



Cboe Options Exchange FLEX Feed Specification

Version 1.1.5

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1 Introduction

1.1 Overview

Note that this specification will be the standard specification used for market data for FLEX Options on the Cboe Options (“C1”) Exchange platform.

Cboe customers may use the FLEX feed to receive real-time auction updates and execution information.

Options FLEX feed cannot be used to enter orders. For order entry, refer to the US Options FIX Specification.

A WAN-Shaped version of the FLEX feed is available from both of Cboe’s datacenters. Customers may choose to take one or more of the following FLEX feed options depending on their location and connectivity to Cboe.

Exchange	Shaping (WAN)	Served From Data Center (Primary/Secondary)	Multicast Feed ID
C1 Options	WAN	Primary	CAF
C1 Options	WAN	Primary	CBF
C1 Options	WAN	Secondary	CEF

1.2 Feed Connectivity Requirements

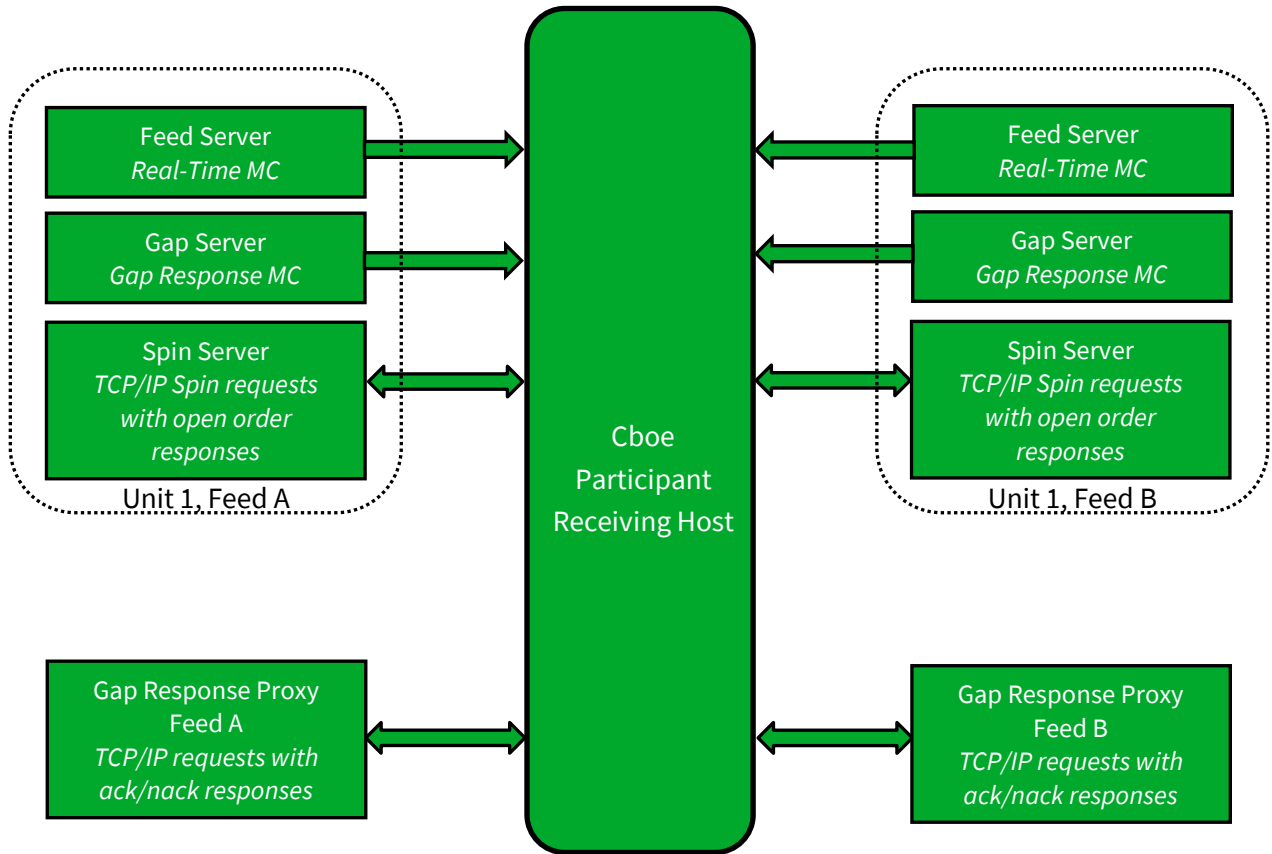
WAN-Shaped feeds are available to customers with a minimum of 100 Mb/s of connectivity to Cboe via cross connect or dedicated circuit.

Customers with sufficient connectivity may choose to take more than one WAN-Shaped feed from the Cboe datacenters. It should be noted that due to proximity, feeds from the secondary datacenter will have additional latency than those co-located with Cboe in the primary datacenter.

Cboe Options FLEX feed real-time events are delivered using a single published multicast address for all symbol ranges.

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The following diagram is a logical representation of Options FLEX feed message flow between Cboe and a customer feed handler that is listening to the “A” and “B” instances of two units:



1.3 FLEX Specific Symbol Processing

Cboe has implemented a symbol mapping mechanism for both simple and complex instruments on the FLEX feed. This symbol mapping significantly reduces the size of the FLEX feed and allows participants to use the same symbol handling mechanisms for the Cboe operated equity, options, and futures exchanges. Refer to the `FLEX Instrument Definition` and `Complex FLEX Instrument Definition` messages for more information.

The `FLEX Instrument Definition` or `Complex FLEX Instrument Definition` messages are sequenced messages that are sent when an instrument is created. If a user misses a mapping message, then that message can be recovered through either the GRP or SPIN Server.

1.4 Gap Request Proxy and Message Retransmission

Establishing a TCP connection to a Gap Request Proxy (“GRP”) port allows for delivery of missed sequenced data. This GRP port is specific to FLEX feed and is NOT shared with any other Cboe Options market data feed. Participants who do not wish to request missed messages do not need to connect to a GRP port for any reason or listen to the multicast addresses reserved for message retransmission. Participants choosing to request missed data will need to connect to their assigned GRP port, log in, and request gap ranges as necessary. All gap requests will be responded to with a `Gap Response` message. A `Gap Response Status` code of ‘A’ccepted signals that the replayed messages will be delivered via the appropriate gap response multicast address. Any other `Gap Response Status` code will indicate the reason that the request cannot be serviced.

Gap requests are limited in message count, frequency, and age by the GRP. Gap requests will only be serviced if they are within a defined sequence range of the current multicast sequence number for the requested unit. Participants will receive a total daily allowance of gap requested messages. In addition, each participant is given renewable one second and one minute gap request limits.

If more than one gap request is received for a particular unit/sequence/count combination within a short timeframe, all requests will receive a successful `Gap Response` message from the GRP, but only a single replayed message will be sent on the gap response multicast address.

If overlapping gap requests are received within a short time period, the gap server will only send the union of the sequence ranges across grouped gap requests. Participants will receive gap responses for their requested unit/sequence/count, but receivers should be prepared for the **gap responses to be delivered via multicast in non-contiguous blocks**.

Gap acknowledgements or rejects will be delivered to users for every gap request received by the GRP. Users should be prepared to see replayed multicast data before or after the receipt of the gap response acknowledgement from the GRP.

1.5 Spin Servers

A Spin Server is available for each unit. The server allows participants to connect via TCP and receive a spin of all symbol definitions, including both FLEX Instrument Definition and Complex FLEX Instrument Definition messages, and Trading Status messages. By using the spin, a participant can get the current instrument definitions and trading status messages quickly in the middle of the trading session without worry of gap request limits. The Spin Server for each unit is assigned its own address and/or TCP port.

Upon successful login and periodically thereafter, a Spin Image Available message is sent which contains a sequence number indicating the most recent message. Using a Spin Request message, a participant may request a spin for symbol definitions and trading status messages to a sequence number noted within one of the *last ten* Spin Image Available messages distributed. If the Spin Request submitted does not present a sequence number that matches one of the last ten Spin Image Available messages distributed, the spin will return orders up to the next closest sequence number reported through a Spin Image Available message that is greater than the sequence number requested.

In the case a participant sends a sequence number in a Spin Request that is higher than the sequence number reported by the most recent Spin Image Available message, the next spin image to be generated will be returned when it is available. If the requested sequence number is still higher at that time, an “O” (Out of Range) error will be generated.

Customers can also use the Spin Server to request a spin of all Symbol Mapping messages by sending an Instrument Definition Request. The Spin Server can only process one spin at a time. Customers will need to wait for a Spin Finished or Instrument Definition Finished message before submitting another request.

2 Protocol

2.1 Message Format

The messages that make up the FLEX feed protocol are delivered using Cboe `Sequenced Unit Header` which handles sequencing and delivery integrity. All messages delivered via multicast will also use the `Sequenced Unit Header` for handling message integrity.

All UDP delivered events will be self-contained. Developers can assume that UDP delivered data will not cross frame boundaries and a single Ethernet frame will contain only one `Sequenced Unit Header` with associated data.

This FLEX data feed is comprised of a series of dynamic length sequenced messages. Each message begins with Length and Message Type fields. **Cboe reserves the right to add message types and grow the length** of any message without notice. Customers should develop their decoders to deal with unknown message types and messages that grow beyond the expected length. Messages will only be grown to add additional data to the end of a message.

2.2 Data Types

The following field types are used within the feed.

- **Alphanumeric** fields are left justified ASCII fields and space padded on the right.
- **Binary** fields are unsigned and sized to “Length” bytes and ordered using Little Endian convention (least significant byte first).
- **Signed Binary** fields are signed and sized to “Length” bytes and ordered using Little Endian convention (least significant byte first).
- **Binary Signed Short Price** fields are signed Little Endian encoded 2 byte binary fields with 2 implied decimal places (denominator = 100). The short price range is -327.68 to +327.67. Prices outside of this range will use the long price.
- **Binary Signed Long Price** fields are signed Little Endian encoded 8 byte binary fields with 4 implied decimal places (denominator = 10,000).
- **Bit Field** fields are fixed width fields with each bit representing a Boolean flag (the 0 bit is the lowest significant bit; the 7 bit is the highest significant bit).
- **Printable ASCII** fields are left justified ASCII fields that are space padded on the right that may include ASCII values in the range of 0x20 – 0x7e.

- **Binary Date** fields are 4 byte unsigned Little Endian values where the base-10 representation is the YYYYMMDD representation of that date. For example, October 30, 2023 would be represented as 20,231,030 (20231030) (**effective Q3 2021**).

2.3 Message Framing

Messages will be combined into a single UDP frame when possible to decrease message overhead and total bandwidth. The count of messages in a UDP frame will be communicated using the `Sequenced Unit Header`. The server for each site will determine framing. The content of the multicast across feeds (e.g. A/BWAN-Shaped) will be identical, **but framing will not be consistent across feeds**. Receiving processes that receive and arbitrate multiple feeds cannot use frame level arbitration to fill gaps.

2.4 Sequenced Unit Header

The `Sequenced Unit Header` is used for all Cboe Multicast messages.

This feed delivers sequenced and unsequenced data using the `Sequenced Unit Header`. Unsequenced headers will have a 0 value for the sequence field and potentially for the unit field.

Sequenced Unit Header				
Field	Offset	Length	Value/Type	Description
<i>Hdr Length</i>	0	2	Binary	Length of entire block of messages. Includes this header and <i>Hdr Count</i> messages to follow.
<i>Hdr Count</i>	2	1	Binary	Number of messages to follow this header.
<i>Hdr Unit</i>	3	1	Binary	Unit that applies to messages included in this header.
<i>Hdr Sequence</i>	4	4	Binary	Sequence of first message to follow this header.
Total Length = 8 bytes				

2.5 Heartbeat Messages

The `Sequenced Unit Header` with a count field set to “0” will be used for heartbeat messages. During trading hours heartbeat messages will be sent from all multicast addresses if no data has been delivered within 1 second. Heartbeat messages never increment the sequence number.

Outside of trading hours Cboe sends heartbeat messages on all real-time channels with a sequence of “0” to help users validate multicast connectivity. Heartbeat messages may not be sent from 12:00 a.m. – 1:00 a.m. ET or during maintenance windows.

3 FLEX Feed Messages

3.1 Time Reference (Effective Q3 2021)

The `Time Reference` message is used to provide a midnight reference point for recipients of the feed. It is sent whenever the system starts up and when the system crosses a midnight boundary. All subsequent `Time` messages for the same unit will use the last `Midnight Reference` until another `Time Reference` message is received for that unit. The `Time Reference` message includes the `Trade Date`, so most other sequenced messages will not include that information.

`Time Reference` messages will be included in a spin response.

Time Reference				
Field Name	Offset	Length	Type/(Value)	Description
<code>Length</code>	0	1	Binary	<code>Length</code> of this message including this field.
<code>Message Type</code>	1	1	0xB1	<code>Time Reference</code> Message
<code>Midnight Reference</code>	2	4	Binary	Midnight Eastern Time reference time for subsequent <code>Time</code> messages, expressed as number of whole seconds since the Epoch (Midnight January 1, 1970 UTC).
<code>Time</code>	6	4	Binary	Number of whole seconds from midnight Eastern time.
<code>Time Offset</code>	10	4	Binary	Nanosecond offset from last unit timestamp.
<code>Trade Date</code>	14	4	Binary Date	Current Trade Date
Total Length = 18 bytes				

3.2 Time

A `Time` message is immediately generated and sent when there is a FLEX event for a given clock second. If there is no FLEX event for a given clock second, then no `Time` message is sent for that second. The `Time` field is the number of seconds relative to midnight Eastern Time. All subsequent time offset fields for the same unit will use the new `Time` value as the base until another `Time` message is received for the same unit. **Effective Q3 2021**, the `Time` message will also include the `Epoch Time` field, which is the current time represented as the number of whole seconds since the Epoch (midnight January 1, 1970).

A trading day may span multiple calendar days, **effective in Q4 2021**. C1 options market data recipients must prepare for a crossing of the midnight ET boundary. At such time, a new `Time Reference` message will be sent and the `Time` field in subsequent `Time` messages will reset to reflect the number of seconds from the most recent midnight ET time.

Time				
Field Name	Offset	Length	Type/(Value)	Description
<code>Length</code>	0	1	Binary	<code>Length</code> of this message including this field

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<i>Message Type</i>	1	1	0x20	Time Message
<i>Time</i>	2	4	Binary	Number of whole seconds from midnight Eastern Time
<i>Epoch Time</i> Effective Q3 2021	6	4	Binary	Number of whole seconds since the Epoch (midnight January 1, 1970 UTC).
Total Length = 6 bytes, 10 bytes effective Q3 2021				

3.3 FLEX Instrument Definition

A FLEX Instrument Definition message represents an instrument that is available to place orders. It is sent as a sequenced message.

Flex Instrument Definition				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x9C	Flex Instrument Definition Message
<i>Time Offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp.
<i>Feed Symbol</i>	6	6	Printable ASCII	<i>Symbol</i> right padded with spaces.
<i>OSI Root</i>	12	6	Printable ASCII	OSI Root right padded with spaces.
<i>Year</i>	18	2	Alphanumeric	Two digit year
<i>Month</i>	20	2	Alphanumeric	Two digit month
<i>Day</i>	22	2	Alphanumeric	Two digit day
<i>Call Put Indicator</i>	24	1	Alphanumeric	C = Call P = Put
<i>Dollar Strike</i>	25	5	Alphanumeric	Dollar strike (if not percentage) left padded with zero. If percentage, field is space padded.
<i>Decimal Strike</i>	30	3	Alphanumeric	Decimal strike (if not percentage) left padded with zero. If percentage, field is space padded.
<i>Symbol Condition</i>	33	1	Alphanumeric	N = Normal C = Closing Only
<i>Underlying</i>	34	8	Printable ASCII	Instrument Underlying right padded with spaces.
<i>Exercise Style</i>	42	1	Alphanumeric	A = American E = European Exercise style is always European for Asian and Cliquet.
<i>Settlement Type</i>	43	1	Alphanumeric	A = AM P = PM S = Asian Q = Cliquet

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<i>Percentage</i>	44	4	Binary	Percentage when strike and price is percentage based (implied 4 decimal places). Otherwise zero.
<i>Observation Day</i>	48	2	Alphanumeric	Two digit observation day of month. Valid only for Asian and Cliquet options, otherwise spade padded.
<i>Return Cap Percentage</i>	50	4	Binary	Return cap percentage (implied 2 decimal places). Valid only for Cliquet, otherwise zero.
<i>Creation Day</i>	54	2	Alphanumeric	Two digit creation day of the month. Valid only for Cliquet, otherwise space padded.
<i>Bit Fields</i>	56	1	Bit Field	Bit 0: If set, strike/price in percentage. Bit 1-7: Reserved
Total Length = 57 bytes				

3.4 Complex FLEX Instrument Definition

A Complex FLEX Instrument Definition message represents a complex instrument that is available to place orders. It is sent as a sequenced message.

The Complex FLEX Instrument Definition message will contain two or more repeating groups of leg definitions. There is a limit of 100 leg definitions. For complex instruments that contain over 17 legs, the complex instrument will be split across multiple messages as indicated by the Message Count.

Complex FLEX Instrument Definition				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x9B	Complex FLEX Instrument Definition Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp.
<i>Complex Instrument ID</i>	6	6	Printable ASCII	Complex Instrument ID right padded with spaces.
<i>Underlying</i>	12	8	Printable ASCII	Complex Instrument Underlying right padded with spaces.
<i>Complex Instrument Type</i>	20	4	Alphanumeric	4 character field; each field describes a characteristic. Character 1: Complex Option Type X = All legs are FLEX options Characters 2-4: Reserved
<i>Leg Count</i>	24	1	Binary	The number of legs in the complex instrument. The maximum number of legs is 100.

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<i>Message Count</i>	25	1	Binary	Number of messages required to define the complex instrument.
<i>Message Number</i>	26	1	Binary	Message number of the message count, e.g. 1 of 5.
<i>Message Leg Count</i>	27	1	Binary	The number of legs in this message.
The following fields repeat <i>Message Leg Count</i> times. The <i>Leg Index</i> is from 0 to <i>Message Leg Count</i> - 1.				
<i>Leg Symbol</i>	28 + 13 * Leg Index	8	Printable ASCII	FLEX Symbol, right padded with spaces.
<i>Leg Ratio</i>	36 + 13 * Leg Index	4	Signed Binary	Leg ratio (positive for buy-side, negative for sell-side).
<i>Leg Security Type</i>	40 + 13 * Leg Index	1	Alphanumeric	The instrument type of this leg. X = FLEX option
Total Length = 28 + (13 * Leg Count) bytes				

3.5 Auction Notification

Auction Notification messages are used to disseminate order details of a FLEX Auction. FLEX Auctions will be available for a defined period of time known as the exposure period.

Auction Notification				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	Length of this message including this field
<i>Message Type</i>	1	1	0xAD	Auction Notification Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp.
<i>FLEX Instrument ID</i>	6	6	Printable ASCII	FLEX Instrument ID right padded with spaces.
<i>Auction ID</i>	12	8	Binary	Day specific identifier assigned to this auction.
<i>Auction Type</i>	20	1	Alphanumeric	B = AIM F = FLEX Auction S = Solicitation Auction Mechanism
<i>Side</i>	21	1	Alphanumeric	B = Buy S = Sell
<i>Price</i>	22	8	Binary Signed Long Price	Auction price. Price will be zero for <i>Auction Type</i> = B and F. Price will be included for <i>Auction Type</i> = S.
<i>Quantity</i>	30	4	Binary	Instrument quantity.
<i>Customer Indicator</i>	34	1	Alphanumeric	N = Non-Customer C = Customer

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				FLEX Auctions (<i>Auction Type</i> = F) will always have a blank <i>Customer Indicator</i> value. AIM auctions will have a blank <i>Customer Indicator</i> for simple options while AIM auctions for complex options series will include a <i>Customer Indicator</i> .
<i>ParticipantID</i>	35	4	Alphanumeric	Executing Broker (optional) of firm attributed to this auction.
<i>Auction End Offset</i>	39	4	Binary	Nanosecond offset from last timestamp.
<i>Client ID</i>	43	4	Alphanumeric	User defined identifier for quote attribution.
Total Length = 47 bytes				

3.6 Delta Adjusted at Close (“DAC”) Auction Notification

DAC Auction Notification messages are used to disseminate order details of a DAC FLEX Auction.

Delta At Close Auction Notification				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	Length of this message including this field
<i>Message Type</i>	1	1	0xDD	DAC Auction Notification Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp.
<i>FLEX Instrument ID</i>	6	6	Printable ASCII	FLEX Instrument ID right padded with spaces.
<i>Auction ID</i>	12	8	Binary	Day specific identifier assigned to this auction.
<i>Auction Type</i>	20	1	Alphanumeric	B = AIM F = FLEX Auction S = Solicitation Auction Mechanism
<i>Side</i>	21	1	Alphanumeric	B = Buy S = Sell
<i>Price</i>	22	8	Binary Signed Long Price	Auction price. Price will be zero for <i>Auction Type</i> = B and F. Price will be included for <i>Auction Type</i> = S.
<i>Quantity</i>	30	4	Binary	Instrument quantity.
<i>Customer Indicator</i>	34	1	Alphanumeric	N = Non-Customer C = Customer

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				FLEX Auctions (<i>Auction Type</i> = F) will always have a blank <i>Customer Indicator</i> value. AIM auctions will have a blank <i>Customer Indicator</i> for simple options while AIM auctions for complex options series will include a <i>Customer Indicator</i> .
<i>ParticipantID</i>	35	4	Alphanumeric	Executing Broker (optional) of firm attributed to this auction.
<i>Auction End Offset</i>	39	4	Binary	Nanosecond offset from last timestamp.
<i>Client ID</i>	43	4	Alphanumeric	User defined identifier for quote attribution.
<i>DAC Reference Price</i>	47	8	Binary Signed Long Price	Value used as the initial reference price for a delta adjust at close auction.
<i>DAC Delta Count</i>	55	1	Binary	Number of delta values for this auction. A simple DAC auction will have 1 delta value. A complex DAC auction will have a delta value per leg, in the same leg order as the FLEX Instrument Definition.
The following fields repeat <i>DAC Delta Count</i> times. The <i>Delta Index</i> is from 0 to <i>DAC Delta Count</i> - 1.				
<i>Delta Value</i>	56 + 2 * Delta Index	2	Signed Binary	Delta value, from -1.0000 to 1.0000 (four implied decimal places).
Total Length = 56 + (2* <i>DAC Delta Count</i>) bytes				

3.7 Auction Cancel

Auction Cancel messages are used to disseminate the cancellation of an earlier Auction Notification message as a result of a user cancellation of the original auction, a user modification request to change the auction price or increase the original auction quantity, or to cancel any remaining auction quantity from the original Auction Notification following an auction termination.

A user request to modify the auction price or to increase the original auction quantity will result in a cancellation of the auction followed by a new Auction Notification message. Auction Cancel messages will not be issued for auction quantity decrements.

Auction Cancel				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	Length of this message including this field
<i>Message Type</i>	1	1	0xAE	Auction Cancel Message

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<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Auction ID</i>	6	8	Binary	Day specific identifier assigned to this auction
Total Length = 14 bytes				

3.8 Auction Trade

`Auction Trade` messages are used to disseminate executions resulting from an auction.

Auction Trade				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	Length of this message including this field
<i>Message Type</i>	1	1	0xAF	Auction Trade Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Auction ID</i>	6	8	Binary	Day specific identifier assigned to this auction
<i>Execution ID</i>	14	8	Binary	Day specific identifier assigned to this execution
<i>Price</i>	22	8	Binary Signed Long Price	Trade price. If instrument trades in percentage terms, then this represents the traded percentage with four implied decimals.
<i>Quantity</i>	30	4	Binary	Instrument quantity traded
Total Length = 34 bytes				

3.9 Trade

The `Trade` message provides information about executions of FLEX orders on the Cboe Options trading floor. Trade messages are necessary to calculate Cboe execution-based data.

No `Add Order` message is sent for FLEX Options orders, and thus, no order modification messages may be sent when FLEX Options are executed. Instead, a `Trade` message is sent whenever a FLEX Options order is executed in whole or in part. A complete view of all Cboe FLEX executions can be built by combining all `Auction Trade` and `Trade` messages.

Trade (long)				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x2A	Trade Message (long)
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Order ID</i>	6	8	Binary	<i>Order ID</i> of the executed order.
<i>Side Indicator</i>	14	1	Alphanumeric	Always "B"
<i>Quantity</i>	15	4	Binary	Instrument quantity traded

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<i>FLEX Instrument ID</i>	19	6	Printable ASCII	<i>FLEX Instrument ID</i> right padded with spaces.
<i>Price</i>	25	8	Binary Signed Long Price	Trade price. If instrument trades in percentage terms, then this represents the traded percentage with four implied decimals.
<i>Execution ID</i>	33	8	Binary	Cboe generated day-unique execution identifier of this trade. <i>Execution ID</i> is also referenced in the Trade Break message.
<i>Trade Condition</i>	41	1	Alphanumeric	See Options Trade Condition Codes section for details about new codes.
Total Length = 42 bytes				

Trade (short)				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x2B	Trade Message (short)
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Order ID</i>	6	8	Binary	<i>Order ID</i> of the executed order.
<i>Side Indicator</i>	14	1	Alphanumeric	Always "B"
<i>Quantity</i>	15	2	Binary	Instrument quantity traded
<i>FLEX Instrument ID</i>	17	6	Printable ASCII	<i>FLEX Instrument ID</i> right padded with spaces.
<i>Price</i>	23	2	Binary Signed Short Price	Trade price. If instrument trades in percentage terms, then this represents the traded percentage with four implied decimals.
<i>Execution ID</i>	25	8	Binary	Cboe generated day-unique execution identifier of this trade. <i>Execution ID</i> is also referenced in the Trade Break message.
<i>Trade Condition</i>	33	1	Alphanumeric	See Options Trade Condition Codes section for details about new codes.
Total Length = 34 bytes				

3.10 Delta Adjusted at Close (“DAC”) Trade

The DAC Trade message provides information about executions of Delta Adjusted at Close (DAC) FLEX orders on the Cboe Options trading floor. DAC Trade messages are necessary to calculate Cboe execution-based data.

No Add Order message is sent for FLEX Options orders, and thus, no order modification messages may be sent when FLEX Options are executed. Instead, a DAC Trade message is sent whenever a Delta Adjusted at Close FLEX Options order is executed in whole or in part. A complete view of all Cboe Delta Adjusted at Close FLEX executions can be built by combining all DAC Trade messages.

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Each DAC auction results in both an `Auction Trade` and `DAC Trade` message. Following the close, a `Trade Break` message is disseminated followed by a new `DAC Trade` message with the final pricing for the trade.

Delta Adjusted at Close Trade				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x36	DAC Trade Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Order ID</i>	6	8	Binary	<i>Order ID</i> of the executed order.
<i>Side Indicator</i>	14	1	Alphanumeric	Always "B"
<i>Quantity</i>	15	4	Binary	Instrument quantity traded
<i>FLEX Instrument ID</i>	19	6	Printable ASCII	<i>FLEX Instrument ID</i> right padded with spaces.
<i>Price</i>	25	8	Binary Signed Long Price	Trade price.
<i>Execution ID</i>	33	8	Binary	Cboe generated day-unique execution identifier of this trade. <i>Execution ID</i> is also referenced in the <code>Trade Break</code> message.
<i>Trade Condition</i>	41	1	Alphanumeric	See Options Trade Condition Codes section for details about new codes.
<i>DAC Reference Price</i>	42	8	Binary Signed Long Price	Reference price of the DAC trade.
<i>DAC Closing Price</i>	50	8	Binary Signed Long Price	Price used as the closing price for DAC trade repricing. \$0 unless repricing a DAC trade after the close.
<i>DAC Delta Value</i>	58	2	Signed Binary	The delta value applied to this DAC trade (within the range -1.0000 through 1.0000; 0 if a complex instrument)
Total Length = 60 bytes				

3.11 Trade Break

The `Trade Break` message is sent whenever a FLEX options execution on Cboe is broken. Trade breaks are rare and only affect applications that rely upon Cboe execution-based data.

Trade Break				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x2C	Trade Break Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Execution ID</i>	6	8	Binary	Cboe execution identifier of the execution that was broken. <i>Execution ID</i> refers to previously sent <code>Auction Trade</code> or <code>Trade</code> message.
Total Length = 14 bytes				

3.12 Trading Status

The `Trading Status` message is used to indicate the current trading status of a FLEX options instrument. A `Trading Status` message will be sent whenever a FLEX options instrument trading status changes.

A `Trading Status` message will be sent for all FLEX options instruments where the underlying security is Halted, Trading or Quoting.

Starting at 7:30 a.m. ET, Cboe will send a `Trading Status` of “Q” once orders can be accepted for queuing in preparation for the market open. At or after 9:30 a.m. ET, Cboe will send a `Trading Status` of “T” as series are open for trading on the Cboe platform. **Effective Q3 2021**, for SPX and VIX series only, Cboe will send a `Trading Status` of “Q” at the end of the RTH session in preparation for the Curb session. Cboe will send a `Trading Status` of “T” as SPX or VIX series are opened for trading during the Curb session.

A `Trading Status` message will also be sent:

- for a Regulatory Halt “Q”uoting Period in any series where the underlying has experienced a Regulatory Halt as well as the “T”rading resumption for the same series.
- for instruments that are in a “Q”uoting period for auctions.

The `Trading Status` field will be used to represent the status of the RTH session (9:30 a.m. ET – 4:15 p.m. ET) and the `GTH Trading Status` field will be used to represent the status of the GTH session (3 a.m. ET – 9:30 a.m. ET). **Effective Q3 2021**, the `GTH Trading Status` field will be used to represent the status of the GTH/Curb session. **Effective Q4 2021**, the GTH session will be from 8:15 p.m. to 9:15 a.m. ET for SPX and VIX series.

Trading Status				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	Length of this message including this field
<i>Message Type</i>	1	1	0x31	<code>Trading Status</code> message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<i>Symbol</i>	6	6	Printable ASCII	<i>Symbol</i> right padded with spaces.
<i>Reserved</i>	12	2	Reserved	Reserved
<i>Trading Status</i>	14	1	Alpha	H = Halted Q = Quote-Only T = Trading
<i>Reserved</i>	15	1	Reserved	Reserved
<i>GTH Trading Status</i>	16	1	Alpha	H = Halted Q = Quote-Only T = Trading
<i>Reserved</i>	17	1	Reserved	Reserved
Total Length = 18 bytes				

3.13 End of Session

The `End of Session` message is sent for each unit when the unit shuts down. No more messages will be delivered for this unit, but heartbeats from the unit may be received.

End of Session				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x2D	End of <code>Session</code> Message
<i>Timestamp</i>	2	4	Binary	Nanosecond offset from last unit timestamp
Total Length = 6 bytes				

Gap Request Proxy Messages

The following messages are used for initializing a TCP/IP connection to the Gap Request Proxy (“GRP”) and to request message retransmissions. Customers only need to implement the following messages if gap requests will be made. The following messages will not be delivered using multicast.

3.14 Login

The `Login` message is the first message sent to the GRP by a user’s process after the connection to the GRP is established. Failure to login before sending any other message type will result in the connection being dropped by the GRP.

Login				
Field	Offset	Length	Value/Type	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x01	<code>Login</code> Message
<i>SessionSubId</i>	2	4	Alphanumeric	<i>SessionSubId</i> supplied by Cboe.
<i>Username</i>	6	4	Alphanumeric	<i>Username</i> supplied by Cboe.
<i>Filler</i>	10	2	Alphanumeric	(space filled)
<i>Password</i>	12	10	Alphanumeric	<i>Password</i> supplied by Cboe.
Total Length = 22 bytes				

3.15 Login Response

The `Login Response` message is sent by the GRP to a user’s process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

Login Response				
Field	Offset	Length	Value/Type	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x02	<code>Login Response</code> Message
<i>Status</i>	2	1	Alphanumeric	Accepted or reason for reject.

Total Length = 3 bytes	
Login Response - Status Codes	
'A'	Login Accepted
'N'	Not authorized (Invalid Username/Password)
'B'	Session in use
'S'	Invalid Session

3.16 Gap Request

The Gap Request message is used by a user's process to request retransmission of a sequenced message (or messages) by one of Cboe's gap servers.

Gap Request				
Field	Offset	Length	Value/Type	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x03	Gap Request Message
<i>Unit</i>	2	1	Binary	<i>Unit</i> that the gap is requested for.
<i>Sequence</i>	3	4	Binary	<i>Sequence</i> of first message (lowest sequence in range).
<i>Count</i>	7	2	Binary	<i>Count</i> of messages requested.
Total Length = 9 bytes				

3.17 Gap Response

The Gap Response message is sent by the GRP in response to a Gap Request message. The *Unit* and *Sequence* fields will match the values supplied in the Gap Request message. A Gap Response message, with a Status of Accepted or reason for failure, will be sent for each Gap Request message received by the GRP.

Gap Response				
Field	Offset	Length	Value/Type	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x04	Gap Response Message
<i>Unit</i>	2	1	Binary	<i>Unit</i> the gap was requested for.
<i>Sequence</i>	3	4	Binary	<i>Sequence</i> of first message in request.
<i>Count</i>	7	2	Binary	<i>Count</i> of messages requested.
<i>Status</i>	9	1	Alphanumeric	Accepted or reason for reject*.
Total Length = 10 bytes				
Gap Response - Status Codes				
'A'	Accepted			
'O'	Out of range (ahead of sequence or too far behind)			
'D'	Daily gap request allocation exhausted			
'M'	Minute gap request allocation exhausted			
'S'	Second gap request allocation exhausted			
'C'	Count request limit for one gap request exceeded			
'I'	Invalid Unit specified in request			
'U'	Unit is currently unavailable			

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* - All non-'A' status codes should be interpreted as a reject.

4 Spin Messages

4.1 Login

The `Login` message is the first message sent to the Spin Server by a user's process after the connection to the Spin Server is established. Failure to log in before sending any other message type will result in the connection being dropped by the Spin Server.

The format of the `Login` message for the Spin Server is identical to that of the GRP described previously in [Section 4.1](#).

4.2 Login Response

The `Login Response` message is sent by the Spin Server to a user's process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

The format of the `Login Response` message for the Spin Server is identical to that of the GRP described previously in [Section 4.2](#).

4.3 Spin Image Available

The `Spin Image Available` message is sent once per second and indicates what sequence number a spin is available through.

Spin Image Available				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x80	<code>Spin Image Available</code> Message
<i>Sequence</i>	2	4	Binary	Spin is available which is current through this sequence number.
Total Length = 6 bytes				

4.4 Spin Request

The `Spin Request` message is used by a user's process to request transmission of a spin of the unit's order book. Refer to [Section 1.6](#) for more complete details regarding *Sequence* specification as well as buffering requirements.

Spin Request				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x81	<code>Spin Request</code> Message
<i>Sequence</i>	2	4	Binary	Sequence number from a <code>Spin Image Available</code> message received by the customer.
Total Length = 6 bytes				

4.5 Spin Response

The `Spin Response` message is sent in response to a user's `Spin Request` message indicating whether a spin will be sent.

Spin Response				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x82	<code>Spin Response</code> Message
<i>Sequence</i>	2	4	Binary	Sequence number from a <code>Spin Image</code> Available message received by the customer.
<i>Order Count</i>	6	4	Binary	Always zero.
<i>Status</i>	10	1	Alphanumeric	Accepted or reason for reject*.
Total Length = 11 bytes				
Spin Response - Status Codes				
'A'	Accepted			
'O'	Out of Range (<i>Sequence</i> requested is greater than <i>Sequence</i> available by the next spin)			
'S'	Spin already in progress (only one spin can be running at a time).			

* - All non-'A' status codes should be interpreted as a reject.

4.6 Spin Finished

The `Spin Finished` message is sent to indicate that all messages for the spin requested have been sent. A `Spin Finished` message is only sent if a `Spin Request` was not rejected. Upon receipt of a `Spin Finished` message, any buffered multicast messages should be applied to the customer's copy of the book to make it current.

Spin Finished				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field.
<i>Message Type</i>	1	1	0x83	<code>Spin Finished</code> Message
<i>Sequence</i>	2	4	Binary	Sequence number from the <code>Spin Request</code> message.
Total Length = 6 bytes				

4.7 Instrument Definition Request

The `Instrument Definition Request` message is used by a user's process to request transmission of this unit's Symbol Mappings. Refer to Section 1.5 for more complete details regarding *Sequence* specification as well as buffering requirements.

Instrument Definition Request				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x84	Instrument Definition Request Message

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<i>Sequence</i>	2	4	Binary	Must be 0. Only the current Symbol Mappings are available.
Total Length = 6 bytes				

4.8 Instrument Definition Response

The Instrument Definition Response message is sent in response to a user's Instrument Definition Request message indicating whether a spin will be sent.

Instrument Definition Response				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x85	Instrument Definition Response Message
<i>Sequence</i>	2	4	Binary	Will always be 0.
<i>Instrument Count</i>	6	4	Binary	Number of Symbol Mapping messages which will be contained in this spin.
<i>Status</i>	10	1	Alphanumeric	Accepted or reason for reject
Total Length = 11 bytes				
Instrument Definition Response - Status Codes				
'A'	Accepted			
'O'	Out of Range (<i>Sequence</i> must be 0)			
'S'	Spin already in progress (only one spin can be running at a time)			

* - All non-'A' status codes should be interpreted as a reject.

4.9 Instrument Definition Finished

The Instrument Definition Finished message is sent to indicate that all Symbol Mapping messages for this unit have been sent. An Instrument Definition Finished message is only sent if an Instrument Definition Request was not rejected.

Instrument Definition Finished				
Field Name	Offset	Length	Type/(Value)	Description
<i>Length</i>	0	1	Binary	<i>Length</i> of this message including this field
<i>Message Type</i>	1	1	0x86	Instrument Definition Finished Message
Total Length = 2 bytes				

5 Message Types

5.1 Gap Request Proxy Messages

0x01	Login
0x02	Login Response
0x03	Gap Request
0x04	Gap Response

5.2 Spin Server Messages

0x01	Login
0x02	Login Response
0x80	Spin Image Available
0x81	Spin Request
0x82	Spin Response
0x83	Spin Finished
0x84	Instrument Definition Request
0x85	Instrument Definition Response
0x86	Instrument Definition Finished

5.3 FLEX Feed Messages

0xB1	Time Reference (effective Q3 2021)
0x20	Time
0x9C	FLEX Instrument Definition
0x9B	Complex FLEX Instrument Definition
0xAD	Auction Notification
0xDD	DAC Auction Notification
0xAE	Auction Cancel
0xAF	Auction Trade
0x2A	Trade (long)
0x2B	Trade (short)
0x36	DAC Trade
0x2C	Trade Break
0x99	Trading Status
0x2D	End of Session

6 Example Messages

Each of the following message types must be wrapped by a sequenced or unsequenced unit header as described in [Section 2.4](#). Note that in the following examples, each byte is represented by two hexadecimal digits.

6.1 Login Message

Length	16	22 bytes
Type	01	Login
SessionSubId	30 30 30 31	"0001"
Username	46 49 52 4D	"FIRM"
Filler	20 20	" "
Password	41 42 43 44 30 30 20 20 20 20	"ABCD00"

6.2 Login Response Message

Length	03	3 bytes
Type	02	Login Response
Status	41	Login accepted

6.3 Gap Request Message

Length	09	9 bytes
Type	03	Gap Request
Unit	01	Unit 1
Sequence	3B 10 00 00	First message: 4155
Count	32 00	50 messages

6.4 Gap Response Message

Length	08	8 bytes
Type	04	Gap Response
Unit	01	Unit 1
Sequence	3B 10 00 00	First message: 4155
Status	41	Accepted

6.5 Spin Image Available Message

Length	06	6 bytes
Type	80	Spin Image Available
Sequence	3B 10 00 00	Sequence: 4155

6.6 Spin Request Message

Length	06	6 bytes
Type	81	Spin Request
Sequence	3B 10 00 00	Sequence: 4155

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6.7 Spin Response Message

Length	0B	11 bytes
Type	82	Spin Request
Sequence	3B 10 00 00	Sequence: 4155
Order Count	00 00 00 00	0 orders
Status	41	Accepted

6.8 Spin Finished Message

Length	06	6 bytes
Type	83	Spin Finished
Sequence	3B 10 00 00	Sequence: 4155

6.9 Instrument Definition Request

Length	06	6 bytes
Type	84	Instrument Definition Request
Sequence	00 00 00 00	Sequence: 0

6.10 Instrument Definition Response

Length	0B	11 bytes
Type	85	Instrument Definition Response
Sequence	00 00 00 00	Sequence: 0
Instrument Count	B8 0B 00 00	3,000 Instruments
Status	41	Accepted

6.11 Instrument Definition Finished

Length	02	2 bytes
Type	86	Instrument Definition Finished

6.12 Time Reference (Effective Q3 2021)

Length	12	18 bytes
Type	B1	Time Reference
Midnight Reference	D0 8B 34 60	2021-02-23 00:00:00 Eastern (1614056400 seconds since the Epoch)
Time	00 E1 00 00	16:00:00
Time Offset	00 00 00 00	Exactly 16:00:00
Trade Date	2F 62 34 01	2021-02-23 February 23, 2021

6.13 Time Message

Length	06	6 bytes
Type	20	Time

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Time	98 85 00 00	34,200 seconds = 09:30 AM Eastern
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6.14 Time Message (Effective Q3 2021)

Length	10	10 bytes
Type	20	Time
Time	98 85 00 00	34,200 seconds = 09:30 AM Eastern
Epoch Time	68 11 35 60	1,614,090,600 seconds since the Epoch

6.15 FLEX Instrument Definition Message

Length	39	57 bytes
Type	9C	Flex Instrument Definition
Time offset	18 D2 06 00	447,000 ns since last Time Message
Feed Symbol	46 30 30 30 31 32	F00012
OSI Root	31 41 41 50 4C 20	1AAPL
Year	31 38	18
Month	31 31	11
Day	32 32	22
Call/Put	43	C = Call
Dollar Strike	00 00 32 30 37	00207 = \$207
Decimal Strike	37 35 00	750 = \$0.750
Symbol Condition	4E	N = Normal
Underlying	41 41 50 4C 20 20 20 20	AAPL
Exercise Style	41	American
Settlement Type	50	PM
Percentage	00 00 00 00	Not percentage pricing
Observation Day	20 20	No Observation Day
Return Cap	00 00 00 00	250 = 2.5% Return cap
Creation Day	20 20	No Creation Day
Bit Fields	00	Not percentage pricing

6.16 Complex FLEX Instrument Definition Message

Length	43	67 bytes
Type	9B	FLEX Instrument Definition
Time offset	18 D2 06 00	447,000 ns since last Time Message
CID	43 30 30 30 31 32	C00012
Underlying	5A 56 5A 5A 54 20 20 20	ZVZZT
Complex Instrument Type	58 20 20 20	X = All Legs are Flex Options
Leg Count	03	3 legs

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Message Count	01	Only one message needed to define instrument
Message Number	01	Message 1 of 1
Message Leg Count	03	3 legs
Leg Symbol	30 30 30 30 30 31 20 20	000001
Leg Ratio	FF FF FF FF	-1 = Sell 1
Leg Security Type	58	FLEX Option Leg
Leg Symbol	30 30 30 30 30 32 20 20	000002
Leg Ratio	FF FF FF FF	-1 = Sell 1
Leg Security Type	58	FLEX Option Leg
Leg Symbol	30 30 30 30 30 33 20 20	000003
Leg Ratio	02 00 00 00	2 = Buy 2
Leg Security Type	58	FLEX Option Leg

6.17 Auction Notification Message

Length	2F	47 bytes
Type	AD	Auction Notification
Time offset	18 D2 06 00	447,000 ns since last Time Message
CID	30 30 6d 45 56 4f	00mEVO
Auction ID	05 40 5B 77 8F 56 1D 0B	631WC4000005
Auction Type	53	S = SAM
Side	42	B = Buy Side
Price	E8 A3 0F 00 00 00 00 00	\$102.50
Quantity	64 00 00 00	100
Customer	43	C = Customer
Indicator		
ParticipantID	45 46 49 44	EFID
Auct. End Offset	38 73 0E 00	947,000 ns since last Time Message
ClientID	41 42 43 44	ABCD

6.18 DAC Auction Notification Message

Length	3A	58 bytes
Type	DD	DAC Auction Notification
Time offset	18 D2 06 00	447,000 ns since last Time Message
FLEX Inst ID	7A 30 33 32 6B 7A	z032kz
Auction ID	05 40 5B 77 8F 56 1D 0B	631WC4000005
Auction Type	42	B = AIM
Side	53	S = Sell Side
Price	E8 A3 0F 00 00 00 00 00	\$102.50
Quantity	FA 00 00 00	250 contracts
Customer	4E	N = Non-Customer
Indicator		

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ParticipantID	45 46 49 44	EFID
Auct. End Offset	38 73 0E 00	947,000 ns since last Time Message
ClientID	43 4F 4C 45	COLE
DAC Reference		
Price	FE 82 06 00 00 00 00 00	\$42.6750
DAC Delta Count	01	1
DAC Delta Value	4C 1D	0.7500

6.19 Auction Cancel Message

Length	0E	14 bytes
Type	AE	Auction Cancel
Time offset	18 D2 06 00	447,000 ns since last Time Message
Auction ID	05 40 5B 77 8F 56 1D 0B	631WC4000005

6.20 Auction Trade Message

Length	22	34 bytes
Type	AF	Auction Trade
Time offset	18 D2 06 00	447,000 ns since last Time Message
Auction ID	05 40 5B 77 8F 56 1D 0B	631WC4000005
Execution ID	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Price	E8 A3 0F 00 00 00 00 00	1.0250%
Quantity	64 00 00 00	100

6.21 Trade (long) Message

Length	2A	42 bytes
Type	2A	Trade (long)
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Side	42	Buy
Quantity	F8 24 01 00	75,000 contracts
Symbol	33 34 35 33 32 31	345321
Price	E8 A3 0F 00 00 00 00 00	\$102.50
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Trade Condition	53	S = ISO

6.22 Trade (short) Message

Length	22	33 bytes
Type	2B	Trade (short)
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message

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Order Id	05 40 5B 77 8F 56 1D 0B	
Side	42	Buy
Quantity	64 00	100 contracts
Symbol	33 34 35 33 32 31	345321
Price	0A 28	\$102.50
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Trade Condition	53	S = ISO

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6.23 DAC Trade Message

Length	3C	60 bytes
Type	36	DAC Trade
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Side	42	B = Buy Side
Quantity	FA 00 00 00	250 contracts
FLEX Inst ID	7A 30 31 7A 47 46	z01zGF
Price	AC AD 0F 00 00 00 00 00	\$102.7500
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Trade Condition	53	S = ISO
DAC Reference		
Price	FE 82 06 00 00 00 00 00	\$42.6750
DAC Closing Price	74 99 06 00 00 00 00 00	\$43.2500
DAC Delta Value	4C 1D	0.7500

6.24 Trade Break Message

Length	0E	14 bytes
Type	2C	Trade Break
Time offset	18 D2 06 00	447,000 ns since last Time Message
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC

6.25 Trading Status Message

Length	12	18 bytes
Type	31	Trading Status
Time Offset	18 D2 06 00	447,000 ns since last Time Message
Symbol	39 39 38 38 37 37	998877
Reserved	20 20	Reserved
Trading Status	54	T = Trading
Reserved	20	Reserved
Global Trading	48	H = Halted
Hours Status		
Reserved	20	Reserved

6.26 End of Session

Length	06	6 bytes
Type	2D	End of Session
Time offset	18 D2 06 00	447,000 ns since last Time Message

7 Multicast Configuration

7.1 Production Environment Configuration

7.1.1 Limitations/Configurations

The following table defines Cboe current configuration for network and gap request limitations. These limitations are session based. Cboe reserves the right to adjust the gap request limitations to improve the effectiveness of the gap request infrastructure.

Period/Type	Limit/Setting	Notes
MTU	1500	Cboe will send UDP messages up to 1500 bytes. Members should ensure that their infrastructure is configured accordingly.
WAN-Shaped Throttle	100 Mb/s	The real-time and gap multicast head ends are configured to shape their output to this level to minimize packet loss.
Gap Response Delay	2 ms	The Gap Server will delay resending sequenced messages via multicast for the specified limit in order to satisfy multiple GRP gap requests with one multicast response.
Count	100	Any single gap request may not be for more than this number of dropped messages.
1 Second	320 Requests	This is the maximum number of retransmission requests allowed per second for each session. This is renewed every clock second.
1 Minute	1500 Requests	This is the maximum number of retransmission requests allowed per minute for each session. This is renewed every clock minute.
Day	100,000 Requests	This is the maximum number of retransmission requests allowed per day for each session.
Within Range	1,000,000 Messages	Users' retransmission requests must be within this many messages of the most recent sequence sent by the real-time feed per session.

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7.1.2 Unit/Symbol Distribution

Unit	C1 Symbol Range	C1 Exceptions
1	A – ADBD~	
2	ADBE – ASMK~	Excludes AMZN
3	ASML – BBX~~	
4	BBY – BYND~	
5	BYNE – COUO~	
6	COUP – DH~~~	
7	DI – ENPG~	Excludes DJX
8	ENPH – FCXA~	
9	FCXB – GLDA~	
10	GLDB – INCX~	Excludes GOOG, GOOGL
11	INCY – IWMA~	
12	IWMB – LMS~~	
13	LMT – MELI~	
14	MELJ – NED~~	Excludes MRUT, MXEA, MXEF
15	NEE – NSCA~	
16	NSCB – OKS~~	Excludes OEX
17	OKT – PTOM~	
18	PTON – ROKU~	Excludes QQQ, RLG, RLV
19	ROKV – SHOP~	Excludes RUI, RUT, RUTW
20	SHOQ – SQAA~	Excludes SIXB, SIXC, SIXE, SIXI, SIXR, SIXRE, SIXT, SIXU, SIXV, SIXY, SPESG, SPX/SPXW, SPY
21	SQAB – TQQP~	
22	TQQQ – ULTA~	Excludes TSLA, UKXM
23	ULTB – WAAA~	Excludes VIX, VIXW
24	WAAB – XLT~~	Excludes XEO
25	XLU – Z~~~~	Excludes XSP
26	GOOG, GOOGL	
27	TSLA	
28	QQQ	
29	AMZN	
30	SPY	
31	DJX, MRUT, MXEA, MXEF, OEX, RLG, RLV, RUI, RUT, RUTW, SIXB, SIXC, SIXE, SIXI, SIXR, SIXRE, SIXT, SIXU, SIXV, SIXY, SPESG, XEO, UKXM, XSP	
32	VIX, VIXW	
33	SPX	
34	SPXW	
35	SPX/SPXW, Cross Product Spreads	

Note - Cboe reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

7.1.3 Cboe Options FLEX Multicast Routing Parameters

Data center	Rendezvous Point
NY5 Primary Data Center A feed	74.115.128.183
NY5 Primary Data Center B feed	74.115.128.184
CH4 Secondary Data Center E feed	174.136.181.249

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7.1.4 Cboe Options FLEX Multicast Addresses

The following tables describe the multicast address distribution across production multicast Cboe FLEX feeds.

Primary Datacenter		WAN-Shaped [CAF] 170.137.114.80 /28		WAN-Shaped [CBF] 170.137.115.80 /28	
Unit	IP Port	Real-time MC	Gap Resp. MC	Real-time MC	Gap Resp. MC
1	30501				
2	30502				
3	30503				
4	30504				
5	30505				
6	30506				
7	30507				
8	30508				
9	30509				
10	30510				
11	30511				
12	30512				
13	30513				
14	30514				
15	30515				
16	30516				
17	30517	224.0.74.92	224.0.74.93	233.182.199.220	233.182.199.221
18	30518				
19	30519				
20	30520				
21	30521				
22	30522				
23	30523				
24	30524				
25	30525				
26	30526				
27	30527				
28	30528				
29	30529				
30	30530				
31	30531				
32	30532				
33	30533				
34	30534				
35	30535				

Note – Cboe reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

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Secondary Datacenter		WAN-Shaped [CEF] 170.137.124.224/28	
Unit	IP Port	Real-time MC	Gap Resp. MC
1	31501	233.19.3.252	233.19.3.253
2	31502		
3	31503		
4	31504		
5	31505		
6	31506		
7	31507		
8	31508		
9	31509		
10	31510		
11	31511		
12	31512		
13	31513		
14	31514		
15	31515		
16	31516		
17	31517		
18	31518		
19	31519		
20	31520		
21	31521		
22	31522		
23	31523		
24	31524		
25	31525		
26	31526		
27	31527		
28	31528		
29	31529		
30	31530		
31	31531		
32	31532		
33	31533		
34	31534		
35	31535		

Note - Cboe reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

7.2 Certification Environment Configuration

7.2.1 Unit/Symbol Distribution

Unit	C1 Symbol Range	C1 Exceptions
1	A – ADBD~	
2	ADBE – ASMK~	Excludes AMZN
3	ASML – BBX~~	
4	BBY – BYND~	
5	BYNE – COUO~	
6	COUP – DH~~~	
7	DI – ENPG~	Excludes DJX
8	ENPH – FCXA~	
9	FCXB – GLDA~	
10	GLDB – INCX~	Excludes GOOG, GOOGL
11	INCY – IWMA~	
12	IWMB – LMS~~	
13	LMT – MELI~	
14	MELJ – NED~~	Excludes MRUT, MXEA, MXEF
15	NEE – NSCA~	
16	NSCB – OKS~~	Excludes OEX
17	OKT – PTOM~	
18	PTON – ROKU~	Excludes QQQ, RLG, RLV
19	ROKV – SHOP~	Excludes RUI, RUT, RUTW
20	SHOQ – SQAA~	Excludes SIXB, SIXC, SIXE, SIXI, SIXR, SIXRE, SIXT, SIXU, SIXV, SIXY, SPESG, SPX/SPXW, SPY
21	SQAB – TQQP~	
22	TQQQ – ULTA~	Excludes TSLA, UKXM
23	ULTB – WAAA~	Excludes VIX, VIXW
24	WAAB – XLT~~	Excludes XEO
25	XLU – Z~~~~	Excludes XSP
26	GOOG, GOOGL	
27	TSLA	
28	QQQ	
29	AMZN	
30	SPY	
31	DJX, MRUT, MXEA, MXEF, OEX, RLG, RLV, RUI, RUT, RUTW, SIXB, SIXC, SIXE, SIXI, SIXR, SIXRE, SIXT, SIXU, SIXV, SIXY, SPESG, XEO, UKXM, XSP	
32	VIX, VIXW	
33	SPX	
34	SPXW	
35	SPX/SPXW, Cross Product Spreads	

Note – Cboe reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

7.2.2 Cboe Options FLEX Certification Multicast Routing Parameters

Data center	Rendezvous Point
Primary Data Center	74.115.128.131

7.2.3 Cboe Options FLEX Certification Multicast Addresses

The following tables describe the multicast address distribution across production multicast Cboe FLEX feeds.

Primary Datacenter		WAN-Shaped 170.137.126.16/28	
Unit	IP Port	Real-time MC	Gap Resp. MC
1	32501	233.103.126.18	233.103.126.19
2	32502		
3	32503		
4	32504		
5	32505		
6	32506		
7	32507		
8	32508		
9	32509		
10	32510		
11	32511		
12	32512		
13	32513		
14	32514		
15	32515		
16	32516		
17	32517		
18	32518		
19	32519		
20	32520		
21	32521		
22	32522		
23	32523		
24	32524		
25	32525		
26	32526		
27	32527		
28	32528		
29	32529		
30	32530		
31	32531		
32	32532		
33	32533		
34	32534		
35	32535		

Note – Cboe reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

8 Options Trade Condition Codes

The following table defines valid values for the *Trade Condition* field.

Type	Field Value
a	Single Leg Auction Non ISO Cboe auction types include AIM, SAM
b	Single Leg Auction ISO Cboe auction types are AIM ISO, SAM ISO
c	Single Leg Cross Non ISO Cboe auction types include Cust to Cust AIM, QCC
d	Single Leg Cross ISO Cboe order type is Cust to Cust AIM ISO
e	Single Leg Floor Trade
f	Complex to Complex Electronic Trade Cboe auction type is COA
g	Complex Auction Trade Cboe order types include C-AIM, C-SAM
h	Complex Cross Cboe auction types include Cust to Cust C-AIM, C-QCC
j	Complex Electronic Trade Against Single Leg(s)
k	Complex with Stock Options Auction Trade Cboe auction types include C-AIM w/ Stock, C-SAM w/ Stock
m	Complex Floor Trade Against Single Leg(s) All complex floor executions are reported as condition 'm'.
n	Complex with Stock Electronic Trade Includes COA auctions done electronically
o	Complex with Stock Cross Cboe auction types include C-QCC w/ Stock
p	Complex with Stock Floor Trade
t	Complex Floor Trade of Proprietary Products Marked as "Combo Order"
l	Electronic Trade
K*	Cabinet Order
O*	Opening Trade
S	ISO

*The *Trade Condition* value of "O=Opening Trade" and "K=Cabinet Trade" will continue to be disseminated on the options PITCH and TOP feeds but will not be sent to OPRA.

9 Connectivity

9.1 Supported Extranet Carriers

Cboe has certified a number of carriers defined in the [Cboe C1 Options Connectivity Manual](#) with respect to redistribution of Cboe Multicast data feeds. For more information on receiving the FLEX feed through any of these providers, reach out to the vendor contact noted in the Extranet Providers section of the Connectivity Manual.

9.2 Bandwidth Recommendation

The WAN-shaped feeds require 100 Mbps of bandwidth. Cboe will use 90% of these respective bandwidths for the FLEX feed to allow customers to use the same physical connection for FIX order entry if desired.

10 References

For more information on Cboe Symbology, please refer to the [Cboe Symbology Reference](#) document.

11 Support

Please e-mail questions or comments regarding this specification to tradedesk@cboe.com.

Revision History

Document Version	Date	Description
1.0.0	11/16/18	Initial draft in support of FLEX Options on Cboe Options Exchange.
1.0.1	02/14/19	Added certification environment IP port and unit distribution information.
1.0.2	04/02/19	Added C1 Certification data center rendezvous point IP address. Corrected C1 Symbol Range.
1.0.3	04/17/19	Added Production IP addresses for C1 Options.
1.0.4	05/08/19	Removed <i>Trading Status</i> field value 'S' = Exchange Specific Suspension from <i>Trading Status</i> message, as this was added in error. Corrected C1 Production WAN-Shaped [CAF] and [CBF] source network IP addresses.
1.0.5	06/12/19	Added additional proprietary products to matching unit 31 in C1. Corrected certification and production C1 symbol range for units 9 and 20. Corrected example for FLEX Instrument Definition message.
1.0.6	06/21/19	Added Trade (short) message type and corresponding example message.
1.0.7	09/06/19	Clarified note for <i>Price</i> field in <i>Auction Notification</i> message to indicate that the field value will be zero when <i>Auction Type</i> = B or F.
1.0.8	09/25/19	<i>Customer Indicator</i> will be blank when <i>Auction Type</i> = F.
1.0.9	10/11/19	Clarified description of <i>Time</i> message. Corrected <i>Auction Notification Price</i> field description.
1.1.0	05/26/20	Corrected Unit Symbol Distribution tables to indicate QQQ is an exception for C1 Unit 20, as it has a dedicated location on Unit 28. Added DAC <i>Auction Notification</i> and DAC <i>Trade</i> messages (effective 07/20/20 effective 09/14/20-TBD). Added Options Trade Condition Codes section.
1.1.1	07/08/20	Updated effective date for FLEX DAC to 09/14/20 .
1.1.2	09/08/20	Updated effective date for FLEX DAC to TBD.
1.1.3	11/5/20	Added SPESG to Unit Distribution Exception entries. Updated effective date for FLEX DAC to 12/2/20.

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1.1.4	02/01/21	Added MRUT to Unit/Symbol Distribution tables for C1 unit 31 (effective 03/01/21). Added new updated Unit/Symbol Distribution tables with harmonized symbol ranges (effective 3/22/21).
1.1.5	03/25/21	Updated the Unit Symbols Distribution Exceptions entries (effective 3/22/21). Added Binary Date field type to Section 2.2 - Data Types (effective Q3 2021). Added new Time Reference message (effective Q3 2021). Updated description of <i>GTH Trading Status</i> field on Trading Status message (effective Q3 2021).