Cboe Futures Exchange Binary Order Entry Specification

Version 1.2.4

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Contents

1 Introduction

1.1 Overview

This document describes Binary Order Entry (BOE), the CBOE proprietary order entry protocol used by a Trading Privilege Holder ("TPH") to connect to CBOE Futures Exchange ("CFE").

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 BOE. This document assumes the reader has basic knowledge of the FIX protocol.

BOE 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 TPH's representation of an order.
- *Session level simplicity.* The session level protocol (login, sequencing, replay of missed messages, logout) is simple to understand.

While CFE has strived to preserve feature parity between FIX and BOE where possible, some features may only be available in one protocol or the other.

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

Each message is identified by a unique message type. Not all message types are used in all of CFE's trading environments globally. A listing of the supported message types is provided in 'Section 10 - List of Message Types'.

All communication is via standard TCP/IP.

1.2 Hours of Operation

Trading hours on CFE vary by product. See the product contract specifications for details on trading hours for each product, which may differ for expiring and non-expiring contracts. See the CBOE Futures Exchange holiday calendar for trading hour adjustments corresponding to holidays.

BOE sessions are available for connection on Sunday starting at 10:30 a.m. CT. BOE sessions will disconnect each day between 4:05 and 4:45 p.m. CT for the daily restart. This will reset all sequences to zero in preparation for the next trading segment. BOE sessions will disconnect on Friday at around 4:05 p.m. CT but will remain available for connectivity testing (telnet testing) until startup on the following Sunday.

1.3 Data Types

The following data types are used by BOE. The size of some data types varies by message. All data types have default values of binary zero, in both TPH to CFE and CFE to TPH 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`
- *Signed Binary:* Little Endian byte order, signed two's complement, binary value. The number of bytes used depends on the context.
  - One byte: `DF = -33`
  - Four bytes: `64 00 00 00 = +100`

- *Binary Price:* Little Endian byte order value, signed two's complement, eight bytes in size, with four implied decimal places. So, if the value is -123,400, the actual value taking into account implied decimal places is -12.34.
  - `08 E2 01 00 00 00 00 00` = 123,400/10,000 = 12.34
  - `F8 1D FE FF FF FF FF FF` = -123,400/10,000 = -12.34
- *Alpha:* 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:* 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. ASCII NUL (0x00) filled on the right, if necessary.
- *DateTime:* 8 bytes. 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 currently ignored and treated as 0 (i.e. the times are only accurate to microseconds) on input, and will always be set to 0 by CFE in outgoing messages. However, CFE may begin populating the nanoseconds portion at any time without warning.

  For example: 1,294,909,373,757,324,000 = 2011-01-13 09:02:53.757324 UTC.
- *Date:* Little Endian byte order, unsigned binary value, 4 bytes in size. The YYYYMMDD expressed as an integer.

1.4 Optional Fields and Bit fields

Some messages such as `New Order` and `Modify Order` have a number of optional fields. A count and number of bitfields in the message specify which optional fields will be present at the end of the message. If a bit is set, the field will be present. Fields are appended to the end of the message. There is no implicit framing between the optional fields. In order to decode the optional fields, they must be appended in a particular order to the end of the message. The fields of the first bitfield are appended first, lowest order bit first. Next, the fields of the next bit field are appended, lowest order bit first. This continues for all bitfields. While certain reserved bits within a defined bitfield are used within another CBOE market and will be ignored, bits that are reserved for future expansion must be set to 0 when noted in the bitfield description.

The size, data type, and values for each field are described in 'Section 8 – List of Optional Fields'.

Note that the set of optional fields returned for each CFE to TPH message type is determined at session login (using the `Login Request` message); hence, the exact size and layout of each message received by the client application can be known in advance. Any requested optional field which is irrelevant in a particular context will still be present in the returned message, but with all bytes set to binary zero (0x00).

Each return message from CFE to TPH indicates the optional fields which are present, even though the TPH indicated during login which optional fields are to be sent. The reason for the inclusion (and duplication) is so that each message can be interpreted on its own, without having to find the corresponding login request or response to know which optional fields are present. So, for example, in a log file, decoding a message requires only that single message.

Example messages are shown with each message type which should help to make this concept clear.

1.5 Protocol Features

1.5.1 Carried Order Restatements

Good 'till Cancel ("GTC") orders, Good 'till Date-Time ("GTD") orders, and Day orders entered during partial holiday sessions can result in orders persisting between sessions. The CFE BOE protocol provides a mechanism for clients to request restatement of orders that have been carried forward from the previous business day trading session. See 'Section 11 – Port Attributes' for information on available port attributes, including 'Carried Order Restatements'.

When enabled, Carried Order Restatements are sent to connected clients for each product on the CFE for which orders have been carried forward from the previous business day trading session. Carried Order Restatements are sent after connection establishment and before regular trading activity messages on a per-product basis.

Carried Order Restatements are represented using `Order Acknowledgement` messages with the following optional attributes set;

- *BaseLiquidityIndicator* = A (Added Liquidity), bitfield 5, bit position 7
- *SubLiquidityIndicator* = C (Carried), bitfield 7, bit position 1

To receive Carried Order Restatements, the Carried Order Restatement port attribute must be set (contact CFE Trade Desk). In addition the following `Logon Request` message requirements must be met to receive Carried Order Restatements:

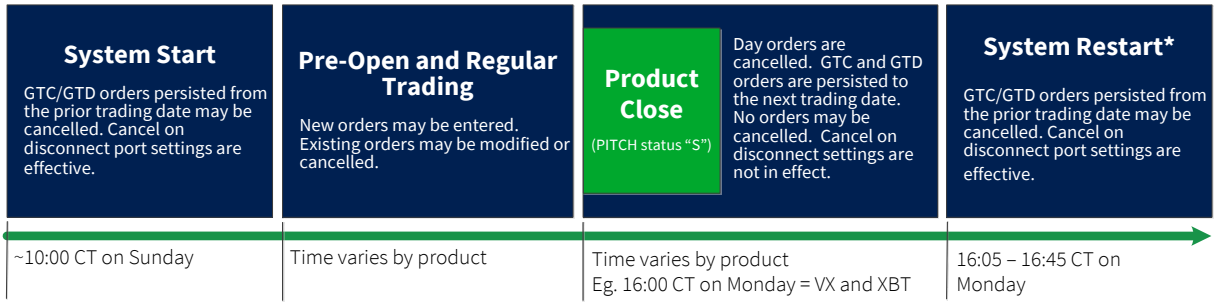
- Customers **must** register to receive *BaseLiquidityIndicator* and *SubLiquidityIndicator* optional fields on `Order Acknowledgement` messages via the `Logon Request` message (See 'Section 3.1.1 – Login Request' for details on registering to receive optional fields on a per-message basis). If the Carried Order Restatement port attribute is set and the bitfield Logon Message registration for the Order Acknowledgement message does not include but BaseLiquidityIndicator and SubLiquidityIndicator, the logon attempt will fail.
- Since the Carried Order Restatement messages are delivered to the session handler before the TPH connects, replay must be requested by setting the *NoUnspecifiedUnitReplay* parameter of the `Logon Request` message Unit Sequence Paramater Group to zero (i.e., don't suppress replay) or specifically set the UnitSequence to zero in the associated unit param group.

Note that no notification is provided at the end of a trading session to indicate when GTC, DTD, or Day orders on partial holiday sessions are persisted to carry over to the next trading sessions. Instead, Carried Order Restatements can be used by members to be notified of orders that have persisted from the previous session.

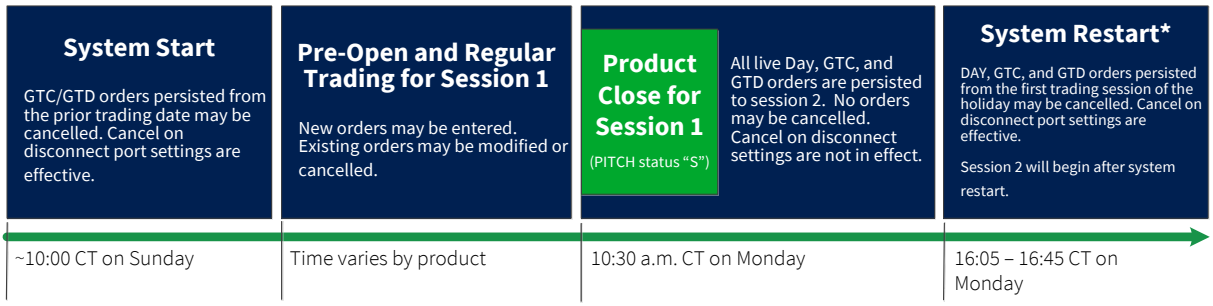
1.5.2 Cancellation of Carried Orders Between Sessions

GTC and GTD orders persist within CFE's trading system between CFE business days. GTC, GTD, and Day orders also persist between multiple trading sessions on the same business day in connection with a holiday. Persisted orders can be canceled while the associated product is in a suspended state and during other trading states as described above. At the scheduled end of trading for a product, cancelation requests for persisted orders in that product will be rejected with reason "O: Unknown Order" until after the system restart completes. After the system restart, persisted orders can be canceled from that time until the scheduled end of trading. In other words, the period of time in which persisted orders cannot be canceled starts at the scheduled end of trading for the associated product and ends after the system restarts. System restarts occur during a suspended state prior to the start of a queuing period and there may be minimal variation in the system restart time.

Regular Trading Example

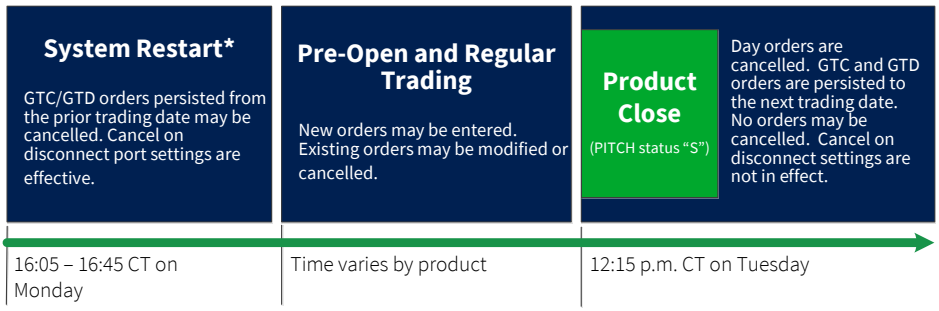


Monday Holiday Example

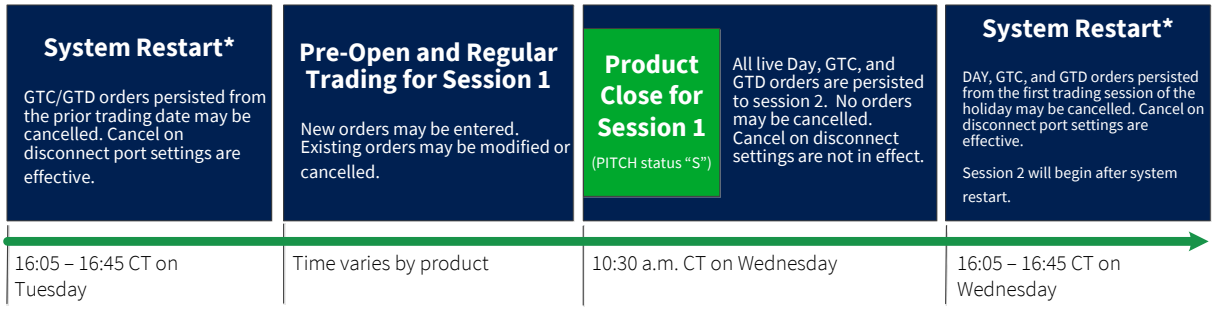


Tuesday Half-Day followed by Wednesday Holiday Example

Tuesday Half-Day



Wednesday Holiday



* The disconnect/reconnect sequence of a system restart generally takes about two minutes and could occur anytime between 16:05 and 16:45 CT.

1.5.3 Post-Settlement Execution Restatements

`Order Executed` messages received at the time of the trade in products VXT (Trade-At-Settlement ("TAS") for VX), VA (Variance Futures) and VAO (Variance Stub Futures) should be considered initial notification of trade. In all three of these products, information available only after the settlement time of the associated contract is required before the trade can be cleared. The following describe the post-settlement processing required for each applicable product:

VXT Execution prices of VXT (TAS) trades represent an offset to the end-of-day settlement price of the associated VX contract. For example, a trade executed at 0.02 is an agreement to buy and sell VX contracts at a price that 2-cents above the end-of-day settlement price, which is available after 3:15PM CST. When VX end-of-day settlements are available, TAS trades executed during the business date are

'resolved' by updating the execution price and changing the symbol to the associated VX contract (TAS trades are cleared as VX trades).

VA Variance Futures are traded at prices in Volatility points (e.g., 15.5% volatility equals a price of 15.5) and quantity expressed in units of Vega (e.g., 100 equals 100 * 1,000 = 100,000 Vega, which is an exposure such that the value change of the position corresponding to a 1% change in Volatility change is $100,000). While VA trades are executed in Volatility and Vega terms, they are cleared in Variance price and size units. At the time of a trade, required information is available to compute the trade size in Variance units (i.e., traded size in Vega units, traded price in Volatility units, and expected and elapsed trading days). As a result, the pending `Order Execution` message at the time of execution, as well as the end-of-day `Variance Restatement` will contain the traded size in Variance units in the *ClearingSize* field. At approximately 4:00PM CST, the closing price of the S&P 500 index is obtained and used to translate trade price and size to Variance units, after which trades can be cleared and restated.

VAO Variance Stub futures are used to trade small size Variance Futures as required to exactly exit a previously entered Variance Futures position (see the Variance Futures Contract Specification). Exiting a VA position requires determining the number of Vega units to be transacted in order to offset a previously executed trade (note the Vega associated with a specified number of Variance Units changes daily). Inevitably, the associated Vega is not an even multiple of 1,000 (minimum VA contract size). To exit a VA position, the round lots of Vega are executed directly in VA. VAO trades are used to execute residual 'odd lots' of VA directly in Variance Units to completely exit a position. The 'odd lots' of Variance Units is computed by subtracting the Variance Units associated with the just executed offsetting VA trade (in Vega units) from the original size in Variance Units. Like VA futures, VAO trades in price units of Volatility. Unlike VA futures VAO futures trade directly in Variance units for size. As a result, both the pending `Order Execution` and the end-of-day `Variance Restatement` messages contain the *ClearingSize* populated with Variance units size, which is simply a copy of the *LastShares* field. At approximately 4:00PM CST, the closing price of the S&P 500 index is obtained and used to translate trade price Variance units, after which trades can be cleared and restated as VA trades in the associated VA contract.

In all three of the above products, trades executed intraday are acknowledged back to participants using `Order Executed` messages. The `Order Executed` message received in these products is considered a 'Pending' trade. As a convenience to customers, an optional value PendingStatus is provided on the `Order Executed` message (see Section 7 - List of Optional Fields). CFE follows up each initial (i.e., pending) TAS and Variance future execution with post-settlement `TAS Restatement` and `Variance Restatement` messages respectively. The following summarizes the restatement details for each product:

VXT VXT trades are restated with the same *ExecID* and *ClOrdID* as the original trade. The as-executed symbol, price and size are maintained in the *Symbol*, *LastPx* and *LastShares* fields of the `TAS Restatement` message respectively. The VX symbol into which the TAS execution will clear (i.e., VX symbol with the same expiration as the as-executed VXT symbol) is contained in the *ClearingSymbol* field. The price with which the TAS execution will clear (i.e., the execution price offset with the contract settlement price) is contained in the *ClearingPrice* field.

VA VA trades are restated with the same *ExecID* and *ClOrdID* as the original trad. The as-executed symbol, price (in Volatility units) and size (in Vega units) are maintained in the *Symbol*, *LastPx* and *LastShares* fields of the `Variance Restatement` message respectively. The *NewSymbol* field will contain a copy of the as-executed Symbol since there is no symbol change for VA executions. The prices with which the VA execution will clear (i.e., the as-executed Volatility unit price in the *LastPx* field transformed to Variance units) is contained in the *ClearingPrice* field. Lastly, the size with which the VA execution will clear (i.e., the as-executed Vega unit price in the *LastShares* field transformed to Variance units) is contained in the *ClearingSize* field.

VAO VAO trades restated with the same *ExecID* and *ClOrdID* as the original trade. The as-executed symbol, price (in Volatility units) and size (in Variance units directly) are maintained in the *Symbol*, *LastPx* and *LastShares* fields of the `Variance Restatement` message respectively. The symbol into which the VAO execution will clear (i.e., the VA symbol with the same expiration as the as-executed VAO symbol) is contained in the *ClearingSymbol* field. The price with which the VAO execution will clear (i.e., the as-executed Volatilty unit price transformed into Variance units) is contained in the *ClearingPrice* field. Lastly, the size with which the VAO execution will clear, which is the same as the *LastShares* field as the VAO instrument trades directly in Variance units, is contained in the *ClearingSize* field..

See sections 4.2.11 and 4.2.12 for details on the TAS `Restatement` and `Variance Restatement` messages used to restate TAS and Variance trades respectively.

1.5.4 Spread Instruments and Signed Prices

All price fields in the CFE BOE protocol are signed values to accommodate spread instruments and TAS prices that can be negative (See 'Section 1.3 - Data Types' for a description and an example of using the *Binary Price* type, which is Little Endian byte order value, signed two's complement, eight bytes in size, with four implied decimal places). For an example of the use of the Binary Price type for negative price values, see the example BOE message in Section 4.2.11 - TAS Restatement. This section presents negative price scenarios introduced by Spread instruments.

Spreads instruments trade on CFE in a well-defined universe of two, three and four legged spreads with a restricted set of ratios and buy/sell conventions as shown in the table below. The notation S(1):B(1) means sell the first (earliest) expiration and buy the second (latest) expiration. The parenthesized numbers are the leg rations. For S(1):B(1) the ratios of each leg is 1, which means one unit of the spread contract is equivalent to selling 1 unit of the first expiration and buying 1 unit of the second expiration.

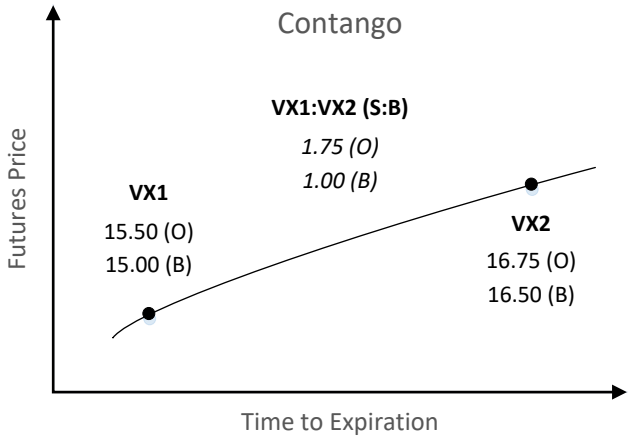
Legs	Spreads (B=Buy, S=Sell, ()=Ratio)
2	**S(1):B(1),** B(1):B(1), S(1):B(2), S(2):B(1)
3	B(1):B(1):B(1), B(1):S(2):B(1)
4	B(1):B(1):B(1):B(1), B(1):S(1):B(1):S(1), B(1):S(1):S(1):B(1)

The bold 2-leg spread in the above table – S(1):B(1) – is a special spread that always exists in the CFE system. As new contracts are listed, the S(1):B(1) two leg spread instruments are automatically created between the new contract and all existing active contracts.

Spread instruments can result in executions where the buyer gets paid and the seller pays. This can be non-intuitive in all but the simplest spreads. Consider the two leg S(1):B(1) spread VX1:VX2 comprising selling 1 unit of the VX1 contract and buying 1 unit of the VX2 contract. To illustrate how buyers can get paid and sellers can pay, we examine spread pricing in Contango and Backwardation price environments.

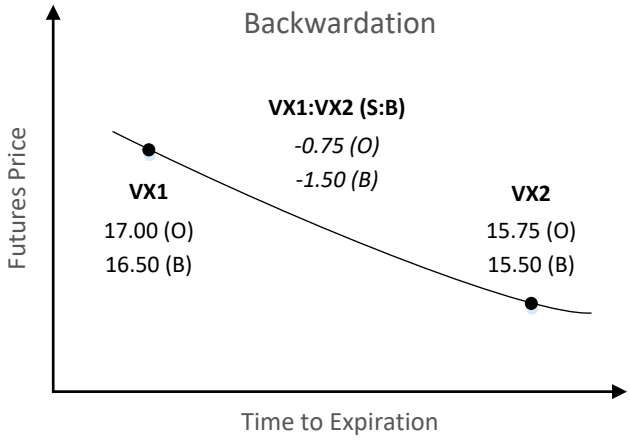
Figure 1 below illustrates spread pricing in a 'Contango' price environment in which the price of the early expiration contract is lower than the later expiration contract. In this example the Bid/Offer of the VX1 simple contract is 15.00 x 15.50 and the Bid/Offer for the VX2 contract is 16.50 x 16.75. The synthetic market for the VX1:VX2 spread (i.e., the Bid/Offer implied by the leg markets) is 1.00 x 1.75. The bid of 1.00 derives from the fact that the offer on the VX1 leg is 15.50 and the bid on the VX2 leg is 16.50 and the net of the two is 1.00 net debit (i.e., buyer pays). Figure 1 shows the implied spread market in italics. This is the normal intuitive situation where the spread buyer pays and seller gets paid.

Figure 1 - *Contango S(1):B(1) spread price example*



Next, consider the same example in the context of a Backward, or Inverted, market in which the price of the early expiration is higher than the price of the later expiration. Figure 2 below illustrates spread pricing in a Backward price environment. The Bid/Offer of the VX1 simple contract Is 16.50 x 17.00 and the Bid/Offer for the VX2 contract is 15.50 x 15.75. The synthetic market for the VX1:VX2 spread is -1.50 x -0.75. The bid of -1.50 derives from the fact that the offer on the VX1 leg is 17.00 and the bid on the VX2 leg is 15.50 and the net of the two is 1.50 net credit (i.e., buyer gets paid).

Figure 2 - *Backwardation (Inverted) S(1):B(1) spread price example*



Spread pricing requires thinking of instrument prices on the entire real number line and not just positive numbers. In the example above the bid is *less* than the offer as its left of the offer on the real number line. One can buy at the offer (paying -0.75 = receiving 0.75) and subsequently sell back at the bid (receiving -1.50 = paying 1.50), giving up the bid/offer spread (0.75) in the process; the same as positive prices. This concept generalizes to two and three leg spreads and unequal ratios; prices can just as easily be negative as positive as a result of the pricing environment (i.e., shape of the price curve vs. expiration date) and the spread definition (which legs bought/sold and ratios).

1.5.5 OCC Clearing Reference

The following table can be used to assist firms in mapping values sent in BOE to their associated field names at the OCC. Note that *ClearingAccount* is not sent to the OCC.

BOE Field Name	FIX Tag	OCC Mapping
ClearingFirm	115	Exec Broker
Account	1	The first ten characters will appear in the Account # field. The entire 16 character string will appear in the Optional CM Data field.
ExecID	17	Trade ID
OrderId	37	Exchange Data
ClOrdId	11	Order ID
CMTANumber	439	CMTA CM#
ClearingAccount	440	Not sent to the OCC.

2 Session

2.1 Message Headers

Each message has a ten 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 CFE to the TPH. Messages from TPH to CFE and all session level messages must always set this value to 0.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	Message type.
MatchingUnit	5	1	Binary	The 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 TPH to CFE, the unit must be 0.**
SequenceNumber	6	4	Binary	The sequence number for this message. Messages from CFE to TPH are sequenced distinctly per matching unit. Messages from TPH to CFE are sequenced across all matching units with a single sequence stream. TPH can optionally send a 0 sequence number on all messages from TPH to CFE. CFE highly recommends that TPHs send sequence number on all inbound messages.

2.2 Login, Replay and Sequencing

Session level messages, both inbound (TPH to CFE) and outbound (CFE to TPH) are unsequenced.

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

Most (but not all) outbound (CFE to TPH) 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 TPH sends the last received sequence number per matching unit in a `Login Request` message. CFE will respond with any missed messages. However, when the `Login Request` *NoUnspeciedUnitReplay* flag is enabled, CFE will exclude messages from unspecified matching units during replay. CFE 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. CFE will reject all orders during replay.

Assuming a TPH has requested replay messages using a properly formatted `Login Request` after a disconnect, any unacknowledged orders remaining with the TPH after the `Replay Complete` message is received should be assumed to be unknown to CFE.

Unsequenced messages will not be included during replay.

A session is identified by the username and session sub-identifier (both supplied by CFE). Only one concurrent connection per username and session sub-identifier is permitted.

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

2.3 Sequence Reset

A reset sequence operation is not available for Binary Order Entry. However, a TPH can send a `Login Request` message with *NoUnspecifiedUnitReplay* field enabled, and *NumberOfUnits* field set to zero. Then, upon receiving a `Login Response` message from CFE, the TPH can use the field *LastReceivedSequenceNumber* as the sequence starting point for sending future messages.

2.4 Heartbeats

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

2.5 Logging Out

To gracefully log out of a session, a `Logout Request` message should be sent by the TPH. CFE 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, CFE will ignore all other inbound (TPH to CFE) messages except for `Client Heartbeat`.

3 Session Messages

3.1 TPH to CFE

3.1.1 Login Request

A `Login Request` message must be sent as the first message upon connection.

A number of repeating parameter groups, some of which may be required, are sent at the end of the message. Ordering of parameter groups is not important. New parameter groups may be added in the future with no notice.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x37`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.
SessionSubID	10	4	Alphanumeric	Session Sub ID supplied by CFE.
Username	14	4	Alphanumeric	Username supplied by CFE.
Password	18	10	Alphanumeric	Password supplied by CFE.
NumberOfParam Groups	28	1	Binary	A number, n (possibly 0), of parameter groups to follow.
ParamGroup$_1$				First parameter group.
…				
ParamGroup$_n$				Last parameter group.

Unit Sequences Parameter Group

This parameter group includes the last consumed sequence number per matching unit received by the TPH. CFE uses these sequence numbers to determine what outbound (CFE to TPH) traffic, if any, was missed by the TPH. If this parameter group is not sent, it's assumed the TPH has not received any messages (e.g., start of day).

The TPH does not need to include a sequence number for a unit if they have never received messages from it. For example, if the TPH has received responses from units 1, 3, and 4, the `Login Request` message need not include unit 2. If the TPH wishes to send a value for unit 2 anyway, 0 would be the only allowed value.

Only one instance of this parameter group may be included.

Field	Offset	Length	Data Type	Description
ParamGroupLength	0	2	Binary	Number of bytes for the parameter group, including this field.
ParamGroupType	2	1	Binary	`0x80`
NoUnspecified UnitReplay	3	1	Binary	Flag indicating whether to replay missed outgoing (CFE to TPH) messages for unspecified units. `0x00` = False (Replay Unspecified Units) `0x01` = True (Suppress Unspecified Units Replay)

NumberOfUnits	4	1	Binary	A number, n (possibly 0), of unit/sequence pairs to follow, one per unit from which the TPH has received messages.
UnitNumber $_1$		1	Binary	A unit number.
UnitSequence$_1$		4	Binary	Last received sequence number for the unit.
…				
UnitNumber $_n$		1	Binary	A unit number.
UnitSequence$_n$		4	Binary	Last received sequence number for the unit.

Return Bitfields Parameter Group

This parameter group, which may be repeated, indicates which attributes of a message will be returned by CFE for the remainder of the session. This allows TPHs to tailor the echoed results to the needs of their system without paying for bandwidth or processing they do not need.

Listing of the return bitfields which are permitted per message is contained in 'Section 7 – Return Bitfields per Message'.

Field	Offset	Length	Data Type	Description
ParamGroupLength	0	2	Binary	Number of bytes for the parameter group, including this field.
ParamGroupType	2	1	Binary	`0x81`
MessageType	3	1	Binary	Return message type for which the bitfields are being specified (e.g., 0x25 for an `Order Acknowledgment` message).
NumberOfReturn Bitfields	4	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	5	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bit field.

Example Login Request Message:

Note this example is for illustrative purposes only. Actual login messages will contain specification of return bitfields for a larger set messages and each return bitfield specification will be complete whereas the example below is only an illustration for purposes of demonstrating the construction of the `Login Request` message.

Field Name	Hexadecimal	Notes
StartOfMessage	BA	Start of message bytes.
MessageLength	3D 00	61 bytes
MessageType	37	`Login Request`
MatchingUnit	00	Always 0 for inbound messages
SequenceNumber	00 00 00 00	Always 0 for session level messages
SessionSubID	30 30 30 31	0001
Username	54 45 53 54	TEST
Password	54 45 53 54 49 4E 47 00 00 00	TESTING
NumberOfParam Groups	03	3 parameter groups
ParamGroupLength	0F 00	15 bytes for this parameter group
ParamGroupType	80	`0x80` = Unit Sequences
NoUnspecified UnitReplay	01	True (replay only specified units)
NumberOfUnits	02	Two unit/sequence pairs to follow;
UnitNumber$_1$	01	Unit 1
UnitSequence$_1$	4A BB 01 00	Last received sequence of 113,482
UnitNumber $_2$	02	Unit 2
UnitSequence$_2$	00 00 00 00	Last received sequence of 0
ParamGroupLength	08 00	8 bytes for this parameter group
ParamGroupType	81	`0x81` = Return Bitfields
MessageType	25	`0x25` = `Order Acknowledgment`
NumberOfReturn Bitfields	03	3 bitfields to follow
ReturnBitfield$_1$	00	No bitfields from byte 1
ReturnBitfield$_2$	41	Symbol, Capacity
ReturnBitfield$_3$	05	Account, ClearingAccount
ParamGroupLength	0B 00	11 bytes for this parameter group
ParamGroupType	81	`0x81` = Return Bitfields
MessageType	2C	`0x2C` = `Order Execution`
NumberOfReturn Bitfields	06	6 bitfields to follow
ReturnBitfield$_1$	00	No bitfields from byte 1
ReturnBitfield$_2$	41	*Symbol, Capacity*
ReturnBitfield$_3$	07	*Account, ClearingFirm, ClearingAccount*
ReturnBitfield$_4$	00	No bitfields from byte 4
ReturnBitfield$_5$	40	*BaseLiquidityIndicator*
ReturnBitfield$_6$	00	No bitfields from byte 6

3.1.2 Logout Request

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

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

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x02`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.

Example Logout Request Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`08 00`	8 bytes
MessageType	`02`	`Logout Request`
MatchingUnit	`00`	Always 0 for inbound messages
SequenceNumber	`00 00 00 00`	Always 0 for session level messages

3.1.3 Client Heartbeat

See 'Section 2.4 – Heartbeats' for more information about heartbeats and the session level protocol.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x03`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.

Example Client Heartbeat Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`08 00`	8 bytes
MessageType	`03`	`Client Heartbeat`
MatchingUnit	`00`	Always 0 for inbound messages
SequenceNumber	`00 00 00 00`	Always 0 for session level messages

3.2 CFE to TPH

3.2.1 Login Response

A `Login Response` message is sent in response to a `Login Request` message. On a successful login, the *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.

CFE will verify Return Bitfields at login time. If the Return Bitfields in a Return Bitfields Parameter Group are invalid, *LoginResponseStatus* will be set to F, and *LoginResponseText* will include a description of which byte and bit are invalid. This is done to ensure that reserved fields are not used, and only options that apply to the local market are set. See 'Section 6 - Return Bitfields Per Message' for additional information.

Note that two sets of sequence numbers are available on the `Login Response`. The set of sequence numbers in the body are the actual CFE to TPH sequence numbers indicating the highest sequence numbers available per matching unit. If specified during login, the Unit Sequences Parameter Group will also be returned which is an echo of the sequence numbers the TPH presented during login as the highest received. If these are different, it indicates a gap which will be filled by CFE.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x24`
MatchingUnit	5	1	Binary	Always 0 for session level messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.
LoginResponseStatus	10	1	Alphanumeric	Accepted, or the reason for the rejection. `A` = Login Accepted `N` = Not authorized (invalid username/pwd) `D` = Session is disabled `B` = Session in use `S` = Invalid session `Q` = Sequence ahead in Login message `I` = Invalid unit given in Login message `F` = Invalid return bit field in login message `M` = Invalid Login Request message structure
LoginResponseText	11	60	Text	Human-readable text with additional information about the reason for rejection. ASCII NUL (0x00) filled on the right, if necessary.
NoUnspecified UnitReplay	71	1	Binary	Echoed back from the original `Login Request` message.
LastReceived SequenceNumber	72	4	Binary	Last inbound (TPH to CFE) message sequence number processed by CFE.
NumberOfUnits	76	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 unsuccessful logins, this will be 0.
UnitNumber $_1$		1	Binary	A unit number.
UnitSequence$_1$		4	Binary	Highest available CFE to TPH sequence number for the unit.
…				
UnitNumber $_n$		1	Binary	A unit number.

UnitSequence$_n$		4	Binary	Highest available CFE to TPH sequence number for the unit.
NumberOfParam Groups		1	Binary	Echoed back from the original `Login Request` message.
ParamGroup$_1$				Echoed back from the original `Login Request` message.
…				
ParamGroup$_n$				Echoed back from the original `Login Request` message.

Example Login Response Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	78 00	120 bytes
MessageType	24	`Login Response`
MatchingUnit	00	Always 0 for session messages
SequenceNumber	00 00 00 00	Always 0 for session level messages
LoginResponseStatus	41	A = Login Accepted
LoginResponseText	41 63 63 65 70 74 65 64 00 00	`Accepted`
	00 00 00 00 00 00 00 00 00 00	(padding)
	00 00 00 00 00 00 00 00 00 00	(padding)
	00 00 00 00 00 00 00 00 00 00	(padding)
	00 00 00 00 00 00 00 00 00 00	(padding)
	00 00 00 00 00 00 00 00 00 00	(padding)
NoUnspecified UnitReplay	01	True (replay only specified units)
Last Received Sequence Number	54 4A 02 00	Last sequence CFE received of 150,100
NumberOfUnits	02	Two unit/sequence pairs to follow;
UnitNumber $_1$	01	Unit 1
UnitSequence$_1$	4A BB 01 00	Actual last sequence of 113,482
UnitNumber $_2$	02	Unit 2
UnitSequence$_2$	00 00 00 00	Actual last sequence of 0
NumberOfParam Groups	03	3 parameter groups
ParamGroupLength	0E 00	15 bytes for this parameter group
ParamGroupType	80	`0x80` = Unit Sequences
NoUnspecified UnitReplay	01	True (replay unspecified units)
NumberOfUnits	02	Two unit/sequence pairs to follow;
UnitNumber $_1$	01	Unit 1
UnitSequence$_1$	4A BB 01 00	Last received sequence of 113,482
UnitNumber $_2$	02	Unit 2
UnitSequence$_2$	00 00 00 00	Last received sequence of 0
ParamGroupLength	08 00	8 bytes for this parameter group
ParamGroupType	81	0x81 = Return Bitfields
MessageType	25	0x25 = `Order Acknowledgment`

NumberOfReturn Bitfields	03	3 bitfields to follow
ReturnBitfield1	00	No bitfields from byte 1
ReturnBitfield2	41	Symbol, Capacity
ReturnBitfield3	05	Account, ClearingAccount
ParamGroupLength	0B 00	11 bytes for this parameter group
ParamGroupType	81	0x81 = Return Bitfields
MessageType	2C	0x2C = Order Execution
NumberOfReturn Bitfields	06	6 bitfields to follow
ReturnBitfield1	00	No bitfields from byte 1
ReturnBitfield2	41	*Symbol, Capacity*
ReturnBitfield3	07	*Account, ClearingFirm, ClearingAccount*
ReturnBitfield4	00	No bitfields from byte 4
ReturnBitfield5	40	*BaseLiquidityIndicator*
ReturnBitfield6	00	No bitfields from byte 6

3.2.2 Logout

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

The Logout contains the last transmitted sequence number for each unit, allowing the TPH to check that their last received sequence number matches.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	0x08
MatchingUnit	5	1	Binary	Always 0 for session level messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.
LogoutReason	10	1	Alphanumeric	The reason why the Logout message was sent. U = User Requested E = End of Day A = Administrative ! = Protocol Violation
LogoutReasonText	11	60	Text	Human-readable text with additional information about the reason for logout. Particularly useful if *LogoutReason* = ! (Protocol Violation).
LastReceived SequenceNumber	71	4	Binary	Last inbound (TPH to CFE) message sequence number processed by CFE.
NumberOfUnits	75	1	Binary	A number, *n* (possibly 0), of unit/sequence pairs to follow, one per unit from which the client has received messages.
UnitNumber 1		1	Binary	A unit number.
UnitSequence1		4	Binary	Highest available sequence number for the unit.
…				
UnitNumber n		1	Binary	A unit number.

UnitSequence$_n$		4	Binary	Highest available sequence number for the unit.

Example Logout Response Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	54 00	84 bytes
MessageType	08	Logout
MatchingUnit	00	Always 0 for session level messages
SequenceNumber	00 00 00 00	Always 0 for session level messages
LogoutReason	55	U = User Requested
LogoutReasonText	55 73 65 72 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 00 00 00	User
LastReceived SequenceNumber	54 5A 02 00	Last CFE received sequence of 150,100
NumberOfUnits	02	Two unit/sequence pairs to follow;
UnitNumber $_1$	01	Unit 1
UnitSequence$_1$	4A BB 01 00	Last sent sequence of 113,482
UnitNumber $_2$	02	Unit 2
UnitSequence$_2$	00 00 00 00	Last sent sequence of 0

3.2.3 Server Heartbeat

See 'Section 2.4 - Heartbeats' for more information about heartbeats and the session level protocol.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	0x09
MatchingUnit	5	1	Binary	Always 0 for session level messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.

Example Server Heartbeat Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	08 00	8 bytes
MessageType	09	Server Heartbeat
MatchingUnit	00	Always 0 for inbound messages
SequenceNumber	00 00 00 00	Always 0 for session level messages

3.2.4 Replay Complete

See 'Section 2.2 - Login, Replay and Sequencing' for more information on Login, sequencing and replay.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x13`
MatchingUnit	5	1	Binary	Always 0 for session level messages.
SequenceNumber	6	4	Binary	Always 0 for session level messages.

Example Replay Complete Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`08 00`	8 bytes
MessageType	`13`	`Replay Complete`
MatchingUnit	`00`	Always 0 for inbound messages
SequenceNumber	`00 00 00 00`	Always 0 for session level messages

4 Application Messages

4.1 TPH to CFE

4.1.1 New Order

A `New Order` message consists of a number of required fields followed by a number of optional fields. The optional fields used are specified by setting bits in the *NewOrderBitfields*. Fields must be appended at the end of the message, starting with the lowest order enabled bit in the first bit field first.

Permitted input optional fields are described in 'Section 5.1 – New Order'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x38`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	The sequence number for this message.
ClOrdID	10	20	Text	Corresponds to *ClOrdID* (11) in CFE FIX. Unique ID chosen by the client. Characters in the ASCII range 33-126 are allowed, except for comma, semicolon, and pipe. If the *ClOrdID* matches a live order, the order will be rejected as duplicate. Sent to the OCC in the Order ID field. **Note: CFE only enforces uniqueness of *ClOrdID* values among currently live orders, which includes long-lived GTC and GTD orders. However, we strongly recommend that you keep your ClOrdID values unique.**
Side	30	1	Alphanumeric	Corresponds to *Side* (54) in CFE FIX. `1` = Buy `2` = Sell
OrderQty	31	4	Binary	Corresponds to *OrderQty* (38) in CFE FIX. Order quantity. System limit is 999,999 contracts.
NumberOf NewOrder Bitfields	35	1	Binary	Bitfield identifying which bitfields are set. Field values must be appended to the end of the message.
NewOrderBitfield¹	36	1	Binary	Bitfield identifying fields to follow.
….				
NewOrderBitfieldⁿ		*1*	*Binary*	*Last bitfield.*
Optional fields. . .				

Example New Order Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`5F 00`	95 bytes
MessageType	`38`	`New Order`

MatchingUnit	00	Always 0 for inbound messages
SequenceNumber	64 00 00 00	Sequence number 100
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
Side	31	1 = Buy
OrderQty	64 00 00 00	100 contracts
NumberOfNewOrder Bitfields	07	7 bitfields to follow
NewOrderBitfield1	34	*Price, OrdType, TimeInForce*
NewOrderBitfield2	41	*Symbol, Capacity*
NewOrderBitfield3	01	*Account*
NewOrderBitfield4	10	*OpenClose*
NewOrderBitfield5	00	*(none)*
NewOrderBitfield6	00	*(none)*
NewOrderBitfield7	E0	*CtiCode, ManualOrderIndicator, OEOID*
Price	F0 49 02 00 00 00 00 00	15.00
OrdType	32	2 = Limit
TimeInForce	30	0 = Day
Symbol	30 30 30 30 30 37	000007
Capacity	43	C = Customer
Account	30 30 32 00 00 00 00 00 00 00 00 00 00 00 00 00	002
OpenClose	4F	O = Open
CtiCode	31	1 = TPH for TPH Acct
ManualOrderIndicator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE

4.1.2 Cancel Order

Request to cancel either a single order or mass cancellation of a group of orders.

- A single order cancellation uses the *ClOrdID* from a previous order (*OrigClOrdID* field)
- Mass cancellation of a group of orders requires sending *MassCancelInst* which comprises filters used to specify the set of orders to cancel.
    - If the Clearing Firm Filter is set to "F", the *ClearingFirm* optional field must be specified or the Cancel Order request will be rejected.
    - If the Acknowlegement Style is set to "S" or "B", the *MassCancelID* optional field must be specified or the `Cancel Order` request will be rejected.
    - If the *ProductName* optional field only orders for instruments associated with the product (e.g., "VX") are cancelled.
    - If Lockout Instruction is set to "L" and the *ProductName* optional field is not specified, a *Firm level* Risk Reset is required to clear the Lockout condition. If Lockout Instruction is set to "L" and the *ProductName* optional field is specified, a Product level reset is required. See specification of the RiskReset optional field in Section 7 - List of Optional Fields.
    - Lockout will apply to all `New Order` and `Modify Order` messages for the *ClearingFirm* (and *ProductName* if specified), regardless of other filtering in the cancel order request message.

The *ManualOrderIndicator and OEOID* fields in the optional field block must be present on all `Cancel Order` requests. Messages sent without these fields will be rejected.

Effective August 15, 2018, the system limits the rate at which identical Mass Cancel and Purge Orders requests can be submitted to the system. Requests are restricted to twenty (20) messages per second per port.

An identical Mass Cancel message is defined as a message having all of the same *CustomGroupID*, *Symbol*, *Clearing Firm*, *Lockout Instruction*, *Instrument Type Filter* and *GTC Order Filter* field values, as a previously received message.

Permitted input optional fields are described in 'Section 5.2 – Cancel Order'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	0x39
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	The sequence number for this message.
OrigClOrdID	10	20	Text	Corresponds to *OrigClOrdID* (41) in CFE FIX. *ClOrdID* of the order to cancel. For mass cancel requests, must be empty (all zeroes).
NumberOf CancelOrder Bitfields	30	1	Binary	Bitfield identifying bitfields which are set. May be 0. Field values must be appended to the end of the message.
CancelOrder Bitfield¹	31	1	Binary	Bitfield identifying fields to follow. Only present if *NumberOfCancelOrderBitfields* is non-zero.
…				
CancelOrder Bitfield^{n}		1	Binary	Last bitfield.
Optional fields. . .				

Example Cancel Order Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	35 00	53 bytes
MessageType	39	Cancel Order
MatchingUnit	0	Always 0 for inbound messages
SequenceNumber	64 00 00 00	Sequence Number 100
OrigClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
NumberOfCancel OrderBitfields	01	1 bitfield to follow
CancelOrderBitfield1	C1	*ClearingFirm, ManualOrderIndicator, OEOID*
ClearingFirm	54 45 53 54	TEST
ManualOrderIndicaator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE

Example Mass Cancel Order Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	60 00	96 bytes
MessageType	39	Cancel Order
MatchingUnit	00	Always 0 for inbound messages

SequenceNumber	64 00 00 00	Sequence Number 100
OrigClOrdID	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	(empty)
NumberOfCancel OrderBitfields	02	2 bitfields to follow
CancelOrderBitfield1	D9	*ClearingFirm, ProductName, MassCancelID, ManualOrderIndicator, OEOID*
CancelOrderBitfield2	01	*MassCancelInst*
ClearingFirm	54 45 53 54	TEST
ProductName	56 58 00 00 00 00	VX
MassCancelID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
ManualOrderIndicaator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE
MassCancelInst	46 4D 4E 42 50 00 00 00 00 00 00 00 00 00 00 00	FMNBP

4.1.3 Modify Order

Request to modify an order. The order attributes to be modified are selected using *NumberOfModifyBitfields* and some number of bitfields to follow. *Price*, *OrderQty*, *OrdType*, *StopPx*, *ManualOrderIndicator*, and *OEOID* may be adjusted. Modifies will result in a loss of time priority unless (1) they have no change in *Price* and also reduce *OrderQty* or (2) they change the *StopPx* for a stop order that has not been elected. *OrdType* may be adjusted from Limit to Market.

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 TPH in total control of the share exposure of the order.

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

The *OrderQty, Price, ManualOrderIndicator and OEOID* fields in the optional field block must be present on all `Modify Order` requests. Messages sent without these fields will be rejected.

A maximum of 1,679,615 `Modify Order` requests may be made to a single order each trading day. Once the 1,679,615th modification is made, then the next user-generated message on the order should be a `Cancel Order` request.

Permitted input optional fields are described in 'Section 5.3 – Modify Order'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x3A`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.

SequenceNumber	6	4	Binary	The sequence number for this message.
ClOrdID	10	20	Text	New *ClOrdID* for this order.
OrigClOrdID	30	20	Text	Corresponds to *OrigClOrdID* (41) in CFE FIX. *ClOrdID* of the order to replace. In the case of multiple changes to a single order, this will be the *ClOrdID* of the most recently accepted change.
NumberOf ModifyOrder Bitfields	50	1	Binary	Bitfield identifying bitfields which are set. May be 0. Field values must be appended to the end of the message.
ModifyOrder Bitfield1	51	1	Binary	Bitfield identifying fields to follow.
…				
ModifyOrder Bitfieldn		1	Binary	Last bitfield.
Optional fields. . .				

Example Modify Order Message:

Field Name	**Hexadecimal**	**Notes**
StartOfMessage	BA BA	Start of message bytes
MessageLength	52 00	82 bytes
MessageType	3A	Modify Order
MatchingUnit	00	Always 0 for inbound messages
SequenceNumber	64 00 00 00	Sequence Number 100
ClOrdID	41 42 43 31 32 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC124
OrigClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
NumberOfModify OrderBitfields	02	1 bitfield to follow
ModifyOrderBitfield1	0C	*OrderQty, Price*
ModifyOrderBitfield2	18	*ManualOrderIndicator, OEOID*
OrderQty	64 00 00 00	100 contracts
Price	08 E2 01 00 00 00 00 00	12.34
ManualOrderIndicaator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE

4.1.4 Purge Orders

Request to cancel a group of orders across all the TPH's sessions. This differs from a mass cancel request sent via a `Cancel Order` message as the purge request is applied across all of the TPH's sessions, not just the session on which the `Cancel Order` was received. In addition, the `Purge Orders` message accepts a list of *CustomGroupIDs* as part of the order matching filter.

- `Purge Orders` requires sending *MassCancelInst* bitfield.
- Optionally *ProductName, ClearingFirm, MassCancelID* and list of *CustomGroupID* may also be sent.
- *ProductName* and *CustomGroupID* are mutually exclusive. Messages containing both will be rejected.
- A maximum of 10 *CustomGroupID* may be sent in one message.
- A `Mass Cancel Acknowledgment` message may be requested by setting the Acknowledgement Style value in the required 'optional' field *MassCancelInst* to "S" or "B". In these cases the Purge Orders request will be rejected if the *MassCancelID* optional field is not provided.
- Individual `Order Cancelled` messages are requested by setting the Acknowledgement Style value of the required 'optional' field *MassCancelInst* to "M" or "B".

The *ManualOrderIndicator and OEOID* fields in the optional field block must be present on all `Purge Orders` requests. Messages sent without these fields will be rejected.

Effective August 15, 2018, the system limits the rate at which identical Mass Cancel and Purge Orders requests can be submitted to the system. Requests are restricted to twenty (20) messages per second per port.

An identical Mass Cancel message is defined as a message having all of the same *CustomGroupID*, *Symbol*, *Clearing Firm*, *Lockout Instruction*, *Instrument Type Filter* and *GTC Order Filter* field values, as a previously received message.

Permitted input optional fields are described in 'Section 5.4 – Purge Orders'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x47`
MatchingUnit	5	1	Binary	Always 0 for inbound (TPH to CFE) messages.
SequenceNumber	6	4	Binary	The sequence number for this message.
ReservedInternal	10	1	Alphanumeric	Reserved for CFE Internal use
NumberOf PurgeOrders Bitfields	11	1	Binary	Bitfield identifying bitfields which are set. May be 0. Field values must be appended to the end of the message.
PurgeOrders Bitfield1	12	1	Binary	Bitfield identifying fields to follow. Only present if *NumberOfPurgeOrdersBitfields* is non-zero.
CustomGroupIDCnt	13	1	Binary	Number of repeating *CustomGroupID* included in this message.
CustomGroupIDOne		2	Binary	First *CustomGroupID*. Only present if *CustomGroupIDCnt* is non-zero.
…				
CustomGroupIDN		2	Binary	Last *CustomGroupID*.
Optional fields. . .				

Example Purge Orders Message with CustomGroupID and Firm Level Lockout:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes
MessageLength	4B 00	75 bytes
MessageType	47	Purge Orders
MatchingUnit	0	Always 0 for inbound messages
SequenceNumber	64 00 00 00	Sequence Number 100
Reserved	00	Ignore
NumberOfPurge OrderBitfields	01	1 bitfield to follow
PurgeOrdersBitfield1	E1	*ClearingFirm, MassCancelID, ManualOrderIndicator, OEOID, MassCancelInst*
CustomGroupIDCnt	02	2 CustomGroupID to follow
CustomGroupID1	BF BE	First *CustomGroupID* of 48831
CustomGroupID2	C0 BE	Second *CustomGroupID* of 48832
ClearingFirm	54 45 53 54	TEST
MassCancelID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
ManualOrderIndicator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE
MassCancelInst	46 42 4C 42 44 00 00 00 00 00 00 00 00 00 00 00	FBLBD

Example Purge Orders Message with Product Level Filter and no Lockout:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes
MessageLength	4D 00	77 bytes
MessageType	47	Purge Orders
MatchingUnit	00	Always 0 for inbound messages
SequenceNumber	64 00 00 00	Sequence Number 100
Reserved	00	Ignore
NumberOfPurge OrderBitfields	01	1 bitfield to follow
PurgeOrdersBitfield1	E9	*ClearingFirm, ProductName, MassCancelID, ManualOrderIndicator, OEOID, MassCancelInst*
CustomGroupIDCnt	00	No *CustomGroupID* to follow
ClearingFirm	54 45 53 54	TEST
ProductName	56 58 00 00 00 00	VX
MassCancelID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
ManualOrderIndicaator	59	Y = Manual
OEOID	4A 4F 48 4E 20 44 4F 45 00 00 00 00 00 00 00 00 00 00	JOHN DOE
MassCancelInst	46 42 4E 42 43 00 00 00 00 00 00 00 00 00 00 00	FBNBC

4.2 CFE to TPH

4.2.1 Order Acknowledgment

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

Per the instructions given in a Return Bitfields Parameter Group on the `Login Request` (Section 3.1.1 – Login Request), optional fields may be appended to echo back information provided in the original `New Order` message. Fields which have been requested to be echoed back but which were not filled in will still be sent, but filled with binary zero (`0x00`).

Permitted return optional fields are described in 'Section 6.1 – Order Acknowledgement'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	`0x25`
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	6	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	Echoed back from the original order.
OrderID	38	8	Binary	Corresponds to *OrderID* (37) in CFE FIX. Order identifier supplied by CFE. This identifier corresponds to the identifiers used in CFE market data products. Sent to the OCC in the Exchange Data field.
ReservedInternal	46	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	47	1	Binary	Number of bitfields to follow.
ReturnBitfield1	48	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfieldn		1	Binary	Last bitfield.
Optional fields. . .				

Example Order Acknowledgment Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`4D 00`	77 bytes
MessageType	`25`	`Order Acknowledgment`
MatchingUnit	`02`	Matching Unit 2
SequenceNumber	`64 00 00 00`	Sequence number 100
TransactionTime	`E0 FA 20 F7 36 71 F8 11`	1,294,909,373,757,320,000
ClOrdID	`41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00`	ABC123

OrderID	05 10 1E B7 5E 39 2F 02	171WC1000005 (base 36)
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	03	3 bitfields to follow
ReturnBitfield1	00	No bitfields from byte 1
ReturnBitfield2	01	*Symbol*
ReturnBitfield3	05	*Account, ClearingAccount*
Symbol	31 32 33 61 42 63 00 00	123aBc
Account	41 42 43 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC
ClearingAccount	00 00 00 00	(empty)

Example Minimal Order Acknowledgment Message:

Field Name	**Hexadecimal**	**Notes**
StartOfMessage	BA BA	Start of message bytes.
MessageLength	2E 00	46 bytes
MessageType	25	`Order Acknowledgment`
MatchingUnit	02	Matching Unit 2
SequenceNumber	64 00 00 00	Sequence number 100
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,320,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
OrderID	05 10 1E B7 5E 39 2F 02	171WC1000005 (base 36)
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	00	No bitfields to follow

4.2.2 Order Rejected

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

Permitted return optional fields are described in 'Section 6.2 – Order Rejected'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	`0x26`
MatchingUnit	5	1	Binary	Unsequenced application message. Matching unit will be set to 0.
SequenceNumber	6	4	Binary	Unsequenced application message. Sequence number will be set to 0.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	Echoed back from the original order.
OrderRejectReason	38	1	Text	Reason for an order rejection. See 'Section 8 – Reason Codes' for a list of possible reasons.

Text	39	60	Text	Human readable text with more information about the reject reason.
ReservedInternal	99	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	100	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	101	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example Order Rejected Message:

Field Name	**Hexadecimal**	**Notes**
StartOfMessage	BA BA	Start of message bytes
MessageLength	7A 00	122 bytes
MessageType	26	`Order Rejected`
MatchingUnit	0	Unsequenced Message, unit = 0
SequenceNumber	00 00 00 00	Unsequenced Message, sequence = 0
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,320,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
OrderRejectReason	44	D
Text	44 75 70 6C 69 63 61 74 65 20 43 6C 4F 72 64 49 44 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	Duplicate ClOrdID
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	04	4 bitfields to follow
ReturnBitfield1	00	No bitfields from byte 1
ReturnBitfield2	01	*Symbol*
ReturnBitfield3	06	*ClearingFirm, ClearingAccount*
Symbol	31 32 33 61 42 63 00 00	123aBc
ClearingFirm	54 45 53 54	TEST
ClearingAccount	00 00 00 00	(empty)
MaturityDate	F0 C5 33 01	2/24/2017

4.2.3 Order Modified

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

Note: You must opt-in to receiving *LeavesQty* in `Order Modified` messages. 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.

Permitted return optional fields are described in 'Section 6.3 – Order Modified'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	`0x27`
MatchingUnit	5	1	Binary	The Matching Unit which created this message. Matching units in BOE correspond to Matching Units on Multicast PITCH.
SequenceNumber	6	4	Binary	The sequence number for this message. Distinct per Matching Unit.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent)
ClOrdID	18	20	Text	Client order ID. This is the *ClOrdID* from the Modify Order message.
OrderID	38	8	Binary	Corresponds to *OrderID* (37) in CFE FIX. The unique *OrderID*. Modifications do not change the *OrderID*.
ReservedInternal	46	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	47	1	Binary	Number of bitfields to follow.
$ReturnBitfield_1$	48	1	Binary	Bitfield identifying fields to return.
…				
$ReturnBitfield_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example Order modified Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`3F 00`	63 bytes
MessageType	`27`	`Order Modified`
MatchingUnit	`02`	Matching Unit 2
SequenceNumber	`64 00 00 00`	Sequence number 100
TransactionTime	`E0 FA 20 F7 36 71 F8 11`	1,294,909,373,757,324,000
ClOrdID	`41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00`	ABC123
OrderID	`05 10 1E B7 5E 39 2F 02`	171WC1000005 (base 36)
ReservedInternal	`00`	Ignore
NumberOfReturn Bitfields	`05`	5 bitfields to follow
ReturnBitfield1	`04`	*Price*
ReturnBitfield2	`00`	No fields from byte 2
ReturnBitfield3	`00`	No fields from byte 3
ReturnBitfield4	`00`	No fields from byte 4
ReturnBitfield5	`02`	*LeavesQty*
Price	`08 E2 01 00 00 00 00 00`	12.34
LeavesQty	`00 00 00 00`	0 (order done)

4.2.4 User Modify Rejected

`User Modify Rejected` messages are sent in response to a `Modify Order` 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).

Permitted return optional fields are described in 'Section 6.4 – User Modify Rejected'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	0x29
MatchingUnit	5	1	Binary	Unsequenced application message. Matching unit will be set to 0.
SequenceNumber	6	4	Binary	Unsequenced application message. Sequence number will be set to 0.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	The *ClOrdID* of the modify request which was rejected.
ModifyReject Reason	38	1	Text	Reason for a modify rejection. See 'Section 8 – Reason Codes' for a list of possible reasons.
Text	39	60	Text	Human readable text with more information about the reject reason.
ReservedInternal	99	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	100	1	Binary	Number of bitfields to follow.
$ReturnBitfield_1$	101	1	Binary	Bitfield identifying fields to return.
…				
$ReturnBitfield_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example User Modify Rejected Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	63 00	99 bytes
MessageType	29	User Modify Rejected
MatchingUnit	00	Unsequenced Message, unit = 0
SequenceNumber	00 00 00 00	Unsequenced Message, sequence = 0
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
ClOrdID	41 42 43 31 32 33 00 00 00 00	ABC123
	00 00 00 00 00 00 00 00 00 00	
ModifyRejectReason	50	Pending Fill
Text	50 65 6E 64 69 6E 67 00 00 00	Pending
	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	
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	00	No optional fields

4.2.5 Order Cancelled

An order has been cancelled.

Permitted return optional fields are described in 'Section 6.5 – Order Cancelled'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	0x2A
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	6	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	The order which was cancelled.
CancelReason	38	1	Text	Reason for the order cancellation. See 'Section 8 – Reason Codes' for a list of possible reasons.
ReservedInternal	39	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	40	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	41	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example Order Cancelled Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes
MessageLength	48 00	72 bytes
MessageType	2A	Order Cancelled
MatchingUnit	01	Matching Unit 1
SequenceNumber	64 00 00 00	Sequence number 100
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
CancelReason	55	U = User Requested
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	05	5 bitfields to follow
ReturnBitfield1	00	No fields from byte 1
ReturnBitfield2	00	No fields from byte 2
ReturnBitfield3	06	*ClearingFirm*, *ClearingAccount*
ReturnBitfield4	00	No fields from byte 2
ReturnBitfield5	01	*OrigClOrdID*
ClearingFirm	54 45 53 54	TEST
ClearingAccount	31 32 33 34	1234

OrigClOrdID	41 42 43 31 32 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC121

4.2.6 Cancel Rejected

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.

Permitted return bitfields are described in 'Section 6.6 - Cancel Rejected'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x2B`
MatchingUnit	5	1	Binary	Unsequenced application message. Matching unit will be set to 0.
SequenceNumber	6	4	Binary	Unsequenced application message. Sequence number will be set to 0.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	The order whose cancel was rejected.
CancelRejectReason	38	1	Text	See 'Section 8 – Reason Codes' for a list of possible reasons.
Text	39	60	Text	Human readable text with more information about the reject reason.
ReservedInternal	99	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	100	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	101	1	Binary	Bitfield identifying fields to return.
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example Cancel Rejected Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes
MessageLength	63 00	99 bytes
MessageType	2B	`Cancel Rejected`
MatchingUnit	00	Unsequenced Message, unit = 0
SequenceNumber	00 00 00 00	Unsequenced Message, sequence = 0
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
CancelRejectReason	4A	J
Text	54 4F 4F 20 4C 41 54 45 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	TOO LATE

ReservedInternal	00	Ignore
NumberOfReturn Bitfields	00	No optional fields

4.2.7 Order Execution

An Order Execution 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.

Permitted return bitfields are described in 'Section 6.7 – Order Execution'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	0x2C
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	*6*	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	*10*	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	*18*	20	Text	Order receiving the execution.
ExecID	*38*	8	Binary	Corresponds to *ExecID* (17) in CFE FIX. Sent to the OCC in the Trade ID field. Execution ID. Unique across all matching units on a given day. Note: *ExecIDs* will be represented on ODROP and FIXDROP ports as base 36 ASCII. Example conversion: **Decimal** / **Base 36** 28294005440239 / A1234B567 76335905726621 / R248BC23H 728557228187 / 09AP05V2Z
LastShares	*46*	4	Binary	Corresponds to *LastShares* (32) in CFE FIX. Executed share quantity.
LastPx	*50*	8	Binary Price	Corresponds to *LastPx* (31) in CFE FIX. Price of this fill. Note the use *of Binary Price* type to represent positive and negative prices, which can occur with spread instruments.
LeavesQty	*58*	4	Binary	Corresponds to *LeavesQty* (151) in CFE FIX. Quantity still open for further execution. If zero, the order is complete.
BaseLiquidity Indicator	*62*	1	Alphanumeric	Indicates whether the trade added or removed liquidity. A = Added Liquidity R = Removed Liquidity C = Market opening / re-opening trade
SubLiquidityIndicator	*63*	1	Alphanumeric	ASCII NULL (0x00)

				U = Qualifying Market Turner order. Only sent when *BaseLiquidityIndicator* = A. **CFE may add additional values without notice. TPHs must gracefully ignore unknown values.**
ContraBroker	64	4	Alphanumeric	Corresponds to *ContraBroker* (375) in CFE FIX. Value always set to "CFE"
ReservedInternal	68	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	69	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	70	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields…				

Example Order Execution Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes
MessageLength	53 00	83 bytes
MessageType	2C	Order Execution
MatchingUnit	01	Matching Unit 1
SequenceNumber	64 00 00 00	Sequence number 100
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
ExecID	01 F0 B7 D9 71 21 00 00	D19800001 (base 36)
LastShares	64 00 00 00	100 contracts
LastPx	08 E2 01 00 00 00 00 00	12.34
LeavesQty	14 00 00 00	20
BaseLiquidityIndicator	41	A = Added
SubLiquidityIndicator	00	(unset)
ContraBroker	43 46 45 00	CFE
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	03	3 bitfields to follow
ReturnBitfield1	00	No bitfields from byte 1
ReturnBitfield2	00	No bitfields from byte 2
ReturnBitfield3	46	*ClearingFirm, ClearingAccount, OrderQty*
ClearingFirm	54 45 53 54	TEST
ClearingAccount	31 32 33 43	1234
OrderQty	78 00 00 00	120 contracts

4.2.8 Trade Cancel or Correct

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

Permitted return bitfields are described in 'Section 6.8 – Trade Cancel or Correct'.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be 0xBA 0xBA.

MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	0x2D
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	6	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	18	20	Text	*ClOrdID* of the order whose fill is being cancelled or corrected.
OrderID	38	8	Binary	Corresponds to *OrderID* (37) in CFE FIX. Order whose fill is being cancelled or corrected.
ExecRefID	46	8	Binary	Corresponds to *ExecRefID* (19) in CFE FIX. Refers to the *ExecID* of the fill being cancelled or corrected.
Side	54	1	Alphanumeric	Side of the order.
BaseLiquidity Indicator	55	1	Alphanumeric	Indicates whether the trade added or removed liquidity. A = Added Liquidity R = Removed Liquidity
ClearingFirm	56	4	Alpha	Echoed back from the original order.
ClearingAccount	60	4	Text	Echoed back from the original order.
LastShares	64	4	Binary	Number of shares of the trade being cancelled.
LastPx	68	8	Binary Price	Price of the trade being cancelled. Note the use of *Binary Price* type to represent positive and negative prices, which can occur with spread instruments.
CorrectedPrice	76	8	Binary Price	For trade corrections, this is the new trade price. For trade breaks, this is set to 0.
OrigTime	84	8	DateTime	Corresponds to *OrigTime* (42). The date and time of the original trade, in GMT.
ReservedInternal	92	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	93	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	94	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields. . .				

Example Trade Cancel or Correct Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	6C 00	108 bytes
MessageType	2D	Trade Cancel or Correct
MatchingUnit	01	Matching Unit 1
SequenceNumber	64 00 00 00	Sequence number 100
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000

ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
OrderID	05 10 1E B7 5E 39 2F 02	171WC1000005 (base 36)
ExecRefID	01 F0 B7 D9 71 21 00 00	D19800001 (base 36)
Side	31	Buy
BaseLiquidity Indicator	41	A = Added
ClearingFirm	54 45 53 54	TEST
ClearingAccount	00 00 00 00	(empty)
LastShares	64 00 00 00	100 contracts
LastPx	70 17 00 00 00 00 00 00	0.60
CorrectedPrice	00 00 00 00 00 00 00 00	0 (cancelled)
OrigTime	E0 BA 75 95 15 4C EB 11	1,291,209,373,757,324,000
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	04	4 bitfields to follow
ReturnBitfield1	00	No fields from byte 1
ReturnBitfield2	01	*Symbol*
ReturnBitfield3	00	No fields from byte 3
ReturnBitfield4	01	*MaturityDate*
Symbol	30 30 51 30 6B 41 00 00	00Q0kA
MaturityDate	F0 C5 33 01	2/24/2017

4.2.9 Purge Rejected

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.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x48`
MatchingUnit	5	1	Binary	Unsequenced application message. Matching unit will be set to 0.
SequenceNumber	6	4	Binary	Unsequenced application message. Sequence number will be set to 0.
TransactionTime	10	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
PurgeRejectReason	18	1	Text	Reason for a purge rejection. See 'Section 8 – Reason Codes' for a list of possible reasons.
Text	19	60	Text	Human readable text with more information about the reject reason.
ReservedInternal	79	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	80	1	Binary	Number of bitfields to follow.
ReturnBitfield₁	81	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfieldₙ		1	Binary	Last bitfield.
Optional fields. . .				

Example Purge Rejected Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA BA	Start of message bytes.
MessageLength	72 00	114 bytes
MessageType	48	Purge Rejected
MatchingUnit	00	Unsequenced Message, unit = 0
SequenceNumber	00 00 00 00	Unsequenced Message, sequence = 0
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
PurgeRejectReason	41	A
Text	41 44 4D 49 4E 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 00 00	ADMIN
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	0F	15 bitfields to follow
ReturnBitfield1	00	No fields from byte 1
ReturnBitfield2	00	No fields from byte 2
ReturnBitfield3	00	No fields from byte 3
ReturnBitfield4	00	No fields from byte 4
ReturnBitfield5	00	No fields from byte 5
ReturnBitfield6	00	No fields from byte 6
ReturnBitfield7	00	No fields from byte 7
ReturnBitfield8	00	No fields from byte 8
ReturnBitfield9	00	No fields from byte 9
ReturnBitfield10	00	No fields from byte 10
ReturnBitfield11	00	No fields from byte 11
ReturnBitfield12	00	No fields from byte 12
ReturnBitfield13	00	No fields from byte 13
ReturnBitfield14	00	No fields from byte 14
ReturnBitfield15	08	*MassCancelID*
MassCancelID	54 45 53 54 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	TEST

4.2.10 Mass Cancel Acknowledgment

A `Mass Cancel Acknowledgment` is an unsequenced message sent when a `Cancel Order` or `Purge Orders` message requested a mass cancellation has completed cancelling all individual orders.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the *StartOfMessage* field.
MessageType	4	1	Binary	`0x36`
MatchingUnit	5	1	Binary	Unsequenced application message. Matching unit will be set to 0.
SequenceNumber	6	4	Binary	Unsequenced application. Message. Sequence number will be set to 0.

TransactionTime	10	8	DateTime	The time in the order entry gateway when the final matching engine event was received to complete the mass cancel.
MassCancelID	18	20	Text	Copied from the MassCancelID passed on the original `Cancel Order`. This field corresponds to *MassCancelID* (7695) in CFE FIX.
CancelledOrder Count	38	4	Binary	Number of orders cancelled. This field corresponds to *CancelledOrderCount* (7696) in CFE FIX.
ReservedInternal	42	1	Binary	Reserved for CFE internal use.

Example Mass Cancel Acknowledgment Message:

Field Name	Hexadecimal	Notes
StartOfMessage	BA	Start of message bytes.
MessageLength	29 00	41 bytes
MessageType	36	`Mass Cancel Acknowledgment`
MatchingUnit	00	Unsequenced Message, unit = 0
SequenceNumber	00 00 00 00	Unsequenced Message, sequence = 0
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
MassCancelID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
CancelledOrderCount	63 00 00 00	99 orders were cancelled
ReservedInternal	00	Ignore

4.2.11 TAS Restatement

A TAS `Restatement` is sent post-settlement time for each TAS (VXT) execution during the associated business day to communicate the updated Price and Symbol associated with the cleared execution. TAS `Restatement` messages are sent shortly after the VX contract settlement prices are disseminated (shortly after 3:15 PM CST).

TPHs that trade TAS should register for at least the following fields on TAS `Restatement` messages.

- *ClearingPrice* – Field contains the as-traded price (*LastPx*) offset with the underlying contract settlement price. This is the price used for TAS trade clearing.
- *ClearingSymbol* – Field contains the mapped symbol ID of the VX contract assocated with the traded VXT contract with the same expiration. This is the symbol under which the TAS trade clears.

See 'Section 6.10 – TAS Restatement' for a complete specification of available fields for TAS `Restatement` messages.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	`0x49`
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	*6*	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	*10*	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	*18*	20	Text	Copied from the associated VXT execution.
ExecID	*38*	8	Binary	Copied from the associated VXT execution.

ReservedInternal	46	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	47	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	48	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields…				

Example TAS Restatement Message (Negative Price):

Field Name	**Hexadecimal**	**Notes**
StartOfMessage	BA BA	Start of message bytes.
MessageLength	46 00	70bytes
MessageType	49	TAS Restatement
MatchingUnit	01	Matching Unit 1
SequenceNumber	64 00 00 00	Sequence number 100
TransactionTime	E0 FA 20 F7 36 71 F8 11	1,294,909,373,757,324,000
ClOrdID	41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00	ABC123
ExecID	01 F0 B7 D9 71 21 00 00	D19800001 (base 36)
ReservedInternal	00	Ignore
NumberOfReturn Bitfields	0C	12 bitfields to follow
ReturnBitfield$_1$	00	No bitfields from byte 1
ReturnBitfield$_2$	01	*Symbol*
…		
ReturnBitfield$_{11}$	00	No bitfields from byte 11
ReturnBitfield$_{12}$	50	*ClearingSymbol, ClearingPrice*
Symbol	31 32 33 61 62 63	123abc
ClearingSymbol	34 35 36 64 65 66	456def
ClearingPrice	54 4A 02 00 00 00 00 00	15.01

4.2.12 Variance Restatement

A Variance Restatement is sent post-settlement time for each VA and VAO execution during the associated business day is used to communicate updated Price, Size and Symbol associated with the cleared execution. Variance Restatement messages are sent shortly after the S&P 500 index settlement price is received (4:00 PM CST).

TPHs that trade Variance futures should register for at least the following fields on Variance Restatement messages.

- *ClearingPrice* – *Price* converted to Variance units.
- *ClearingSize* – For VA executions, this field will contain the *LastShares* of the original execution in Vega contracts to Variance units. For VAO executions, this field will contain a copy of the *LastShares* from the original execution as VAO trades directly in Variance units.
- *ClearingSymbol* – Field contains the mapped symbol ID of the VA contract assocated with the traded contract with the same expiration. This is the symbol under which the Variance trade clears. Note that this field will be the same as the as-traded original symbol for VA executions; only VAO executions will experience a change of symbol for clearing.

See 'Section 6.11 – Variance Restatement' for a complete specification of available fields for `Variance Restatement` messages.

Field	Offset	Length	Data Type	Description
StartOfMessage	0	2	Binary	Must be `0xBA 0xBA`.
MessageLength	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the StartOfMessage field.
MessageType	4	1	Binary	0x4A
MatchingUnit	5	1	Binary	The matching unit which created this message. Matching units in BOE correspond to matching units on Multicast PITCH.
SequenceNumber	*6*	4	Binary	The sequence number for this message. Distinct per matching unit.
TransactionTime	*10*	8	DateTime	The time the event occurred in the CFE Matching Engine (not the time the message was sent).
ClOrdID	*18*	20	Text	Copied from the associated VA/VAO execution.
ExecID	*38*	8	Binary	Copied from the associated VA/VAO execution.
ReservedInternal	46	1	Binary	Reserved for CFE internal use.
NumberOfReturn Bitfields	47	1	Binary	Number of bitfields to follow.
ReturnBitfield$_1$	48	1	Binary	Bitfield identifying fields to return.
…				
ReturnBitfield$_n$		1	Binary	Last bitfield.
Optional fields…				

Example Variance Restatement Message:

Field Name	Hexadecimal	Notes
StartOfMessage	`BA BA`	Start of message bytes.
MessageLength	`4A 00`	74 bytes
MessageType	`4A`	`Variance Restatement`
MatchingUnit	`01`	Matching Unit 1
SequenceNumber	`64 00 00 00`	Sequence number 100
TransactionTime	`E0 FA 20 F7 36 71 F8 11`	1,294,909,373,757,324,000
ClOrdID	`41 42 43 31 32 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00`	ABC123
ExecID	`01 F0 B7 D9 71 21 00 00`	D19800001 (base 36)
ReservedInternal	`00`	Ignore
NumberOfReturn Bitfields	`12`	12 bitfields to follow
ReturnBitfield$_1$	`00`	No bitfields from byte 1
ReturnBitfield$_2$	`01`	*Symbol*
…		
ReturnBitfield$_{11}$	`00`	No bitfields from byte 11
ReturnBitfield$_{12}$	`70`	*ClearingPrice, ClearingSize, ClearingSymbol*
Symbol	`31 32 33 61 62 63`	123abc
ClearingPrice	`00 10 27 00 00 00 00 00`	256.00
ClearingSize	`0C 1C 00 00`	3100
ClearingSymbol	`34 35 36 64 65 66`	123abc

5 Input Bitfields Per Message

Legend:

R Indicates that the field must be specified for a message

● Indicates that the field can be specified for a message

(Blank) Indicates that the field is not used by CFE and cannot be specified for a message

Input messages that containing invalid fields (i.e., Blank) will be rejected. In the case of rejected input messages, the associated `Reject` message sent back to the TPH will contain a 'RejectReason' code non-optional field (See Section 8 - Reason Codes) and a 'Text' non-optional field containing descriptive text.

5.1 New Order

Byte	Bit	Field	
1	1	*ClearingFirm*	●
	2	*ClearingAccount*	●
	4	*Price*	●
	8	*ExecInst*	
	16	*OrdType*	●
	32	*TimeInForce*	**R**
	64	*MinQty*	●
	128	*MaxFloor*	
2	1	*Symbol*	**R**
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	**R**
	128	*RoutingInst*	
3	1	*Account*	**R**
	2	*DisplayIndicator*	
	4	*MaxRemovePct*	
	8	*DiscretionAmount*	
	16	*PegDifference*	
	32	*PreventMatch*	●
	64	*LocateRequired*	
	128	*ExpireTime*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*RiskReset*	●
	16	*OpenClose*	●
	32	*CMTANumber*	●
	64	*TargetPartyID*	
	128	*(Reserved)*	

Byte	Bit	Field	
5	1	*(Reserved)*	
	2	*AttributedQuote*	
	4	*BookingType*	
	8	*ExtExecInst*	
	16	*ClientID*	
	32	*InvestorID*	
	64	*ExecutorID*	
	128	*OrderOrigination*	
6	1	*DisplayRange*	
	2	*StopPx*	●
	4	*RoutStrategy*	
	8	*RouteDeliveryMethod*	
	16	*ExDestination*	
	32	*EchoText*	
	64	*AuctionId*	
	128	*RoutingFirmID*	
7	1	*AlgorithmicIndicator*	
	2	*CustomGroupId*	●
	4	*ClientQualifiedRole*	
	8	*InvestorQualifiedRole*	
	16	*ExecutorQualifiedRole*	
	32	*CtiCode*	**R**
	64	*ManualOrderIndicator*	**R**
	128	*OEOID*	**R**

5.2 Cancel Order

Byte	Bit	Field	
1	1	*ClearingFirm*	●
	2	*MassCancelLockout*	
	4	*MassCancel*	
	8	*ProductName*	●
	16	*MassCancelID*	●
	32	*RoutingFirmID*	
	64	*ManualOrderIndicator*	**R**
	128	*OEOID*	**R**
2	1	*MassCancelInst*	●
	2	*(Reserved)*	
	4	*(Reserved)*	
	8	*(Reserved)*	
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

5.3 Modify Order

Byte	Bit	Field	
1	1	*ClearingFirm*	●
	2	*(Reserved)*	
	4	*OrderQty*	**R**
	8	*Price*	**R**
	16	*OrdType*	●
	32	*CancelOrigOnReject*	●
	64	*ExecInst*	
	128	*Side*	
2	1	*MaxFloor*	
	2	*StopPx*	●
	4	*RoutingFirmID*	
	8	*ManualOrderIndicator*	**R**
	16	*OEOID*	**R**
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

OrderQty, Price, Manual Order Indicator and OEOID must be present on all `Modify Order` requests. Messages sent without these fields will be rejected.

5.4 Purge Orders

Byte	Bit	Field	
1	1	*ClearingFirm*	●
	2	*MassCancelLockout*	
	4	*MassCancelInst*	**R**
	8	*ProductName*	●
	16	*MassCancelID*	●
	32	*RoutingFirmID*	
	64	*ManualOrderIndicator*	**R**
	128	*OEOID*	**R**

6 Return Bitfields Per Message

Legend:

- ● Indicates that the field can be requested for a message
- – Indicates that the field cannot be requested for a message
- (Blank) Indicates that the field is not used by CFE and cannot be requested for a message

Attempts to register to receive an unused field in the `Login Request` message will result in a rejected login.

6.1 Order Acknowledgment

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	●
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	●
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	●
	128	*ExpireTime*	●

Byte	Bit	Field	
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	
7	1	*SubLiquidityIndicator*	●
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFlrmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	

Byte	Bit	Field	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–
13	1	*CumQty*	●
	2	*DayOrderQty*	●
	4	*DayCumQty*	●
	8	*AvgPx*	●
	16	*DayAvgPx*	●
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.2 Order Rejected

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	●
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.3 Order Modified

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	●
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	●
	2	*LeavesQty*	●
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	●
	128	*ExpireTime*	●
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFIrmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.4 User Modify Rejected

Byte	Bit	Field	
1	1	*Side*	–
	2	*PegDifference*	
	4	*Price*	–
	8	*ExecInst*	
	16	*OrderType*	–
	32	*TimeInForce*	–
	64	*MinQty*	–
	128	*MaxRemovePct*	
2	1	*Symbol*	–
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	–
	128	*(Reserved)*	
3	1	*Account*	–
	2	*ClearingFirm*	–
	4	*ClearingAccount*	–
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventMatch*	–
4	1	*MaturityDate*	–
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	–
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	–
	4	*StopPx*	–
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	–
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFIrmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	–
	2	*ManualOrderIndicator*	–
	4	*OEOID*	–
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.5 Order Cancelled

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	●
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	●
	2	*LeavesQty*	●
	4	*LastShares*	●
	8	*LastPx*	●
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	●
6	1	*SecondaryOrderId*	●
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.6 Cancel Rejected

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	–
	2	*ClearingFirm*	–
	4	*ClearingAccount*	–
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventMatch*	–
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	●
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.7 Order Execution

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	●
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	●
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	●
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	●
	16	*ClearingPrice*	–
	32	*ClearingSize*	●
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	●
	2	*DayOrderQty*	●
	4	*DayCumQty*	●
	8	*AvgPx*	●
	16	*DayAvgPx*	●
	32	*PendingStatus*	●
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	●
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	●
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.8 Trade Cancel or Correct

Byte	Bit	Field	
1	1	*Side*	–
	2	*PegDifference*	
	4	*Price*	–
	8	*ExecInst*	
	16	*OrderType*	–
	32	*TimeInForce*	–
	64	*MinQty*	–
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	–
	2	*ClearingFirm*	–
	4	*ClearingAccount*	–
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventMatch*	–
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	●
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	–
	4	*StopPx*	–
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	–
	2	*ManualOrderIndicator*	–
	4	*OEOID*	–
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.9 Purge Rejected

Byte	Bit	Field	
1	1	*Side*	–
	2	*PegDifference*	
	4	*Price*	–
	8	*ExecInst*	
	16	*OrderType*	–
	32	*TimeInForce*	–
	64	*MinQty*	–
	128	*MaxRemovePct*	
2	1	*Symbol*	–
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	–
	128	*(Reserved)*	
3	1	*Account*	–
	2	*ClearingFirm*	–
	4	*ClearingAccount*	–
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventMatch*	–
4	1	*MaturityDate*	–
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	–
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	–
	2	*LeavesQty*	–
	4	*LastShares*	–
	8	*LastPx*	–
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	–
	2	*EchoText*	–
	4	*StopPx*	–
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	–
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFirmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	–
	2	*ManualOrderIndicator*	–
	4	*OEOID*	–
	8	*TradeDate*	–
	16	*ClearingPrice*	–
	32	*ClearingSize*	–
	64	*ClearingSymbol*	–
	128	*(Reserved)*	–

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	–
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	–
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	●
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.10 TAS Restatement

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	●
	2	*LeavesQty*	–
	4	*LastShares*	●
	8	*LastPx*	●
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	●
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFIrmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	●
	16	*ClearingPrice*	●
	32	*ClearingSize*	–
	64	*ClearingSymbol*	●
	128	*(Reserved)*	

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*DrillThruProtection*	
	128	*MultilegReportingType*	●
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	●
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

6.11 Variance Restatement

Byte	Bit	Field	
1	1	*Side*	●
	2	*PegDifference*	
	4	*Price*	●
	8	*ExecInst*	
	16	*OrderType*	●
	32	*TimeInForce*	●
	64	*MinQty*	●
	128	*MaxRemovePct*	
2	1	*Symbol*	●
	2	*SymbolSfx*	
	4	*Currency*	
	8	*IdSource*	
	16	*SecurityId*	
	32	*SecurityExchange*	
	64	*Capacity*	●
	128	*(Reserved)*	
3	1	*Account*	●
	2	*ClearingFirm*	●
	4	*ClearingAccount*	●
	8	*DisplayIndicator*	
	16	*MaxFloor*	
	32	*DiscretionAmount*	
	64	*OrderQty*	–
	128	*PreventParticipantMatch*	●
4	1	*MaturityDate*	●
	2	*StrikePrice*	
	4	*PutOrCall*	
	8	*OpenClose*	●
	16	*ClOrdIdBatch*	
	32	*CorrectedSize*	–
	64	*PartyID*	
	128	*AccessFee*	
5	1	*OrigClOrdId*	●
	2	*LeavesQty*	–
	4	*LastShares*	●
	8	*LastPx*	●
	16	*DisplayPrice*	
	32	*WorkingPrice*	
	64	*BaseLiquidityIndicator*	–
	128	*ExpireTime*	–
6	1	*SecondaryOrderId*	–
	2	*CCP*	
	4	*ContraCapacity*	
	8	*AttributedOrder*	
	16	*ExtExecInst*	
	32	*BulkOrderIds*	
	64	*BulkRejectReasons*	
	128	*PartyRole*	

Byte	Bit	Field	
7	1	*SubLiquidityIndicator*	–
	2	*TradeReportTypeReturn*	
	4	*TradePublishIndReturn*	
	8	*Text*	
	16	*Bid*	
	32	*Offer*	
	64	*LargeSize*	
	128	*LastMkt*	
8	1	*FeeCode*	●
	2	*EchoText*	
	4	*StopPx*	●
	8	*RoutingInst*	
	16	*RoutStrategy*	
	32	*RouteDeliveryMethod*	
	64	*ExDestination*	
	128	*TradeReportRefID*	
9	1	*MarketingFeeCode*	
	2	*TargetPartyID*	
	4	*AuctionId*	
	8	*OrderCategory*	
	16	*LiquidityProvision*	
	32	*CmtaNumber*	●
	64	*CrossType*	
	128	*CrossPrioritization*	
10	1	*CrossId*	
	2	*AllocQty*	
	4	*GiveUpFirmID*	
	8	*RoutingFIrmID*	
	16	*WaiverType*	
	32	*CrossExclusionIndicator*	
	64	*PriceFormation*	
	128	*ClientQualifiedRole*	
11	1	*ClientID*	
	2	*InvestorID*	
	4	*ExecutorID*	
	8	*OrderOrigination*	
	16	*Algo*	
	32	*DeferralReason*	
	64	*InvestorQualifiedRole*	
	128	*ExecutorQualifiedRole*	
12	1	*CtiCode*	●
	2	*ManualOrderIndicator*	●
	4	*OEOID*	●
	8	*TradeDate*	●
	16	*ClearingPrice*	●
	32	*ClearingSize*	●
	64	*ClearingSymbol*	●
	128	*(Reserved)*	

Byte	Bit	Field	
13	1	*CumQty*	–
	2	*DayOrderQty*	–
	4	*DayCumQty*	–
	8	*AvgPx*	–
	16	*DayAvgPx*	–
	32	*PendingStatus*	–
	64	*(Reserved)*	
	128	*MultilegReportingType*	●
14	1	*LegCFICode*	
	2	*LegMaturityDate*	
	4	*LegStrikePrice*	
	8	*RoomId*	
	16	*SecondaryExecId*	●
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	
15	1	*(Reserved)*	
	2	*EquityPartyId*	
	4	*EquityNBBOProtect*	
	8	*MassCancelId*	–
	16	*(Reserved)*	
	32	*(Reserved)*	
	64	*(Reserved)*	
	128	*(Reserved)*	

7 List of Optional Fields

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

Field	Length	Data Type	Description
Account	16	Text	Corresponds to *Account* (1) in CFE FIX. Unique account identifier associated with an order. This field will be reflected back on execution reports associated with this order. The first 10 characters are sent to the OCC in the Account # field. The entire 16 character string will appear in the Optional CM Data field. Valid characters include ASCII 32-126.
AvgPx	8	Binary Price	Corresponds to *AvgPx* (6) in CFE FIX. Average price of executions for this order weighted by trade size. Zero if *CumQty* field is zero or if a leg fill related to a complex execution.
BaseLiquidityIndicator	1	Alphanumeric	Corresponds to *TradeLiquidityIndicator* (9730). Indicates whether the trade added or removed liquidity. A A = Added Liquidity R = Removed Liquidity C = Market opening / re-opening trade
CancelOrigOnReject	1	Alpha	Corresponds to *CancelOrigOnReject* (9619) in CFE 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 CFE FIX. C = Customer F = Firm The *Capacity* refers to the OCC account type. A value of "C" denotes an account that clears in the Customer range at OCC. A value of "F" denotes an account that clears in the Clearing Firm range at OCC.
ClearingAccount	4	Text	Corresponds to *OnBehalfOfSubID* (116) and *ClearingAccount* (440) in CFE FIX. Supplemental identifier. Recorded and made available in execution reports. Available via Drop feeds. This field can be blank or filled out with an optional four character string. This field is not sent to the OCC.
ClearingFirm	4	Alpha	Corresponds to *OnBehalfOfCompID* (115) CFE FIX. EFID that will clear the trade. **Port attribute value of 'Default EFID' is used if not provided.** Sent to OCC in Exec Broker field.

ClearingPrice	8	Binary Price	Corresponds to *ClearingPrice* (21050) in CFE FIX. Optional field used in restatement messages where the originally reported fill price (*LastPx*) is transformed prior to clearing.
ClearingSize	4	Binary	Corresponds to *ClearingSize* (21051) in CFE FIX. Optional field used in `Order Execution` messsages corresponding to VA and VAO trades, and `Variance Restatement` messages where the originally reported fill quantity (*LastShares*) is transformed prior to clearing.
ClearingSymbol	8	Alphanumeric	Corresponds to *ClearingSymbol* (21053) in CFE FIX. Optional field used in restatement messages where the symbol on which the original execution occurred is tranformed prior to clearing.
CMTANumber	4	Binary	Corresponds to *CMTANumber* (439) in CFE FIX. CMTA Number of the firm that will clear the trade. Must be specified for CMTA orders and left unspecified for non-CMTA orders. Sent to the OCC in the CMTA CM# field.
ContraCapacity	1	Alphanumeric	Capacity of the contra for this execution. See *Capacity* for allowed values.
CorrectedSize	4	Binary	Corresponds to *CorrectedSize* (6655) in CFE FIX. Number of shares after trade adjustment.
CtiCode	1	Alphanumeric	Corresponds to *CTICode* (9702) in CFE FIX. Valid values: 1, 2, 3, 4 1 = CTI 1: Transactions initiated and executed by an individual TPH for the TPH's own account, for an account the TPH controls, or for the account in which the TPH has an ownership or financial interest. 2 = CTI 2: Transactions executed for the proprietary account of a clearing TPH or non-clearing TPH. 3 = CTI 3: Transactions where an individual TPH or authorized trader executes for the personal account of another individual TPH, for an account the other individual TPH controls or for an account in which the other individual TPH has an ownership or financial interest. 4 = CTI 4: Any transaction not meeting the definition of CTI 1, 2 or 3. (These should be non-TPH customer transactions).
CumQty	4	Binary	Corresponds to *CumQty* (14) in CFE FIX Cumulative quanity of contracts executed for the order over the life of the order, which may be multiple business days in the case of GTC and GTD orders. Populated for leg fills related to complex executions
CustomGroupID	2	Binary	Corresponds to *CustomGroupID* (7699) in CFE FIX for `New Order` and `Purge Orders` messages. Used to group orders for use in mass cancels where multiple orders can be cancelled by specifying a list of *CustomGroupIDs*.
DayAvePx	8	Binary Price	Corresponds to *DayAvgPx* (426) in CFE FIX.

			Applicable to GTC and GTD orders only. Average price per contract of executions on current business date. Zero if *DayCumQty* is zero.
DayCumQty	4	Binary	Corresponds to *DayCumQty* (425) in CFE FIX. Applicable to GTC and GTD orders only. Cumulative quantity of contracts executed for the order during the current business day.
DayOrderQty	4	Binary	Corresponds to *DayOrderQty* (424) in CFE FIX. Applicable to GTC and GTD orders only. Contracts remaning to be filled for the order at the beginning of the current business day (i.e., *OrderQty* – *CumQty* at the end of the previous business day)
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.
FeeCode	2	Alphanumeric	Corresponds to *FeeCode* (9882) in CFE 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. TPHs are encouraged to code their systems to accept unknown fee codes.
LastPx	8	Binary Price	Corresponds to *LastPx* (31) in CFE FIX. Price of this fill. Present on MTP triggered `Order Cancelled` message. Contains the price at which *LastShares* would have matched.
LastShares	4	Binary	Corresponds to *LastShares* (32) in CFE FIX. Quantity of contracts traded on this fill. Present on MTP triggered `Order Cancelled` message. Contains the number of contracts that would have been matched.
LeavesQty	4	Binary	Corresponds to *LeavesQty* (151) in CFE FIX. Quantity still open for further execution. If zero, the order is complete.
ManualOrder Indicator	1	Alpha	Corresponds to *ManualOrderIndicator* (1028) in CFE FIX. Y = Manual order entry N = Automated order entry
MassCancelInst	16	Text	Corresponds to *MassCancelInst* (7700) in CFE FIX. Used for specification of `Purge Orders` functionality and optionally used for specification of Mass Cancel functionality associated with the `Cancel Order` message. At least one character must be provided (Clearing Firm Filter). Contiguous characters must be specified up to total length. Truncated/unspecified characters will default to values indicated (D) below. ***1st Character : Clearing Firm Filter*** A = No filtering by clearing firm relationship is performed. F = All orders that were sent under the clearing relationship specified in *ClearingFirm* optional field. If "F" specified and ClearingFirm not provided, the Mass Cancel or Purge request will be rejected. ***2nd Character : Acknowledgement 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. S = A single `Mass Cancel Acknowledgement` message is sent once all cancels have been processed. The *MassCancelID* optional field must be specified or the Mass Cancel or Purge Request will be rejected. B = Both individual `Order Cancelled` and `Mass Cancel Acknowledgement` messages will be sent. Also requires *MassCancelID* optional filed to be specified or the Mass Cancel or Purge request will be rejected. ***3rd Character : Lockout Instruction*** N = (D) No lockout L = Lockout until corresponding Risk Reset received. Lockout can be used only with Clearing Firm Filter set to "F", otherwise the Mass Cancel or Purge request will be rejected. Lockout will apply to all `New Order` and `Modify Order` messages for the *ClearingFirm* (and *ProductName* or *CustomGroupIDs*, if specified), regardless of other filtering in the `Purge Orders` or `Cancel Order` message. ***4th Character : Instrument Type Filter*** B = (D) Cancel both Simple and Complex orders S = Cancel Simple orders only C = Cancel Spread orders only ***5th Character : GTC Order Filter*** C = (D) Cancel GTC and GTD orders P = Don't cancel (preserve) GTC and GTD orders If *ProductName* optional field is specified, it must contain a valid product symbol (e.g., "VX"), in which case only orders associated with the specified product will be cancelled. A self-imposed lockout can be released using the *RiskReset* field of the `New Order` message. If *ProductName* optional field is specified, a Product level reset is required, otherwise a Firm level reset is required to release a lockout. For more information, refer to the CFE Risk Management Specification.
MassCancelID	20	Text	Corresponds to *MassCancelID* (7695) in CFE FIX. Copied from the *MassCancelID* on the original `Cancel Order` message
MaturityDate	4	Date	Corresponds to *MaturityMonth* (200) and *MaturityDay* (205) in CFE FIX. When specifying the Symbol for a `New Order` message the user can specify the mapped symbol identifier in the *Symbol* field. Alternatively, the product class (e.g., "VX", "VXT", "VU", etc.) can be supplied for the Symbol field and the MaturityDate field is used to specify the expiration date of the symbol within the specified product class. If a value is provided for *MaturityDate*, the Symbol field must correspond to a valid product or the order will be rejected with reason code C (Unknown Product Name). If an invalid *MaturityDate* is provided, the order will be rejected with reason code B (Unknown Maturity Date).

MinQty	4	Binary	Corresponds to *MinQty* (110) in CFE FIX. Minimum fill quantity for IOC orders. Ignored for other Simple instrument orders. Not supported for Spread instruments. Spread instrument orders with specified *MinQty* will be rejected.
MultilegReportingType	1	Alphanumeric	Corresponds to *MultilegReportingType* (442) in CFE FIX Present on `Order Execution`, `TAS Restatement` and `Variance Restatement` messages representing either Spread orders or Simple orders that are part Spread execution. 1 = Simple instrument execution 2 = Simple instrument execution that is part of a Spread execution 3 = Spread instrument execution
OpenClose	1	Alphanumeric	Corresponds to *OpenClose* (77) in CFE FIX. Indicates status of client position in a trade resulting from the order. O = Open C = Close N = None (same as not present)
OEOID	18	Text	Corresponds to *OEOID* (25004) in CFE FIX. Identifies the Order Entry Operator responsible for this message. Min length 3, max length 18. Values in ASCII range 33-126 except comma, semicolon and pipe are permissible.
OrderQty	4	Binary	Corresponds to *OrderQty* (38) in CFE FIX. Order quantity. System limit is 999,999 contracts.
OrdType	1	Alphanumeric	Corresponds to *OrdType* (40) in CFE FIX. 1 = Market 2 = Limit (default) 4 = Stop Limit Market implies *TimeInForce* of IOC (3). Stop Limit orders must have a *TimeInForce* of DAY (0), GTC (1), or GTD (6).
OrigClOrdID	20	Text	Corresponds to *OrigClOrdID* (41) in CFE FIX.
PendingStatus	1	Alphanumeric	Field is provided as a convenience to determine whether an Order Execution message is a preliminary notification representing a pending trade. The value 'P' indicates that the execution is associated with a product for which the Order Execution message is a preliminary notification of an execution and for which a post-settlement restatement will be sent. N = Not applicable P = Pending See 'Section **Error! Reference source not found.** - **Error! Reference source not found.**' for a description products for which PendingStatus is applicable.

PreventMatch	3	Alpha	Corresponds to *PreventMatch* (7928) in CFE FIX. Three characters: ***1st character - MTP Modifier:*** N = Cancel Newest O = Cancel Oldest B = Cancel Both ***2nd character - Unique ID Level:*** F = Prevent Match at Firm(TPH) Level M = Prevent Match at EFID Level ***3rd character - Trading Group ID (optional):*** TPH specified alphanumeric value 0-9, A-Z, or a-z. 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. Note that in the event of a Spread order match with a Simple order, the Spread order will always be cancelled irrespective of the value of the 1st character.
Price	8	Binary Price	Corresponds to *Price* (44) in CFE 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. Orders will be rejected if Price does not fall on the applicable minimum trading increment. For all contracts other than VXT, simple orders will be rejected if *Price* is less than or equal to zero, or greater than or equal to 100,000. For VXT, simple orders will be rejected if *Price* is outside the price limits presented in the contract specification. Spread orders will be rejected if *Price* is outside the price limits implied by the spread instrument definition and constituent instrument min and max prices.
ProductName	6	Text	Used to specify product class (e.g., “VX”, “VU, etc.) for `Purge Orders` and `Cancel Order` message cancel by product functionality. If an unrecognized ProductName is provided, the associated request will be rejected with reason code C (Unknown Product Name).

RiskReset	8	Text	Corresponds to *RiskReset* (7692) in CFE FIX. *Single Character Values (Values may be combined)* S = Product-level risk/lockout reset F = Firm-level risk/lockout reset C = CustomGroupID lockout reset Values may be combined together to allow for resets of multiple risk trips or self-imposed lockouts in a single message. For example, "FS", "SC", "FC", and "SFC" are all acceptable values. The characters may be combined in any order. For example, to "reset all" set this field to "SFC", which is the equivalent to "CFS". For more information, refer to the CFE US Futures Risk Management Specification.
SecondaryExecID	8	Binary	Corresponds to *SecondaryExecID* (527) in CFE FIX. Field indicates whether an execution is a Spread instrument execution or a Simple instrument execution that is part of a Spread execution. • If *SecondaryExecID* field is not present, the execution is a Simple instrument execution only. • If *SecondaryExecID* is present and is the same as the *ExecID* required field, the execution represents a Spread execution for which associated Simple instrument executions will follow. • Simple instrument executions associated with a Spread execution will contain a *SecondaryExecID* value that matches the *ExecID* of the associated Spread execution.
SecondaryOrderID	8	Binary	Corresponds to *SecondaryOrderID* (198) in CFE FIX. For MTP triggered `Order Cancelled` message, value contains the *OrderID* of the other order in the MTP pair.
Side	1	Alphanumeric	Corresponds to *Side* (54) in CFE FIX. 1 = Buy 2 = Sell
StopPx	8	Binary Price	Corresponds to *StopPx* (99) in CFE FIX. Stop price. Required if *OrdType* = 4 (Stop Limit). Stop Limit orders will only be triggered off Last Sale Eligible trades.
SubLiquidityIndicator	1	Alphanumeric	Additional information about the liquidity of an order. CFE may add additional values without notice. TPHs must gracefully ignore unknown values. ASCII NULL (0x00) = No Additional Information C = Carried Order Indicator U = Qualifying Market Turner order

Symbol	8	Alphanumeric	Corresponds to *Symbol* (55) in CFE FIX. Simple Instruments can be specified by providing the mapped symbol format in the Symbol field or by providing the product name (e.g., "VX") in the *Symbol* field and maturity date in the *MaturityDate* field. Responses to the TPH will contain the instrument specification in the manner that was provided on the associated new order specification (e.g., either Symbo ID or Product and MaturityDate). The Symbol field for Spread instrument related messages will always contain mapped symbol ID as product and maturity date does not completely specify the Spread instrument.
TimeInForce	1	Alphanumeric	Corresponds to *TimeInForce* (59) in CFE FIX. `0` = Day (Expires at the end of the business day.) `1` = GTC (Good 'till Cancel. Order remains until cancelled or contract expires). `3` = IOC (Portion not filled immediately is cancelled. Market orders are implicitly IOC.) `4` = FOK (An IOC where the entire size must be filled, else the order will be cancelled back) `6` = GTD (Good 'till Date-Time Expires at the date-time specified in the *ExpireTime* field).
TradeDate	4	Date	Corresponds to *TradeDate* (75) in CFE FIX. TradeDate represented as Note that on CFE, business date is not always the same as the calendar date. For example, the VX/VT products open for trading on the calendar day prior to the associated business date. Executions that occur after the open and before midnight will have a *TradeDate* value that is not the same as the calendar date of the execution.

8 Reason Codes

The following is a list of all reason codes used by CFE. These reason codes are used in a variety of contexts (order cancellations and order rejections). All reasons are not valid in all contexts. CFE may add additional reason codes without notice. Members must gracefully ignore unknown values.

A = Admin
B = Unknown maturity date
C = Unknown product name
D = Duplicate identifier (e.g., ClOrdID)
H = Halted
I = Incorrect data center
J = Too late to cancel
K = Order rate threshold exceeded
M = Liquidity available exceeds order size
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
U = User requested
V = Would wash
X = Order expired
Y = Symbol not supported
Z = Unforeseen reason
f = Risk management firm level or custom group ID level
m = Market access risk limit exceeded
n = Risk management configuration is insufficient
o = Max open orders count exceeded
s = Risk management product level
y = Order received by CFE during replay

9 List of Message Types

9.1 TPH to CFE

Message Name	Level	Type	Sequenced
Login Request	Session	0x37	No
Logout Request	Session	0x02	No
Client Heartbeat	Session	0x03	No
New Order	Application	0x38	Yes
Cancel Order	Application	0x39	Yes
Modify Order	Application	0x3A	Yes
Purge Orders	Application	0x47	Yes

9.2 CFE to TPH

Message Name	Level	Type	Sequenced
Login Response	Session	0x24	No
Logout	Session	0x08	No
Server Heartbeat	Session	0x09	No
Replay Complete	Session	0x13	No
Order Acknowledgment	Application	0x25	Yes
Order Rejected	Application	0x26	No
Order Modified	Application	0x27	Yes
User Modify Rejected	Application	0x29	No
Order Cancelled	Application	0x2A	Yes
Cancel Rejected	Application	0x2B	No
Order Execution	Application	0x2C	Yes
Trade Cancel or Correct	Application	0x2D	Yes
Purge Rejected	Application	0x48	No
Mass Cancel Acknowledgment	Application	0x36	No
TAS Restatement	Application	0x49	Yes
Variance Restatement	Application	0x4A	Yes

10 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 CFE Trade Desk.

Attribute	Default	Description
Allowed Executing Firm ID(s)	All EFIDs	Executing Firm ID(s) allowed for trading on the port.
Default Executing Firm ID	None	Default Executing Firm ID to use if none is sent on a `New Order`.
Cancel on Disconnect	All	Cancels open orders upon order handler disconnect; both graceful and ungraceful. If Cancel On Disconnect is set, open orders in products that are not in Closed state at the time of the disconnect are cancelled. `All` = Cancel Day, GTC, and GTD orders `Day` = Cancel only Day orders `None` = Disabled
Cancel on Reject[1]	No	Cancels an order upon a cancel or modify reject for that order.
Cancel on ME Disconnect	All	Controls whether orders are cancelled or preserved on a Matching Unit failover and provides for the ability to preserve GTC orders (Day). In any event, if a failover takes longer than 5 minutes, all orders are cancelled (including GTCs). `All` = Cancel Day, GTC, and GTD orders `Day` = Cancel only Day orders `None` = Disabled
Cancel Open Orders on DROP Port Disconnect	No	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. `All` = Cancel Day, GTC, and GTD orders `Day` = Cancel only Day orders `None` = Disabled Note this parameter applies to Standard FIX DROP ports and not Order-By-Order DROP ports (ODROP).
Carried Order Restatements	Yes	If the Carried Order Restatements port attribute is set, `Order Acknowledgement` messages representing orders carried forward from the previous business date will be sent after the `Login Response` message and before regular session messages for each product. See 'Section 1.5.1 - Carried Order Restatements' for a detailed description of Carried Order Restatements.
Default MTP Value[1][2]	None	Specifies default value for *PreventMatch*.

[1] Port attribute can be overridden on an order-by-order basis

[2] Requires certification

Firm Risk Reset	Disabled	Configures how risk may be reset after a risk trip. Disabled (default): Will require manually resetting all Firm Level Risk trips by contacting the Trade Desk. Enabled: will allow Firm Level Risk resets using FIX or BOE RiskReset field of FIRM or BOTH.
Reject Orders on DROP Port Disconnect	No	Allows TPH/Sponsoring Firms to associate DROP port(s) to order entry port(s). If all associated DROP ports experience disconnection, new orders will be rejected until at least one DROP port session has been reestablished.
Reject Orders on DROP Port Timeout(s)	30 seconds	Only applicable if "Reject Orders on DROP Port Disconnect" has been enabled. When the last associated DROP port has disconnected, begin rejecting orders on the associated order entry port(s) if a DROP session has not been reestablished within this timeout. Minimum value allowed is 0 seconds.
Send Trade Breaks[2]	No	Enables sending of `Trade Cancel or Correct` messages.
Port Order Rate Threshold	Default = 3000 msgs/sec Max allowed = 3000 msgs/sec	The maximum allowed message rate on the session. When the first non-administrative messeage is received, a one second window begins. During the second no more than 2,999 additional non-administrative messeages 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.
Symbol Order Rate Threshold	3000 msgs/sec	Functions the same as the Port Order Rate Threshold but is calculcated at the symbol level. It is capped by the Port Order Rate Threshold.

11 Support

Please email questions or comments regarding this specification to cfetradedesk@cboe.com.

Revision History

Version	Date	Description
1.0.0	05/01/17	Initial version.
1.0.1	05/17/17	Added Cancel on ME Disconnect port attribute. Changed *Binary Price* to a signed data type. Removed *Signed Binary Price*, *Signed Binary Fee*, and *Short Binary Price* data types. Cleanup of minor typos and formatting.
1.1.0	07/14/17	Added additional fields to accommodate Spread instrument executions. Updated Mass Cancel and Purge fields to add additional filtering based on GTC orders and Spread instruments.
1.1.1	07/24/17	Introduced improved method of specifying Mass Cancel and Purge Orders operations using the MassCancelInst field. Modified and clarified explanation for Variance and TAS pending and restatement Execution Reports and associated custom fields for transformed symbol, price and size for clearing. Modified TAS and Variance Restatement messages to contain same required fields as `Order Executed`.
1.1.2	08/07/17	Renamed *VariancePrice*, *VarianceSize* and *NewSymbol* to *ClearingPrice*, *ClearingSize* and *ClearingSymbol* respectively. Removed *TASPrice* field using *ClearingPrice* instead to report transformed TAS execution price. Removed *BaseLiquidityIndicator* from `Order Execution` message list of valid optional fields.
1.1.3	08/14/17	Corrected `Purge Orders` input bitfields specification.
1.1.4	08/25/17	Clarified ClOrdID uniqueness in New Order to account for long-lived GTC orders. Added N value to optional field OpenClose. Moved general presentation of protocol features to Section 1 – Introduction. Clarified that Cancel on Disconnect applies for graceful and ungraceful disconnect. Updated Cancel on ME Disconnect and Cancel on DROP Port Disconnect port attributes to provide ability to filter out GTC orders.
1.1.5	09/12/17	Updated description of Carried Order Restatements section to clarity steps required to receive on connect including specifically enabling replay for associated matching units in the `Login Request` message.
1.1.6	09/25/17	Added to documentation of *Price* field of `New Order` message to specify that orders that don't comply with tick increments or values outside of system price limits will be rejected. Update Return Bitfields for `Order Modified` message; *OrigClOrdId, LeavesQty, LastShares, LastPx and BaseLiquidityIndicator* are value return fields. Updated explanatory text for reason code 'n' (risk). Added explanatory text for *MassCancelInst* lockout behavior. Updated bitfields in return messages, including `Order Modified` *LeavesQty*.

1.1.7	10/11/17	Removed *EchoText* optional field from `New Order` input message and removed from various return messages. Removed *LastShares* and *LastPx* optional return bitfields from `Order Modified` message. Removed *LastShares, LastPx* and *BaseLiquidityIndicator* optional return bitfields from `Order Cancelled` message. Removed all Byte 12 return bitfields from `Trade Cancel or Correct` message. Added Byte 5 return bitfields (*OrigClOrdId, LeavesQty, LastShares and LastPx*) and removed Byte 13 return bitfields (*CumQty* and *AvgPx*) from `TAS Restatement` message. Added Byte 5 return bitfields (*OrigClOrdId, LeavesQty, LastShares* and *LastPx*) and removed Byte 13 return bitfields (*CumQty, DayOrderQty, DayCumQty, AvgPx,* and *DayAvgPx*) from `Variance Restatement` message.
1.1.8	10/17/17	Cboe branding/logo changes.
1.1.9	10/30/17	Clarified Account field is a unique identifier associated with an order. Added calculation of trade size in Variance units to VA pending `Order Execution` message *ClearingSize* field. Added associated return bitfield for `Order Execution` message. For consistency with VA, added *ClearingSize* to pending `Order Execution` messages for VAO trades.
1.1.10	11/02/17	Clarified definition of *BaseLiquidityIndicator* field, associated with FIX *TradeLiquidityIndicator* (9730) and added "C" value for market-opening/reopening. Removed header fields *LastShares*, *LastPx*, *LeavesQty*, *BaseLiquidityIndicator*, *SubLiquidityIndicator* and *ContraBroker* from `TAS Restatement` and `Variance Restatement` messages. Removed *OrderQty*, *LeavesQty*, *BaseLiquidityIndicator* and *PendingStatus* fields from `TAS Restatement` and `Variance Restatement` return bitfields.
1.1.11	11/14/17	Fixed ordering of fields in `New Order` message example. Added Port Order Rate Threshold and Symbol Order Rate Threshold port attributes. Updated description of *MinQty* field in `New Order` message to clarify usage. Added support for GTD orders comprising addition *TimeInForce* value "6", addition of *ExpireTime* to `New Order` message and *ExpireTime* as valid return field for `Order Acknowledgement`, `Order Modified`, `Order Cancelled`, `Cancel Rejected` and `Order Execution` messages. Effective 12/11/17.
1.1.12	11/22/17	Removed 'Report MTP Fields' port attribute, which is applicable only for FIX. Added *LastPx* and *LastShares* to return fields for `Order Cancelled` and updated description of each field to indicate they are present on MTP triggered `Order Cancelled` messages.
1.1.13	12/05/17	Combined the two 'f' Reason Codes into one line for clarity.

1.1.14	12/21/17	Clarified use of Expiration symbology vs. mapped Symbol ID for Spread execution Execution Reports. Specifically, updated description of *Symbol* and *MaturityDate* fields. Added *OperatorId* and *ManualOrderIndicator* as fields that may be changed with a `Modify Order` message. Clarified that *OperatorId* and *ManualOrderIndicator* are required on all TPH to CFE message types. Added GTC and GTD *TimeInForce* values as accepted for Stop and Stop Limit orders.
1.1.15	01/19/18	Corrected `New Order` message example to reflect that *Account* is a required field. Updated description of the *Capacity* (47) to clarify meaning of C and F with respect to OCC ranges.
1.1.16	02/27/18	Minor corrections to example messages. Added session availability times and description of daily restart to Hours of Operation section. Documented the system limit of 1,295 `Modify Order` requests per order per day.
1.1.17	03/05/18	Added OCC Clearing Reference section to more clearly describe the BOE to OCC field mappings. Maximum number of `Modify Order` requests per order per day will be raised to 1,679,615 effective 3/18/18.
1.1.18	03/14/18	Clarified description of the case where overlapping `Modify Order` messages may be used. Clarified valid Account field characters are ASCII 32-126 (i.e., space is a valid character). Effective 3/18/18, updated definition of the OperatorId field to include characters 33-126, except for comma, semicolon, and pipe with minimum length of 3 and maximum length of 18 characters.
1.1.19	04/10/18	*CumQty* to be populated on leg fills related to complex executions (Effective 4/29/18).
1.2.0	04/26/18	Added optional fields to the `Purge Rejected` message to accommodate optional return of the *MassCancelId* field from the associated `Purge Request` message (Effective 7/1/18). Updated *OperatorID* field name to *OEOID*. Added section to Protocol Features detailing the conditions under which persisted orders can be cancelled while the associated product is in a suspended state.
1.2.1	05/30/18	*MassCancelId* moved to bit 8 from bit 1 in byte 15 of the Return Bitfields for a `Purge Rejected` message. Added additional detail around holiday schedules and when order cancellations are processed on holidays.
1.2.2	07/02/18	Correction to example for `Purge Rejected` message.
1.2.3	07/20/18	Added *SubLiquidityIndicator* value of "U" to indicate Market Turner status.
1.2.4	08/07/18	Added notes to Cancel Order and Purge Orders sections indicating request limits of 20 per second for duplicative requests (**effective 8/15/18**).