Cboe Titanium Cboe U.S. Equities Binary Order Entry Specification

Version 0.0.1 (DRAFT)

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Contents

Introduction

Overview

This document describes Binary Order Entry, version 3 (BOEv3), the Cboe proprietary order entry protocol used by members to send orders and purges to Cboe.

Where applicable, the terminology (e.g., time in force) used in this document is similar to that used by the FIX protocol to allow those familiar with FIX to more easily understand BOEv3. This document assumes the reader has basic knowledge of the FIX protocol.

BOEv3 fulfills the following requirements:

- *CPU and memory efficiency*. Message encoding, decoding, and parsing are simpler to code and can be optimized to use less CPU and memory at runtime.
- *Application level simplicity*. State transitions are simple and unambiguous. They are easy to apply to a member's representation of an order.
- *Session level simplicity*. The session level protocol (login, sequencing, replay of missed messages, logout) is simple to understand.

While Cboe strives to preserve feature parity between FIX and BOEv3 where possible, some features may only be available in one protocol or the other.

Note that while FIX is an ASCII based protocol, BOE is binary based, providing for efficiencies that can allow for reduced latency.

All binary values are in **little-endian** (as used by Intel x86 processors), and not network byte order.

Each message is identified by a unique message type. A listing of the supported message types is provided in List of Message Types on page 0.

All communication is via standard TCP/IP.

Differences with prior versions of BOE

Notable differences between BOEv3 and the prior major version of BOE (BOEv2) include:

1. BOEv3 has statically sized messages except when sizing variability is required due to (statically sized) repeating groups of fields. Consequently, BOEv3 does not support optional fields on input nor bitfield-specified optional return fields. This provides a more consistent and predictable experience for all users.
2. The **`Logout Response`** message no longer returns the *LastReceivedSequenceNumber*, nor the highest available sequence numbers of the matching unit(s).
3. BOEv3 requires the *ClearingFirm* be specified on all **`Cancel Order`** and **`Modify Order`** messages (either via Port default or by specifying in the message). This differs from prior versions of BOE where this was only required of service bureau members.
4. When logging in, members may specify a behavior of "Fail" for unspecified matching units (fail the login if a matching unit was not specified). For more information about Fail, Skip, and Replay behaviors, see For more information about Fail, Skip, and Replay behaviors on page 21.
5. There no longer exists a condition where a member would send a **`Modify Order`** followed immediately by a **`Cancel Order`** message and it was not deterministic as to which *OrigClOrdId* value was correct on the **`Cancel Order`** message. In BOEv3, the *OrigClOrdId* on a cancel should be the *ClOrdId* sent on the most recent **`Modify Order`** (or **`New Order`** if no modifies have been sent), even if the corresponding response has not yet been seen. *CancelOrigOnReject* should be set to `Y` to ensure that a rejected **`Modify Order`** does not leave behind a live order.
6. Member risk trips and self-imposed lockouts are now required to be reset using the **`Reset Risk`** message. They can no longer be reset via the **`New Order`** message.
7. An *InFlight* field has been added to most return messages, informing the member of the total number of messages received by the BOEv3 order handler which have not yet been acknowledged by the matching engine.
8. BOEv3 **`Trade Cancel`** or **`Correct`** messages are not suppressible by port parameter.
9. In many of the messages from Cboe to Member, the fixed set of fields in the response will be fewer than the total number of fixed and optional fields available via BOEv2.
10. For sequenced messages from the member to Cboe, a sequence number of `0` will always be accepted and is treated as if it were the next expected sequence number.
11. Symbol Order Rate threshold is no longer an available risk port attribute for BOEv3.
12. Sustained Order Rate thresholds are no longer available, and instead the use of rate limiting via pause is recommended.
13. LocateReqd on NewOrderShortUSEquitiesV1 is implied to be a value of 'N', and thus is not a field on the message itself.

14. *Binary Price* and *Short Binary Price* data types have been expanded to have six implied decimals rather than four.

BOEv3 Message Format Versioning and Nomenclature

Message types may be introduced when new fields cannot be accommodated by utilizing reserved bytes in the existing message specification. In such cases, when a new message type is introduced, it will be documented as a distinct message type in this document. Application layer message types are named using the following pattern:

Table 1. BOEv3 Message Format

APPLICATION LAYER MESSAGE TYPE	GENERAL TYPE	MARKET	VERSION
NewOrderUSEquitiesV1	**`New Order`**	US Equities	V1

This allows for ease of distinction between similar message types between markets (for example, JP Equities compared to U.S. Futures), and the handling of new versions of the message (V1, V2, etc.).

When application layer message types are discussed in this document, they are referred to using their general type name unless their specific version is relevant to the documentation.

During any time when multiple versions of messages from Cboe to Member are supported concurrently, the port configuration determines which message version may be sent by Cboe.

Introduction of New Fields in Existing BOEv3 Messages

Existing message fields will not change in length. Fields currently identified as *Reserved* may be redefined, in part or in whole, as new specified fields. New fields may be introduced at the end of any message that does not have a repeating group of fields; consequently, members must check the length of messages received from Cboe and treat any additional bytes present as undefined values.

Certification Requirement

All customers must complete a formal certification in the appropriate Cboe Certification test environment before production orders or quotes will be accepted by Cboe. Formal certification scripts can be found in the Cboe Customer Web Portal. Customers may complete the formal certification using the Certification Tool app and selecting the applicable certification script. Customers are advised to test all functionality they plan to use in production in the Cboe Certification test environment.

Document Format

Blue highlighted sections highlight key differences between the Cboe US Equities Exchanges (BZX Equities Exchange BZX only, BYX Equities Exchange BYX only, EDGA Equities Exchange EDGA only, and EDGX Equities Exchange EDGX only).

Hours of Operation

All times noted are Eastern Time zone (ET) based.

Refer to the website for the Cboe Holiday schedule.

Cboe BZX Equities Exchange (BZX) supports an opening and closing auction for BZX listed securities (refer to the Cboe U.S. Equities Auction Process Specification for more information).

Orders entered prior to the start of the Pre-Market or Regular Trading Session which are accepted will be queued for trading in the session designated by the order. Once trading begins, queued orders will be released to the respective book and crossing orders will be matched by time priority. Refer to the Cboe U.S. Equities Opening Process for more information.

Orders are rejected if they are received outside the hours Cboe is available for trading or queuing. All orders remaining after the Post Market Session will be cancelled automatically (Execution Reports will be delivered).

Table 2. Trading Sessions

SESSION	START TIME (ET)	END TIME (ET)
Early Order Acceptance	6:00 a.m. 2:30 a.m. (BZX and EDGX only)	7:00 a.m. 4:00 a.m. (BZX and EDGX only)
Early Trading Session	7:00 a.m. 4:00 a.m. (BZX and EDGX only)	8:00 a.m.
Pre-Market Trading Session	8:00 a.m.	9:30 a.m.
Regular Trading Session	9:30 a.m.	4:00 p.m.
Post-Market Session	4:00 p.m.	8:00 p.m.

Data Types

The following data types are used by BOEv3. The size of some data types varies by message. All data types have default values of binary zero, in both Member to Cboe and Cboe to Member contexts.

- *Binary*: Little Endian byte order, unsigned binary value. The number of bytes used depends on the context.
  - One byte: `FE` = 254
  - Four bytes: `64 00 00 00` = 100
- *Binary Price*: Little Endian byte order value, signed two's complement, eight bytes in size, with six implied decimal places. So, if the value is 12,340,000, the actual value considering implied decimal places is 12.340000.
  - `20 4B BC 00 00 00 00 00` = 12,340,000/1,000,000 = 12.340000
  - `E0 B4 43 FF FF FF FF FF` = -12,340,000/1,000,000 = -12.340000
- *Short Binary Price*: Little Endian byte order value, signed two's complement, four bytes in size, with six implied decimal places. So, if the value is 12,340,000, the actual value considering implied decimal places is 12.340000.
  - `20 4B BC 00` = 12,340,000/1,000,000 = 12.340000
  - `E0 B4 43 FF` = -12,340,000/1,000,000 = -12.340000
- Access Fee: Little Endian byte order value, signed two's complement, eight bytes in size, with five implied decimal places. So, if the value is 141,341, the actual value considering implied decimal places is 1.41341. 1D 28 02 00 00 00 00 00 = 141,341/100,000 = 1.41341 E3 D7 FD FF FF FF FF = -141,341/100,000 = -1.41341
- *Alpha*: ASCII uppercase letters (A-Z) and lowercase letters (a-z) only. ASCII NUL (0x00) filled on the right, if necessary. The number of bytes used depends on the context.
- *Alphanumeric*: ASCII uppercase letters (A-Z), lowercase letters (a-z) and numbers (0-9) only. ASCII NUL (0x00) filled on the right, if necessary.
- *Text*: Printable ASCII characters only (binary values in the inclusive range 0x20 through 0x7E). ASCII NUL (0x00) filled on the right, if necessary. The number of bytes used depends on the context.
- *DateTime*: Little Endian byte order, unsigned binary value, 8 bytes in size. The date and time, in UTC, represented as nanoseconds past the UNIX epoch (00:00:00 UTC on 1 January 1970). The nanoseconds portion is set to 0 by the exchange (the actual precision will be in microseconds).
  - `E0 FE 20 F7 36 71 F8 11` = 1,294,909,373,757,325,000 = 2011-01-13 09:02:53.757325 UTC
- *Date*: Little Endian byte order, unsigned binary value, 4 bytes in size. The YYYYMMDD expressed as an integer.

  - `A7 3C 34 01` = 20200615 = June 15, 2020
- *Reserved*: Sequence of ASCII NUL (0x00) values when sent by the member. May contain any values when sent by the exchange and should be ignored by the member.

Some blank Alpha and Text fields (entirely filled with ASCII NUL (0x00)) are eligible to be populated with a port default value. See US Equities BOE Port Attributes on page 67 for eligible port parameters.

Protocol Features

The exchange does not guarantee messages sent by Members/TPHs to the exchange, including through protocols such as TCP. Members/TPHs are responsible to monitor the status of the messages they send to the exchange.

Architecture and Message in Flight Settings

Each BOE order handler process will allow a single TCP connection from a member. Connection attempts from unknown source IP ranges will be blocked to prevent unauthorized access to BOE ports. The Cboe NOC should be contacted in the event that a Member desires to connect from a new source IP range.

Each BOE order handler will connect, using a proprietary UDP protocol, to all matching units. Connections from order handlers to matching engines are latency equalized. The connections between order handlers and matching units are governed by an internal flow control mechanism to control burst rates.

The number of messages in flight between each order handler and matching engine is 32. In addition, when the total number of unacknowledged messages exceeds 1,024, the BOE order handler will stop reading from the member-facing TCP socket. This will cause the order handler to stop removing bytes from the TCP receive buffer, and will prevent the member from sending more TCP data once the member's send buffer is full.

When the total number of unacknowledged messages falls below 960, the reading of the member facing TCP socket will be resumed.

For message in flight counting purposes each new order, cancel/replace, or cancel message will count as one message.

Cboe may either update the message in flight or the total number of unacknowledged messages settings with notice. Changes to reduce either limit will be made with at least two weeks' notice. Cboe reserves the ability to increase either limit immediately with notice.

Cboe Market Close (BZX Only)

Cboe Market Close on BZX allows for Members to submit buy and sell Market-On-Close orders designated for participation in CMC in order to obtain the official closing price for any matched shares. Any remaining shares will be cancelled back to Members.

At 2:30 a.m. ET, Members may enter new orders to participate in CMC. Members will populate the following BOE fields to send a CMC order.

Table 3. CMC `New Order` Fields

FIELD NAME	REQ'D	DESCRIPTION
OrdType	Y	1=Market
TimeInForce	Y	7=At the Close
RoutingInst	Y	B=Book Only
CmcSessions	N	A=3:15 p.m. D=3:30 p.m. L=3:49 p.m. S=3:54 p.m. (NASDAQ-listed only)

An **`Order Restated`** message will be sent for any fully or partially matched CMC order after the order executes in a CMC matching session. A standard **`Order Canceled`** message will be sent for any CMC order that does not have any matched quantity after the final CMC session when the eligible order has finished. The restatement will contain the following fields:

Table 4. CMC `Order Restated` Fields

FIELD NAME	DESCRIPTION
RestatementReason	C=CMC Restatement
LastShares	Number of Shares Cancelled (if any)
LeavesQty	Quantity of unexecuted shares. Will include shares already matched in a previous session.
CmcMatchQty	Matched size for CMC matching session.

After the closing price is received one or more **`Order Execution`** messages, totaling the sum of the matched size from each restatement, will be sent for each CMC order. The execution message will contain the following fields:

Table 5. CMC `Order Execution` Fields

FIELD NAME	DESCRIPTION
LastShares	Execution Size
LastPx	Execution Price (official close price)

If a closing price is not received from the primary listing exchange by 8:00 p.m. ET, then all CMC matched shares will be cancelled. In the event that a closing price is updated by the primary listing exchange after its initial publication, then a Trade Cancel or Correct message will be sent to update the execution price for each CMC execution impacted by the changed closing price.

Periodic Auctions (BYX Only)

The Periodic Auction process is a price forming auction that runs for a fixed time period of 100 milliseconds and is only available during the regular trading session. A Periodic Auction starts when two opposite side Periodic Auction orders of either type can match. Continuous book displayed and non-displayed orders are not eligible to initiate a Periodic Auction but may be swept into the auction at the end of the auction process. Members can populate the following instructions to send a Periodic Auction order.

Table 6. Periodic Auctions Fields

FIELD NAME	REQ'D	DESCRIPTION
CrossTradeFlag	Y	Can be entered on individual orders or as a port setting. 0= None (to override port settings if necessary) 1= Periodic Auction Only 2= Periodic Auction Eligible
TimeInForce	Y	R= Regular Hours only (Required for Periodic Auction Only orders) All TIFs except FOK and IOC supported for Periodic Auction Eligible orders.
DisplayIndicator	Y	I= Invisible
MinQty	N	Minimum total fill quantity, which may be made up of several consecutive smaller fills. If Enable True *MinQty* port attribute is set to Yes, orders will be converted into standard *MinQty* during a Periodic Auction. Periodic Auction Eligible orders will remain as True *MinQty* in the continuous book.
ExecInst	N	If *OrdType* (40)=P, only the following are accepted for Periodic Auction Only orders: R=Primary Peg M=Midpoint Peg If *OrdType* (40) =P, all instructions allowed for Periodic Auction Eligible orders. If *ExecInst*=m, the 'No Trade in a Locked Market' instruction will only be applied when the PAE order is live in continuous book trading and will not apply to either initiating a Periodic Auction or to executing at the conclusion of the Periodic Auction.
PegDifference	N	For Periodic Auction Only Orders, aggressive offsets only for primary peg orders. Orders with passive offsets will be rejected. No restrictions for Periodic Auction Eligible Orders.

The Execution Report will contain a new ***SubLiquidityIndicator*** value for Periodic Auction orders.

Table 7. Periodic Auctions Execution Report Field

FIELD NAME	REQ'D	DESCRIPTION
SubLiquidityIndicator	Y	P=Periodic Auction

Maximum Open Order Limits

The exchange limits the maximum number of open orders allowed on a BOE port to 100,000 per port (BYX/EDGA) and 300,000 per port (BZX/EDGX). New orders will be rejected once this limit is breached until the number of open orders drops back below the limit.

Stale NBBO

A stale NBBO will occur when the Cboe trading system determines that one or more SIP quote channels is impaired or down completely. If the trading system detects that an NBBO is stale, new orders for the affected symbol(s) will be rejected. Any existing orders will remain on the book but will not be allowed to update (user updates, peg movements, or sliding updates). Members will be allowed to cancel any open orders. Regular trading will resume when the NBBO for a given symbol is determined to be healthy by the Cboe trading system.

Session

Message Header Fields

Each message has a twelve-byte header. The two initial *StartOfMessage* bytes are present to aid in message reassembly for network capture purposes. The *MatchingUnit* field is only populated on sequenced, non-session level messages sent from Cboe to the Member. Messages from Member to Cboe and all session level messages must always set this value to 0.

Table 8. Message Header Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	B0 E3 (58288)
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes of the *StartOfMessage* field.
MessageType	4	2	Binary	Message type
MatchingUnit	6	1	Binary	Matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH. For session level traffic the unit is set to 0. For messages from Member to Cboe, the unit must be 0.
Reserved	7	1	Binary	Must be zero from member. Value unspecified from Cboe.
SequenceNumber	8	4	Binary	The sequence number for this message. Messages from Cboe to Member are sequenced distinctly per matching unit. Zero for session level traffic.

Handling of Invalid Message Headers

If an invalid message header is encountered, the Exchange will disconnect the port. A message header is considered invalid if any of the following is encountered:

- *StartOfMessage* is not B0E3.
- *MessageLength* is not appropriate for the given message type.
- *MessageType* is not a documented message type for Cboe. Note that the types of application messages accepted will vary between Cboe and other BOEv3 exchanges.

Login, Replay and Sequencing

Session level messages, both inbound (Member to Cboe) and outbound (Cboe to Member) are unsequenced.

Inbound (Member to Cboe) application messages are sequenced. Upon reconnection, Cboe informs the member of the last processed sequence number; the member may choose to resend any messages with sequence numbers greater than this value. A gap forward in the member's incoming sequence number is permitted at any time and is ignored by Cboe. Gaps backward in sequence number (including the same sequence number used twice) are never permitted and will always result in a **`Logout Response`** message being sent and the connection being dropped.

Many outbound (Cboe to Member) application messages are monotonically sequenced per matching unit. Each message's documentation will indicate whether it is sequenced or unsequenced. While matching units on BOE correspond directly to matching units on Multicast PITCH, sequence numbers do not.

Upon reconnection, a member sends the last received sequence number per matching unit in a **`LoginRequest`** message. Cboe will then respond with any missed messages.

The *ReplayInstruction* value can be used to control the replay behavior for unknown units. If the flag is set to F (Fail), Cboe will send a **`Login Response`** message and close the connection if the login request does not list all matching units. If the flag is set to S (Skip), Cboe will exclude messages from unspecified matching units during replay. If the flag is set to R (Replay), Cboe will send messages from unspecified units during replay (starting with sequence 1 per unspecified unit). Cboe will send a **`Replay Complete`** message when replay is finished. If there are no messages to replay, a **`Replay Complete`** message will be sent immediately after a **`Login Response`** message. Cboe will reject all orders during replay.

If a member has requested replay messages using a properly formatted **`LoginRequest`** message after a disconnect, any unacknowledged orders remaining with the member after the **`Replay Complete`** message is received should be assumed to be unknown to Cboe.

Unsequenced messages will not be included during replay.

A session is identified by the *SessionId* and *SessionSubId* (both supplied by Cboe).

If a login is rejected, an appropriate **`Login Response`** message will be sent and the connection will be terminated.

Sequence Reset

A reset sequence operation is not available for Binary Order Entry. However, a member can send a **`LoginRequest`** message with *ReplayInstruction* set to S (Skip), and *NumberOfUnits* set to zero. Then, upon receiving a **`Login Response`** message from Cboe, the member can use the *ClientSequence* value in that message as the sequence starting point for sending future messages.

Heartbeats

`Client Heartbeat` messages are sent from Member to Cboe and **`Server Heartbeat`** messages are sent from Cboe to Member if no other data has been sent in that direction for one second. Like other session level messages, heartbeats from Cboe to the Member do not increment the sequence number. If Cboe receives no inbound data or heartbeats for 5 seconds, a **`Logout`** message will be sent and the connection will be terminated. **Members are encouraged to have a one second heartbeat interval and to perform similar connection staleness logic.**

Logging Out

To gracefully log out of a session, a **`Logout Request`** message should be sent by the Member. Cboe will finish sending any queued data for that port and will then respond with its own **`Logout`** message and close the connection. After receipt of a **`Logout Request`** message, Cboe will ignore all other inbound (Member to Cboe) messages except for **`Client Heartbeat`** message.

Session Messages

Table 9. Session Message Types

DIRECTION	MESSAGE NAME	TYPE	SEQUENCED
Member to Cboe	**`Login Request`**	01 00 (1)	No
Member to Cboe	**`Logout Request`**	02 00 (2)	No
Member to Cboe	**`Client Heartbeat`**	03 00 (3)	No
Cboe to Member	**`Login Response`**	F5 01 (501)	No
Cboe to Member	**`Replay Complete`**	F6 01 (502)	No
Cboe to Member	**`Logout Response`**	F7 01 (503)	No
Cboe to Member	**`Server Heartbeat`**	F8 01 (504)	No

Member to Cboe

Login Request Message Fields

A **`LoginRequest`** message must be sent as the first message upon connection.

The message includes a repeating group starting with field *UnitNumber* which repeats *NumberOfUnits* times. This can be used to specify the last consumed sequence numbers per matching unit received by the member. Cboe uses these sequence numbers to determine what outbound (Cboe to Member) traffic, if any, was missed by the member. If *NumberOfUnits*= 0, it is assumed the member has not received any messages (e.g., start of day).

The member does not need to include a sequence number for a unit if they have never received messages from it. If the member wishes to send a value for the unit anyway, 0 is the only allowed value for *NumberOfUnits*.

If the member is sending a **`LoginRequest`** message to a Unit Order Port, Unit Quoting Port, or Unit Purge Port, the only *UnitNumber* accepted is the number of the port's unit.

Table 10. Login Request Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x0001 (1)
MatchingUnit	6	1	Binary	Must be zero
Reserved	7	1	Binary	Must be zero
SequenceNumber	8	4	Binary	Must be zero
SessionId	12	4	AlphaNumeric	Session Id as supplied by Cboe
SessionSubId	16	4	AlphaNumeric	Session Sub Id as supplied by Cboe
Password	20	10	AlphaNumeric	The password associated with the *SessionId* and *SessionSubId*.
ReplayInstruction	30	1	Text	Controls replay behavior for unknown units. Must be one of: F = fail if unit not specified R = replay any unspecified unit from zero

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
				`S` = skip replay of unspecified units
NumberOfUnits	31	1	Binary	The number (possibly 0) of unit/sequence pairs to follow, one per unit from which the member has received messages over this port. The value must be `0` or `1` for unitized BOE ports.
→UnitNumber	32	1	Binary	A unit number. This must be the unit number of the port.
→UnitSequence	33	4	Binary	Last received sequence number for the unit.

Login Request Message Example

Table 11. Login Request Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`23 00`	35 bytes
MessageType	`01 00`	*LoginRequest*
MatchingUnit	`00`	Must be zero
Reserved	`00`	Must be zero
SequenceNumber	`00 00 00 00`	Must be zero
SessionId	`54 45 53 54`	"TEST"
SessionSubId	`30 30 30 31`	"0001"
Password	`54 45 53 54 49 4E 47 00 00 00`	"TESTING"
ReplayInstruction	`46`	"F" (Fail)
NumberOfUnits	`01`	1 unit
→UnitNumber	`02`	Unit 2
→UnitSequence	`3F 15 00 00`	5,439

Logout Request Message Fields

To end the session, the member should send a **`Logout Request`** message. Cboe will finish sending any queued data and finally respond with a **`Logout Response`** message and close the connection.

A member may simply close the connection without logging out, but may lose any queued messages by doing so.

Table 12. Logout Request Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	B0 E3 (58288)
MessageLength	2	2	Binary	0A 00 (10)
MessageType	4	2	Binary	02 00 (2)
MatchingUnit	6	1	Binary	Must be zero
Reserved	7	1	Binary	Must be zero
SequenceNumber	8	4	Binary	Must be zero

Logout Request Message Example

Table 13. Logout Request Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`0A 00`	10 bytes
MessageType	`02 00`	Logout Request
MatchingUnit	`00`	Must be zero
Reserved	`00`	Must be zero
SequenceNumber	`00 00 00 00`	Must be zero

Client Heartbeat Message Fields

See Heartbeats on page 23 for more information about heartbeat and the session level protocol.

Table 14. Client Heartbeat Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	B0 E3 (58288)
MessageLength	2	2	Binary	0A 00 (10)
MessageType	4	2	Binary	03 00 (3)
MatchingUnit	6	1	Binary	Must be zero
Reserved	7	1	Binary	Must be zero
SequenceNumber	8	4	Binary	Must be zero

Client Heartbeat Message Example

Table 15. Client Heartbeat Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`0A 00`	10 bytes
MessageType	`03 00`	Client Heartbeat
MatchingUnit	`00`	Must be zero
Reserved	`00`	Must be zero
SequenceNumber	`00 00 00 00`	Must be zero

Cboe to Member

Login Response Message Fields

`A Login Response` message is sent in response to a **`Login Request`** message. On a successful login, ***LoginResponseStatus*** will be set to A. On a failed login, ***LoginResponseStatus*** will be set to a value other than A, and ***LoginResponseText*** will be set to an appropriate failure description.

Note that the repeating group starting with field ***UnitNumber*** provides the highest available Cboe to member sequence number for the specified unit. All units will be included in a successful *Login Response* message, regardless of whether all units were listed in the *Login Request* message.

Table 16. Login Response Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	B0 E3 (58288)
MessageLength	2	2	Binary	(76 + *NumberOfUnits**5)
MessageType	4	2	Binary	F5 01 (501)
MatchingUnit	6	1	Binary	Will be zero
Reserved	7	1	Binary	Unspecified
SequenceNumber	8	4	Binary	Will be zero
LoginResponseStatus	12	1	Text	Accepted, or the reason for the rejection. A = Accepted B = Session In Use D = Disabled I = Invalid Unit M= Invalid Message N = Not Authorized Q= Sequence Ahead S = Invalid Session X = Invalid replay instruction
LoginResponseText	13	60	Text	Human-readable text with additional information about the reason for rejection. ASCII NUL (0x00) filled on the right, if necessary.
ClientSequence	73	4	Binary	Last inbound (member to Cboe) message sequence number processed by Cboe on this port.
NumberOfUnits	77	1	Binary	A number, n, of unit/sequence pairs to follow, one per unit. A pair for every unit will be sent, even if no messages have been sent to this port today. For logins having *LoginResponseStatus* other than A, Q, or R, this will be 0.
→UnitNumber	78	1	Binary	A unit number
→UnitSequence	79	4	Binary	Highest available Cboe to member sequence number for the unit.

Login Response Message Example

Table 17. Login Response Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes

FIELD NAME	HEXADECIMAL	DESCRIPTION
MessageLength	`56 00`	86 bytes
MessageType	`F5 01`	*Login Response*
MatchingUnit	`00`	Always zero
Reserved	`00`	
SequenceNumber	`00 00 00 00`	Always zero
LoginResponseStatus	`41`	A (Accepted)
LoginResponseText	`54 45 53 54 49 4E 47 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00`	`TESTING`
ClientSequence	`01 00 00 00`	1
NumberOfUnits	02	2 units
→*UnitNumber*	01	Unit 1
→*UnitSequence*	06 41 27 00	160,790
→*UnitNumber*	02	Unit 2
→*UnitSequence*	3F 15 00 00	5,439

Replay Complete Message Fields

See Login, Replay and Sequencing on page 21 for more information about heartbeats and the session level protocol.

Table 18. Replay Complete Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`B0 E3` (58288)
MessageLength	2	2	Binary	`0A` (10)
MessageType	4	2	Binary	`F6 01` (502)
MatchingUnit	6	1	Binary	Will be zero
Reserved	7	1	Binary	Unspecified
SequenceNumber	8	4	Binary	Will be zero

Replay Complete Message Example

Table 19. Replay Complete Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`0A 00`	10 bytes
MessageType	`F6 01`	Replay Complete
MatchingUnit	`00`	Always zero
Reserved	`00`	
SequenceNumber	`00 00 00 00`	Always zero

Logout Response Message Fields

A **`Logout Response`** message is usually sent in response to a **`Logout Request`** message. Any queued data is transmitted, a **`Logout Response`** message is sent, and Cboe will close the connection. However, a **`Logout Response`** message may also be sent if the member violates the protocol specification (e.g., by moving backwards in sequence number).

Table 20. Logout Response Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`B0 E3` (58288)
MessageLength	2	2	Binary	`47 00` (71)
MessageType	4	2	Binary	`F7 01` (503)
MatchingUnit	6	1	Binary	Will be zero
Reserved	7	1	Binary	Unspecified
SequenceNumber	8	4	Binary	Will be zero
LogoutReason	12	1	Text	Reason for the logout. `U` = User Requested `A` = Administrative `!` = Protocol Violation
LogoutReasonText	13	60	Text	Human-readable text with additional information about the reason for logout.

Logout Response Message Example

Table 21. Logout Response Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`47 00`	71 bytes
MessageType	`F7 01`	Logout Response
MatchingUnit	`00`	Always zero
Reserved	`00`	
SequenceNumber	`00 00 00 00`	Always zero
LogoutReason	`55`	U (User Requested)

LogoutReasonText	`54 45 53 54 49 4E 47 00 00 00 00 00 00`
	`00 00 00 00 00 00 00 00 00 00 00 00 00`
	`00 00 00 00 00 00 00 00 00 00 00 00 00`
	`00 00 00 00 00 00 00 00 00 00 00 00 00`
	`00 00 00 00 00 00 00 00`
		`TESTING`

Server Heartbeat Message Fields

See Heartbeats on page 23 for more information about heartbeats and the session level protocol.

Table 22. Server Heartbeat Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`B0 E3` (58288)
MessageLength	2	2	Binary	`0A` (10)
MessageType	4	2	Binary	`F8 01` (504)
MatchingUnit	6	1	Binary	Will be zero
Reserved	7	1	Binary	Unspecified
SequenceNumber	8	4	Binary	Will be zero

Server Heartbeat Message Example

Table 23. Server Heartbeat Message Example

FIELD NAME	HEXADECIMAL	DESCRIPTION
StartOfMessage	`B0 E3`	Start of message bytes
MessageLength	`0A 00`	10 bytes
MessageType	`F8 01`	Server Heartbeat
MatchingUnit	`00`	Always zero
Reserved	`00`	
SequenceNumber	`00 00 00 00`	Always zero

Application Messages

Member to Cboe

New Order Message Fields

Submission of a new order to Cboe.

NewOrderUSEquitiesV1 Message Fields

Table 24. NewOrderUSEquitiesV1 Message Fields

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`0xB0 0xE3`
MessageLength	2	2	Binary	
MessageType	4	2	Binary	`0x0FA1`
MatchingUnit	6	1	Binary	Zero - from member message
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	Next sequence number (or zero)
ClOrdID	12	20	Text	
Side	32	1	Text	
OrderQty	33	4	Binary	
ClearingFirm	37	4	Alpha	
ClearingAccount	41	4	Text	
Price	45	8	BinaryPrice	
ExecInst	53	1	Text	
OrdType	54	1	Text	
TimeInForce	55	1	Text	
MinQty	56	4	Binary	
MaxFloor	60	4	Binary	
Symbol	64	8	Alphanumeric	
Capacity	72	1	Text	
RoutingInst	73	4	Text	
Account	77	16	Text	
DisplayIndicator	93	1	Text	
DiscretionAmount	94	2	Binary	
PegDifference	96	8	BinaryPrice	
PreventMatch	104	3	Text	
LocateReqd	107	1	Text	
ExpireTime	108	8	DateTime	
AttributedQuote	116	1	Text	
ExtExecInst	117	1	Text	
DisplayRange	118	4	Binary	
StopPx	122	8	BinaryPrice	
RoutStrategy	130	6	Text	
RouteDeliveryMethod	136	3	Text	
ExDestination	139	1	Text	
RiskGroupID	140	2	Binary	
CrossTradeFlag	142	1	Text	
LocateBroker	143	4	Text	

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StepUpAmount	147	4	ShortBinaryPrice	
CmcSessions	151	2	Alpha	

NewOrderShortUSEquitiesV1 Message Fields

Table 25. NewOrderShortUSEquitiesV1 Message Fields

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`0xB0 0xE3`
MessageLength	2	2	Binary	
MessageType	4	2	Binary	`0x0FA6`
MatchingUnit	6	1	Binary	Zero - from member message
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	Next sequence number (or zero)
ClOrdID	12	20	Text	
Side	32	1	Text	
OrderQty	33	4	Binary	
ClearingFirm	37	4	Alpha	
ClearingAccount	41	4	Text	
Price	45	8	BinaryPrice	
ExecInst	53	1	Text	
OrdType	54	1	Text	
TimeInForce	55	1	Text	
Symbol	56	8	Alphanumeric	
Capacity	64	1	Text	
ShortRoutingInst	65	1	Text	
ShortAccount	66	10	Text	
DisplayIndicator	76	1	Text	
RiskGroupID	77	2	Binary	
LocateBroker	79	4	Text	

Cancel Order Message Fields

Request to cancel a single order.

CancelOrderUSEquitiesV1 Message Fields

Table 26. CancelOrderUSEquitiesV1 Message Fields

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`0xB0 0xE3`
MessageLength	2	2	Binary	
MessageType	4	2	Binary	`0x0FA3`
MatchingUnit	6	1	Binary	Zero (from member message)
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	
OrigClOrdID	12	20	Text	
ClearingFirm	32	4	Alpha	

Modify Order Message Fields

Request to modify an order. *Price*, *Side*, *OrderQty*, *StopPx*, *MaxFloor*, and *OrdType* may be adjusted. Modifies will result in a loss of time priority unless the modification involves a decrease in *OrderQty*, a change to *MaxFloor*, a change to *StopPx*, or a change in *Side* from sell long to sell short or vice-versa.

Other fields (including *ExecInst)* will be ignored, and the value from the original order will be reused. In particular, note that when a Day ISO is modified, the ISO designation is applied to the new order.

A change in *MaxFloor* takes effect on the next reserve reload. A zero value for *MaxFloor* will be ignored. If *MaxFloor* is to be removed completely, then the order should be cancelled and a new order sent.

Changes in *OrderQty* result in an adjustment of the current order's *OrderQty*. The new *OrderQty* does not directly replace the current order's *LeavesQty*. Rather, a delta is computed from the current *OrderQty* and the replacement *OrderQty*. This delta is then applied to the current *LeavesQty*. If the resulting *LeavesQty* is less than or equal to zero, the order is cancelled. This results in safer behavior when the modification request overlaps partial fills for the current order, leaving the Member in total control of the share exposure of the order.

A **`Modify Order`** message should not be issued until the **`Order Acknowledgment`** message for the previous **`New Order`** or **`Order Modified`** message for the previous **`Modify Order`** message has been received. The BOE handler will reject a new **`Modify Order`** message if it has not been accepted or it has not seen the result of the prior modification from the Matching Engine. However, **`Modify Order`** message requests that merely reduce *OrderQty* may be overlapped if the existing *ClOrdID* is reused, as long as the trading identifier has not been opted-in to daily limit trading risk controls. This is the only case where reuse of the *ClOrdID* is allowed.

A maximum of 1,295 **`Modify Order`** message requests may be made to a single order each trading day. Once the 1,295th modification is made, the next user-generated message on the order should be a **`Cancel Order`** message request.

BOEv2 to BOEv3 Migration Notice

The BOEv3 **`Modify Order`** message must specify all values to apply to the update. This is unlike BOEv2, wherein the absence of optional fields implied that the values would be carried forward from the version of the order being modified (blank fields in BOEv3 will have port defaults applied when available).

ModifyOrderUSEquitiesV1 Message Fields

Table 27. ModifyOrderUSEquitiesV1 Message Fields

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3
MessageLength	2	2	Binary	

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
MessageType	4	2	Binary	`0x0FA2`
MatchingUnit	6	1	Binary	Zero - from member message
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	The sequence number for this message.
ClOrdID	12	20	Text	
OrigClOrdID	32	20	Text	
ClearingFirm	52	4	Alpha	
Symbol	56	8	Alphanumeric	
OrderQty	64	4	Binary	
Price	68	8	BinaryPrice	
OrdType	76	1	Text	
Side	77	1	Text	
MaxFloor	78	4	Binary	
StopPx	82	8	BinaryPrice	
CancelOrigOnReject	90	1	Text	
LocateBroker	91	4	Text	

Purge Orders

Request to cancel a group of orders across all of the firm's sessions. **`Purge Orders`** messages are only accepted on dedicated BOE Purge Ports. The *MassCancelInst* optional field is required and must be selected and populated. In addition, a firm may choose to implement one or more filters:

- *ClearingFirm* Filter - optionally cancel based on *ClearingFirm*. This is required for any self-imposed lockouts or for service bureaus. Set using first character of *MassCancelInst* and sending *ClearingFirm*.
- Symbol Filter - optionally cancel based on symbol. Set by sending a valid symbol. Cannot be combined with *RiskGroupID* filter.
- *RiskGroupID* Filter - optionally cancel based on *RiskGroupID*. A maximum of 10 *RiskGroupID*s may be included on a single **`Purge Orders`** message. Set by populating *RiskGroupIDCnt* to a non-zero value. Cannot be combined with symbol filter.
- *TargetMatchingUnit* Filter - *RiskGroupID* or *MPID* purges with no *Symbol* filter may be directed to a specific matching unit using the *TargetMatchingUnit* field. If *TargetMatchingUnit* is zero or not specified, then these purge types will be sent to all matching units. **Note that this may result in self-imposed, risk lockouts occurring on select units while other units are still trading.**

A firm may use the second character of *MassCancelInst* to set the acknowledgment style. If a single **`Mass Cancel Acknowledgment`** message is selected, then *MassCancelID* must be sent.

A firm may also impose a lockout using the third character of *MassCancelInst*, which cancels any open orders and causes inbound orders received after the lockout to be rejected. A self-imposed lockout requires an MPID (*ClearingFirm*) to be sent. The firm may also choose to lockout by symbol or *RiskGroupID* but not by both.

The system limits the rate at which identical **`Purge Orders`** message requests can be submitted to the system. Requests are restricted to twenty (20) messages per second per port.

An identical purge message is defined as a message having all of the same *RiskGroupID*, *Symbol*, *ClearingFirm*, *TargetMatchingUnit*, and Lockout Instruction field values, as a previously received message.

PurgeOrdersUSEquitiesV1 Message Fields

Table 28. PurgeOrdersUSEquitiesV1 Message Fields

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`0xB0 0xE3`
MessageLength	2	2	Binary	
MessageType	4	2	Binary	`0x0FA5`
MatchingUnit	6	1	Binary	Zero (from member message)
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	
MassCancelID	12	20	Text	

FIELD	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
ClearingFirm	32	4	Alpha	
MassCancelInst	36	8	Text	
Symbol	44	8	Alphanumeric	
TargetMatchingUnit	52	1	Binary	
RiskGroupIDCnt	53	1	Binary	
→ *RiskGroupID*	54	2	Binary	(Repeats *RiskGroupIDCnt* times)

Reset Risk Message Fields

Reset or release Firm, Symbol, or Risk Group ID level lockout conditions resulting from risk profile trips or self-imposed lockouts issued via **`Purge Orders`** messages.

Only one unique risk reset of a given type (EFID, Symbol, CustomGroupID) is allowed per 100 milliseconds per port. Additional resets will be ignored (***RiskResetResult***=<space>). For example, a customer may reset risk for ***RiskGroupID***=1 and may not reset risk again for ***RiskGroupID***=1 until 100 milliseconds has elapsed. This restriction is designed to safeguard the trading platform from excessive risk messaging.

Using ***Symbol*** and ***TargetMatchingUnit*** at the same time will result in a reject with ***RiskResetResult***=M, even if ***TargetMatchingUnit*** is otherwise correct for the given ***Symbol***. Either ***Symbol*** should be empty (NUL filled) or ***TargetMatchingUnit*** should be zero.

ResetRiskUSEquitiesV1 Message Fields

Table 29. ResetRiskUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x0FA4
MatchingUnit	6	1	Binary	Zero - from member message
Reserved	7	1	Binary	MUST be zero from member
SequenceNumber	8	4	Binary	Next sequence number (or zero)
RiskStatusID	12	16	Text	
RiskReset	28	8	Text	
ClearingFirm	36	4	Alpha	
Symbol	40	8	Text	
TargetMatchingUnit	48	1	Binary	
RiskGroupID	49	2	Binary	

Cboe to Member

Order Acknowledgment Message Fields

`Order Acknowledgment` messages are sent in response to **`New Order`** messages. The message corresponds to a FIX Execution Report with *ExecType* (150) =0 (New).

OrderAcknowledgementUSEquitiesV1 Message Fields

Table 30. OrderAcknowledgementUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x1195 (4501)
MatchingUnit	6	1	Binary	Unit number which accepted the order
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClOrdID	22	20	Text	
OrderID	42	8	Binary	
Side	50	1	Text	
Price	51	8	BinaryPrice	
OrdType	59	1	Text	
Symbol	60	8	Alphanumeric	
ClearingFirm	68	4	Alpha	
LeavesQty	72	4	Binary	
DisplayPrice	76	8	BinaryPrice	
WorkingPrice	84	8	BinaryPrice	
BaseLiquidityIndicator	92	1	Text	
SubLiquidityIndicator	93	1	Text	

(New fields may be introduced at the end of this message. Consequently, members must treat any additional bytes present as undefined values.)

Order Rejected Message Fields

`Order Rejected` messages are sent in response to a **`New Order`** message which must be rejected. This message corresponds to a FIX Execution Report with *ExecType* (150) =8 (Rejected). **`Order Rejected`** messages are unsequenced.

OrderRejectedUSEquitiesV1 Message Fields

Table 31. OrderRejectedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x1196 (4502)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClOrdID	22	20	Text	
ClearingFirm	42	4	Alpha	
OrderRejectReason	46	1	Text	
Text	47	60	Text	

Order Modified Message Fields

`Order Modified` messages are sent in response to a **`Modify Request`** message to indicate that the order has been successfully modified.

In some cases, the last message to be received on an order's lifecycle will be an **`Order Modified`** message. The way to know the order is no longer live is to inspect *LeavesQty*. An example of this would be modification of an order whilst an execution is being generated, resulting in the order being reduced to zero outstanding quantity.

OrderModifiedUSEquitiesV1 Message Fields

Table 32. OrderModifiedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x1197 (4503)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClOrdID	22	20	Text	
OrigClOrdID	42	20	Text	
OrderID	62	8	Binary	
ClearingFirm	70	4	Alpha	
Symbol	74	8	Alphanumeric	
Side	82	1	Text	
Price	83	8	BinaryPrice	
OrdType	91	1	Text	
MaxFloor	92	4	Binary	
OrderQty	96	4	Binary	
StopPx	100	8	BinaryPrice	
LeavesQty	108	4	Binary	
DisplayPrice	112	8	BinaryPrice	
WorkingPrice	120	8	BinaryPrice	
BaseLiquidityIndicator	128	1	Text	
SecondaryOrderID	129	8	Binary	

Order Restated Message Fields

`Order Restated` messages are sent to inform the Member that an order has been asynchronously modified for some reason without an explicit **`Modify Order`** message request having been sent. Some example (non-exhaustive) reasons for **`Order Restated`** messages being sent:

- A reserve (iceberg) order has been reloaded.
- An order's remaining quantity was decremented because of a prevented wash trade.
- A routed order has returned to rest on the book after matching liquidity on another market.

Members should be prepared to accept and apply **`Order Restated`** messages for any reason.

In some cases, the last message to be received on an order's lifecycle will be an **`Order Restated`** message. The way to know the order is no longer live is to inspect *LeavesQty*. An example of this would be restatement of an order in some cases due to *PreventMatch* being set to `d`.

OrderRestatedUSEquitiesV1 Message Fields

Table 33. OrderRestatedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x1199 (4505)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClOrdID	22	20	Text	
OrderID	42	8	Binary	
ClearingFirm	50	4	Alpha	
Symbol	54	8	Alphanumeric	
OrderRestatementReason	62	1	Text	
OrderQty	63	4	Binary	
Price	67	8	BinaryPrice	
LeavesQty	75	4	Binary	
DisplayPrice	79	8	BinaryPrice	
WorkingPrice	87	8	BinaryPrice	
BaseLiquidityIndicator	95	1	Text	
SecondaryOrderID	96	8	Binary	
LastShares	104	4	Binary	
LastPx	108	8	BinaryPrice	
CmcMatchQty	116	4	Binary	

Modify Rejected Message Fields

`User Modify Rejected` messages are sent in response to a **`Modify Order`** message for an order which cannot be modified. **`User Modify Rejected`** messages are unsequenced.

This message corresponds to a FIX Execution Report with *MsgType* (35)=9 (Order Cancel Reject) and *CxlRejResponseTo* (434) =2 (Order Cancel/Replace Request).

ModifyRejectedUSEquitiesV1 Message Fields

Table 34. ModifyRejectedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x1198 (4504)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClearingFirm	22	4	Alpha	
ClOrdID	26	20	Text	
OrigClOrdID	46	20	Text	
ModifyRejectReason	66	1	Text	
Text	67	60	Text	

Order Cancelled Message Fields

This message indicates an order has been cancelled. The cancellation may be solicited or unsolicited. A solicited cancellation is in response to a **`Cancel Order`**, or a **`Purge Orders`** message.

OrderCancelledUSEquitiesV1 Message Fields

Table 35. OrderCancelledUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x119A (4506)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClearingFirm	22	4	Alpha	
ClOrdID	26	20	Text	
CancelReason	46	1	Text	

Cancel Rejected Message Fields

A **`Cancel Rejected`** message is sent in response to a **`Cancel Order`** message to indicate that the cancellation cannot occur. **`Cancel Rejected`** messages are unsequenced.

CancelRejectedUSEquitiesV1 Message Fields

Table 36. CancelRejectedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	`0xB0 0xE3 (58288)`
MessageLength	2	2	Binary	
MessageType	4	2	Binary	`0x119B (4507)`
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClearingFirm	22	4	Alpha	
ClOrdID	26	20	Text	
CancelRejectReason	46	1	Text	
Text	47	60	Text	

Order Execution Message Fields

An **`Order Execution`** message is sent for each fill on an order.

Rather than returning a monetary value indicating the rebate or charge for an execution, the *FeeCode* is an indication of a fee classification corresponding to an item on the venue's fee schedule.

OrderExecutionUSEquitiesV1 Message Fields

Table 37. OrderExecutionUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x119C (4508)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClearingFirm	22	4	Alpha	
ClOrdID	26	20	Text	
ExecID	46	8	Binary	
LastShares	54	4	Binary	
LastPx	58	8	BinaryPrice	
LeavesQty	66	4	Binary	
BaseLiquidityIndicator	70	1	Text	
SubLiquidityIndicator	71	1	Text	
ContraBroker	72	4	Alphanumeric	
Side	76	1	Text	
Symbol	77	8	Alphanumeric	
FeeCode	85	2	Alphanumeric	
AccessFee	87	8	AccessFee	

Trade Cancel or Correct Message Fields

Used to relay a trade which has been cancelled (busted) or corrected (price change only). The *CorrectedPrice* field will be set to 0 for cancelled trades and to the new trade price for corrected trades. **`Trade Cancel or Correct`** messages can be sent for same day as well as previous day trades.

TradeCancelCorrectUSEquitiesV1Block Message Fields

Table 38. TradeCancelCorrectUSEquitiesV1Block Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x119D (4509)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
ClOrdID	22	20	Text	
OrderID	42	8	Binary	
ExecRefID	50	8	Binary	
Side	58	1	Text	
BaseLiquidityIndicator	59	1	Text	
SubLiquidityIndicator	60	1	Text	
ClearingFirm	61	4	Alpha	
ClearingAccount	65	4	Text	
LastShares	69	4	Binary	
LastPx	73	8	BinaryPrice	
CorrectedPrice	81	8	BinaryPrice	
OrigTime	89	8	DateTime	
Symbol	97	8	Alphanumeric	
Capacity	105	1	Text	

Purge Rejected Message Fields

A **`Purge Rejected`** message is sent in response to a **`Purge Orders`** message to indicate that the mass cancellation cannot occur. **`Purge Rejected`** messages are unsequenced.

PurgeRejectedUSEquitiesV1 Message Fields

Table 39. PurgeRejectedUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x11A0 (4512)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
MassCancelID	22	20	Text	
PurgeRejectReason	42	1	Text	
Text	43	60	Text	

Reset Risk Acknowledgment Message Fields

Response to a **`Reset Risk`** message request.

ResetRiskAcknowledgementUSEquitiesV1 Message Fields

Table 40. ResetRiskAcknowledgementUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x119E (4510)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
RiskStatusID	14	16	Text	
RiskResetResult	30	1	Text	

Purge Acknowledgement Message Fields

A **`Purge Acknowledgment`** message is an unsequenced message sent when a **`Purge Orders`** message requesting an order purge has completed canceling all individual orders.

Multiple **`Purge Acknowledgment`** messages will be sent in response to **`Purge Order`** message requests for multi-unit orders (*MassCancelInst*, 2nd character = I). An acknowledgement message will be sent for each matching unit followed by a final acknowledgement containing the total number of orders cancelled due to the purge request across all matching units. This final acknowledgment will have a *SourceMatchingUnit* value of 0.

PurgeAcknowledgementUSEquitiesV1 Message Fields

Table 41. PurgeAcknowledgementUSEquitiesV1 Message Fields

FIELD NAME	OFFSET	LENGTH	DATA TYPE	DESCRIPTION
StartOfMessage	0	2	Binary	0xB0 0xE3 (58288)
MessageLength	2	2	Binary	
MessageType	4	2	Binary	0x119F (4511)
MatchingUnit	6	1	Binary	
Reserved	7	1	Binary	Value sent to member not specified
SequenceNumber	8	4	Binary	Zero - unsequenced application message
InFlight	12	2	Binary	
TransactionTime	14	8	DateTime	
MassCancelID	22	20	Text	
CancelledOrderCount	42	4	Binary	

List of Message Fields

The following are descriptions of message fields which may be sent or received.

Table 42. List of Message Fields

FIELD	LENGTH	DATA TYPE	DESCRIPTION
Account	16	Text	Corresponds to *Account* (1) in Cboe FIX. Reflected back on execution reports associated with this order. May be made available in the Member's clearing file. Allowed characters are alphanumeric and colon.
AccessFee	8	AccessFee	Transaction fee for the trade.
AttributedQuote	1	Alphanumeric	Optional. Allows for an order to be attributed to a firm's MPID or optionally RTAL (for retail firms) in Cboe's market data feeds. The order may also be included in attributed summary information displays related to quote/trade information on the Cboe website. Must opt-in to support through the Cboe Trade Desk. N= Do not attribute firm MPID to this order Y= Attribute firm MPID to this order R= Attribute RTAL to this order
BaseLiquidityIndicator	1	Alphanumeric	Indicates whether the trade added or removed liquidity. A= Added Liquidity R= Removed Liquidity X= Routed to Another Market C= Auction/Uncrossing W= Waiting for execution at pre-market time as dictated by *TimeInForce* value and "Hold Early to 7am" port setting. Only applied on the initial order acknowledgment.
CancelOrigOnReject	1	Alpha	Corresponds to *CancelOrigOnReject* (9619) in Cboe FIX. Indicates handling of original order on failure to modify. N= Leave original order alone Y= Cancel original order if modification fails
Capacity	1	Alpha	Corresponds to *OrderCapacity* (47) in Cboe FIX. A= Agency P= Principal R= Riskless Principal
ClearingAccount	4	Text	Corresponds to *OnBehalfOfSubID* (116) and *ClearingAccount* (440) in Cboe FIX. Supplemental identifier. Recorded and made available in execution reports. Available via Drop feeds.
ClearingFirm	4	Alpha	Corresponds to *OnBehalfOfCompID* (115) and *ClearingFirm* (439) Cboe FIX. MPID that will clear the trade. Must be an allowed NSCC MPID. **Port attribute value of Default EFID is used if not provided.**
CmcSessions	2	Text	2 character field. Specifies the range of CMC sessions the order is eligible to participate in. If not specified CMC orders will be eligible to participate in all CMC matching sessions. **1st Character:** First CMC session the order is eligible to participate in. If the second character is not provided the order will only participate in this session.

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			2nd Character: If provided, specifies the final CMC session the order is eligible to participate in. A= 3:15 p.m. D= 3:30 p.m. L= 3:49 p.m. S= 3:54 p.m. (NASDAQ-listed only)
ContraBroker	4	Alphanumeric	Corresponds to ContraBroker (375) in Cboe FIX. All externally matched (routed) executions will identify the away exchange. AMEX= Routed to NYSE American ARCA= Routed to NYSE Arca BEX= Routed to Nasdaq BX CHX= Routed to NYSE Texas ICRS= Routed to Intelligent Cross (pending approval) IEX= Routed to Investors Exchange INET = Routed to Nasdaq LTSE = Routed to Long Term Stock Exchange MEMX = Routed to Members Exchange NYSE = Routed to NYSE PERL = Routed to MIAX PEARL Exchange PSX = Routed to Nasdaq PSX NSX= Routed to NYSE National DRT = Routed to DRT Pool TFXE = Routed to 24X BATS = Routed to Cboe BZX Exchange* BYXX = Routed to Cboe BYX Exchange* EDGA = Routed to Cboe EDGA Exchange* EDGX= Routed to Cboe EDGX Exchange* *Internally matched if ContraBroker matches the identifier of the local trading platform's book.
CrossTradeFlag (BYX Only)	1	Alphanumeric	Corresponds to *CrossTradeFlag* (9355) in Cboe FIX. Used to set eligibility for Periodic Auctions. Can be entered on individual orders or as a port setting. 0= None (to override port setting as necessary) 1= Periodic Auction Only 2= Periodic Auction Eligible
DiscretionAmount	2	Binary	Corresponds to *DiscretionAmount* (9622) in Cboe FIX. Two implied decimal places (e.g., 10 = $0.10) Discretion is implicitly added to bid prices and subtracted from offer prices Order will be displayed at Price, but can be executed in the discretionary range. A discretionary order will use the minimum amount of discretion necessary to achieve execution. Maximum range is -9999 to 9999 (i.e., -99.99 to 99.99) May not be used with IOC orders. May not be used with Post Only orders.
DisplayIndicator	1	Alphanumeric	Corresponds to *DisplayIndicator* (9479) in Cboe FIX. **Re-pricing Options:**

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			V= Default. As determined by port level setting (defaults to S) P= Price Adjust m= Multiple Price Adjust R= Cancel back the order if it cannot be booked and displayed without adjustment r= Hidden; cancel back the order if it cannot be booked without adjustment S= Display Price Sliding (this is to override an opt-out of Display Price Siding at the port level) L= Display Price Sliding, but cancel back if order crosses the NBBO on entry M= Multiple Display Price Sliding **Other Options:** v= Visible (for visible peg orders only; others will be rejected) I= Invisible (implied for Midpoint Peg orders) N= No Rescrape at Limit. Applicable only to fully routable, IOC orders (*RoutingInst*=R and *TimeInForce*=3). After walking the price to the limit, there will be no final scrape at Cboe and the cancel reason code will state X (Expired) rather than N (No Liquidity).
DisplayPrice	8	Binary Price	Only present when order is fully or partially booked. If the order has to be displayed at a less aggressive price for some reason, then that price will be reported here, otherwise equals *Price*. Present for hidden orders, indicating the price the order would have been displayed at.
DisplayRange	4	Binary	Corresponds to *DisplayRange* (8020) in Cboe FIX. Used for random replenishment of reserve orders. Random replenishment establishes a range of possible values for the order quantity that is to be displayed. For example, *if MaxFloor*=2,000, and *DisplayRange*=200, the displayed quantity will be selected from one of the following values: 1,800, 1,900, 2,000, 2,100, or 2,200. Must be specified in round lots.
ExDestination	1	Text	Corresponds to *ExDestination* (100) in Cboe FIX. Used to specify the designated away venue for *RoutStrategy*=DIRC and for *RoutingInst*=A (Post to Away). A= NYSE American[1] B= NASDAQ BX[1] C= NYSE National G = 24X H= MIAX Pearl I= Investors Exchange J= EDGA[1] K= EDGX[1,2] L= Long Term Stock Exchange M= NYSE Texas N= NYSE[1] P= NYSE Arca[1] Q= NASDAQ[1] T= Intelligent Cross*(pending approval)* U= MEMX

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			X= NASDAQ PSX Y= BYX[1] Z= BZX[1] [1]Post to Away option available for ROUT and ROUX only. [2]Post to EDGX (for ROUT, ROUX, ROUZ, and RDOT).
ExecInst	1	Text	Corresponds to *ExecInst* (18) in Cboe FIX. f= Intermarket Sweep (Directed or Book/Post only) P= Market Peg (peg Buy [Sell] to NBBO Offer [Bid]) Q= Market Maker Peg (see Market Maker Specification) R= Primary Peg (peg Buy [Sell] to NBB Bid [Offer]) U= Supplemental Peg Order M= Midpoint (peg to NBBO Midpoint) m= Midpoint (peg to NBBO Midpoint, but do not match when NBBO is locked) L= Alternate Midpoint (less aggressive of midpoint and 1 tick inside NBBO) **EDGA and EDGX:** d= Midpoint Discretionary Order e= Midpoint Discretionary Order with Quote Depletion Protection **BZX:** r= Late (for use with Auction Only orders); see the Cboe US Equities Auction Process **BZX and EDGX:** o= Listing Market Opening (for ROOC *RoutStrategy* only) c= Listing Market Close (for ROOC *RoutStrategy* only) a= Both Listing Market Open and Close (for ROOC *RoutStrategy* strategy only; also eligible for participation in halt auctions)
ExpireTime	8	DateTime	Corresponds to *ExpireTime* (126) in Cboe FIX. Required for *TimeInForce* = 6 orders, specifies the date-time (in UTC) that the order expires.
ExtExecInst	1	Text	Corresponds to *ExtendedExecInst* (9416) in Cboe FIX. N= None R= Retail Order, eligible for Retail rebate. **BYX:** P= Retail Order (Price Improvement Only) T= Retail Price Improving Order **EDGX:** X= Retail Priority Order, eligible for Retail Priority and Retail rebate rate.
FeeCode	2	Alphanumeric	Corresponds to *FeeCode* (9882) in Cboe FIX. Indicates fee associated with an execution. Fee codes are published in the pricing schedule. New fee codes may be sent with little or no notice. Members are encouraged to code their systems to accept unknown fee codes.
LastPx	8	Binary Price	Corresponds to *LastPx* (31) in Cboe FIX. Price of this fill.
LastShares	4	Binary	Corresponds to *LastShares* (32) in Cboe FIX. Executed share quantity.
LeavesQty	4	Binary	Corresponds to *LeavesQty* (151) in Cboe FIX.

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			Quantity still open for further execution. If zero, the order is complete.
LocateBroker	4	Alpha	Corresponds to *LocateBroker* (5700) in Cboe FIX. Used for short sale orders to identify the broker that the short seller has identified as the source from which they will borrow the securities they are selling short.
LocateReqd	1	Alpha	Corresponds to *LocateReqd* (114) in Cboe FIX. Optional, only processed for Sell Short and Sell Short Exempt orders. N= Client affirms ability to borrow (default) Y= Client does not affirm ability to borrow (results in reject)
FeeCode	2	Alphanumeric	Corresponds to *FeeCode* (9882) in Cboe FIX. Indicates fee associated with an execution. Fee codes are published in the pricing schedule. New fee codes may be sent with little or no notice. Members are encouraged to code their systems to accept unknown fee codes.
LastPx	8	Binary Price	Corresponds to *LastPx* (31) in Cboe FIX. Price of this fill.
LastShares	4	Binary	Corresponds to *LastShares* (32) in Cboe FIX. Executed share quantity.
LeavesQty	4	Binary	Corresponds to *LeavesQty* (151) in Cboe FIX. Quantity still open for further execution. If zero, the order is complete.
LocateBroker	4	Alpha	Corresponds to *LocateBroker* (5700) in Cboe FIX. Used for short sale orders to identify the broker that the short seller has identified as the source from which they will borrow the securities they are selling short.
LocateReqd	1	Alpha	Corresponds to *LocateReqd* (114) in Cboe FIX. Optional, only processed for Sell Short and Sell Short Exempt orders. N= Client affirms ability to borrow (default) Y= Client does not affirm ability to borrow (results in reject)
MassCancelID	20	Text	Corresponds to *MassCancelID* (7695) in Cboe FIX. Copied from the *MassCancelID* passed on the original **`Purge Orders`** message.
MassCancelInst	8	Text	Corresponds to *MassCancelInst* (7700) in Cboe FIX. Used for specification of **`Purge Orders`** message functionality. At least one character must be provided (MPID Filter). Contiguous characters must be specified up to total length. Truncated/unspecified characters will default to values indicated (D) below. ***1st Character: MPID Filter*** A= No filtering by MPID is performed. F= All orders that were sent under the MPID specified in *ClearingFirm* optional field. If F specified and *ClearingFirm* not provided, the **`Purge Orders`** message will be rejected. If F specified and *ClearingFirm* is provided but is blank (NULL), the **`Mass Cancel`** or **`Purge Orders`** message will be treated like A, and no filtering by clearing firm relationship is performed. ***2nd Character: Acknowledgment Style*** M= (D) Order Cancelled messages are sent for each cancelled order. If M is set and the *MassCancelID* optional field is specified, the *MassCancelID* value is ignored.

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			S= A single **Mass Cancel Acknowledgment** message is sent once all cancels have been processed. The *MassCancelID* optional field must be specified or the **Mass Cancel** or **Purge Orders** message will be rejected. B= Both individual **Order Cancelled** and **Mass Cancel Acknowledgment** messages will be sent. Also requires *MassCancelID* optional field to be specified or the **Mass Cancel** or **Purge Orders** message will be rejected. *3rd Character: Lockout Instruction* N= (D) No lockout L= Lockout until corresponding *RiskReset* received. Lockout can be used only with MPID Filter set to F, otherwise the **Purge Orders** message will be rejected. Lockout will apply to all **New Order** and **Modify Order** messages for the *ClearingFirm* (and symbol or *RiskGroupIDs*, if specified). A self-imposed lockout can be released using the *RiskReset* optional field in a **New Order** message.
MaxFloor	4	Binary	Corresponds to *MaxFloor* (111) in Cboe FIX. Portion of *OrderQty* to display. The balance is reserve. 0 displays the entire quantity. The displayed quantity of each order at a price level is decremented first. When the displayed quantity is decremented below one round lot, it is is reloaded up to *MaxFloor* from reserve. Default= 0
MinQty	4	Binary	Corresponds to *MinQty* (110) in Cboe FIX. Minimum fill quantity for non-routable hidden or non-routable IOC orders which only interact with liquidity on the target Cboe Exchange. **Ignored** if Enable True *MinQty*=No and the order is a routable displayed or routable IOC. **Order is rejected** if Enable True *MinQty*=Yes and the order is a routable displayed or routable IOC. **Default** is zero. Odd lot and mixed lot quantities allowed. When the remaining size on an order is less than the defined *MinQty*, then *MinQty* will be automatically set to the remaining size. When Enable True *MinQty*=No, the minimum total fill size may be made up of several consecutive smaller fills. Setting this port attribute to Yes will require every fill to meet the defined *MinQty*. See US Equities BOE Port Attributes on page 67 for details. If Enable True *MinQty*=Yes, orders will be converted into standard *MinQty* during a Periodic Auction. Periodic Auction Eligible orders will remain as True *MinQty* in the continuous book (BYX Only).
OrderQty	4	Binary	Corresponds to *OrderQty* (38) in Cboe FIX. Order quantity. System limit is 999,999 shares. On **Order Restated** messages, the *OrderQty* may be updated (for example, for SWP or CMC restatements).
OrdType	1	Alphanumeric	Corresponds to *OrdType* (40) in Cboe FIX. 1= Market 2= Limit (default) 3= Stop 4= Stop Limit

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			P= Pegged Pegged requires *ExecInst* be set to L, M, m, P, Q, or R. Market implies a *TimeInForce* of Day. Market day orders post in LULD straddle state or if a short sale during a Regulation SHO short sale circuit breaker. Pegged orders may not be routable except for midpoint pegs BYX where *RoutStrategy*=RMPT, RMPL, or DIRC.
OrigClOrdID	20	Text	Corresponds to *OrigClOrdID* (41) in Cboe FIX.
PegDifference	8	Signed Binary Price	Corresponds to *PegDifference* (211) in Cboe FIX. **Optional signed** value up to four decimal places[1], when the peg difference is below $1.00, is **added** to the result of peg calculation. When the peg difference is above $1.00 a maximum of two decimal places can be specified. Previously was required to be only a non-aggressive offset. Must be zero for non-pegged orders. Default is zero for Midpoint Discretionary Orders with *ExecInst*=d. Default is $0.01 (-$0.01) for sell (buy) Midpoint Discretionary Orders with *ExecInst* (18) =e. Displayed Primary Peg orders with non-aggressive offset must have *TimeInForce*=R (Regular Hours Only) or 0 (Day). Day orders must be submitted after 9:30 a.m. ET. On BYX: If *ExtExecInst*=T (Retail Price Improving order): May be priced in $0.001 increments Must be ≥ 0 for Buy orders Must be ≤ 0 for Sell orders [1] *PegDifference* is rounded (down for buy, up for sell) to fit the tick size. For Periodic Auction Only orders, aggressive offsets only for primary peg orders. No restrictions for Periodic Auction Eligible orders. Orders with passive offsets will be rejected.
PreventMatch	3	Alpha	Corresponds to *PreventMemberMatch* (7928) in Cboe FIX. Three characters: **1st character: MTP Modifier:** N= Cancel Newest O= Cancel Oldest B= Cancel Both S= Cancel Smallest D= Decrement larger / Cancel Smaller d= Same as D above, but only decrement LeavesQty. Do not restate OrderQty. **2nd character: Unique ID Level:** F= Prevent Match at Firm (Member) Level M= Prevent Match at MPID Level X= Prevent Match at the Affiliate (Exchange Member) or Sponsored Participant Level **3rd character: Trading Group ID (optional):** Member specified alphanumeric value 0-9, A-Z, or a-z.

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			The Unique ID level (character 2) of both orders must match to prevent a trade. If specified on both orders, Trading Group ID (character 3) must match to prevent a trade. The MTP Modifier (character 1) of the inbound order will be honored, except that if the inbound order specifies Decrement and the resting order does not, and the resting order is larger, then both orders will be cancelled. This exception is to protect the order entry software for the resting order from receiving an unexpected restatement message. If order entry software is prepared to handle unexpected restatement messages, this exception may be overridden at the port level by requesting Allow MTP Decrement Override functionality. Uses of MTP Modifier D or d and users of Allow MTP Decrement Override functionality must be prepared to receive an **`Order Restated`** message that decrements *LeavesQty* (and, for method D, *OrderQty* as well). Match Trade Prevention will be supported for Periodic Auctions (BYX only).
Price	8	Binary Price	Corresponds to *Price* (44) in Cboe FIX. Limit price. Four implied decimal places. Required for limit orders (*OrdType*=2). If specified on market order (*OrdType*=1), the order will be rejected. This field is also used to specify an optional cap price for pegged orders.
RiskGroupID	2	Binary	Corresponds to *RiskGroupID* (7699) in Cboe FIX for **`New Order`** and **`Purge Orders`** messages. Used to group orders for use in **`Purge Orders`** messages where multiple orders can be cancelled by specifying a list of *RiskGroupIDs*.
RiskReset	8	Text	Corresponds to *RiskReset* (7692) in Cboe FIX. For use by customers to release MPID, symbol or *RiskGroupID* level lockout conditions resulting from self-imposed lockouts issued via **`Purge Orders`** messages. Single Character Values: S= Symbol level lockout reset F= MPID level lockout reset C=*RiskGroupID* lockout reset Values may be combined together to allow for resets of multiple self-imposed lockouts in a single message. For example, FS, SC, FC, and SFC are all acceptable values. If orders have been locked out any level, inbound orders for the locked symbol *MPID* or *RiskGroupID* will be rejected until this field is filled with the appropriate value on a **`New Order`** message.
RouteDeliveryMethod	3	Text	Corresponds to *RouteDeliveryMethod* (9350) in Cboe FIX. RTI= Route to improve (default if not specified). Ability to receive price improvement will take priority over speed of execution. RTF= Route to Fill. Speed of execution will take priority over potential price improvement. Only applicable to *RoutStrategy*=ROUT, ROUX, and ROUE.
RoutingInst	4	Text	Corresponds to *RoutingInst* (9303) in Cboe FIX. 1st character:

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			B= Book Only (not routable, will remove from local book)[1] P= Post Only (not routable)[2] R= Routable S= Super Aggressive - Cross or Lock (order will be removed from the book and routed to any away quote that is locking or crossing the order). May remove liquidity after posting. X= Aggressive - Cross or Lock (order will be removed from the book and routed to any away quote that is locking or crossing the order) K= Super Aggressive When Odd Lot (routable order will be automatically assigned Super Aggressive status when it becomes an odd lot) A= Post to Away (a limit order that will post remainder to an away venue specified in *ExDestination* for applicable routing strategies) N= Non-Displayed Swap - Book only, Hidden order that may remove liquidity after posting. Requires *DisplayIndicator*=I. **2nd character (for use with *RoutStrategy*=DIRC, TRIM, SLIM, SLIM+ only):** D= Eligible to route to DRT L= Route to displayed markets only
RoutStrategy	6	Text	Corresponds to *RoutStrategy* (9400) in Cboe FIX. **Please note:** DRT: Dark Routing Technique LCPMC: Low Cost Protected Market Centers **All exchanges:** ALLB= Book + IOC Other Cboe Exchanges RDOT= Book + DRT + IOC/Day NYSE ROUT= Book + DRT + Street (default) ROUX= Book + Street ROUZ= Book + DRT SWPA= ISO Sweep of All Protected Markets DIRC= Book + DRT + Directed IOC or Directed ISO if *ExecInst*=f. *ExDestination* must also be sent. **EDGA/EDGX:** ROUC= Book + DRT + LCPMC + All Other Protected Markets + Posts to EDGX(EDGX only)or EDGA(EDGA only) **BYX:** DIRC= Book + Midpoint IOC IEX (also requires *Ordtype*=P, *ExecInst*=M or m, and *ExDestination*=I) RMPT= Book + Midpoint IOC Select DRT/Lit Venues + Post to Local Book if non-IOC (must be used in conjunction with Midpoint Peg order type) RMPL= Book + Midpoint IOC RMPT Venues + Midpoint IOC RMPL Venues + Post to Local Book if non-IOC (must be used in conjunction with Midpoint Peg order type) ROBB= Book + NYSE National + NASDAQ BX + NYSE American + BYX **BYX:** ROCO= Book + NYSE National + NASDAQ BX + NYSE American + (DRT) + BYX TRIM= Book + NYSE National + NASDAQ BX + (DRT) SLIM= Book + LCPMC + (DRT) + LCPMC + All other protected markets

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			BZX: TRIM= Book + BYX + NYSE National + NASDAQ BX + NYSE American + (DRT) SLIM= Book + BYX + LCPMC + (DRT) + LCPMC + All other protected markets SLIM+= BYX + BZX + LCPMC + (DRT) + LCPMC + All other protected markets[1] **BZX/EDGX:** ROOC= Listing Market Open + Book + DRT + Street + Listing Market Close[2] [1]Route to BYX prior to scraping BZX unless price improvement is available. [2]Can be used with *ExecInst*=a, c, or o to specify listing market opening/closing eligibility.
SecondaryOrderID	8	Binary	Corresponds to *SecondaryOrderID* (198) in Cboe FIX. Denotes an alternative *OrderID* which is present on Cboe market data feeds (for example, to hide that a reserve (iceberg) order has reloaded). Or, *OrderID* of the contra side of a prevented match.
ShortAccount	10	Text	See *Account*.
ShortRoutingInst	1	Text	See *RoutingInst*, first character only.
Side	1	Alphanumeric	Corresponds to *Side* (54) in Cboe FIX. 1= Buy 2= Sell 5= Sell Short (client affirms ability to borrow) 6= Sell Short Exempt
StepUpAmount	4	Short Binary Price	Corresponds to *StepUpAmount*(25025) in Cboe FIX. *StepUpAmount* is implicitly added to bid prices and subtracted from offer prices for Enhanced RPI (Retail Price Improvement) orders. The *StepUpAmount* value is specified in 0.001 minimum increments. The minimum value is 0.000 (default). The maximum value is 99.999.
StopPx	8	Binary Price	Corresponds to *StopPx* (99) in Cboe FIX. Stop price. Required if *OrdType*=3 (Stop) or 4 (Stop Limit). Stop and Stop Limit orders will only be triggered off Last Sale Eligible trades.
SubLiquidityIndicator	1	Alphanumeric	Additional information about an execution. **Cboe may add additional values without notice. Members must gracefully ignore unknown values.** ASCII NUL (0x00) = No Additional Information E= Trade added RPI liquidity (BYX only) H= Trade added hidden liquidity I= Trade added hidden liquidity that was price improved J= Execution from first order to join the NBBO P= Periodic Auction (BYX Only) S= NBBO-Setter fee eligible V= Visible liquidity add trade that was price improved m= Midpoint peg order s= Order set the NBBO but is not fee eligible
Symbol	8	Alphanumeric	Corresponds to *Symbol* (55) in Cboe FIX.

FIELD	LENGTH	DATA TYPE	DESCRIPTION
			Entire Cboe format symbol or symbol root if using CQS or CMS format.
SymbolSfx	8	Alphanumeric	Corresponds to *SymbolSfx* (65) in Cboe FIX. CMS or CQS suffix. **Do not send *SymbolSfx* if using Cboe format or if the symbol does not have a suffix.**
TargetMatchingUnit	1	Binary	Corresponds to *MatchingUnit* (25017) in Cboe FIX. Matching unit number the **`Purge Orders`** message will be sent toward. If blank or 0, the **`Purge Orders`** message will be sent to all units. Incompatible with symbol-level purges, specifying both symbol and *TargetMatchingUnit* will cause the **`Purge Orders`** message to be rejected. If both *MassCancelInst*=L and a *MatchingUnit* parameter specified, a lockout will occur and will impact only the specified matching unit. Subsequent risk resets will clear risk locks on all units.
TimeInForce	1	Alphanumeric	Corresponds to *TimeInForce* (59) in Cboe FIX. 0= Day (default) (Early Trading Session until end of Regular Session) 1= GTC (allowed, but treated as Day) 2= At the Open (BZX only and Cboe listed securities only) 3= IOC (Portion not filled immediately is cancelled) 4= FOK (an IOC where the entire size must be filled, else the order will be cancelled back) 5= GTX (Early Trading Session until end of Post-Market Session) 6= GTD (Early Trading Session; expires at earlier of *ExpireTime* or end of Post-Market Session) 7= At the Close (BZX only and applicable to Cboe Listed securities and Cboe Market Close symbols E= PRE (Pre-Market Trading Session until end of Regular Session) R= RHO (Regular Hours/Session Only) T= PTD (Pre-Market Trading Session; expires at earlier of specified *ExpireTime* or end of Post-Market Session) X= PTX (Pre-Market Trading Session until end of Post-Market Session)
WorkingPrice	8	Binary Price	Corresponds to *WorkingPrice* (9690) in Cboe FIX. If price had to be adjusted to a less aggressive value for some reason, then the adjusted price will be reported here, otherwise equals *Price*.

Reason Codes

The following is a list of all reason codes used by Cboe. These reason codes are used in a variety of contexts (order cancellations and order rejections). All reasons are not valid in all contexts. The reason code will be followed by free-form text. The specific text the system delivers may vary from the test listed below, to provide clarification of the reject reason. Cboe may add additional reason codes without notice. Members must gracefully ignore unknown values.

Table 43. Reason Codes

CODE	DESCRIPTION
A	Admin
C	Capacity undefined
D	Duplicate identifier (e.g., ClOrdID)
E	Size reduction due to SWP restatement
F	Failed to quote
H	Halted
I	Incorrect data center
J	Too late to cancel
K	Order rate threshold exceeded
L	Order would lock or cross NBBO
M	Order size exceeded
N	Ran out of liquidity to execute against
O	*ClOrdID* doesn't match a known order
P	Can't modify an order that is pending fill
Q	Waiting for first trade
R	Routing Unavailable
S	Short sale price violation
T	Fill would trade through the NBBO
U	User requested
V	Would wash
W	Add liquidity only order would remove
X	Order expired
Y	Symbol not supported
Z	Unforeseen reason
f	Risk management MPID or *RiskGroupID* level
m	Market access risk limit exceeded
o	Max open orders count exceeded
r	Reserve reload
s	Risk management symbol level
u	Limit Up Limit Down (LULD)
w	Would remove on unslide
x	Crossed market
y	Order received by Cboe during replay

US Equities BOE Port Attributes

The table below lists BOE port attributes that are configurable on the port or firm level. Changes to these attributes can be made by contacting the Cboe Trade Desk.

Table 44. US Equities BOE Port Attributes

ATTRIBUTE	DEFAULT	DESCRIPTION
All Routable to Halt Auction (BZX and EDGX Only)	No	Send all routable orders to the halt auction on the primary listing exchange. This applies to all routing strategies.
Allow Directed ISO[1]	Yes	Allow or disallow ISO orders directed to other market centers.
Allow ISO[1]	Yes	Allow or disallow ISO orders.
Allow MTP Decrement Override[1,3]	No	Overrides the exception that requires both the resting and inbound order to be marked as Decrement.
Allow Post-Market	Yes	Allow orders to be entered after the Regular Session close.
Allow Pre-Market	Yes	Allow orders to be entered prior to Regular Session open.
Allow Sponsored Participant MTP Control[1,3]	No	Allow Sponsored Participant to override port default for match trade prevention by using *PreventMatch* on the order level.
Allow Test Symbols Only	Disabled	Allow or disallow orders in non-test symbols.
Allowed Clearing MPIDs[1]	All MPIDs	MPID(s) allowed for trading on the port. If Sponsored Port attribute is enabled, only one Clearing MPID is allowed for trading on that port.
Cancel on Disconnect	Option 1	Cancels open orders upon order handler session disconnect; both graceful and ungraceful. If Cancel On Disconnect is set, open orders in Symbols that are not in Closed state at the time of the disconnect are cancelled. 1= Cancel continuous book orders only (default) 2= Cancel all open orders (continuous + auction)* 3= Do not cancel any open orders *If disconnect occurs during the cut-off period for an auction, On-Open, On-Close and Late orders that are to participate in the auction will not be cancelled.
Cancel on ME Disconnect	Yes	When set to No, this setting allows orders to remain open on a Matching Unit failover. When set to Yes, all open orders associated with a session are immediately cancelled in the event of loss of connectivity to a Matching Unit. In any event, if a failover takes longer than five minutes, all orders are cancelled unconditionally.
Cancel on Regulatory Halt	No	Cancels open orders upon receipt of a Regulatory Halt.
Cancel on Reject [2]	No	Cancels an order upon a modify reject.
Cancel Open Orders on DROP Port Disconnect[1]	None	Only applicable if Reject Orders on DROP Port Disconnect has been enabled. When the last Standard FIX DROP port associated with an order handler session has disconnected, open orders, associated with the session are cancelled. No= Disabled Yes= Cancel all open orders Note this parameter applies to Standard FIX DROP ports and not Order-By-Order DROP ports (ODROP).
Capacity Override	None	When set, the capacity of individual orders received on the port will default to the Member specified order capacity.

ATTRIBUTE	DEFAULT	DESCRIPTION
		None= No override (default) A= Agency P= Principal R= Riskless Principal
Crossed Market Cancel / Reject	No	Reject new orders when the NBBO in the security is crossed. Routable orders will have any remaining quantity cancelled back when the order returns to the book. Order modifications which cause a loss in priority will result in a cancel of the original order if the NBBO is crossed upon receipt of the modify request.
Default Attributed Quote [1,2]	(see description)	Default value for *AttributedQuote* (9732). May override at order level. Yes= Attribute to MPID RTAL= Attribute as RTAL No= Don't Attribute (may override at order level) Never= Never Attribute* *May only change this setting to Yes or No after executing Attribution Addendum to Exchange User Agreement.
Default CrossTradeFlag (BYX Only)	0	Sets default *CrossTradeFlag* for inbound orders to designate Periodic Auction eligibility. 0= None (default) 1= Periodic Auction Only 2= Periodic Auction Eligible 3= Midpoint Peg - Periodic Auction Only **When set to 2:** IOC, FOK, and displayed orders are not converted to a Periodic Auction Eligible order and are sent to the book as-is. *DisplayIndicator* (9479) will be ignored if *ExecInst* (18) =m or M. **When set to 3:** IOC, FOK, IOC/FOK orders with *ExecInst* (18) =M, and all other orders where *ExecInst* (18) !=m will not be converted and will be sent to the book as-is. All non-IOC/FOK orders with *ExecInst* (18) =M will be converted to RHO Midpoint Peg - Periodic Auction Only order. **Orders with the following RPI instructions will set this port attribute to 0:** *ExtendedExecInst* (9416) =R or P, plus is an IOC *ExtendedExecInst*=T
Default Exec Instruction [1,2]	(None)	Default execution instruction for new orders. See *ExecInst* for details. If a port level setting is present, new orders sent with a value of NULL 0x00 will use the port level setting.
Default MPID	None	Default MPID to use if none is sent on a **`New Order`** message.
Default MTP Value[1,2,3]	None	Specifies default value for *PreventMatch*. When set to X, Affiliate Firm's or Sponsored Participant's match trade prevention will be used by default.
Default Price Sliding(Hidden Order Override)[2]	S	Default price sliding behavior for hidden orders. See *DisplayIndicator* for details.
Default Price Sliding [2]	S	Default price sliding behavior. See *DisplayIndicator* for details.
Default Routing Instruction (Hidden Order Override)[2]		Specifies a default value for *RoutingInst* that is applied to hidden orders only.

ATTRIBUTE	DEFAULT	DESCRIPTION
Default Routing Instruction[2]		Specifies a default value for routing. Fields can be overridden at the order level. The defaults are *RoutingInst*=R, *RouteDeliveryMethod*=RTI, and *RoutStrategy*=ROUT
Default to Retail Order[1,2,3]	None	Default *ExtExecInst*=R or P
Default True *MinQty*	No	Do not aggregate multiple contra orders to meet the *MinQty* specified on an order. If set to Yes, orders will be converted into standard MinQty during a Periodic Auction. Periodic Auction Eligible orders will remain as True *MinQty* in the continuous book (BYX Only).
Disallow Market Orders	Option 1	Controls the acceptance or rejection of inbound Market orders during continuous trading. 1= Do not restrict Market orders 2= Reject Market orders during continuous trading,but allow Market orders during openings, re-openings, auctions, and auction routing (e.g. ROOC) 3= Reject all Market orders except MOO and MOC orders (including CMC orders)
Duplicative Order Protection Action	Option 1	Action taken when Duplicative Order Protection criteria is met: 1= Not enabled 2= Reject new offending orders 3= Disable port for *ClearingFirm*. Must call Cboe Trade Desk to reenable.
Duplicative Order Protection Order Count Threshold	None	Number of consecutive orders with the same *ClearingFirm*, *Price*, *OrdQty*, and *Symbol* that must be seen to initiate Duplicative Order Protection Action.
Early Trading Session Opt-Out	No	Allows orders to be executable during the Early Trading Session on page 11. If set to Yes, the following *TimeInForce* values will be translated: 0 (DAY) → E (PRE) 5 (GTX) → X (PTX) 6 (GTD) → T (PTD)
Enforce Rate Limit via Pause	False	When set to False, the existing Port Order Rate Threshold, Sustained Port Order Rate Threshold, Symbol Order Rate Threshold, and Sustained Symbol Order Rate Threshold port attributes will be enforced by rejects (as described). When set to True, Port Order Rate Threshold, Sustained Port Order Rate Threshold, Symbol Order Rate Threshold, and Sustained Symbol Order Rate Threshold port attributes will be enforced by read pause instead of by rejects.
Fat Finger Protection[1]	None	Orders entered through the NBBO by a specified percentage or dollar based limit price tolerance will be rejected. Limits may be different for different price ranges and price ranges may vary across markets. Please see the Web Portal Port Controls Specification for complete details.
Force MDO with QDP (EDGA and EDGX Only)	n	When set, midpoint and standard MDO order types will default to MDO with QDP orders. n= Do nothing (default) b= Book only MDO with QDP p= Post only MDO with QDP

ATTRIBUTE	DEFAULT	DESCRIPTION
Hold Early to 7am (BZX and EDGX Only)	False	Controls the executable time of orders submitted prior to 7:00 a.m. ET with a *TimeInForce* (59) that allows trading in the Early Trading Session. False= Orders may enter the book and trade as early as 4:00 a.m. ET. True= Orders will be queued until 7:00 a.m. ET.
Lock Auction Orders (BYX Only)	False	Disallow order cancellation during periodic auction. False= Allow cancellations True= Do not allow cancellations
Maximum Order Dollar Value[1]	Unlimited	Maximum dollar value per order.
Maximum Order Size[1]	25,000	Maximum order quantity
MPID Filter for Purge Ports	None	Specify up to ten MPIDs per purge port for which purges will be permitted. If a purge request specifies an MPID not included in the list of configured MPIDs, the purge request will be rejected. If a purge port is configured with multiple MPIDs and a purge request is sent without any MPIDs specified, the purge will be applied only to the list of configured MPIDs.
Port Order Rate Threshold	5,000 msgs/s	The maximum allowed message rate on the session. When the first non-session level message is received, a one second window begins. During the second no more than 4,999 additional non-session level messages will be allowed within that window. If the rate is exceeded, all new orders in the time window are rejected, modifies are treated as cancels, and cancels are processed. Note: Order handler burst rates towards each matching unit may be limited as described in Architecture and Message in Flight Settings on page 14.
Reject Market Orders Without NBBO	No	Reject Market Orders (including unpriced Peg Orders and Stop Orders) when there is no NBBO on the opposite side.
Reject Orders on DROP Port Disconnect[1]	No	If all associated Standard FIX DROP ports associated with an order entry session experience disconnection, new orders will be rejected until at least one Standard FIX DROP port session has been reestablished. Note this parameter does not apply to Order-By-Order drop ports (ODROP).
Reject Orders on DROP Port Timeout (seconds)[1]	30 seconds	Only applicable if Reject Orders on DROP Port Disconnect has been enabled. When the last Standard FIX DROP port associated with an order entry session has disconnected, begin rejecting orders on the order entry session if a Standard FIX DROP session has not been reestablished within this timeout. Minimum value allowed is 0 seconds.
Risk Group Id(s)	No	A comma separated list of values that, if configured, will cause orders without one of the listed *RiskGroupIDs* to be rejected.
Routing Retail Indicator (EDGX Only)	No	Mark orders as retail when routing to dark liquiditypools.
Single Order ADV Check	None	Reject orders when order size exceeds a specified percentage of the 20-day ADV. Members may also specify a 20-day ADV amount below which the check will not be applied.
Sponsored Port	No	Designates that the session will carry Sponsored flow.
Sponsoree Firm ID	None	Only available when Sponsored Port is set to Yes. Will be populated with the Sponsored Firm's Firm ID.

[1]Sponsored Participants require written approval from Sponsors to update these settings on ports associated to a Sponsor's MPID.

[2]Port attribute can be overridden on an order by order basis.

[3]Requires certification.

Appendix A: Example Application Messages

Appendix A will be available in Version 1.0.0.

Appendix B: Login Playbook

Appendix B will be available in Version 1.0.0.

Revision History

DATE	DESCRIPTION
August 15, 2025	*Version 0.0.1* First draft release of Cboe Titanium Cboe U.S. Equities Binary Order Entry Version 3 specification.