**MIAX Pearl Options Exchange**

# MIAX Express Orders
# Binary Orders for Trading Options

# MEO Interface Specification

**Revision Date: 01/16/2026**
**Version: 2.2b**

# Table of Contents

# 1. Overview

MIAX Express Orders (**MEO**) interface is a messaging interface that MIAX Pearl (referred to as Pearl for the rest of the document) members use to submit binary orders for trading on the Pearl 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.
- Pearl allows Market Makers to self-assign symbols to provide liquidity.
- Pearl provides some of the industry's best risk protection mechanisms such as:
  - o Protections available to all Members:
    - Aggregate Risk Management (ARM) Protection
    - Cancel on Disconnect
    - Single Side Liquidity Protection
    - Priority Mass Cancel ports for prioritized Mass Cancels of resting liquidities
  - o Market Maker Protections:
    - Pearl ARM$^2$ Protection
  - o Electronic Exchange Member (EEM/OFP) Protections:
    - The Pearl Order size and open order protection mechanism
    - The Pearl Risk Protection Monitor (RPM)
- MEO notifications provide current **electronic system status** allowing the firms to take necessary actions immediately.

This specification is intended for the use for Pearl Members only.

## 1.1 Exchange Related Information

### 1.1.1 Hours of Operation for Pearl Options Exchange

Please visit 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**<br>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)**<br>Start of acceptance of messages (including Orders). Orders received at or after this time will be accepted by Pearl. |
| 9:30 am | **Opening Process**<br>Start of Pearl Opening process. |
| 9:30 am to 4:00 pm | **Trading Session for Equity Options** (ends at 1:00 pm on early closing days)<br>Pearl stops accepting orders in these classes at the end of this trading session. Pearl 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)<br>Pearl stops accepting orders in these classes at the end of this trading session. Pearl may send trade related data following the end of the trading session for various operational reasons as needed. |
| 4:25 pm | **End of LOW**<br>Stop accepting messages. |
| 5 pm (approx) | **End of Session** (ends at 2 pm on early closing days)<br>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 at TradingOperations@miaxglobal.com or by visiting MIAX website

## 1.2 MEO Architecture



**Pearl Matching Engines**
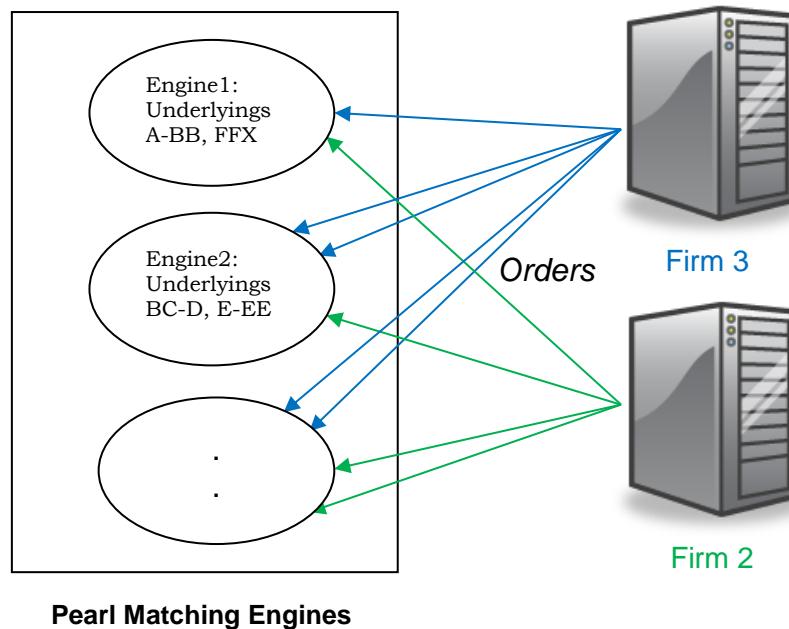
Highlights:

- Pearl 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 the Firms are ready with their application, they must certify their application with Pearl. 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 Pearl 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 and/or send bulk binary orders via the MEO interface.

- *Bulk 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).

*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 binary bulk order entry.
  - **Full Service Port Single (FSP$_S$) -** Supports all MEO input message types and binary order entry on a single order by order basis (no bulk orders).
  - **Limited Service Port (LSP) -** Supports all MEO input message types, but does not support 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 Pearl 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*: Pearl has several value-adding data feeds. Details of the feeds and their content can be obtained by visiting MIAX website or emailing Trading Operations at TradingOperations@miaxglobal.com

*Symbol management*: Firms will get the list of all option symbols that will be traded via MEO at the start of every session. The Pearl 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. Self-trade prevention is also available to Electronic Exchange Members (EEMs) at an MPID level. EEMs can opt-in to receive this protection by using Self-Trade Protection Designation Request.
- Order management: Pearl manages orders to opposite side ABBO in order to prevent locking or crossing the ABBO. Pearl also provides management of Post-Only orders to opposite side Pearl BBO (PBBO). Please refer to the Pearl rules for further details on order management.

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

*Pearl Protections Availability:*

- Protections that are available to all Members:
  - Pearl ARM Risk Protection – Available to Market Makers, and EEMs that elect it.
  - Cancel on Disconnect - Upon MEO disconnect, the Pearl Engine cancels all orders from the system as required by firm configuration.
  - Single Side Liquidity Protection – Optional single Option symbol and side protection for an MPID.
- Market Maker Protections:
  - Pearl ARM$^2$ – This mechanism provides Market Makers additional protections on top of the ARM functionality.
  - Self-trade protection at the firm level.
- Electronic Exchange Member (EEM/OFP) Protections:
  - Pearl Order protections – This mechanism provides additional protections such as (but not limited to) size safety checks, maximum open orders and contracts check
  - Pearl Risk Protection Monitor – This mechanism provides additional protections such as (but not limited to) order rate and execution rate check.
  - Maximum Put Price Protection – This mechanism provides price protection for Put orders.
  - Optional self-trade protection at an MPID level.

*ARM Risk protection*: Firms can set up their ARM settings at Pearl and Pearl 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 orders, are counted towards ARM protection. Executions of FIX 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. Pearl 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*: Available to Market Makers only, 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 an optional protection mechanism for a single side of an Option. Market Makers and EEMs can enable Single Side Liquidity Protection per MPID by contacting MIAX Trading Operations. If protection is enabled, the Pearl Options Exchange will provide the following protections for the MPID:

- 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.

*Pearl Risk Protection Monitor*: The Pearl Risk Protection Monitor (RPM) provides additional protections such as (but not limited to) binary order rate and execution rate check. When a binary order is received or an execution from a binary order occurs, RPM will look back over the specified time frame and calculate the number of orders or executed contracts for the firm. When the number of orders or executed contracts from orders for the firm exceeds a predetermined level, RPM will automatically, on a best efforts basis, trigger RPM safeguards for the firm on that interface. **RPM for FIX orders is separate from RPM for binary orders.**

*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 SLAP purge event
    - SLAP reset is not required following any Standard/Hybrid Mass-Cancel event (all codes are reset automatically after a 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 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 Pearl to enable or disable some or all the notifications on each port.

Execution Notifications, Cancel Notifications, Order Notifications and Done for Day 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, Order Notifications and Done for Day Notifications 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. **All** - Always receive the notification
2. **All Originator Port** – Always receive the notification when this port originated the last successful request for the order
3. **Limited** - Always receive the notification. Standard/Hybrid Mass Cancel and SLAP events are excluded (See Notes section for limited cancel notifications)
4. **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)
5. **Never** – Never receive the notification on this port

Notes:
- Pearl requires that each notification, with the exception of the cancel notification and order notification, be received on at least 1 port per cloud.
- Firms can choose to disable cancel notifications or enable limited cancel notifications or all cancel notification 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 and ARM protection or ARM[2] initiated Hybid 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 request or system initiated cancel 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 bulk binary order entry.
- **Full Service Port Single (FSP$_S$)** – Supports all MEO input message types and binary order entry on a single order by order basis.
- **Limited Service Port (LSP)** – Supports all MEO input message types, but has the following limitations:
  o LSP's do not support bulk order entry.
  o LSP's support the use of IOC or ISO orders only.
- **Priority Mass Cancel Port -** Supports only Standard/Hybrid Mass Cancel and SLAP requests.

All MEO output message types are supported on all of these port types (FSP$_B$, FSP$_S$ and LSP).
Limited Service Ports (LSP) are restricted to 12 LSPs per Matching Engine environment.

*Port groups*: Firms can chose to have Pearl 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 chose 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.

*Order Protection*: Pearl supports the following configurable protections for EEM orders sent via MEO:
- Maximum order size
- Maximum number of open orders
- Maximum number of open contracts

_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$^2$ is available to Market Makers only. 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 <u>MIAX website</u>) 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 Pearl for the current session on the cloud associated for this connection.

**Message Direction**: Pearl 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 Pearl system today. |
| **Product ID** | 4 | BinaryU | Pearl 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. Eg: 09:30:00 |
| **Closing Time** | 8 | Alphanumeric | Expressed in HH:MM:SS format. Eg: 16:15:00 |
| **Restricted Option** | 1 | Alphanumeric | "Y" = Pearl will accept position closing orders only "N" = Pearl will accept open and close positions |
| **Long Term Option** | 1 | Alphanumeric | "Y" = Far month expiration (as defined by Pearl rules) "N" = Near month expiration (as defined by Pearl rules) |
| **Active on Pearl** | 1 | Alphanumeric | Indicates if this symbol is tradable on Pearl in the current session: "A" = Active (tradable) on Pearl "I" = Inactive (not tradable) on Pearl |
| **Pearl 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 Pearl |

| Indicator | BBO Increments | |
|---|---|---|
| | Price <= $3 | Price > $3 |
| "P" | Penny (0.01) | Penny (0.01) |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|

| | | | "N" | Penny (0.01) | Nickel (0.05) |
|---|---|---|---|---|---|
| | | | "D" | Nickel (0.05) | Dime (0.10) |

| Order Acceptance Increment Indicator | 1 | Alphanumeric | This is the Minimum Price Variation forOrder acceptance as per Pearl rules |
|---|---|---|---|

| Indicator | Order Increments | |
|---|---|---|
| | Price <= $3 | Price > $3 |
| "P" | Penny (0.01) | Penny (0.01) |
| "N" | Penny (0.01) | Nickel (0.05) |
| "D" | Nickel (0.05) | Dime (0.10) |

| Opening Underlying Market Code | 1 | Alphanumeric | Options opening will be triggered on receipt of Opening quote/trade from this Underlying market: |
|---|---|---|---|

| Market Code | Description |
|---|---|
| A | NYSE Amex |
| B | NASDAQ OMX BX |
| C | National Stock Exchange |
| D | FINRA ADF |
| E | Market Independent (Any market that opens first) |
| H | MIAX Pearl Equities |
| I | International Securities Exchange |
| J | EDGA Exchange, Inc |
| K | EDGX Exchange, Inc |
| L | LTSE |
| M | Chicago Stock Exchange |
| N | NYSE Euronext |
| P | NYSE Arca Exchange |
| Q | NASDAQ OMX (via UTP Feed) |
| T | NASDAQ OMX (via CTA Feed) |
| U | MEMX |
| V | IEX |
| W | CBOE Stock Exchange (CBSX) |
| X | NASDAQ OMX PHLX |
| Y | BATS Y-Exchange, Inc |
| Z | BATS Exchange Inc |

| Reserved | 12 | BinaryU | **Reserved for future use** |
|---|---|---|---|

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 Pearl

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Unsequenced Pkt; Refer to SesM Protocol Specification* |
| **Message Type** | 2 | Alphanumeric | "RS" |
| **Client Message ID** | 4 | BinaryU | Unique message ID assigned by the firm |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Member |
| **Action** | 1 | Alphanumeric | Valid values: <br> 'S' – Set (add or update) ARM settings <br> 'D' – Delete ARM settings |
| **Underlying Symbol** | 11 | Alphanumeric | Underlying symbol for which this ARM protection is applicable <br> **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 Pearl to trigger ARM protection for this underlying. Please refer to the rules for details of ARM. <br> 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. <br> Allowable Range: 100 to 15,000 milliseconds <br> Must be a multiple of 100 milliseconds. |
| **Market Maker Origin Multiplier** | 2 | BinaryU | Contra side Market Maker Origin Multiplier. <br> Valid range: Please refer to Regulatory Circular |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Away Market Maker Origin Multiplier | 2 | BinaryU | Contra side Away Market Maker Origin Multiplier. Valid range: Please refer to Regulatory Circular |
| Broker Dealer Origin Multiplier | 2 | BinaryU | Contra side Broker Dealer Origin Multiplier. Valid range: Please refer to Regulatory Circular |
| Firm Origin Multiplier | 2 | BinaryU | Contra side Firm Origin Multiplier. Valid range: Please refer to Regulatory Circular |
| Priority Customer Origin Multiplier | 2 | BinaryU | Contra side Priority Customer Origin Multiplier. Valid range: Please refer to Regulatory Circular |
| Non-Priority Customer Origin Multiplier | 2 | BinaryU | Contra side Non-Priority Customer Origin Multiplier. Valid range: Please refer to Regulatory Circular |
| Reserved | 16 | BinaryU | Reserved for future use |

Points to note:

- ARM is available to EEM's and Market Makers.
- As of the date of this spec release, Pearl will have an ARM setting global default applicable only to Market Makers (i.e. the ARM default does not apply to designated EEMs)
  - Allowable Engagement Percentage = 105%
  - Counting Period = 1,000 milliseconds (1 seconds)
  - Contra side Origin Multiplier = 10 (original Trade size)

**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.
- Origin Multiplier can be configured for each Trade contra-side origin type. The multiplier will be applied to each ARM eligible Trade size based on the contra-side origin type as specified in Simple ARM Settings Update Request.
  - The specified Origin Multiplier needs to be divided by 10. For example, if the Priority Customer Origin Multiplier is set to 2, the value used for calculations will be 0.2.
  - If valid range is from 0 to 100 for each contra side origin:
    - 0 - Do not use this trade (x0.0 multiplier)
    - 1 - Use 10% of the trade size (x0.1 multiplier)
    - 10 - Use full size (100%) of the trade size (x1.0 multiplier)
    - 11 - Use 110% of the trade size (x1.1 multiplier)
- 100 - Use 1000% of the trade size (x10.0 multiplier)If using older version of this message (MEO2.1 or older), the origin multipliers will be automatically set to 10. Eg: If Allowable Engagment Percentage setting is 100% and applicable contra side origin multiplier 10, 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.
  - If in the above example respective contra side origin multipliers are 5 and 8, then the calculation $((70*0.5)/100)*100 + ((3*0.8)/10)*100 = 59\%$ and will not trigger ARM

- Pearl will carry over all ARM settings across trading days. 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.
- Pearl 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 Pearl global default setting (for MM only)

  Therefore, if a firm deletes a setting, other remaining MPID settings or Pearl 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

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

**Message Direction**: Pearl 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 | Pearl 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<br>"A" = Invalid Action<br>"B" = Invalid Origin Multiplier Value<br>"C" = Enhanced ARM feature is disabled<br>"P" = Invalid Allowable Engagement Percentage<br>"D" = Invalid Counting Period<br>"M" = Unknown MPID<br>"U" = Invalid Underlying<br>"N" = No such ARM settings<br>"Z" = Undefined error<br>"*" = 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 Pearl

| 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 | Pearl 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 available to Market Makers only.
- 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 each underlying 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.
- **Pearl 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

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

**Message Direction**: Pearl 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 | Pearl 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<br>"A" = Invalid Action<br>"P" = Invalid ARM Threshold<br>"D" = Invalid Counting Period<br>"I" = Invalid for EEM MPID<br>"M" = Unknown MPID<br>"U" = Invalid Underlying<br>"N" = No such ARM$^2$ setting<br>"Z" = Undefined error<br>"*" = 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 Pearl which of their MM MPIDs is assigned or unassigned in a product.

**Message Direction**: Firm to Pearl

| 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 | Pearl assigned ID of the Market Maker |
| **Product ID** | 4 | BinaryU | Product ID mapped to a given Option assigned by the Pearl 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 Pearl 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

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

**Message Direction**: Pearl 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 | Pearl assigned ID of the Market Maker |

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

Points to note:
- This is not a sequenced message.

## 3.8 Self-Trade Protection Designation Request

Firms can use this message format to communicate to Pearl which of their EEM MPIDs are designated for self-trade protection.

**Message Direction**: Firm to Pearl

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Unsequenced Pkt; Refer to SesM Protocol Specification* |
| Message Type | 2 | Alphanumeric | "SP" |
| Client Message ID | 4 | BinaryU | Unique message ID assigned by the firm |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the EEM |
| Action | 1 | Alphanumeric | Valid values:<br>'D' – Designate MPID for self-trade protection<br>'U' – Unassign |

Points to note:
- This setting only provides MPID to MPID based protection and does not provide protection across a firm's given MPIDs.
- The setting will remain in effect for the remainder of the trading day. These settings are not persistent across days and hence Firms must send their settings requests for each trading session.
- MMs do not need to send this request. They get Firm based protection by default. Only EEMs need to opt in using this designation.

## 3.9 Self-Trade Protection Designation Response

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

**Message Direction**: Pearl to Firm

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Unsequenced Pkt; Refer to SesM Protocol Specification* |
| **Message Type** | 2 | Alphanumeric | "SR" |
| **Client Message ID** | 4 | BinaryU | Unique message ID sent by the firm in the request |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the EEM |
| **Self-Trade Protection Status** | 1 | Alphanumeric | " " = Settings applied successfully "M" = Unknown MPID "E" = Invalid for MM MPID "A" = Invalid Action "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 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 Pearl

| 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** | 57 | 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, Standard Order Cancel/Replace can be combined in a single *Bulk binary liquidity* message. If the size of a specific liquidity unit added to the bulk liquidity message is smaller than the available Liquidity Unit size as defined above, the remaining bytes will be padded and act as reserved bytes for future usage.
- 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.
- Pearl 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 Pearl disconnecting the client session on which the block was received.
- Pearl 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. EEM firms can fill in 0 (zero) or a valid send time in this field.

### 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 Pearl

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| **Liquidity Unit Type** | 1 | N | Alphanumeric | 'A' |
| **Client Order ID** | 4 | N | BinaryU | Client order ID. If an Order with this Client Order ID found for the same product, MPID and side, this Order replaces the resting Order. If not, this order is treated as new Order. For each Product and side, an MPID can have a maximum of N orders with unique client order ID that they can keep replacing. 0 results in a reject. Maximum value (N) defined in Regulatory circular. |
| **MPID** | 4 | N | Alphanumeric | Pearl assigned ID of the Member |
| **Product ID** | 4 | N | BinaryU | Product ID mapped to a given Option assigned by the Pearl for the current session |
| **Time In Force(TIF)** | 1 | N | Alphanumeric | Valid values: 'D'=DAY |
| **Order Instruction** | 1 | N | Alphanumeric | Valid values: 'R'=Regular 'P'=PostOnly |
| **Origin** | 1 | N | Alphanumeric | Specifies the order origin type. Valid values: 0 = Priority Customer 1 = Firm 2 = Broker/Dealer 4 = Market Maker (Pearl MM) 5 = Non-Member Market Maker (Away MM) 8 = Non-Priority Customer |
| **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. |

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| | | | | Negative value indicates MEO to use Exchange default value. |
| Price | 4 | Y | BinaryPrc4U | 0 for market orders. Max Price is defined in Regulatory Circulars. Market orders are not allowed for Origin 4(MM) and 5(Away MM). |
| Size | 4 | Y | BinaryU | Number of contracts. Max size: 999999 |
| Side | 1 | N | Alphanumeric | B=Buy, S=Sell |
| Open/Close | 1 | Y | Alphanumeric | Valid values: 'O'=Open, 'C'=Close, 'N'=N/A(For MMs Origin 4 or 5), Any other Value = Ignored for MMs with Origin 4 or 5, rejected for other origins) |
| Covered/Uncovered | 1 | Y | Alphanumeric | Valid values: 'C'=Covered, 'U'=Uncovered, 'N'=N/A(For MMs), Any other Value=N/A (ignored) |
| Clearing Account | 5 | N | Alphanumeric | OCC Sub account (Multi account) for non-MM (origin not equal to 4) orders. Must be filled for Away MM (origin equal to 5). Must be filled with MM MPID for EEMs sending MM orders in which case MPID field above becomes Executing MPID. OCC sub account is ignored for orders delivered by MIAX MMs. |
| CMTA | 4 | N | BinaryU | Maximum value 99999. 0 = CMTA not specified. |
| Account | 10 | N | Alphanumeric | Customer ID defined by the firms. This will be passed through for clearing. Ignored when replacing an existing order. |
| Additional Text | 8 | N | Alphanumeric* | Additional text that can hold billing, clearing or pertinent information that firms need. This will be passed through for clearing. The field can be populated in the following ways: <br>• Can contain characters or numbers. Left justified and space-padded on to the right. The field must not contain Alphanumeric content with embedded spaces. |

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| | | | | The 1st byte is set to NULL.  The remining bytes are ignored and automatically coverted to all spaces. Ignored when replacing an existing order. |
| 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 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 Pearl

| 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 | Pearl assigned ID of the Member |
| Product ID | 4 | N | BinaryU | Product ID mapped to a given Option assigned by the Pearl for the current session |

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| Time In Force(TIF) | 1 | N | Alphanumeric | Valid values:<br>'I'=IOC<br>'D'=DAY |
| Order Instruction | 1 | N | Alphanumeric | Valid values:<br>'R'=Regular<br>'S'=ISO<br>'P'=PostOnly |
| Origin | 1 | N | Alphanumeric | Specifies the order origin type. Valid values:<br>0 = Priority Customer<br>1 = Firm<br>2 = Broker/Dealer<br>4 = Market Maker (Pearl MM)<br>5 = Non-Member Market Maker (Away MM)<br>8 = Non-Priority Customer |
| 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.<br>Negative value indicates MEO to use Exchange default value. |
| Price | 4 | Y | BinaryPrc4U | 0 for market orders.<br>Max Price is defined in Regulatory Circulars.<br>Market orders are not allowed for Origin 4(MM) and 5(Away MM). |
| Size | 4 | Y | BinaryU | Number of contracts.<br>Max Size: 999999 |
| Side | 1 | N | Alphanumeric | Valid values:<br>'B'=Buy<br>'S'=Sell |
| Open/Close | 1 | Y | Alphanumeric | Valid values:<br>'O'=Open,<br>'C'=Close,<br>'N'=N/A(For MMs Origin 4 or 5),<br>Any other value = Ignored for MMs with Origin 4 or 5, rejected for other origins) |
| Covered/Uncovered | 1 | Y | Alphanumeric | Valid values:<br>'C'=Covered,<br>'U'=Uncovered,<br>'N'=N/A(For MMs),<br>Any other Value=N/A (ignored) |
| Clearing Account | 5 | N | Alphanumeric | OCC Sub account (Multi account) for non-MM (origin not equal to 4) orders.  Must be filled for Away MM (origin equal to 5). |

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| | | | | Must be filled with MM MPID for EEMs sending MM orders in which case MPID field above becomes Executing MPID.<br><br>OCC sub account is ignored for orders delivered by MIAX MMs. |
| CMTA | 4 | N | BinaryU | Maximum value 99999<br>0 = CMTA not specified. |
| Account | 10 | N | Alphanumeric | Customer ID defined by the firms. This will be passed through for clearing. |
| Additional Text | 8 | N | Alphanumeric* | Additional text that can hold billing, clearing or pertinent information that firms need. This will be passed through for clearing.<br>The field can be populated in the following ways:<br>• Can contain characters or numbers. Left justified and space-padded on to the right. The field must not contain Alphanumeric content with embedded spaces.<br>The 1st byte is set to NULL. The remining bytes are ignored and automatically coverted to all spaces |
| SLAP Codes | 1 | Y | BinaryU | Optionally associates each liquidity with up to 8 SLAP codes when corresponding bit is set:<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>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.
- For a PostOnly order, TIF must be Day. Otherwise, order will be rejected.
- 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 Order – Cancel/Replace

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 Pearl

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| **Liquidity Unit Type** | 1 | N | Alphanumeric | 'R' |
| **Client Order ID** | 4 | Y | BinaryU | Client order ID.<br>Must be unique for the MPID.<br>0 results in a reject. |
| **MPID** | 4 | N | Alphanumeric | Pearl assigned ID of the Member |
| **Product ID** | 4 | N | BinaryU | Product ID mapped to a given Option assigned by the Pearl 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. |
| **Time In Force(TIF)** | 1 | N | Alphanumeric | Valid values:<br>'I'=IOC<br>'D'=DAY |
| **Order Instruction** | 1 | N | Alphanumeric | Valid values:<br>'R'=Regular<br>'S'=ISO<br>'P'=PostOnly |
| **Origin** | 1 | N | Alphanumeric | Specifies the order origin type. Valid values:<br>0 = Priority Customer<br>1 = Firm<br>2 = Broker/Dealer<br>4 = Market Maker (Pearl MM)<br>5 = Non-Member Market Maker (Away MM)<br>8 = Non-Priority Customer |
| **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.<br>Negative value indicates MEO to use Exchange default value. |
| **Price** | 4 | Y | BinaryPrc4U | 0 for market orders.<br>Max Price: Defined in Regulatory Circular<br>Market orders are not allowed for Origin 4(MM) and 5(Away MM). |

| Field Name | Length | Replaceable | Data Type | Notes |
|---|---|---|---|---|
| Size | 4 | Y | BinaryU | Number of contracts.<br>Max Size: 999999 |
| Side | 1 | N | Alphanumeric | Valid values:<br>'B'=Buy<br>'S'=Sell |
| Open/Close | 1 | Y | Alphanumeric | Valid values:<br>'O'=Open,<br>'C'=Close,<br>'N'=N/A(For MMs Origin 4 or 5),<br>Any other value = Ignored for MMs with Origin 4 or 5, rejected for other origins) |
| Covered/Uncovered | 1 | Y | Alphanumeric | Valid values:<br>'C'=Covered,<br>'U'=Uncovered,<br>'N'=N/A(For MMs),<br>Any other Value=N/A (ignored) |
| Clearing Account | 5 | N | Alphanumeric | OCC Sub account (Multi account) for non-MM (origin not equal to 4) orders. Must be filled for Away MM (origin equal to 5).<br><br>Must be filled with MM MPID for EEMs sending MM orders in which case MPID field above becomes Executing MPID. |
| CMTA | 4 | N | BinaryU | Maximum value 99999<br>0 = CMTA not specified. |
| SLAP Codes | 1 | Y | BinaryU | Optionally associates each liquidity with up to 8 SLAP codes when corresponding bit is set:<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>Note: Bit 0 is LSB or Least Significant Bit. |

Points to note:
- For a PostOnly order, TIF must be Day. Otherwise, order will be rejected. *Cancel/replacement behavior*:
  - Pearl 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 Order – Cancel

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 Pearl

| 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.<br>0 results in a reject. |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the Member |
| Product ID | 4 | BinaryU | Product ID mapped to a given Option assigned by the Pearl 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<br>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 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**: Pearl 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<br>"R" = Invalid bulk liquidity block<br>"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 Pearl engine generated this response. |
| **1 to N single-side order responses consisting of the following fields:** | | | |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| **Order status** | 1 | Alphanumeric | " " = successfully accepted |
| | | | "A" = Market Order not accepted during LULD |
| | | | "B" = Too Wide For Sell Market Zero Bid |
| | | | "C" = Pearl closed for trading of this product; request cannot be completed |
| | | | "E" = Market Too Wide to accept Market order |
| | | | "F" = Buy/Sell Limit Too Aggressive |
| | | | "G" = Max Open Orders exceeded |
| | | | "H" = Max Open Contracts exceeded |
| | | | "I" = Invalid TIF when option not trading |
| | | | "J" = Invalid Order Instruction when option not trading |
| | | | "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 or Protected 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 |
| | | | "Y" = Invalid for MPID |
| | | | "1" = Invalid Origin |
| | | | "2" = Invalid TIF |
| | | | "3" = Restricted Option – Opening position not allowed |
| | | | "4" = Non-Tradable Option |
| | | | "5" = Incompatible Order Type |
| | | | "6" = Incompatible TIF |
| | | | "7" = Invalid Order Instruction |
| | | | "8" = Invalid Open Close |
| | | | "9" = Invalid Covered / UnCovered |
| | | | "0" = Invalid MVP Ticks |
| | | | "a" = Invalid Clearing Account |
| | | | "b" = Blocked by OCC Kill Switch |
| | | | "c" = Blocked by RPM |
| | | | "e" = Duplicate Client Order ID |
| | | | "f" = Invalid Account |
| | | | "g" = Invalid Liquidity Unit Type |
| | | | "h" = Invalid CMTA specified |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| | | | "s" = Rejected due to Single Side Liquidity Protection in effect<br>"t" = Invalid Additional Text<br>'u' = Rejected due to SLAP protection in effect<br>'v' = SLAP code specified for an immediate order<br>"Z" = Undefined error<br>"*" = Downgraded from older version |
| Engine Sequence Number | 8 | BinaryU | Unique Sequence number, assigned by the Pearl 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 and Engine Sequence Number must be ignored. Pearl will populate Order status with space.
- When orders and cancels are simultaneously sent for the same product across multiple ports, Engine sequence number 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 order notifications, 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 Liquidity Mass Cancel Request

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

**Message Direction**: Firm to Pearl

| 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 | Pearl assigned ID of the Member |
| **Client Send Time** | 8 | TimeStamp | Firm's send time for the mass cancel. Nanoseconds since Epoch. |
| **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 Binary Orders and block all subsequent Binary Orders (including immediate orders).<br>'D' – (Hybrid Mass-Cancel) Cancel all open Binary Orders. All subsequent Binary Orders will be blocked except immediate orders.<br>'S' – Selective Liquidity Auto Purge (SLAP) |
| **SLAP Codes** | 1 | BinaryU | SLAP codes for Selective Mass-Cancel.<br>This field is only applicable for Mass Cancel Scope 'S' and is ignored for other scopes.<br>Resting liquidities with the specified SLAP codes will be purged<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>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.
  - o 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. EEM firms can fill in 0(zero) or a valid send time in this field.
- Selective Liquidity Auto Purge (SLAP)
  - o SLAP will automatically cancel all resting liquidity that match the MPID, Underlying and any of the SLAP Codes specified in the request
  - o 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.
  - o 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
  - o When bit is not set for a particular SLAP code, this SLAP code will retain its prior state (reset or purged).
  - o 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.

## 4.1.4 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**: Pearl 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 | Pearl assigned ID of the Member |
| **Status** | 1 | Alphanumeric | " " = Cancel successful<br>"A" = All specified SLAP codes are already purged<br>"B" = SLAP codes are not provided in the request<br>"D" = SLAP purge while Standard/Hybrid mass-cancel is active<br>"U" = Invalid Underlying<br>"N" = All orders have already been canceled<br>"M" = Unknown MPID<br>"C" = Cannot cancel while not in LOW<br>"J" = Mass Cancel Scope contains invalid value<br>"X" = SLAP feature disabled |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| | | | "Z" = Undefined error<br>"*" = Downgraded from older version |

Points to note:

- This is not a sequenced message.

## 4.1.5 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 of the specified underlying.

**Message Direction**: Firm to Pearl

| 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 | Pearl assigned ID of the Member |
| **Underlying Symbol** | 11 | Alphanumeric | Must be filled with a valid underlying. Pearl will remove (reset) the Order protection for this Member for entire series of this underlying. |
| **Scope** | 1 | Alphanumeric | 'A' – Reset Standard/Hybrid Mass-Cancel<br>'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.<br>The specified SLAP codes will be reset when corresponding bit is set.<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>Note: Bit 0 is LSB or Least Significant Bit. |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Reserved | 10 | BinaryU | For future use |

Points to note:
- A Liquidity Protection Reset will not enable sending Binary Orders for Option 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:
  - o 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.
  - o 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 Pearl 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.
  - o Order protection due to Underlying Level ARM$^2$ Protection
    - ✓ Firms must call Pearl 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.
  - o 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.
  - o 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.
  - o 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.
  - o 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 noop.
- Halts do not trigger Mass Cancels. Hence halts will not require liquidity protection reset.

## 4.1.6 Liquidity Protection Reset Response

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

**Message Direction**: Pearl 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 | Pearl assigned ID of the Member |
| Status | 1 | Alphanumeric | " " = Order Protection reset successful<br>"B" = SLAP codes are not provided in the request<br>"D" = SLAP reset while Standard/Hybrid mass-cancel is in effect<br>"U" = Invalid Underlying<br>"C" = Cannot reset while not in LOW<br>"A" = ARM[2] Underlying level protection is in effect<br>"M" = Unknown MPID<br>"F" = ARM[2] Firm level protection is in effect<br>"S" = Invalid Scope<br>"X" = SLAP feature disabled<br>"Z" = Undefined error<br>"*" – 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 Pearl Trading Operations.

## 4.1.7 Single Side Liquidity Protection Reset Request

Request to reset Single Side Liquidity Protection for the specific Option and Side for a given MPID.

**Message Direction**: Firm to Pearl

| 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 | Pearl assigned ID of the Member |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Product ID | 4 | BinaryU | Pearl assigned Product ID (for the current session) for a given Option<br>If set to zero, will reset both sides of every Option for the MPID |
| Side | 1 | Alphanumeric | The side of Product ID to reset Valid values are:<br>When Product ID not zero:<br>"B" = Bid (Buy)<br>"S" = Ask (Sell)<br>When Product ID is zero:<br>"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. However, if other protections are also in effect, those protections are required to be reset independently.

## 4.1.8 Single Side Liquidity Protection Reset Response

Response to Single Side Liquidity Protection Reset Request

**Message Direction**: Pearl 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 | Pearl assigned ID of the Member |
| Reserved | 4 | Alphanumeric | Reserved for future use |
| Status | 1 | Alphanumeric | " " = Single Side Protection Reset Request successful<br>"M" = Unknown MPID<br>"C" = Invalid Product ID<br>"S" = Invalid Side<br>"E" = Feature not enabled<br>"Z" = Undefined error<br>"*" – Downgraded from older version |

Points to note:
- This is not a sequenced message.
- Error code "E" (Feature not enabled) will be used when current MEO Version does not support Single Side Liquidity Protection mechanism or when Single Side Liquidity Protection is not enabled for the specified MPID.

## 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**: Pearl 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 Pearl system. |
| **MEO Version** | 8 | Alphanumeric | Eg:MEOX.X (where is 'X.X' is MEO version i.e.1.1 or 1.6). This Version: MEO1.2 |
| **Session ID** | 1 | BinaryU | Pearl assigned ID for the current trading session |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| System Status | 1 | Alphanumeric | Current system status:<br>"S" = Start of System hours<br>"C" = End of System hours<br>"P" = LOW (Ready to accept Orders)<br>"L" = Not in LOW(Not Ready to accept application messages including Orders)<br>"M" = MPID Product assignment window open.<br>"E" = MPID Product assignment window closed.<br>"1" = Start of Test Session (sent before tests).<br>"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, Pearl 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.
- Pearl will disconnect the connection through which the firm sends an application message before Pearl 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**: Pearl 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 Pearl system. |
| Underlying Symbol | 11 | Alphanumeric | Underlying Symbol |
| Trading Status | 1 | Alphanumeric | "H" = Pearl has halted trading for this Underlying Symbol |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| | | | "R" = Pearl will resume trading (reopen) for this Underlying Symbol<br>"O" = Pearl will open trading for this Underlying Symbol |
| Event Reason | 1 | Alphanumeric | "A" = This event resulted from automatic/market driven event<br>"M" = Pearl manually initiated this event |
| Expected Event Time | 8 | NanoTime | Expected time of start of the event as specified below:<br>When underlying trading status="H", this will be 0 (zero).<br>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 Pearl grants relief from valid opening width parameters for Opening as specified by regulatory circulars of Pearl.

**Message Direction**: Pearl 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 Pearl system. |
| Underlying Symbol | 11 | Alphanumeric | If filled with valid underlying, relief applies to all options symbols of this underlying.<br>**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<br>(Opening BBO width). Eg: 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.
- This relief is applicable to MM orders and does not affect any EEM orders.
- 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 Pearl rules as to the details and exceptions to this rule.

- For a Relief multiplier setting of 1.50 in Pearl, 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**: Pearl to Firm

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Sequenced Pkt; Refer to SesM Protocol Specification* |
| **Message Type** | 2 | Alphanumeric | "RN" |
| **Notification Time** | 8 | NanoTime | Time at which this was generated by Pearl system. |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Member. MPID will be spaces for Pearl 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 Pearl 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 Pearl 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. |
| **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) |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Market Maker Origin Multiplier | 2 | BinaryU | Contra side Market Maker Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Away Market Maker Origin Multiplier | 2 | BinaryU | Contra side Away Market Maker Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Broker Dealer Origin Multiplier | 2 | BinaryU | Contra side Broker Dealer Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Firm Origin Multiplier | 2 | BinaryU | Contra side Firm Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Priority Customer Origin Multiplier | 2 | BinaryU | Contra side Priority Customer Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Non-Priority Customer Origin Multiplier | 2 | BinaryU | Contra side Non-Priority Customer Origin Multiplier. <mark>Valid range: Please refer to Regulatory Circular</mark> |
| Reserved | 16 | BinaryU | Reserved for future use |

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.
- For more information about Origin Multiplier please see "ARM Setting Update Request"

### 4.2.5 ARM$^2$ Underlying Level Protection Settings Notification

This message format will be used to notify firms of their ARM$^2$ Underlying Level protection settings. All the latest ARM$^2$ 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**: Pearl 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 Pearl system |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the Market Maker |
| Action | 1 | Alphanumeric | Valid values: 'S' – Set (add or update) ARM$^2$ settings 'D' – Delete ARM settings |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| 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**: Pearl 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 Pearl system. |
| MPID | 4 | Alphanumeric | Pearl 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<br>"B" = Pearl Help-desk triggered protection<br>"U" = Firm initiated Standard/Hybrid Mass Cancel<br>"R" = ARM triggered protection<br>"O" = RPM Binary Order Rate Protection Trigger<br>"T" = RPM Binary Order Executed Contracts Rate Protection Trigger<br>"F" = ARM2 Firm level protection initiated Hybrid Mass Cancel<br>"J" = Reserved for future use<br>"*" – 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**: Pearl 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 Pearl system. |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Member |
| **Underlying Symbol** | 11 | Alphanumeric | Underlying for which this MPID requested SLAP protection |
| **Requested SLAP Codes** | 1 | BinaryU | Provides a list of SLAP codes that were requested to be purged as specified in Liquidity Mass Cancel request:<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>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<br><br>Bit 0 – SLAP Code 1<br>Bit 1 – SLAP Code 2<br>Bit 2 – SLAP Code 3<br>Bit 3 – SLAP Code 4<br>Bit 4 – SLAP Code 5<br>Bit 5 – SLAP Code 6<br>Bit 6 – SLAP Code 7<br>Bit 7 – SLAP Code 8<br><br>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.

**Message Direction**: Pearl 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 Pearl system |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the Member |
| Product ID | 4 | BinaryU | Pearl assigned Product ID (for the current session) for a given Option |
| 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 Pearl 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**: Pearl 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 Pearl system. |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Market Maker |
| **Underlying Symbol** | 11 | Alphanumeric | Underlying for which this MPID is placed in ARM$^2$ underlying level protection. |
| **Notification Type** | 1 | Alphanumeric | "T" - ARM$^2$ Underlying Level protection Triggered<br>"R" - ARM$^2$ Underlying Level protection Reset<br>"*" – 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**: PEARL 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 Pearl 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<br>"R" - ARM$^2$ Firm Level protection Reset<br>"*" – Downgraded from older version |
| **Reserved** | 16 | Alphanumeric | Reserved for future use |

Points to note:
- This is a sequenced message.

## 4.2.11 Order Notification

This is the message format that will be used to notify firms about orders sent by firms. Note that this is sent for new orders only (including replaces) and it is meant to provide a copy of the order. Subsequent order updates due to fills, cancels and executions are not provided. This notification is for both A-R Orders and Standard Binary Orders.

**Message Direction**: Pearl to Firm

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Unsequenced Pkts; Refer to SesM Protocol Specification* |
| **Message Type** | 2 | Alphanumeric | "ON" |
| **Notification Time** | 8 | NanoTime | Time at which this was generated by Pearl system. |
| **Client Order ID** | 4 | BinaryU | Client order ID. If an Order with this Client Order ID found for the same product, MPID and side, this Order replaces the resting Order. If not, this order is treated as new Order. For each Product and side, an MPID can have 1 order with a client order ID that they can keep replacing. |
| **Client Message ID** | 4 | BinaryU | Client Message ID supplied by the firm in Bulk order message |
| **Bulk Order Index** | 1 | BinaryU | Bulk Liquidity Index assigned by Pearl to each Order in bulk Liquidity (order position in the bulk liquidity) |
| **Target Client Order ID** | 4 | BinaryU | Target Client Order of the order that was replaced |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Member |
| **Product ID** | 4 | BinaryU | Product ID mapped to a given Option assigned by the Pearl for the current session |
| **Time In Force(TIF)** | 1 | Alphanumeric | I=IOC, D=DAY |
| **Order Instruction** | 1 | Alphanumeric | R=Regular, S=ISO, P=PostOnly |
| **Origin** | 1 | Alphanumeric | Specifies the order origin type. Valid values: 0 = Priority Customer 1 = Firm 2 = Broker/Dealer 4 = Market Maker (Pearl MM) 5= Non-Member Market Maker (Away MM) 8 = Non-Priority Customer |
| **MVP** | 1 | 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 | BinaryPrc4U | Price that was sent in the Order. 0 for market orders. |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Size | 4 | BinaryU | Number of contracts. |
| Side | 1 | Alphanumeric | B=Buy, S=Sell |
| Open/Close | 1 | Alphanumeric | O=Open, C=Close, N=N/A |
| Covered/Uncovered | 1 | Alphanumeric | C=Covered, U=Uncovered, N=N/A |
| Clearing Account | 5 | Alphanumeric | OCC Sub account (Multi-account) for non-MM orders or MM MPID for EEMs sending MM orders (in which case MPID field above becomes Executing MPID) |
| CMTA | 4 | BinaryU | CMTA sent in the order |
| Account | 10 | Alphanumeric | Customer ID defined by the firms. |

Points to note:
- This is not a sequenced message.
- The values in the MVP, Open/Close and Covered/Uncovered fields are the values after Engine processing and acceptance and may sometimes be different than what is sent in the original order.

## 4.2.12 Done For The Day Notification

This is the message format that will be used to notify firms about the final status of the binary orders at the end of day after end of LOW.

**Message Direction**: Pearl to Firm

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| *SesM Protocol Data* | | | *Unsequenced Pkts; Refer to SesM Protocol Specification* |
| Message Type | 2 | Alphanumeric | "DD" |
| Notification Time | 8 | NanoTime | Time at which this was generated by Pearl system. |
| Client Order ID | 4 | BinaryU | Client order ID. If an Order with this Client Order ID found for the same product, MPID and side, this Order replaces the resting Order. If not, this order is treated as new Order. For each Product and side, an MPID can have 1 order with a client order ID that they can keep replacing. |
| Client Message ID | 4 | BinaryU | Client Message ID supplied by the firm in Bulk order message |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| Bulk Order Index | 1 | BinaryU | Bulk Liquidity Index assigned by Pearl to each Order in bulk Liquidity (order position in the bulk liquidity) |
| Target Client Order ID | 4 | BinaryU | Target Client Order of the order that was replaced |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the Member |
| Product ID | 4 | BinaryU | Product ID mapped to a given Option assigned by the Pearl for the current session |
| Time In Force(TIF) | 1 | Alphanumeric | I=IOC, D=DAY |
| Order Instruction | 1 | Alphanumeric | R=Regular, S=ISO, P=PostOnly |
| Origin | 1 | Alphanumeric | Specifies the order origin type. Valid values: <br> 0 = Priority Customer <br> 1 = Firm <br> 2 = Broker/Dealer <br> 4 = Market Maker (Pearl MM) <br> 5 = Non-Member Market Maker (Away MM) <br> 8 = Non-Priority Customer |
| MVP | 1 | 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. <br> Negative value indicates MEO to use Exchange default value. |
| Price | 4 | BinaryPrc4U | Price that was sent in the Order. 0 for market orders. |
| Size | 4 | BinaryU | Number of contracts that remained open at end of day. |
| Side | 1 | Alphanumeric | B=Buy, S=Sell |
| Open/Close | 1 | Alphanumeric | O=Open, C=Close, N=N/A |
| Covered/Uncovered | 1 | Alphanumeric | C=Covered, U=Uncovered, N=N/A |
| Clearing Account | 5 | Alphanumeric | OCC Sub account (Multi-account) for non-MM orders or <br> MM MPID for EEMs sending MM orders (in which case MPID field above becomes Executing MPID) |
| CMTA | 4 | BinaryU | CMTA sent in the order |
| Account | 10 | Alphanumeric | Customer ID defined by the firms. |

Points to note:
- This is not a sequenced message.
- The values in the MVP, Open/Close and Covered/Uncovered fields are the values after Engine processing and acceptance and may sometimes be different than what is sent in the original order.

### 4.1.13 Cancel Notification

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

**Message Direction**: Pearl 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 Pearl system. |
| **MPID** | 4 | Alphanumeric | Pearl assigned ID of the Member |
| **Product ID** | 4 | BinaryU | Pearl Product ID. |
| **Liquidity Type** | 1 | Alphanumeric | "O" –Binary Order (AR or Standard) "X" – Reserve for future use |
| **Client Message ID** | 4 | BinaryU | Client Message ID supplied by the firm in Bulk order message |
| **Client Order ID** | 4 | BinaryU | Client order ID. |
| **Bulk Order Index** | 1 | BinaryU | Bulk Liquidity Index assigned by Pearl to each Order in bulk Liquidity (order position in the bulk liquidity) |
| **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 | Pearl Engine sequence number of this cancel |
| **Cancel Reason** | 1 | Alphanumeric | "L" = Line disconnect triggered protection Standard/Hybrid Mass Cancel "B" = Pearl Help-desk initiated cancel (individual order cancel or Standard Mass Cancel) "U" = Firm initiated Standard/Hybrid Mass Cancel "R" = Pearl initiated Hybrid Mass Cancel due to ARM protection "O" = RPM Binary Order Rate Protection Trigger Standard Mass Cancel "T" = RPM Binary Order Executed Contracts Rate Protection Trigger Standard Mass Cancel "F" = ARM[2] Firm level protection initiated Hybrid Mass Cancel "A" = Price Protection canceled "C" = Cancel of resting order crossed by opposite side order of same MPID or Firm. "D" = LULD canceled "J" = Canceled by User with cancel or replace request "M" = Canceled due to replace request while blocked by RPM protection "P" = Post Only Canceled due to locking or crossing managed interest on the opposite side "S" = Cancel for unexecuted part of order "Q" = Canceled due to Single Side Liquidity Protection trigger |

| Field Name | Length | Data Type | Notes |
|---|---|---|---|
| | | | "G" = A-R Order cancelled due to rejection of an A-R replace request. <br> "H" = Firm initiated SLAP protection <br> "I" = Standard Order canceled due to replace request while blocked by SLAP protection <br> "Z" = Undefined reason <br> "*" – Downgraded from older version |

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.

- Halts do not trigger Mass Cancels. Hence halts will not require reentry (liquidity protection reset).

- 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 All, Send All Originator Port, 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] | Send All or All Originator Port[3] |
|---|---|---|---|
| **Firm replaces Standard Order** | Not sent | Not sent[1] | Not sent[1] |
| **Firm cancels Standard Order** | Not sent | Not sent | Sent |
| **System[4] initiated individual order cancel – Standard Order** | Not sent | Sent | Sent |
| **Firm replaces A-R Order** | Not sent | Not sent | Not sent |
| **Firm cancels A-R Order** | Not sent | Not sent | Not sent |
| **System[4] initiated individual order cancel – A-R Order** | Not sent | Sent | Sent |
| **Standard/Hybrid Mass cancel (system[4] initiated or Firm initiated)** | Not sent | Not sent[2] | Sent for Standard orders. Not sent for A-R orders. |
| **SLAP Protection** | Not sent | Not sent[5] | Sent for Standard orders. Not sent for A-R orders. |
| **Single Side Liquidity Protection triggered cancels** | Not sent | 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. Similarly, "All Originator Port" configuration has the same behavior as "All" but only sends cancel notification when this port originated last successful order request.

4 System initiated cancels include order cancelations by MIAX Trading Operations HelpDesk 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.

## 4.2.14 Execution Notification

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

**Message Direction**: Pearl 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 Pearl system. |
| MPID | 4 | Alphanumeric | Pearl assigned ID of the Member |
| Product ID | 4 | BinaryU | Pearl Product ID mapped to a given option. It is assigned per trading session and is valid for that session. |
| Liquidity Type | 1 | Alphanumeric | "O" –Binary order (AR or Standard) "X" –- Reserved for future use |
| Client Message ID | 4 | BinaryU | Client Message ID supplied by the firm in bulk order message |
| Client Order ID | 4 | BinaryU | Client order ID. |
| Bulk Order Index | 1 | BinaryU | Bulk Liquidity Index assigned by Pearl to each Order in bulk Liquidity (order position in the bulk liquidity) |
| Trade ID | 4 | BinaryU | Pearl Trade ID |
| Execution ID | 8 | BinaryU | Pearl 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; eg: 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.

# Appendix A: Contact List

Please visit MIAX website for obtaining 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**  **Limited Service**        **Full service**  **Limited Service**
**Port**        **Port**                    **Port**        **Port**

**Group1 MPIDs: MPID1, MPID2, <span style="color:red">MPID3</span>**    **Group2 MPIDs: <span style="color:red">MPID3</span>, 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:
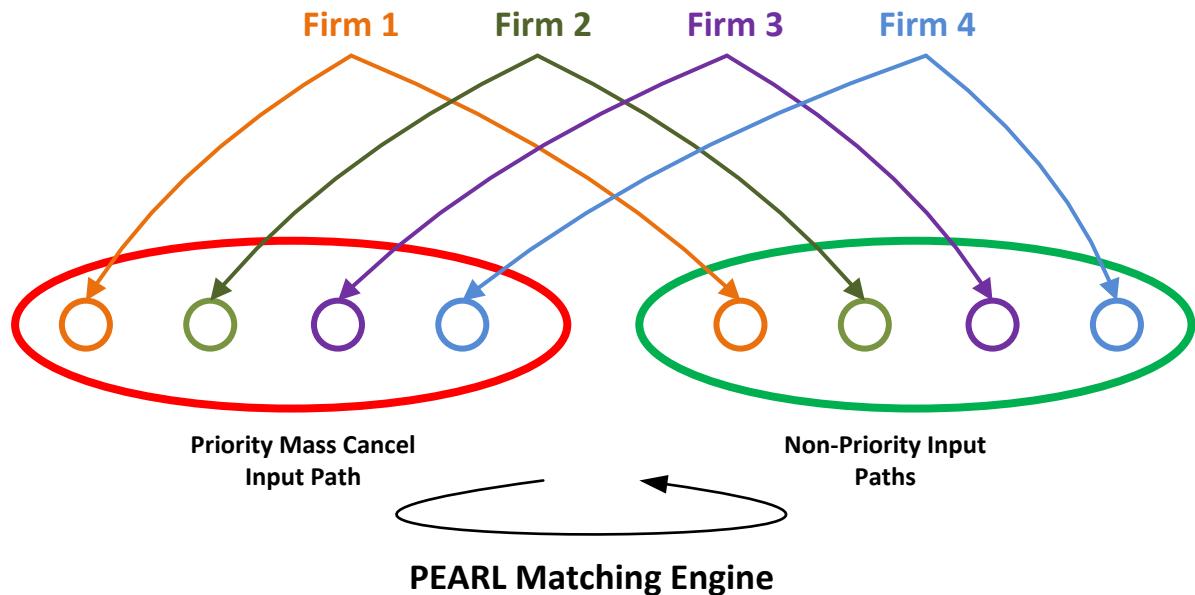


The Priority Mass Cancel Ports provide an expedited processing path to the Matching Engine over that of other inbound paths on a best effort basis. Under routine circumstances, the Matching Engine will check if there is a pending Mass Cancel request in the priority path waiting to be processed before 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 |
|---|---|---|
| Sep 30th, 2016 | 1.0 | First release. |
| Nov 30th, 2016 | 1.0a | Fixed typos in Clearing Account field description in all messages.<br>Clarified the availability of two Full Service Port types in Hot Topics and Configuration sections. Added Order Protection Settings in Configuration section.<br>Clarified notes (in series update and cancel notification sections) about orders canceled when series is made inactive<br>Notes added in order messages to refer to Regulatory circular for max price and size. Notes added to clarify that PO orders must have TIF=day.<br>ClOrdID must not be zero in any liquidity message.<br>Clarified Open Size field in Bulk Liquidity Message Response.<br>New error code 'M' added to Liquidity Protection Reset Response.<br>Notes in Order notification indicate that the values are those as processed by the Engine and may sometimes be different than the order sent.<br>Open/Close field behavior clarified in AR Order and Standard Order sections. |
| Jan 11th, 2017 | 1.0b | Cancel Notification: Notes elaborate on settings and behavior. Cancel reasons also clarified.<br>Liquidity mass cancel response: Removed cancel notification information from notes.<br>Configuration: Clarified cancel notification settings and behavior. |
| April 12th, 2017 | 1.1 | Hot topics: IOC/ISO order executions don't count towards ARM.<br>Change reflected throughout the document: (a) PO orders are not canceled upon halts or series<br>non-tradable (cancel notification codes 'E' and 'H' removed). (b) PO orders not rejected when product is not in open.<br>Execution Notification: LiquidityIndicator field added and Reserved bytes adjusted.<br>System State Notification: MEO Version updated. |
| Nov 10th, 2017 | 1.1a | Miscellaneous updates and clarifications. |
| Nov 13th, 2017 | 1.2 | Added support for Mass Cancel of Day orders only.<br>ARM trigger will not block immediate orders.<br>Added Single Side Liquidity Protection<br>Added new Order Status code to Bulk Liquidity Message Response<br>Added new Cancel Reason to Cancel Notification: Cancel reasons also clarified.<br>Added Priority Mass cancel port support |
| May 25th, 2018 | 1.2a | Self-trade Protection is expanded from MPID level to the firm level for Market Maker firms. Updated self-trade protection description. |

| Revision Date | Version | Description |
|---|---|---|
| **Oct 29th, 2019** | 2.0 | Added "Firm Send time" to Bulk Liquidity and Liquidity Mass cancel messages for upcoming CAT requirement.<br>Added reserved bytes Bulk Liquidity message.<br>Changed Message type of above mentioned messages.<br>Increased Liquidity Unit from 50 to 57 bytes in Bulk Liquidity message and added Additional Text field in AR and Standard binary orders.<br>Invalid Additional Text error code added to Bulk liquidity response message. |
| **July 10th, 2020** | 2.0a | Added comments for clarity on the Additional Text field |
| **Aug 12th 2020** | 2.0b | Added new Equities exchanges |
| **Mar 29th 2021** | 2.0c | Added note in Configuration section related to LSP counts per Matching Engine environment. |
| **Mar 31st, 2022** | 2.0d | Added a note in the Hot Topics section for the new Maximum Put Price Protection.<br>Annotated in Bulk Liquidity Message Response for Order Status = "P" that it will also be sent when an order is rejected due to price protection.<br>Added Originator Port session entitlement feature. |
| **Jul 25th, 2023** | 2.1 | New cancel reason "G" in Cancel Notification |
| **Apr 08th, 2024** | 2.1a | Updated Client Message ID required to be unique in Bulk Liquidity Message |
| **Jun 12, 2025** | 2.2 | Addition of SLAP functionality:<br>• New field "SLAP Codes" in Bulk Liquidity Message<br>• New field and Mass Cancel Scope in Liquidity Mass Cancel Request<br>• New SLAP Protection Trigger Notification<br>• New version of Liquidity Protection Reset request<br>• New cancel reason for Cancel Notification<br>• New status codes in multiple Response messages<br>ARM Origin Multipliers<br>• New version of ARM Settings Update Request<br>• New version of ARM Protection Settings Notification |
| **July 25, 2025** | 2.2a | Added note to Bulk Liquidity Message |
| **Jan 16th, 2026** | 2.2b | ARM Origin Multiplier valid range is defined in Regulatory Circular<br>Clarified detail in "additional text" field |

# miax.

MIAXGlobal.com