



# U.S. Options Auction Feed Specification

Version 1.0.8

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## 1 Introduction

The Cboe U.S. Options Auction Feed specification may be used to deliver Auction message information for the EDGX Options Exchange. Cboe Members may use this multicast feed to receive real-time Auction Notification, Auction Trade and Auction Cancel messages.

### Multicast Options Auction Feed Descriptions

Exchange	Shaping	Served From Data Center (Primary/Secondary)	Multicast Feed ID
EDGX Options	Gig	Primary	EAA
EDGX Options	Gig	Primary	EBA
EDGX Options	Gig	Secondary	EEA

Cboe Members may also use Cboe Multicast PITCH to receive auction messages as well as real-time depth of book quotations and execution information. Refer to the [US Equities/Options Multicast Depth of Book \(PITCH\) Specification](#) for more information.

### 1.1 Feed Connectivity Requirements

Gig Shaped feeds are available to members with a minimum of 1 GB/s of connectivity to Cboe via cross connect or dedicated circuit.

Members with sufficient connectivity may choose to take both the Gig-Shaped feeds from one of Cboe datacenters and arbitrate the feeds to recover lost data. Alternatively, members may choose to arbitrate feeds from both datacenters. It should be noted that feeds from the secondary datacenter will have additional latency for those connected with Cboe in the primary data center due to proximity and business continuity processing.

Cboe Options Auction Feed real-time events are delivered using a published range of multicast addresses divided by symbol range units

## 2 Protocol

EDGX Options users may receive the Cboe Options Auction Feed protocol over multicast only.

The Cboe Options Auction Feed cannot be used to enter orders. For Cboe Options Auction order entry, refer to the Cboe US Options [FIX](#) or [BOE](#) specifications.

## 2.1 Message Format

Cboe Options Auction Feed protocol messages are delivered un-sequenced and may not be retrieved if missed.

Cboe Members familiar with the Multicast Depth of Book protocol should find it very easy to reuse that code to process the Cboe Options Auction Feed. All multicast delivered events will be self-contained. Developers can assume that delivered data will not cross frame boundaries and a single Ethernet frame will contain only one Unit Header with associated data.

The Cboe Options Auction Feed is comprised of a series of dynamic length un-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. Members should develop their decoders to handle unknown message types and messages beyond the expected length. Messages will only be grown to add additional data to the end of a message.

## 2.2 Unsequenced Unit Header

The `Unsequenced Unit Header` is used for all Cboe Options Auction Feed messages.

Unsequenced data may be delivered using the `Unsequenced Unit Header`. Unsequenced headers will have a 0 value for the sequence field and potentially for the unit field.

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

### 2.3 Execution IDs

The 1<sup>st</sup> character of an Execution ID (after converting to a 9 character, base 36 number zero-padded on the left) may be used to differentiate between internal matched trades and internal auction fills. The Cboe Options Auction Feed will only represent Auction Fills as follows:

- 0 (zero) = Cboe Internal Match
- C = Auction Fill

### 2.4 Heartbeat Messages

The `Unsequenced Unit Header` with a count field set to “0” will be used for heartbeat messages. During trading hours heartbeat messages will be sent if no data has been delivered within 1 second.

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

## 3 Cboe Options Auction Feed Messages

### 3.1 Time

A `Time` message is sent whenever the source time for a unit passes over a second boundary. 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.

Time				
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	0x20	Time Message
<i>Time</i>	2	4	Binary	Number of whole seconds from midnight Eastern Time
<b>Total Length = 6 bytes</b>				

### 3.2 Unit Clear

The `Unit Clear` message instructs feed recipients to clear all orders for the Cboe book in the unit specified in the `Unsequenced Unit Header`. This message will be sent at startup each day. It would also be distributed in certain recovery events such as a data center fail-over.

Unit Clear				
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	0x97	Unit Clear Message
<i>Time offset</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<b>Total Length = 6 bytes</b>				

### 3.3 Auction Notification

`Auction Notification` messages are used to disseminate order details of an auction. 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>Symbol</i>	6	6	Printable ASCII	<i>Symbol</i> 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	"T" = Step-Up Mechanism (SUM) "B" = Bats Auction Mechanism (BAM)
<i>Side</i>	21	1	Alphanumeric	"B" or "S"
<i>Price</i>	22	8	Binary Long Price	For SUM this will reflect the NBBO price of the opposite side of the auction at the time of entry.  For BAM this will reflect the limit price specified on the BAM order.
<i>Contracts</i>	30	4	Binary	Number of contracts available in the auction.
<i>Customer Indicator</i>	34	1	Alphanumeric	"N" = Non-Customer "C" = Customer
<i>ParticipantID</i>	35	4	Alphanumeric	Executing Broker (optional) of firm attributed to this quote
<i>Auction End Offset</i>	39	4	Binary	Nanosecond offset from last timestamp
<b>Total Length = 43 bytes</b>				

### 3.4 Auction Cancel

Auction Cancel messages are used to disseminate the cancellation of an earlier Auction Notification message as a result of a user cancelation of the original order, a user modification request to change the price or increase the original order quantity, or a fading of the NBBO.

A user request to modify the order price or to increase the original order quantity will result in a cancelation of the auction followed by a new Auction Notification message. Auction Cancel messages will not be issued for order 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
<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
<b>Total Length = 14 bytes</b>				

### 3.5 Auction Trade

Auction Trade messages are used to disseminate executions resulting from an options 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 Long Price	Trade price
<i>Contracts</i>	30	4	Binary	Number of contracts traded
<b>Total Length = 34 bytes</b>				



### 3.6 End of Session

The `End of Session` message is sent for each unit when the unit shuts down. No more auction 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 Session Message
<i>Timestamp</i>	2	4	Binary	Nanosecond offset from last unit timestamp
<b>Total Length = 6 bytes</b>				

### 3.7 Symbol Mapping

A `Symbol Mapping` message is used to map the 6 character multicast feed symbol field to an OSI symbol. These messages are sent continuously through the day at variable rates as bandwidth allows.

Symbol Mapping				
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	0x2E	Symbol Mapping Message
<i>Feed Symbol</i>	2	6	Printable ASCII	Symbol right padded with spaces
<i>OSI Symbol</i>	8	21	Printable ASCII	OSI Symbol
<i>Symbol Condition</i>	29	1	Alphanumeric	“N” = Normal “C” = Closing Only
<b>Total Length = 30 bytes</b>				

## 4 Example Messages

Each of the following message types must be wrapped by an unsequenced unit header as described in Section 2.24. Note that in the following examples, each byte is represented by two hexadecimal digits.

### 4.1 Unsequenced Unit Header

Hdr Length	31 00	49 bytes, including header
Hdr Count	02	2 messages to follow
Hdr Unit	01	Unit 1
Hdr Sequence	00 00 00 00	Always set to zero

### 4.2 Time Message

Length	06	6 bytes
Type	20	Time
Time	98 85 00 00	34,200 seconds = 09:30 AM Eastern

### 4.3 Unit Clear

Length	06	6 bytes
Type	97	Unit Clear
Time offset	18 D2 06 00	447,000 ns since last Time Message

### 4.4 Auction Notification Message

Length	2B	43 bytes
Type	AD	Auction Notification
Time offset	18 D2 06 00	447,000 ns since last Time Message
Symbol	30 30 6d 45 56 4f	00mEVO
Auction ID	05 40 5B 77 8F 56 1D 0B	631WC4000005
Auction Type	54	T = SUM
Side	42	B = Buy Side
Prc	E8 A3 0F 00 00 00 00 00	\$102.50
Contracts	64 00 00 00	100 contracts
Customer		
Indicator	43	C = Customer
ParticipantID	45 46 49 44	EFID
Auct. End Offset	38 73 0E 00	947,000 ns since last Time Message

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#### 4.5 Auction Cancel Message

Length	E	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	

#### 4.6 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	
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Prc	E8 A3 0F 00 00 00 00 00	\$102.50
Contracts	64 00 00 00	100 contracts

#### 4.7 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

#### 4.8 Symbol Mapping Message

Length	1E	30 bytes
Type	2E	Symbol Mapping Message
Feed Symbol	31 20 20 20 20 20	
OSI Symbol	4D 53 46 54 20 20 31 30 30 31 31 36 43 30 30 30 34 37 35 30 30	MSFT 100116C00047500
Symbol Condition	44	'C' - Closing Only

## 5 Multicast Configuration

### 5.1 US Options Production Environment Configuration

#### 5.1.1 Production Unit Distribution

The following table describes an updated Cboe symbol distribution across units for EDGX Options.

Unit	Symbol Range
1	A – ADOZZ
2	ADP – AMZMZ AMZNA – ANETZ
3	ANEU – BAAAZ
4	BAAB – BKNFZ
5	BKNG – BZZZZ
6	C – CLGXZ
7	CLGY – CSXAZ
8	CSXB – DISAZ
9	DISB – ETFBZ
10	ETFC – FIVDZ
11	FIVE – GLDAZ
12	GLDB – GOOGZ
13	GOOH – HSXZZ
14	HSY – IWLZZ
15	IWM – JNJAZ
16	JNJB – LMTAZ
17	LMTB – MLNXZ
18	MLNY – MUA AZ
19	MUAB – NTE SZ
20	NTET – OXYAZ
21	OXYB – QGENZ
22	QGEO – RHAAZ
23	RHAB – SMGZZ
24	SMH – SPXZZ SPYA – SYEZZ
25	SYF – TSKZZ
26	TSL – UALAZ
27	UALB – VLOAZ
28	VLOB – WDCAZ
29	WDCB – XLDZZ
30	XLE – ZZZZZ
31	AMZN
32	SPY

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.

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**5.1.2 EDGX Options Production Multicast Routing Parameters**

Data Center	Rendezvous Point
NY5 Primary Data Center A feed	74.115.128.160
NY5 Primary Data Center B feed	74.115.128.161
CH4 Secondary Data Center E feed	174.136.181.250

**5.1.3 EDGX Options Production Address/Unit Distribution**

The following tables describe the unit distribution across the EDGX Options Auction Feed.

NY5 Primary Datacenter		Gig Shaped [EAA] 174.136.164.0/28	Gig Shaped [EBA] 174.136.164.16/28
Unit	IP Port	Real-time MC	Real-time MC
1	30601	224.0.131.144	233.130.124.144
2	30602		
3	30603		
4	30604		
5	30605	224.0.131.145	233.130.124.145
6	30606		
7	30607		
8	30608		
9	30609	224.0.131.146	223.130.124.146
10	30610		
11	30611		
12	30612		
13	30613	224.0.131.147	233.130.124.147
14	30614		
15	30615		
16	30616		
17	30617	224.0.131.148	233.130.124.148
18	30618		
19	30619		
20	30620		
21	30621	224.0.131.149	233.130.124.149
22	30622		
23	30623		
24	30624		
25	30625	224.0.131.150	233.130.124.150
26	30626		
27	30627		
28	30628		
29	30629	224.0.131.151	233.130.124.151
30	30630		
31	30631		
32	30632		

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CH4 Secondary Datacenter		Gig Shaped [EEA] 174.136.176.128/28
Unit	IP Port	Real-time MC
1	31601	233.19.3.128
2	31602	
3	31603	
4	31604	
5	31605	233.19.3.129
6	31606	
7	31607	
8	31608	
9	31609	233.19.3.130
10	31610	
11	31611	
12	31612	
13	31613	233.19.3.131
14	31614	
15	31615	
16	31616	
17	31617	233.19.3.132
18	31618	
19	31619	
20	31620	
21	31621	233.19.3.133
22	31622	
23	31623	
24	31624	
25	31625	233.19.3.134
26	31626	
27	31627	
28	31628	
29	31629	233.19.3.135
30	31630	
31	31631	
32	31632	

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. Addresses in the gray area are pre-assigned but not available. Members should not configure their networks or systems for these addresses.

## 5.2 US Options Certification Environment Configuration

### 5.2.1 Certification Unit Distribution

The following table describes the Cboe Options symbol distribution across units.

Unit	Symbol Range
1	A - ADOZZ
2	ADP - AMZMZ AMZNA - ANETZ
3	ANEU - BAAAZ
4	BAAB - BKNFZ
5	BKNG - BZZZZ
6	C - CLGXZ
7	CLGY - CSXAZ
8	CSXB - DISAZ
9	DISB - ETFBZ
10	ETFC - FIVDZ
11	FIVE - GLDAZ
12	GLDB - GOOGZ
13	GOOH - HSXZZ
14	HSY - IWLZZ
15	IWM - JNJAZ
16	JNJB - LMTAZ
17	LMTB - MLNXZ
18	MLNY - MUA AZ
19	MUAB - NTE SZ
20	NTET - OXYAZ
21	OXYB - QGENZ
22	QGEO - RHAAZ
23	RHAB - SMGZZ
24	SMH - SPXZZ SPYA - SYEZZ
25	SYF - TSKZZ
26	TSL - UALAZ
27	UALB - VLOAZ
28	VLOB - WDCAZ
29	WDCB - XLDZZ
30	XLE - ZZZZZ
31	AMZN
32	SPY

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.

**5.2.2 Options Certification Multicast Routing Parameters**

Data Center	Rendezvous Point
NY5 Certification Data Center	74.115.128.129

**5.2.3 EDGX Options Certification Address/Unit Distribution**

The following tables describe the unit distribution across certification EDGX Options Multicast Auction Feed out of the NY5 datacenter.

NY5 Primary Datacenter		WAN-Shaped 174.136.174.176/28
Unit	IP Port	Real-time MC
1	32601	224.0.74.208
2	32602	
3	32603	
4	32604	
5	32605	
6	32606	
7	32607	
8	32608	
9	32609	
10	32610	
11	32611	
12	32612	
13	32613	
14	32614	
15	32615	
16	32616	
17	32617	224.0.74.210
18	32618	
19	32619	
20	32620	
21	32621	
22	32622	
23	32623	
24	32624	
25	32625	
26	32626	
27	32627	
28	32628	
29	32629	
30	32630	
31	32631	
32	32632	

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.



## **6 Connectivity**

### **6.1 Supported Extranet Carriers**

The Cboe Options Auction Feed will be made available to Members through extranet carriers that have completed their multicast implementation and certified with Cboe on a per-market basis. Cboe has certified a number of carriers for redistribution of Cboe Multicast data feeds as outlined in the [Cboe US Equity/Options Connectivity Manual](#). For more information on receiving the Cboe Options Auction Feed through any of these providers, please refer to the vendor contact information noted in the Extranet Providers section of the Connectivity Manual.

## **7 References**

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

## **8 Support**

Please e-mail questions or comments regarding this specification to [tradedesk@cboe.com](mailto:tradedesk@cboe.com).

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## Revision History

Document Version	Date	Description
1.0.0	05/17/16	Initial version 1.0.0.
1.0.1	05/31/16	Added IPs and Port Numbers to the EDGX Options Certification Address/Unit Distribution table.
1.0.2	06/28/16	Added IPs and Port Numbers to the EDGX Options Production Address/Unit Distribution table.  Updated the Unsequenced Unit Header to 8 bytes.  Removal of NBBO Price from Auction Notification message.
1.0.3	08/01/16	Added support for BAM Auctions.
1.0.4	01/06/17	Updated description of Auction Trade message.
1.0.5	10/17/17	Cboe branding/logo changes.
1.0.6	03/08/18	Updated Unit Distribution ranges.
1.0.7	03/23/18	Updated Unit Distribution ranges effective date updated to 4/14/18.
1.0.8	6/28/2018	Added Multicast Options Auction Feed Descriptions table. Added Feed Connectivity Requirements section. Added feed shaping information to source network headers.