configuration of maximum order size applicable to their orders.
- An order with a TIF of IOC or an ISO instruction that specifies SLAP codes (must be set to zero) will be rejected (See response message for detail)

4.1.1.3 Standard Binary Order – Cancel/Replace

Firms can use this format to send a single Cancel/Replace of a Standard Order in the Liquidity Unit field of the Bulk Liquidity message.

Message Direction: Firm to Sapphire

Field Name	Length	Replaceable	Data Type	Notes
Liquidity Unit Type	1	N	Alphanumeric	'R'
Client Order ID	4	Y	BinaryU	Client order ID. Must be unique for the MPID. 0 results in a reject.
MPID	4	N	Alphanumeric	Sapphire assigned ID of the Member
Product ID	4	N	BinaryU	Product ID mapped to a given Option assigned by the Sapphire for the current session
Target Client Order ID	4	N	BinaryU	If an Order with this Target Client Order ID is found for the same MPID, this replace is processed and the Target Client Order is replaced with this order. If not, this replace is Rejected.

Field Name	Length	Replaceable	Data Type	Notes
Time In Force(TIF)	1	N	Alphanumeric	Valid values: 'I'=IOC 'D'=DAY
Order Instruction	1	N	Alphanumeric	Valid values: 'R'=Regular 'S'=ISO
MVP	1	N	BinaryS	Number or price levels up to which the order will trade from the initial market price at time of arrival. After that, order will be canceled back to the firm. Negative value indicates MEO to use Exchange default value.
Price	4	Y	BinaryPrc4U	Limit order price. Max Price: Defined in Regulatory Circular
Size	4	Y	BinaryU	Number of contracts. Max Size: 999999
Side	1	N	Alphanumeric	Valid values: 'B'=Buy 'S'=Sell
SLAP Codes	1	Y	BinaryU	Optionally associates each liquidity with up to 8 SLAP codes when corresponding bit is set: • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 6 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.

Points to note:

- Cancel/replacement behavior:
  - Sapphire will subtract the executed contracts of the pending order from the quantity specified in the *Size* field of the replace request and leave open the remaining volume in the new (replaced) order.
  - There will be no "too late to cancel" message generated if requested size is less than the executed size

4.1.1.4 Standard Binary Order – Cancel

Firms can use this format to send a single Cancel of a Standard Order in the Liquidity Unit field of the Bulk Liquidity message.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
Liquidity Unit Type	1	Alphanumeric	'C'
Client Order ID	4	BinaryU	Client order ID of the cancel request. Must be unique for the MPID. 0 results in a reject.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Product ID	4	BinaryU	Product ID mapped to a given Option assigned by the Sapphire for the current session
Target Client Order ID	4	BinaryU	If an Order with this Target Client Order ID is found for the same MPID, this cancel is processed and the Target Client Order is canceled. If not, this cancel is rejected.

Points to note:

- Cancel of an order that is not open (or never existed) will result in a cancel reject.

4.1.2 Simple Bulk Liquidity Message Response

This message format will be used to inform the firm of the status of Orders sent in the Bulk Liquidity Message request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"LR"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
Bulk Order Status	1	Alphanumeric	" " = Bulk liquidity block is valid "R" = Invalid bulk liquidity block "Z" = Undefined error
Order Count	1	BinaryU	Number of orders that were submitted in the Bulk liquidity block
Invalid Order Count	1	BinaryU	Number of orders that were rejected (orders with status other than " ")
Order Ack Time	8	NanoTime	Time at which Sapphire engine generated this response.
1 to N single-side order responses consisting of the following fields:			
Order status	1	Alphanumeric	" " = successfully accepted "C" = Sapphire closed for trading of this product; request cannot be completed "F" = Buy/Sell Limit Too Aggressive "I" = Invalid TIF when option not trading "J" = Invalid Order Instruction when option not trading

Field Name	Length	Data Type	Notes
			"K" = No A-R order to cancel "L" = Order received while not in LOW "N" = Invalid Client Order ID "O" = Invalid Product ID "P" = Invalid Price "Q" = Invalid Size "R" = Rejected due to order protection "S" = Invalid Side "T" = Invalid Target Client Order ID "U" = Unknown MPID "V" = Invalid to Change "W" = Invalid Cancel Request (when product mismatches) "X" = Not permitted "2" = Invalid TIF "4" = Non-Tradable Option "5" = Incompatible Order Type "7" = Invalid Order Instruction "0" = Invalid MVP Ticks "b" = Blocked by OCC Kill Switch "e" = Duplicate Client Order ID "g" = Invalid Liquidity Unit Type "s" = Rejected due to Single Side Liquidity Protection in effect "u" = Rejected due to SLAP protection in effect "v" = SLAP code specified for an immediate order "Z" = Undefined error "*" = Downgraded from older version
Engine Sequence Number	8	BinaryU	Unique Sequence number, assigned by the Sapphire Matching Engine, for orders processed successfully and zero if rejected.
Engine Transaction Time	8	NanoTime	Unique timestamp, assigned by the Sapphire Matching Engine, for orders processed successfully and zero if rejected.
Open Size	4	BinaryU	Indicates the remaining size open after processing the new order, cancel/replace or cancel. Zero for rejected orders.

Points to note:

- This is not a sequenced message.
- If the order block is rejected, Order status, Engine Sequence Number and Engine Transaction Time must be ignored. Sapphire will populate Order status with space.
- When orders and cancels are simultaneously sent for the same product across multiple ports, Engine sequence number or Engine Transaction Time can be used to determine the sequence of processing of these liquidities by the matching engine for the cloud.

- The Open Size field indicates the size accepted by the system upon processing each submitted order prior to any executions that may occur subsequent to order acceptance.
    - For Cancel Replace of Standard Orders, the accepted order size may be reduced if the replaced order had prior executions.
    - For all other orders types accepted, the size will be the same as the submitted size. The order size field will be zero for rejected orders.
    - When in SSP protection, an A-R order cancel will be rejected with status of "s", where as a standard order – cancel will be rejected with status of "T".
    - Firms may get execution notifications and cancel notifications for each order in the block, followed by the response for the entire block. The Open size field can be used to know the size of the order that was processed by the system.
    - Examples:
      Example 1:
- New Standard Order O1 size=100 (OpenSize=100).
- Execution of Order O1 filled size 50.
- Cancel/Replace Order O1 size 60 (OpenSize 10).

  Example 2:
- New Standard Order O1 size=100 (OpenSize=100).
- Execution of Order O1 filled size 50.
- Cancel/Replace Order O1 size 40 (OpenSize 0). Resting Order O1 is canceled.

  Example 3:
- A-R Order O1 size=100 (OpenSize=100).
- Execution of Order O1 filled size 50.
- A-R Order replacing O1 size 40 (OpenSize 40).

4.1.3 Complex Binary Order Request

This is the format for a Complex Binary Order message that can be sent to match with a resting Complex orders on the complex book.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"CO"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm for this request
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Client Send Time	8	TimeStamp	Firm's send time for the complex binary order. Nanoseconds since Epoch.
Strategy ID	4	BinaryU	Sapphire Strategy ID is assigned per trading day and is valid only for that day. ID is not unique between Series Product ID.
Time in Force	1	Alphanumeric	Time in Force for complex binary order: • "I" – IOC (Immediate match or cancel)

Field Name	Length	Data Type	Notes
Price	8	BinaryPrc4S	The net limit price for the strategy If Side is "B": • Positive number represents net debit • Negative number represents net credit If Side is "A": • Positive number represents net credit • Negative number represents a net debit Price of zero is net neutral transaction for either side.
Size	4	BinaryU	Number of times to execute the specified strategy. NOTE: The absolute value of the highest Option Leg Ratio of the strategy multiplied by the Size must be less or equal to 999,999. The absolute value of the Stock Leg Ratio of the strategy, if present, multiplied by the Size must be less or equal to 99,999,999.
Side	1	Alphanumeric	Side of complex binary order: "B" = Bid (Buy) "S" = Ask (Sell)
Stock Sell Short Indicator	1	Alphanumeric	Sell Short indicator if this complex binary order sells the stock leg of the strategy "N" = Not Short "Y" = Short "E" = Short Exempt " " (space) = N/A (Not applicable)
Reserved	16	Alphanumeric	Reserved for future use

Points to note:

- Complex binary order can only trade against complex order book and will not leg against simple liquidities.

4.1.4 Complex Binary Order Response

This message indicates if the complex binary order is accepted or rejected. Note that this message does not report executions. For executions, please refer to the *Execution notification*. For the handling of any unexecuted portion that was canceled, please refer to the *Cancel notification*.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"CR"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Order ID	8	BinaryU	Sapphire assigned ID for complex binary order if accepted;

Field Name	Length	Data Type	Notes
			Zero if complex binary order was rejected.
Status	1	Alphanumeric	" " = Request accepted successfully "C" = Sapphire closed for trading of this strategy; request cannot be completed "G" = Complex Feature Disabled "I" = Invalid Strategy ID "J" = Outside Price Range for Strategy "K" = Not in LOW "M" = Unknown MPID "P" = Invalid Price "R" = Rejected due to order protection "S" = Invalid Side "T" = Invalid Time in Force "V" = Invalid Size "X" = Request is not permitted. "Y" = Rejected due to Single Side Liquidity Protection in effect "Z" = Undefined error "b" = Blocked by OCC Kill Switch "7" =Rejected due to stock clearing account (Underlying MPID or DTC account number) not configured. "8" = Invalid Sell Short Indicator "*" – Downgraded from older version
Reserved	16	Alphanumeric	Reserved for future use

Points to note:

- This is a sequenced message

4.1.5 Liquidity Mass Cancel Request

Firms can use this message format to request the cancelation of all Simple orders for an MPID for all series for an underlying.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"xq"
Client Message ID	4	BinaryU	Unique message ID assigned for the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Client Send Time	8	TimeStamp	Firm's send time for the mass cancel. Nanoseconds since Epoch.

Field Name	Length	Data Type	Notes
Underlying Symbol	11	Alphanumeric	Cancel request applies to the entire series of this underlying.
Mass Cancel Scope	1	Alphanumeric	'A' – (Standard Mass-Cancel) Cancel all open Simple Binary Orders (AR and Standard Binary DAY) and block all subsequent Simple and Complex Binary Orders (including immediate orders). 'D' – (Hybrid Mass-Cancel) Cancel all open Simple Binary Orders. All subsequent Simple Binary Orders will be blocked, however immediate orders (Standard and Complex Binary) will not be blocked 'S' – Selective Liquidity Auto Purge (SLAP)
SLAP Codes	1	BinaryU	○ SLAP codes for Selective Mass-Cancel. ○ This field is only applicable for Mass Cancel Scope 'S' and is ignored for other scopes. ○ Resting liquidities with the specified SLAP codes will be purged • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.
Reserved	6	BinaryU	For future use

Points to note:

- Liquidity Mass Cancel Request is atomic, and once received by the matching engine, no other requests for liquidities are processed by the matching engine until the Liquidity Mass Cancel request is completed.
- Standard/Hybrid Mass Cancel request will require an *Order Protection Reset,* when the member is ready, in order to resume submitting orders.
    - An Order Protection Reset will not be required to submit immediate orders if the "Mass Cancel Scope" field was set to 'D' in the above request.
- MEO will not read any other messages from the firm on this connection until the processing of this request is complete.
- It is mandatory for Market Making firms to fill in the Client Send Time field with a valid send time.
- Selective Liquidity Auto Purge (SLAP)
    - SLAP will automatically cancel all resting liquidity that match the MPID, Underlying and any of the SLAP Codes specified in the request.
    - When multiple SLAP codes are requested to purge and some SLAP codes are already in purged state, only the SLAP codes that are not yet purged are processed.
    - Any new order or order modification requests that match the MPID and Underlying pair, and contain any of the purged SLAP codes, will be rejected upon arrival.
    - When bit is not set for a particular SLAP code, this SLAP code will retain its prior state (reset or purged).

- Each purged SLAP code requires explicit reset (See Liquidity Protection Reset) unless Standard/Hybrid Mass-Cancel event is issued (See Liquidity Protection Trigger Notification).
  - Standard/Hybrid Mass-Cancel always takes precedence over SLAP purge (if any).
  - Standard/Hybrid Mass-Cancel will reset all SLAP codes.
  - SLAP reset is not needed and will be rejected when Standard/Hybrid mass-cancel is in effect.
- Purged SLAP codes do not impact acceptance of immediate orders.

4.1.6 Liquidity Mass Cancel Response

This message format will be used to inform the firm about the status of their previous Mass Cancel request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"XR"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Status	1	Alphanumeric	" " = Cancel successful "A" = All specified SLAP codes are already purged "B" = SLAP codes are not provided in the request "D" = SLAP purge while Standard/Hybrid mass-cancel is active "U" = Invalid Underlying "N" = All orders have already been canceled "M" = Unknown MPID "C" = Cannot cancel while not in LOW "J" = Mass Cancel Scope contains invalid value "X" = SLAP feature disabled "Z" = Undefined error "*" = Downgraded from older version

Points to note:

- This is not a sequenced message.

4.1.7 Liquidity Protection Reset Request

Following an order protection being engaged for a given MPID and underlying, firms must use this message format to reset their Order Protection in order to start sending orders for any option or a complex strategy of the specified underlying.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"P1"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Underlying Symbol	11	Alphanumeric	Must be filled with a valid underlying. Sapphire will remove (reset) the Order protection for this Member for entire series of this underlying.
Scope	1	Alphanumeric	'A' – Reset Standard/Hybrid Mass-Cancel 'S' – Reset SLAP
SLAP Codes	1	BinaryU	List of SLAP codes to be reset. This field is only applicable for Mass Cancel Scope 'S' and is ignored for other scopes. The specified SLAP codes will be reset when corresponding bit is set. • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.
Reserved	10	BinaryU	For future use

Points to note:

- A Liquidity Protection Reset will not enable sending Binary Orders for Option/Strategy sides that are subject to Single Side Liquidity Protection. Single Side Liquidity Protection Resets will also be required for these Options.
- Each type of order protection and the corresponding system behavior and expectations are listed below:
    - Order protection due to ARM
        - All resting orders are cancelled.
        - Order protection reset is required to start sending day orders again.
        - Day orders sent before resetting will be rejected.
        - Immediate orders can be sent without resetting.
    - Order protection due to Firm Level ARM2 Protection
        - All resting orders are cancelled across all trading environments for the firm's assigned underlyings. Firms must call Sapphire Trading Operations to manually reset ARM^2 protection. Then, an Order protection reset is required to start sending day orders again.
        - Day orders sent before resetting will be rejected.
        - Immediate orders can be sent without resetting.
        - Order protection reset sent before manual ARM^2 reset will be rejected.
    - Order protection due to Underlying Level ARM^2 Protection

- Firms must call Sapphire Trading Operations to manually reset ARM[2] protection. Then, an Order protection reset is required to start sending orders in the effected underlying again.
- Orders sent for the effected underlying before resetting will be rejected.
- Order protection reset sent for the effected underlying before manual ARM[2] reset will be rejected.
- Immediate orders can be sent without resetting.

- Order protection due to Exchange initiated manual Standard/Hybrid Mass Cancel
  - All orders are cancelled.
  - Order protection reset is required to start sending orders again.
  - All orders sent before resetting will be rejected.
- Order protection due to System initiated Standard/Hybrid Mass Cancel when all lines of the Firm disconnect
  - All orders are cancelled.
  - Order protection reset is required to start sending orders again.
  - All orders sent before resetting will be rejected.
- Order protection due to Firm initiated Standard/Hybrid Mass Liquidity Cancel
  - All resting orders are cancelled.
  - Order protection reset is required to start sending day orders again.
  - Day orders sent before resetting will be rejected.
  - Immediate orders sent before resetting will be accepted or rejected based on the type of Standard/Hybrid Mass Cancel requested by user.
- Selective Liquidity Auto Purge (SLAP) Reset
  - Will reset specified MPID and Underlying pair with SLAP codes (bit is set) to allow acceptance of incoming liquidities containing these MPID and Underlying pair with SLAP codes.
  - When bit is not set for a particular SLAP code, this SLAP code will retain its prior state (reset or purged).
  - SLAP reset is not needed and will be rejected when Standard/Hybrid mass-cancel is in effect.
  - SLAP reset on SLAP code that is already reset (and not in purged state) is no-op.
- Halts do not trigger Mass Cancels. Hence halts will not require liquidity protection reset.

4.1.8 Liquidity Protection Reset Response

This message format is used to inform the firms of the status of their Order Protection Reset Request.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"PR"
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Member

Field Name	Length	Data Type	Notes
Status	1	Alphanumeric	" " = Order Protection reset successful "B" = SLAP codes are not provided in the request "D" = SLAP reset while Standard/Hybrid mass-cancel is in effect "U" = Invalid Underlying "C" = Cannot reset while not in LOW "A" = ARM^2 Underlying level protection is in effect "M" = Unknown MPID "F" = ARM^2 Firm level protection is in effect "S" = Invalid Scope "X" = SLAP feature disabled "Z" = Undefined error "*" – Downgraded from older version

Points to note:

- This is not a sequenced message.
- An order protection reject due to ARM^2 reject reasons requires a manual reset by Sapphire Trading Operations.

4.1.9 Single Side Liquidity Protection Reset Request

Request to reset Single Side Liquidity Protection for the specific Option or Complex Strategy.

Message Direction: Firm to Sapphire

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SS"
Client Message ID	4	BinaryU	Unique message ID assigned by the firm
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Security ID Scope	1	Alphanumeric	Defines type of security specified in "Security ID" field. Valid values are: "P" = Security ID specifies Sapphire Option Product ID "S" = Security ID specifies Sapphire Complex Strategy ID
Security ID	4	BinaryU	Sapphire Option Product ID if Security ID Scope = "P". Sapphire Complex Strategy ID if Security ID Scope = "S". If set to zero, will apply reset for both sides of every option or every strategy for the MPID

Field Name	Length	Data Type	Notes
Side	1	Alphanumeric	The side of Security ID to reset Valid values are: When Security ID not zero: “B” = Bid (Buy) “S” = Ask (Sell) When Security ID is zero: ”N” = Not Applicable
Reserved	4	Alphanumeric	Reserved for future use

Points to note:

- The Single Side Liquidity Protection Reset will enable sending of Binary Day and IOC orders for the specified Options and sides or enable sending of IOC Complex Binary Orders for the side of the Complex strategy specified in the request. However, if other protections are also in effect, those protections are required to be reset independently.

4.1.10 Single Side Liquidity Protection Reset Response

Response to Single Side Liquidity Protection Reset Request

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	“ST”
Client Message ID	4	BinaryU	Unique message ID sent by the firm in the request
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Reserved	4	Alphanumeric	Reserved for future use
Status	1	Alphanumeric	“ “ = Single Side Protection Reset Request successful “M” = Unknown MPID “A” = Invalid Security ID scope “C” = Invalid Security ID “S” = Invalid Side “E” = Single Side Protection is not enabled for the specified MPID “Z” = Undefined error “*” – Downgraded from older version

Points to note:

- This is not a sequenced message.

4.2 Notifications

4.2.1 System State Notification

This message format is used to notify the firms of the state changes of the system. This is an exchange-wide notification and not a symbol or Member based notification.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MEO Version	8	Alphanumeric	Eg:MEOX.X (where is 'X.X' is MEO version i.e.1.0 or the current version).
Session ID	1	BinaryU	Sapphire assigned ID for the current trading session
System Status	1	Alphanumeric	Current system status: "S" = Start of System hours "C" = End of System hours "P" = LOW (Ready to accept Orders) "L" = Not in LOW(Not Ready to accept application messages including Orders) "M" = MPID Product assignment window open. "E" = MPID Product assignment window closed. "1" = Start of Test Session (sent before tests). "2" = End of Test Session.

* The specific times for each of these system statuses are on the MIAX website

Points to note:

- This is a sequenced message.
- From time to time, Sapphire will conduct off-hours testing. Such tests will be preceded by a System State Message indicating the start of test and close with a System State Message indicating the end of the test. Firms must ensure that messages sent on this feed from the beginning of "start of test session" to the end of "end of test session" will not affect their production systems.
- Sapphire will disconnect the connection through which the firm sends an application message before Sapphire disseminates this message with system status of "P".
- A System Status of "L" is published at end of cancel acceptance window and also in certain circumstances when the Exchange has to stop order acceptance midday.

4.2.2 Underlying Trading Status Notification

This message format will be used to notify the firms of changes to the trading status of all the options of an underlying.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"UN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
Underlying Symbol	11	Alphanumeric	Underlying Symbol
Trading Status	1	Alphanumeric	"H" = Sapphire has halted trading for this Underlying Symbol "R" = Sapphire will resume trading (reopen) for this Underlying Symbol "O" = Sapphire will open trading for this Underlying Symbol
Event Reason	1	Alphanumeric	"A" = This event resulted from automatic/market driven event "M" = Sapphire manually initiated this event
Expected Event Time	8	NanoTime	Expected time of start of the event as specified below: When underlying trading status="H", this will be 0 (zero). When underlying trading status = "R" or "O", this will be the time at which the opening/reopening process will start for this Underlying Symbol

Points to note:

- This is a sequenced message.
- Halts do not trigger Mass Cancels.

4.2.3 Opening Width Relief Notification

This message format will be used to notify the firms if and when Sapphire grants relief from valid opening width parameters for Opening as specified by regulatory circulars of Sapphire.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"QN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
Underlying Symbol	11	Alphanumeric	If filled with valid underlying, relief applies to all options symbols of this underlying. **If filled with spaces, relief is an exchange-wide relief**
Relief Multiplier	4	BinaryPrc4U	Relief is the multiplier times the regular acceptable Exchange Opening width (Opening BBO width). e.g.: For a series with BBO width of $X, a relief multiplier of 2 implies that the acceptable BBO width is 2*$X.

Points to note:

- This is a sequenced message.
- This relief is only applicable for the current trading session.
- Permitted BBO width is defined as the wider of applicable BBO width and underlying quote width (applicable to in-the-money Options only).
  Applicable BBO width = exchange-wide relief * underlying relief * Long Term Option relief (if applicable) * valid BBO width.
  Refer to Sapphire rules as to the details and exceptions to this rule.
- For a Relief multiplier setting of 1.50 in Sapphire, MEO will send out the value 15000 in the Relief multiplier field as required by the BinaryPrc4U data format.

4.2.4 ARM Protection Settings Notification

This message format will be used to notify firms of their ARM settings. All the latest ARM settings will be carried over to the next trading session and will be published upon system initialization and each subsequent change will also be published.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"AN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member. MPID will be spaces for Sapphire global default settings.
Underlying Symbol	11	Alphanumeric	Underlying symbol for which this ARM protection is applicable If this is filled with spaces and MPID is filled with valid MPID, this ARM protection setting acts as the global default setting for this MPID. If this is filled with spaces and MPID is filled with spaces, this ARM protection setting acts as the Sapphire global default settings. Note that the underlying ARM setting will override the global setting.
Allowable Engagement Percentage	4	BinaryU	Percentage of order size at which Sapphire must trigger ARM protection for this MPID and underlying. Please refer to the rules for details of ARM.
Counting Period	2	BinaryU	Duration (in number of milliseconds) for which trades are considered for Engagement percentage calculation in order to determine if the MPID should be put on ARM protection for this underlying.

Field Name	Length	Data Type	Notes
Action	1	Alphanumeric	Valid values: 'S' – Set (added or updated) ARM settings 'D' – Deleted ARM settings
Source	1	Alphanumeric	Valid values: 'T' – Changes carried out by the Firm (via MEO) 'E' – Changes carried out by the Exchange (Global default changes or firm requested settings applied manually)

Points to note:

- This is a sequenced message.
- ARM settings will be carried over to the next trading session and will be published upon system initialization and each subsequent change will also be published.

4.2.5 ARM² Underlying Level Protection Settings Notification

This message format will be used to notify firms of their ARM² Underlying Level protection settings. All the latest ARM² Underlyings settings will be carried over to the next trading session and will be published upon system initialization and each subsequent change will also be published.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"A2"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Action	1	Alphanumeric	Valid values: 'S' – Set (add or update) ARM² settings 'D' – Delete ARM settings
Underlying Symbol	11	Alphanumeric	Underlying symbol for which this ARM² protection is applicable
ARM Threshold Count	4	BinaryU	Number of ARM triggers for the Counting Period for the specified underlying that will trigger ARM² Underlying Level protection.
Counting Period	4	BinaryU	Counting Period in milliseconds in which the number of unique ARM triggers cannot exceed the configured ARM Threshold Count specified for ARM² protection.
Reserved	16	Alphanumeric	Reserved for future use

Points to note:

- This is a sequenced message.

4.2.6 Liquidity Protection Trigger Notification

This message format will be used to notify firms when order protection is triggered for an MPID. Order protection can be triggered due to any one of the reasons listed in the message below.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"QP"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Underlying Symbol	11	Alphanumeric	Underlying for which this MPID is placed in Order protection
Trigger Reason	1	Alphanumeric	"L" = Line disconnect triggered protection "B" = Sapphire Help-desk triggered protection "U" = Firm initiated Standard/Hybrid Mass Cancel "R" = ARM triggered protection Protection Trigger "F" = ARM2 Firm level protection initiated Hybrid Mass Cancel "J" = Undefined reason "*" – Downgraded from older version

Points to note:

- This is not a sequenced message.
- Please refer to order Protection Reset Request for details about requirements for resetting order protection.
- All orders for the MPID and Underlying will be canceled when this message is sent.
- Resetting triggered order protection will automatically reset all SLAP codes (if any)

4.2.7 SLAP Protection Trigger Notification

This message format will be used to notify firms when SLAP protection is triggered for an MPID and Underlying.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SL"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Underlying Symbol	11	Alphanumeric	Underlying for which this MPID requested SLAP protection

Field Name	Length	Data Type	Notes
Requested SLAP Codes	1	BinaryU	Provides a list of SLAP codes that were requested to be purged as specified in Liquidity Mass Cancel request: • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.
Triggered SLAP Codes	1	BinaryU	Provides a list of all SLAP codes that are currently purged and not reset • Bit 0 – SLAP Code 1 • Bit 1 – SLAP Code 2 • Bit 2 – SLAP Code 3 • Bit 3 – SLAP Code 4 • Bit 4 – SLAP Code 5 • Bit 5 – SLAP Code 6 • Bit 6 – SLAP Code 7 • Bit 7 – SLAP Code 8 Note: Bit 0 is LSB or Least Significant Bit.
Reserved	10	Alphanumeric	Reserved for future use

Points to note:

- This is not a sequenced message.
- Please refer to Liquidity Protection Reset Request for details about requirements for resetting SLAP order protection.
- All orders that are part of the specified SLAP groups (bit is set) for MPID and Underlying are canceled.
- Triggered SLAP Codes list is a combined list of all SLAP purge requests that are not reset. For Example:
  - SLAP Liquidity Mass Cancel request #1 specifies SLAP Code 1 to be purged
  - SLAP Protection Trigger Notification #1 contains SLAP Code 1 in both Requested and Triggered SLAP codes
  - SLAP Liquidity Mass Cancel request #2 specifies SLAP Code 2 to be purged
  - SLAP Protection Trigger Notification #2 contains SLAP Code 2 as Requested SLAP code, but Triggered SLAP codes contain both Code 1 and Code 2

4.2.8 Single Side Liquidity Protection Trigger Notification

This message format will be used to notify firms when a Single Side Liquidity Protection is triggered for an Option or Strategy.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"QX"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Security ID Scope	1	Alphanumeric	Defines type of security specified in "Security ID" field. Valid values are: "P" = Security ID specifies Sapphire Option Product ID "S" = Security ID specifies Sapphire Complex Strategy ID
Security ID	4	BinaryU	Sapphire Option Product ID if Security ID Scope = "P". Sapphire Complex Strategy ID if Security ID Scope = "S".
Side	1	Alphanumeric	Side for which Single Side Liquidity Protection was triggered. Valid values are: "B" = Bid "S" = Ask
Triggering Client Message ID	4	BinaryU	Client Message ID supplied by the firm in the Bulk order message that triggered the Single Side Liquidity Protection
Triggering Bulk Order Index	1	BinaryU	Bulk Order Index assigned by Sapphire to each Order in Bulk Liquidity (order position in the Bulk liquidity) that triggered Single Side Liquidity Protection
Reserved	4	Alphanumeric	Reserved for future use

Points to note:

- This is a sequenced message.

4.2.9 ARM² Underlying Level Protection Notification

This message format will be used to notify firms about ARM² Underlying Level protection events.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"UP"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Underlying Symbol	11	Alphanumeric	Underlying for which this MPID is placed in ARM² underlying level protection.

Field Name	Length	Data Type	Notes
Notification Type	1	Alphanumeric	"T" - ARM^2 Underlying Level protection Triggered "R" - ARM^2 Underlying Level protection Reset "*" – Downgraded from older version
ARM Threshold Count	4	BinaryU	Number of ARM triggers for the Counting Period for the specified underlying that will trigger ARM2 Underlying Level protection.
Counting Period	4	BinaryU	Counting Period in milliseconds in which the number of unique ARM triggers cannot exceed the configured ARM Threshold Count specified for ARM2 protection.
Reserved	16	Alphanumeric	Reserved for future use

Points to note:

- This is a sequenced message.

4.2.10 ARM^2 Firm Level Protection Notification

This message format will be used to notify firms about ARM^2 Firm Level protection events.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"FP"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
ARM Threshold Count	4	Binary4U	Number of unique ARM triggers for the Counting Period that will trigger ARM^2 Firm Level protection.
Counting Period	4	Binary4U	Counting Period in milliseconds in which the number of unique ARM triggers cannot exceed the configured ARM Threshold Count specified for ARM^2 protection.
Notification Type	1	Alphanumeric	"T" - ARM^2 Firm Level protection Triggered "R" - ARM^2 Firm Level protection Reset "*" – Downgraded from older version
Reserved	16	Alphanumeric	Reserved for future use

Points to note:

- This is a sequenced message.

4.2.11 Cancel Notification

This is the message format that will be used to notify firms about Simple or Complex order cancels.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Unsequenced Pkts; Refer to SesM Protocol Specification.* ***Configurable*** *to be Sequenced.*
Message Type	2	Alphanumeric	"XN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Security ID Scope	1	Alphanumeric	"O" – Simple Binary Order (AR or Standard) "X" – Complex Binary Order
Security ID	4	BinaryU	Sapphire Product ID for **Security ID Scope** "O", and Sapphire Strategy ID for **Security ID Scope** "X".
Client Message ID	4	BinaryU	Client Message ID supplied by the firm in Bulk order message or Complex Binary Order
Client Order ID	4	BinaryU	Client order ID in Simple Binary Order. Set to zero for Complex Binary order.
Bulk Order Index	1	BinaryU	Bulk Liquidity Index assigned by Sapphire to each Order in bulk Liquidity (order position in the bulk liquidity). Set to zero for Complex binary order.
Side	1	Alphanumeric	This is the side of the liquidity that is being canceled "B" = Buy "S" = Sell
Size	4	BinaryU	For Order Cancels, this is the size that was canceled
Engine Sequence number	8	BinaryU	Sapphire Engine sequence number of this cancel
Cancel Reason	1	Alphanumeric	"B" = Sapphire Help-desk initiated cancel (individual order cancel) "G" = Auto Replace order canceled due to reject of the replacement request. "K" = Complex Strategy leg has wide MBBO. Only applicable to Complex Binary Orders "A" = Price Protection canceled "C" = Cancel of resting order crossed by opposite side order of same MPID or Firm. "D" = LULD canceled "E" = Strategy is not open for trading. Only applicable to IOC Complex Binary Order. "J" = Standard Order is canceled as a result of cancel replace request. "S" = Cancel for unexecuted part of order "Q" = Canceled due to Single Side Liquidity Protection trigger "I" = Standard Order canceled due to replace request while blocked by SLAP protection "Z" = Undefined reason "*" – Downgraded from older version
Reserved	8	Alphanumeric	Reserved for future use

Points to note:

- By default, this is not a sequenced message. Firms can request this to be configured to be a sequenced message. Please note that all cancels for the day will be held in log file and played back during rewinds if this message is configured as a sequenced message.
- When an active series is made inactive, the firms will be informed using Series Update (See section 3.1 Series Update) message format.
- When an MPID is deleted and the system has orders for that MPID, Firms will be contacted by MIAX Trading Operations personnel and subsequently, manually cancel such orders.
- Firms can request one of the following configurations for cancel notifications:
  - Send Limited, Send Limited Originator Port, or Send None
  - Cancel notifications to expect in each of these settings:

	Send None	Send Limited or Limited Originator Port[3]
Firm replaces Standard Order	Not sent	Not sent[1]
Firm cancels Standard Order	Not sent	Not sent
System[4] initiated individual order cancel – Standard Order	Not sent	Sent
Firm replaces A-R Order	Not sent	Not sent
Firm cancels A-R Order	Not sent	Not sent
System[4] initiated individual order cancel – A-R Order	Not sent	Sent
System initiated individual Complex order cancel	Not sent	Sent
Standard/Hybrid Mass cancel (system[4] initiated or Firm initiated)	Not sent	Not sent[2]
SLAP Protection	Not sent	Not sent[5]
Single Side Liquidity Protection triggered cancels	Not sent	Sent

[1] Cancel notification sent if replaces causes existing order to cancel and no replacement order remains.
[2] Liquidity Protection Notification gets sent. Refer to that message section. It is one per underlying per MPID and indicates that all order for all series of the underlying are canceled.
[3] "Limited Originator Port" configuration has the same behavior as "Limited" but only sends cancel notification when this port originated last successful order request.
[4] System initiated cancels include order cancelations by MIAX Trading Operations Help Desk personnel
[5] SLAP Protection Notification gets sent. Refer to the relevant message section. This Notification is sent once per Underlying / MPID pair for which SLAP codes are purged.

4.2.12 Execution Notification

This message format will be used to notify the firms of executions of their orders.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"EN"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Member
Liquidity Type	1	Alphanumeric	"O" – Simple Binary order (AR or Standard) "X" – Complex Binary Order
Product ID	4	BinaryU	Sapphire Product ID mapped to a given option. It is assigned per trading session and is valid for that session.
Client Message ID	4	BinaryU	Client Message ID supplied by the firm in bulk order message
Client Order ID	4	BinaryU	Client order ID. 0 for Complex binary order.
Bulk Order Index	1	BinaryU	Bulk Liquidity Index assigned by Sapphire to each Order in bulk Liquidity (order position in the bulk liquidity). 0 for Complex binary order
Trade ID	4	BinaryU	Sapphire Trade ID
Execution ID	8	BinaryU	Sapphire execution ID
Trade Status	1	Alphanumeric	"E" – New Execution
Last Price	4	BinaryPrc4U	Price of this execution
Side	1	Alphanumeric	"B" = Bought "S" = Sold
Last Size	4	BinaryU	Number of contracts executed (not cumulative)
Liquidity Indicator	1	Alphanumeric	Order Traded as specified in this billing field: "M" = Maker "T" = Taker " " (space) = N/A (Not applicable; e.g.: Opening) '*' (asterisk) = downgraded for older version
*** Reserved ***	15	BinaryU	* Reserved for future use *

Points to note:

- This is a sequenced message.
- A two-sided clearing trade is assigned a Trade ID. Each side of that trade is assigned a unique Execution ID. Therefore, Execution ID uniquely identifies each execution. Execution ID is also unique per leg in case of executions of Liquidity Type "X" Therefore, Execution ID uniquely identifies each execution per side.

- Executions with Liquidity Type “X” are part of the complex strategy transaction in which Client Message ID identifies complex binary order submitted by the firm for the specific Strategy ID.
- Executions with Liquidity Type “X” are delivered one per leg for each complex trade. Only Option leg execution of a complex trade is delivered with this message. See the 4.2.14 Stock Leg Execution Notification for Execution Notification (Stock Leg Only) for stock leg of a complex trade.

4.2.13 Complex Strategy Definition Notification

This is the message format that will be used to disseminate stock option strategies traded on Sapphire for the current session. The Strategy ID sent in this message is utilized by the Sapphire Liquidity Feed (SLF) for Complex Order dissemination, the Complex Top of Market Feed (cToM) for Complex Trade and Top of Market dissemination and the Sapphire Express Orders (MEO) for Complex Binary Order.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"SC"
Notification Time	8	NanoTime	Time at which this Strategy is added/updated on Sapphire system today.
Strategy ID	4	BinaryU	Sapphire Strategy ID is assigned per trading day and is valid only for that day.
Underlying Symbol	11	Alphanumeric	Underlying Symbol for this strategy
Active on Sapphire	1	Alphanumeric	Indicates if this strategy is tradable on Sapphire in the current session: "A" = Active (tradable) on Sapphire "I" = Inactive (not tradable) on Sapphire
Reserved	*1*	*BinaryU*	*** Reserved for future use ***
Update Reason	1	Alphanumeric	"N" – New strategy created "U" – Strategy definition updated "*" – Downgraded for older version
Reserved	*10*	*BinaryU*	*** Reserved for future use ***
Number of Legs	1	BinaryU	Number of Legs. Valid values: 2 – 12 (for Options only) 2 – 13 (for Stock-tied)
2 to 13 legs consisting of the following fields:			
➡ **Product ID**	4	BinaryU	*Option leg:* Sapphire Defined Series. See Simple Series Update Message. *Stock leg:* 0 (zero)
➡ **Leg Ratio Qty**	4	BinaryU	The ratio of this individual leg. Number of option contracts or Number of stock shares for this leg is: LegRatioQty * Size
➡ **Leg Side**	1	Alphanumeric	The side of this individual leg Valid values are: "B" = Bid "A" = Ask
➡ **Reserved**	8	BinaryU	** Reserved for future use **

Points to note:

- This is a sequenced message.
- Given that this notification message is sequentially distributed to all ports via TCP, Firms that are sensitive to the timely delivery of this message are advised to get it from a MIAX data feed such as TOM, cTOM, etc.
- Strategies may be created intra-day as orders are placed at the Sapphire Exchange or pre-defined before the market open.
- The length of this message is ***variable*** based on the number of legs.
- When underlying halts, all strategies for that underlying are in a halted state. Firms should process Underlying Trading Status notification to determine current state of the strategies.
- This message might be published more than once per day. When Update Reason is "U", the only field that can change is "Active on Sapphire".
- The tradability of a strategy can be tracked with the status of the underlying (message type "H") or the individual series. (message type "P")
- The Strategy ID and Product ID fields are separate and distinct fields with assigned ID's per trading day and valid only for the current day. Their scope is limited to each field.

4.2.14 Stock Leg Execution Notification

This message format will be used to notify the firm of a stock leg execution from a stock-tied complex binary order.

Message Direction: Sapphire to Firm

Field Name	Length	Data Type	Notes
SesM Protocol Data			*Sequenced Pkt; Refer to SesM Protocol Specification*
Message Type	2	Alphanumeric	"CS"
Notification Time	8	NanoTime	Time at which this was generated by Sapphire system.
MPID	4	Alphanumeric	Sapphire assigned ID of the Market Maker
Underlying Symbol	11	Alphanumeric	Underlying Symbol for this strategy. Format: OCC Options Underlying Symbol (default) or Stock Ticker Symbol (configurable)
Liquidity Type	1	Alphanumeric	"X" – Complex Binary Order
Client Message ID	4	BinaryU	Client Message ID supplied by the firm
Trade ID	4	BinaryU	Sapphire Trade ID
Execution ID	8	BinaryU	Sapphire execution ID
Trade Status	1	Alphanumeric	"E" – New Execution
Last Price	4	BinaryPrc4U	Price of this execution
Side	1	Alphanumeric	"B" = Bought "S" = Sold
Stock Sell Short Indicator	1	Alphanumeric	"N" = Not Short "Y" = Short "E" = Short Exempt " " (space) = N/A (Not applicable)
Last Size	4	BinaryU	Number of shares traded (not cumulative)

Field Name	Length	Data Type	Notes
**** Reserved ****	16	BinaryU	** Reserved for future use **

Points to note:

- This is a sequenced message.
- A two-sided clearing trade is assigned a Trade ID. Each side of that trade is assigned a unique Execution ID. Execution ID is also unique per leg. Therefore, Execution ID uniquely identifies each execution per side.
- Stock leg execution notifications are part of a stock-tied complex strategy execution.

Appendix A: Contact List

Please visit the MIAX website to obtain the most up-to-date contact list and other such information.

Appendix B: Multiport MEO Setup

Port grouping concept and cancel on disconnect scoping

Please consider the following examples to help illustrate the port grouping concept and cancel on disconnect scoping (explained in the Hot Topics section above) as it relates to port grouping.

Example 1: Firm requiring a setup to separate out their orders, Mass- Cancel or Notifications to separate port

Full Service Ports **Limited Service Port**

For this example, the group 2 is set up to not cancel on disconnect. But, the group 1 is set up to cancel on disconnect. Assuming that the firm is connected on all ports,

Scenario 1: MEO Port 1 disconnects, no cancels.
Scenario 2: MEO port 1 and port 2 disconnect, cancel on disconnect is engaged
Scenario 3: MEO port 3 disconnects, no cancels
Scenario 4: MEO port 1 and port 3 disconnect, no cancels

Example 2: Firm requiring a setup to divide the ports on a cloud to separate computer/bins or traders

Full Service Port **Limited Service Port** **Full service Port** **Limited Service Port**

Group1 MPIDs: MPID1, MPID2, MPID3 **Group2 MPIDs: MPID3, MPID4, MPID5**

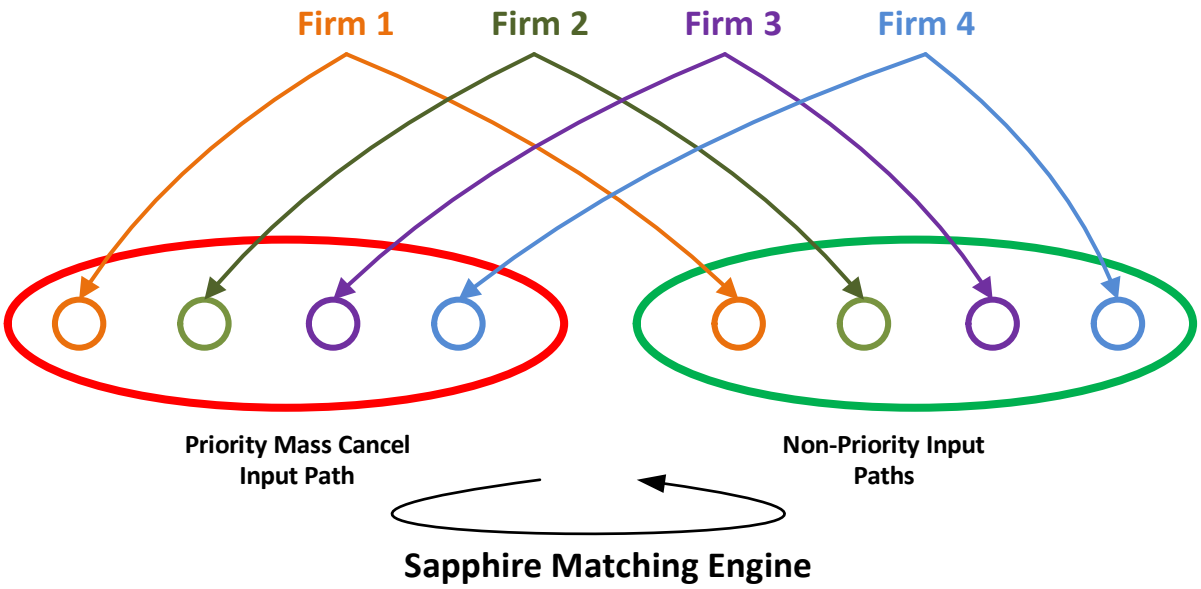
For this example, both groups are set up to cancel on disconnect. MPID3 is shared on both groups. Port 1 and 3 are full service ports. Port 2 and 4 are limited service ports. Please note that in this setup, MPIDs 1, 2, 4 and 5 will not benefit from redundancy. Firms are encouraged to consider such disadvantages with the setup they are requesting.

Assuming that the firm is connected on all ports,

Scenario 1: MEO Port 1 disconnects, no cancels.
Scenario 2: MEO port 1 and port 2 disconnect, cancel on disconnect is engaged for MPID1, MPID2, MPID3. But no cancels is done for MPID4 and MPID5.
Scenario 3: MEO port 3 disconnects, no cancels
Scenario 4: MEO port 1 and port 3 disconnect, no cancels

Appendix C: Priority Mass Cancel Ports

Illustration of Priority Mass Cancel Input Processing:



The Priority Mass Cancel Ports provide an expedited processing path to the Matching Engine over that of other inbound paths on a best effort basis. Under routine circumstances, the Matching Engine will check if there is a pending Mass Cancel request in the priority path waiting to be processed before checking any other inbound paths for pending requests. Exceptions to this approach exist with regard to various flow control and rate limiters that are incorporated into the mechanism.

Example of the Processing under routine circumstances:

1) Process a single Mass Cancel request for each firm from the Priority Mass Cancel input path
2) Process a single request from the Non-Priority Input Path
3) Continue to alternate between processing one message from each firm port in the Priority Mass Cancel Input Path and a single message from a single firm port in the Non-Priority Input Path.

Receipt of Exchange defined excessive number of Mass cancels on the Priority Mass Cancel Ports will result in a forced disconnect followed by a brief pause in the ability to reconnect. Please contact Trading Operations for the current settings for excessive Mass Cancels.

Appendix D: Revision History

Revision Date	Version	Description
Jul 25th, 2023	1.0	First release.
Aug 24th, 2023	1.1	Update Simple Bulk Liquidity Message Response to include Engine Transaction Time
Dec 20th, 2023	1.1a	Updated Response Code J in Message QP
Jan 17th, 2024	1.1b	Removed Full Service Port Single (FSP_S)
Feb 2nd, 2024	1.1c	Update field names and description in Message Type EN
Apr 8th, 2024	1.1d	Updated Client Message ID required to be unique in Simple Bulk Liquidity Message
Aug 13th, 2024	1.1e	Adjusted the max number of LSPs per Matching Engine environment
Jan 15th, 2026	1.2	Addition of SLAP functionality: • SLAP described in Hot Topics section • New field "SLAP Codes" in most Simple Bulk Liquidity Message formats • New SLAP-specific error codes in Simple Bulk Liquidity Message Response • New "SLAP Codes" field and Mass Cancel Scope value in Liquidity Mass Cancel Request • New SLAP-specific Status codes in Liquidity Mass Cancel Response • New version of Liquidity Protection Reset request • New SLAP-specific Status codes in Liquidity Protection Reset Response • New Point to Note within Liquidity Protection Trigger Notification • New SLAP Protection Trigger Notification • New SLAP-specific Cancel Reason values and Points to Note for Cancel Notification

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