BX Options Depth of Market

Market Data Feed

Technical Specifications

Revision [2.2]

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[Approved]

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Document History

Revision	Published	Author(s)	Summary
2.2	08/30/2024		• Converting the SoupBINTCP Protocol option to a replay without support for Live Market Data • Adding the End of Replay Sequence Message only for SoupBINTCP.
2.1	01/26/2024		• Remove → "M" = Manual Trade in section 4.6 Trade Messages • full message removed → 4.6.2 Broken Trade/Order Execution Message
2.1	01 09 2023		• Version updated to 2.1 • Clarifying the Data Types: Added "2 byte Price fields are unsigned positive numbers. 4 byte Price fields are signed positive numbers."
2.0	07 15 2020		• Added note related to NOII message for Block Auctions • Updated Order Cancel message to include 'Instrument Id' • Updated 'Best Bid Quantity' and 'Best Ask Quantity' Length from 8-byte to 4-byte on "Net Order Imbalance Indicator" (NOII) message. • Updated Options Trade Message "Cross Type" from-The auction session for which the message is being generated. "O"= Opening/Reopening Auction "P"= Price Improvement (PRISM) Auction "N"=Non-Auction To The auction session for which the message is being generated. "A"= All Auctions "P"= Price Improvement (PRISM) Auction "N"=None
2.0	03 10 2019		• Removed the Seconds, Base Reference Number Messages. • Block Single Side Delete message is now obsolete. • Added a 2-byte Internal indicator to all messages. • All messages using the order/quote reference number 4-byte deltas have been updated to use the 8-byte absolute reference numbers. • Updated timestamp field to 8 bytes instead of 4 bytes. • Security Open/Close message consolidated into Trade Action Message. • Additional fields added to Directory Message. • Additional fields added to Net Order Imbalance Message. • All book update messages updated to have uniform message header. • Order Capacity field added to the Add Order Message. • Strategy ID added to Trade Message. • Cross Trade Message consolidated into one Trade Message. • Source field no longer relevant and removed from Directory Message.
1.3	02 11 2017		System
1.2	30 11 2015		System Event Message • Updated the Start of Messages (System Event Code "O") time to ~4:00 am. • Updated the End of System Hours (System Event Code "E") time to ~5:15 pm to more accurately reflect current practice. • Updated the End of Messages (System Event Code "C") time to ~5:20 pm to more accurately reflect current practice.
1.1	26 5 2015		NOII and Options Cross Trade Message • Updated the NOII message for Order Exposure notification and price improvement (PRISM) auction. • Added new field Customer/ Firm Indicator. Also added 3 reserve bytes for consistency with other feeds. • Updated the Options Cross Trade message for price improvement (PRISM) auction.
1.0	10 4 2012		Initial BX Options Depth of Market Technical Specification • NASDAQ released the initial BX Options Depth data feed specification document to the public.

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1. Overview

Nasdaq BX Options Depth of Market (BX Depth) is a direct data feed product offered by The Nasdaq BX Options Market®, which features the following data elements:

- **Order and Quote level data:** For Nasdaq BX Option System, Nasdaq will provide its full order and quote depth using the standard BX Depth format. BX Depth uses a series of order and quote messages to track the life of an order and quote[1].
- **Trade messages:** To ensure that customers have complete information about the Nasdaq BX Options order book, BX Depth will support a trade message to reflect a match of an order in the Nasdaq BX Options system but not already sent on the BX Depth feed.
- **Net Order Imbalance Data:** In the minutes leading up to the Nasdaq BX Options Opening Auction, Nasdaq disseminates the indicative clearing price and net order imbalance in the Nasdaq BX Options System. Because the calculation includes orders that are not booked, the Net Order Imbalance Indicator (NOII) is the best indicator of the BX Options opening prices available to the public.
- **Administrative messages:** such trading actions and symbol directory messages:
  - Trading action messages are used to inform market participants when an option is halted or released for trading and the current state of the option.
  - Symbol Directory messages provide basic option data.

2. Architecture

The BX Depth feed will be made up of a series of sequenced messages. Each message is variable in length based on the message type and is composed of binary bytes. The messages that make up the BX Depth protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees. BX Depth is an outbound market data feed only. The BX Depth protocol does not support order or quote entry.

Nasdaq plans to offer the BX Depth data feed in two protocol options:

Protocol Option	Number of Outbound Channels
SoupBinTCPv3.00	Multiple output channels, each channel supporting a subset of securities, the range defined by first letter of underlying
MoldUDP64v1.00	Multiple output channels, each channel supporting a subset of securities, the range defined by first letter of underlying

Both the primary (“A feed”) and secondary (“B feed”) will be hosted by servers co-located with the trading system and will have identical performance characteristics. In fact the “A” and “B” feeds are logically identical: Mold or Soup messages will have the same Mold or Soup sequence numbers across all the streams.

Please note that Nasdaq has determined to provide local redundancy in the NY Metro Area (“A” and “B” feeds), while using the Mid-Atlantic Region (“C” feed) for disaster recovery in the event order entry is switched from the NY Metro Area.

A complete set of alternate connection parameters are available for each Multicast Channel and TCP Connection in the event of a failure in any of the primary connections.

The SoupBinTCP channel will be available only for replaying messages. Upon client login, the channel will replay all messages until it is ready to stream live data. Once the replay is complete, it will publish an "End Of Replay Sequence" message with the sequence number that allows the client to resume receiving real-time messages from the Mold channel. The client connection on the replay channel will stay up with just the soup heartbeats. The client can then disconnect and ask for another replay if necessary.

1 BX Depth is an outbound market data feed only. The protocol does not support order or quote entry. For information on order/quote entry protocols for Nasdaq BX Options, please refer to the Trading Services section of the Nasdaq Trader website.

3. Data Types

All Alpha or Alphanumeric fields are left justified and padded on the right with spaces.

All Integer fields are unsigned big-endian (network byte order) binary encoded numbers unless otherwise specified. Integers may be 1, 2 or 4 bytes long.

Prices are 2 byte or 4 byte Integer fields. 2 byte Price fields are unsigned positive numbers. 4 byte Price fields are signed positive numbers. When a 4 byte price is converted to a decimal format, prices are in fixed point format with 6 whole number places followed by 4 decimal digits. When a 2 byte price is converted to a decimal format, prices are in fixed point format with 3 whole number places followed by 2 decimal digits.

4. Message Formats

The BX Depth feed is composed of a series of messages that describe orders/quotes added to, removed from, modified and executed/traded on the BX Options Market as well as disseminate Auction and Option Symbol Directory information.

4.1. System Event Message

The system event message type is used to signal a market or data feed handler event. The format is as follows:

System Event Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"S" = System Event Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Event Code	11	1	Alpha	Refer to System Event Codes below

System Event Codes

Code	Explanation	When (Typically)
"O"	Start of Messages. This is always the first message sent in any trading day.	After ~2:00am
"S"	Start of System Hours. This message indicates that the exchange is open and ready to start accepting orders.	7:00am
"Q"	Start of Opening Process. This message is intended to indicate that the exchange has started its opening auction process.	9:30:00am
"N"	End of Normal Hours Processing - This message is intended to indicate that the exchange will no longer accept any new orders or changes to existing orders for options that trade during normal trading hours.	4:00:00pm
"L"	End of Late Hours Processing - This message is intended to indicate that the exchange will no longer accept any new orders or changes to existing orders for options that trade during extended hours.	4:15:00pm
"E"	End of System Hours. This message indicates that the exchange system is now closed.	~5:15pm
"C"	End of Messages. This is always the last message sent in any trading day.	~5:20pm

4.2. Administrative Messages

4.2.1. Derivative Directory Message

At the start of each trading day, Nasdaq disseminates options symbol directory messages for all active options symbols in the system.

Notes on the Derivative Directory Messages:

- The Derivative Directory Messages are sent once per symbol, typically before the "Start of System Hours" System Event. Should it be necessary, intra-day updates to this message will be sent as they occur. In the case of an intra-

day update, for a given Option Id, the canonical information for the option is invariant (will not change). The canonical information consists of Security Symbol, Expiration Year Month and Day, Strike Price and Option Type. Other attributes for the Option may change.

- Firms should note that they will only receive Derivative Directory messages for the symbol range associated with the matching engine serving that connection.
- The Underlying Symbol is in most cases the same as the industry standard ticker underlying. In rare cases, such as a special settlement symbol, the exchange assigns unique underlying symbols.
- If an Option is removed from the system intra-day, a new options directory message will be sent with "Tradable" field set to "N". Any Quotes sent for this removed Option will be rejected. All existing quotes for this option will be purged.
- The Minimum Price Variation (MPV) has the following values:
  - "E" – All prices are in penny increments
  - "S" – Prices below $3.00 are in increments of $0.05, prices above $3.00 are in increments of $0.10
  - "P" – Prices below $3.00 are in increments of $0.01, prices above $3.00 are in increments of $0.05

Derivative Directory Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"R" = Directory Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument ID	11	4	Integer	Option ID assigned daily. Valid for trading day
Security Symbol	15	6	Alphanumeric	Denotes the security symbol.
Expiration Year	21	1	Integer	Last two digits of the year of the option expiration
Expiration Month	22	1	Integer	Expiration Month (1-12)
Expiration Date	23	1	Integer	Day of the Month of expiration (1-31)
Explicit Strike Price	24	4	Integer	Explicit strike price. Refer to Data Types for field processing notes.
Option Type	28	1	Alpha	"C" = Call option "P" = Put option "N"= N/A
Underlying Symbol	29	13	Alphanumeric	Denotes the unique symbol assigned to the underlying security.
Closing Type	42	1	Alphabetic	Denotes which System Event is used to trigger the instrument closingprocess. "N" = Normal Hours "L" = Late Hours
Tradable	43	1	Alpha	Denotes whether or not this instrument is tradable at the exchange. The allowable values are: "Y" = Instrument is tradable "N" = Instrument is not tradable
MPV	44	1	Alpha	Minimum Price Variation for instrument. See Notes below for further explanation: "E" = penny Everywhere "S" = Scaled "P" = penny Pilot
ISIN	45	12	Alphanumeric	International Securities Identification Number for instrument Not supported on BX Options. Always set to '0'
Tick Size Table ID	57	2		Tick Size ID for instrument Not supported on BX Options. Always set to '0'
Price notation	59	1	Alpha	The price notation of the order book. Not supported on BX Options. Always set to '0'

Derivative Directory Message

Name	Offset	Length	Value	Notes
Volume notation	60	1	Alpha	The Volume notation of the order book Not supported on BX Options. Always set to '0'
Financial Product	61	2	Integer	Type of Financial Product Not supported on BX Options. Always set to '0'
Market segment Id	63	1	Alpha	Market identifier Not supported on BX Options. Always set to '0'
Trading Currency	64	3	Alpha	Currency of the trading instrument Not supported on BX Options. Always set to '0'
MIC	67	4	Alpha	Market Identifier Code identifying the Exchange. Not supported on BX Options. Always set to '0'
Instrument Long Name	71	16	Alpha	Instrument long name Not supported on BX Options. Always set to '0'

4.2.2. Trading Action Message

The options system uses this administrative message to indicate the current trading status of an index or equity option within the options market.

The Trading Action message will be used to indicate the current trading state of the instrument as it transitions through the various states during the trading session. It will begin with Pre Open state if it is eligible for trading. The states Opening and Re-Opening indicate that the instrument is undergoing an auction prior to it moving into Continuous Trading state. Buy Side and Sell Side Trading Suspended states are special cases of Continuous Trading. The instrument transitions to Closed state at the end of trading hours. At any point before the Closed state the instrument can enter the Halted state for regulatory or operational reasons.

After the start of system hours, the options system will use the Trading Action message to relay changes in trading status for an individual option. Messages will be sent when an option: is halted, is released for quotation, released for trading, or temporarily suspended for trading on the buy or sell side.

Trading Action Message

Field Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"H" = Trading Action Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option ID assigned daily. Valid for trading day

Trading Action Message

Field Name	Offset	Length	Value	Notes
Current Trading State	15	1	Alphabetic	Reflects the current trading state for the derivative. The allowable values are: "H" = Halt in effect "B" = Buy Side Trading Suspended –i.e. Buy orders are not executable) "S" = Sell Side Trading Suspended –i.e. Sell orders are not executable) "I" = Pre Open "O" = Opening Auction "R" = Re-Opening "T" = Continuous Trading "X" = Closed

4.3. Add Order Message

An Add Order Message indicates that a new order has been accepted by the Nasdaq BX Option system and was added to the displayable book. The message includes a day-unique Order Reference Number used by BX to track the order.

For bandwidth efficiency reasons, this message can be published in either short or long format.

Add Order Message – Short Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"a"=Add Order Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option ID assigned daily, valid for trading day
Order Reference Number	15	8	Integer	The unique reference number assigned to the new order. The order reference number is Increasing, but not necessarily sequential.
Market Side	23	1	Alpha	The type of order being added. "B" = Buy "S" = Sell "X" = Buy AON "Y" = Sell AON
Order Capacity	24	1	Alpha	Indicates Order Capacity Not supported on BX Options. Always set to '0'
Price	25	2	Integer	The display price of the new order being added to the book. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Volume	27	2	Integer	The total quantity of the new order being added to the book.
Rank	29	2	Integer	Order Rank on the book. Not supported on BX Options. Always set to '0'

Add Order Message - Long Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"A"=Add Order Message
Tracking Number	1	2	Integer	Internal system tracking number

Add Order Message - Long Form

Name	Offset	Length	Value	Notes
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option Id assigned daily, valid for trading day.
Order Reference Number	15	8	Integer	The unique reference number assigned to the new order. The order reference number is Increasing, but not necessarily sequential.
Market Side	23	1	Alpha	The type of order being added. "B" = Buy "S" = Sell "X" = Buy AON "Y" = Sell AON
Order Capacity	24	1	Alpha	Indicates Order Capacity Not supported on BX Options. Always set to '0'
Price	25	4	Integer	The display price of the new order being added to the book. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Volume	29	4	Integer	The total quantity of the new order being added to the book.
Rank	33	2	Integer	Order Rank on the book. Not supported on BX Options. Always set to '0'

4.4. Add Quote Message

An Add Quote Message indicates that a new quote has been accepted by the BX Option system and was added to the displayable book. The message includes a unique

Bid/Ask Reference Numbers used by BX to track the quote. The bid/ask sequence numbers can change during the day and will be reflected in the quote update messages.

For bandwidth efficiency reasons, this message can be published in either short or long format.

Add Quote Message – Short Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"j" = New Quote message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Bid Reference Number	15	8	Integer	The bid reference number associated with the new quote.
Ask Reference Number	23	8	Integer	The ask reference number associated with the new quote
Bid Price	31	2	Integer	The display bid price of the new quote. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Bid Size	33	2	Integer	The bid quantity of the new quote.
Ask Price	35	2	Integer	The display ask price of the new quote. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Ask Size	37	2	Integer	The ask quantity of the new quote.

Add Quote Message – Long Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"J" = New Quote message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Bid Reference Number	15	8	Integer	The bid reference number associated with the new quote.
Ask Reference Number	23	8	Integer	The ask reference number associated with the new quote
Bid Price	31	4	Integer	The display bid price of the new quote. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Bid Size	35	4	Integer	The bid quantity of the new quote.
Ask Price	39	4	Integer	The display ask price of the new quote. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Ask Size	43	4	Integer	The ask quantity of the new quote.

4.5. Modify Order/Quote Message

Modify messages always include the Reference Number of the order, one or both sides of the quote to which the update applies. The Reference Numbers on an order/quote will change in the Replace messages. Depth of Market subscribers must track these Reference Number changes to know the current active Reference Number. The Reference numbers must be tracked separately for each side of a quote. To determine the current display contracts for an order

or quote, Depth of Market subscribers must adjust the number of contracts stated in the Modify message from the original number of contracts stated in the Add/Replace message with the same reference number.

4.5.1. Single Side Executed Message

A "Side order" represents an order or one side of a quote.

This message is sent whenever a Side order is executed in whole or in part. It is possible to receive several Single Side Executed Messages for the same Side order if that Side order is executed in several parts. The multiple Single Side Executed Messages on the same order are cumulative. By combining the executions received separately via two types of Single Side Executed Messages and Trade Messages, it is possible to build a complete view of all non- auction executions that happen on The BX Options Market. Auction execution information is available in one bulk print via the Trade Message.

Order Executed Message

NAME	OFFSET	LENGTH	VALUE	NOTES
Message Type	0	1	Alpha	"E" = Single Side Order/Quote Executed Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Strategy ID	15	4	Integer	Complex Strategy ID in case of a leg execution. Not supported on BX Options. Always set to '0'

Order Executed Message

NAME	OFFSET	LENGTH	VALUE	NOTES
Reference Number	19	8	Integer	The order/quote reference number associated with the executed order.
Executed volume	27	4	Integer	The total quantity executed.
Cross Number	31	4	Integer	Trade Group Id. Ties together all trades of a given atomic transaction in the matching engine.
Match Number	35	4	Integer	Execution Id. Identifies the component of an execution. Uniquefora given day. The match number is also referenced in the Trade Break Message.

4.5.2. Single Side Executed With Price Message

A “Side order” represents an order or one side of a quote.

This message is sent whenever an incoming Side order is executed against the book in whole or in part at a price different from the initial display price. Since the execution price is different than the display price of the original Add/Replace, BX includes a price field within this execution message. It is possible to receive multiple Single Side Executed and Single Side Executed with Price messages for the same Side order if that Side order is executed in several parts. The multiple Single Side Executed messages on the same Side order arecumulative.

These executions may be marked as non-printable. If the execution is marked as non-printed, it means that the contracts will be included into a later bulk print (e.g., in the case of auction executions). If a firm is looking to use the BX Options Depth data in time-and-sales displays or volume calculations, Nasdaq recommends that firms ignore messages marked as non-printable to prevent double counting.

Order Executed With Price Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	“C” = Single Side Order/Quote Executed With Price Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option Id assigned daily, valid for trading day.
Strategy ID	15	4	Integer	Complex Strategy ID in case of a leg execution Not supported on BX Options. Always set to ‘0’
Reference Number	19	8	Integer	The order/quote reference number associated with the executed order.
Cross Number	27	4	Integer	Trade Group Id. Ties together all trades of a given atomic transaction in the matching engine.
Match Number	31	4	Integer	Execution Id. Identifies the component of an execution. Unique for a given day. The match number is also referenced in the Trade Break Message.
Printable	35	1	Alpha	Indicates if the execution should be reflected on time and sale displays and volume calculations. “N” = non-printable “Y” = printable
Price	36	4	Integer	The execution price. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Volume	40	4	Integer	The execution quantity.

4.5.3. Order Cancel Message

This message is sent whenever an order on the book is modified as a result of a partial cancellation.

Order Cancel Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"X" = Order Cancel Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option ID assigned daily. Valid for trading day
Order Reference Number	15	8	Integer	The order reference number associated with the executed order.
Cancelled Volume	23	4	Integer	Volume to be removed from the display size of the order as the result of a cancellation.

4.5.4. Single Side Replace Message

This message is sent whenever an order or one side of a quote on the book is replaced. The replacement has a new sequence number and replaces the prior sequence number.

For bandwidth efficiency reasons, this message can be published in either short or long format.

Order Replace Message – Short Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"u" = Single Side Replace message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option ID assigned daily. Valid for trading day
Original Reference Number	15	8	Integer	The original reference number associated with the order being replaced.
New Reference Number	23	8	Integer	The new reference number associated with the new order.
Price	31	2	Integer	The display price of the replaced order being added to the book. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Volume	33	2	Integer	The total quantity of the replaced order being added to the book.

Order Replace Message – Long Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"U" = Single Side Replace message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option ID assigned daily. Valid for trading day
Original Reference Number	15	8	Integer	The original reference number associated with the order being replaced.
New Reference Number	23	8	Integer	The new reference number associated with the new order.

Order Replace Message – Long Form

Name	Offset	Length	Value	Notes
Price	31	4	Integer	The display price of the replaced order being added to the book. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Volume	35	4	Integer	The total quantity of the replaced order being added to the book.

4.5.5. Single Side Delete Message

The message is sent when an order or a side of a quote is being cancelled. All remaining contracts are no longer accessible so the side should be removed from the book.

Order Delete Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"D" = Single Side Order/Quote Delete Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option Id assigned daily, valid for trading day.
Reference Number	15	8	Integer	The order/quote reference number associated with the cancelled order.

4.5.6. Single Side Update Message

This message is sent whenever an order or a side of a quote is being updated for price and (or) contracts. The reference number associated with the order quote is unchanged.

Order Change Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"G" = Single Side Order/Quote Update message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option Id assigned daily, valid for trading day.
Reference Number	15	8	Integer	The reference number associated with the update for an order or quote.
Change Reason	23	1	Alpha	'U' - USER 'R' – REPRICE 'S' - SUSPEND

Order Change Message

Name	Offset	Length	Value	Notes
Price	24	4	Integer	The display price of the updated side order on the book. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Volume	28	4	Integer	The total quantity of the updated side order on the book.

The order/ bid (ask) quote retains its priority on the book.

Here are some of the scenarios when a single side update message is generated:

- A user updates quote that just decreases the bid(ask) size.
- System re-prices an order/quote due to the BX Options market crossing the away market.

4.5.7. Quote Replace Message

This message is sent whenever a quote on the book is replaced. The replaced quote has new sequence numbers on both sides. These new sequence numbers replace the prior sequence numbers on the quote.

For bandwidth efficiency reasons, this message can be published in either short or long format.

Quote Replace – Short Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"k" = Quote Replace short message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Original Bid Reference Number	15	8	Integer	The original bid reference number that is replaced
Bid Reference Number	23	8	Integer	The bid reference number associated with the replaced quote
Original Ask Reference Number	31	8	Integer	The original ask reference number that is replaced
Ask Reference Number	39	8	Integer	The ask reference number associated with the replaced quote
Bid Price	47	2	Integer	The display bid price of the replaced quote. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Bid Size	49	2	Integer	The display bid quantity of the replaced quote.
Ask Price	51	2	Integer	The display ask price of the replaced quote. NOTE: When converted to a decimal format, this price is in fixed point format with 3 whole number places followed by 2 decimal digits.
Ask Size	53	2	Integer	The display ask quantity of the replaced quote.

Quote Replace – Long Form

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"K" = Quote Replace long message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.

Quote Replace – Long Form

Name	Offset	Length	Value	Notes
Original Bid Reference Number	15	8	Integer	The original bid reference number that is replaced
Bid Reference Number	23	8	Integer	The bid reference number associated with the replaced quote
Original Ask Reference Number	31	8	Integer	The original ask reference number that is replaced
Ask Reference Number	39	8	Integer	The ask reference number associated with the replaced quote
Bid Price	47	4	Integer	The display bid price of the replaced quote. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Bid Size	51	4	Integer	The display bid quantity of the replaced quote.
Ask Price	55	4	Integer	The display ask price of the replaced quote. NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits.
Ask Size	59	4	Integer	The display ask quantity of the replaced quote.

4.5.8. Quote Delete Message

The message is sent when a single quote is being cancelled. All remaining contracts are no longer accessible so the quote should be removed from the book.

Quote Delete Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"Y" = Quote Delete message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Bid Reference Number	15	8	Integer	The bid reference number associated with the delete
Ask Reference Number	23	8	Integer	The ask reference number associated with the delete NOTE: When converted to a decimal format, this price is in fixed point format with 6 whole number places followed by 4 decimal digits. A Quote Delete message is sent for an explicit quote purge(two sided). On the other hand a Single Side Delete message is sent for a quote bid(ask) when the quote ask (bid) is completely executed.

4.6. Trade Messages

4.6.1. Options Trade Message

This Options Trade Message is designed to provide execution details for normal match events involving non-display able order types.

Since no Add Order/Quote Message is generated when a non-displayed order is initially received, BX cannot use the Modify Order/Quote message for all matches. BX therefore developed this message to indicate when a match occurs between non-displayable order types. This message is transmitted each time a non-displayable order is executed in whole or in part. It is possible to receive multiple messages for the same Side order if that order is executed in several parts. Trade Messages for the same Side order are cumulative. These messages should be included in BX time-and-sales displays as well as volume and other market statistics. Since Trade Messages do not affect the book, however, they may be ignored by firms just looking to

build and track the BX Options System display.

Trade Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"Q" = Trade Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Options Id assigned daily, valid for trading day.
Cross Number	15	4	Integer	Trade Group Id. Ties together all trades of a given atomic transaction in the matching engine.
Match Number	19	4	Integer	Execution Id. Identifies the component of an execution. Unique for a given day. The match number is also referenced in the Trade Break Message.
Strategy ID	23	4	Integer	Complex Strategy ID in case of a leg execution Not supported on BX Options. Always set to '0'
Cross Type	27	1	Alpha	The auction session for which the message is being generated. "A"= All Auctions "P"= Price Improvement (PRISM) Auction "N"=None
Price	28	4	Integer	The execution price.
Volume	32	4	Integer	The number of contracts executed.
Printable	36	1	Alpha	Indicates if the execution should be reflected on time and sale displays and volume calculations. "N" = non-printable "Y" = printable
Trade Type	37	1	Alpha	Trade Type Identifier "E" = Electronic Trade

4.7. Net Order Imbalance Indicator (NOII)

BX disseminates NOII data for BX Opening Auction events. Details pertaining to dissemination will be provided at a later date. This message is also used for price improvement (PRISM) auctions.

For the BX Opening Auction, BX will begin the dissemination of NOII messages for a put or a call option five minutes prior to the start of opening process event and two minutes prior to the halt resumption (reopening) process event. Note: The Imbalance Price, Imbalance Volume and Imbalance Direction may not be provided for Block Auctions.

Net Order Imbalance Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"I"=NOII Message
Tracking Number	1	2	Integer	Internal system tracking number
Timestamp	3	8	Integer	Nanoseconds since midnight
Instrument Id	11	4	Integer	Option Id assigned daily, valid for trading day.
Auction ID	15	4	Integer	Uniquely identifies the Auction for the trading day.
Auction Type	19	1	Alpha	Type of Auction: "O" = Opening "R" = Reopening "P"= Price Improvement (PRISM) Auction "I" = Order Exposure "B"= Block Auction

Net Order Imbalance Message

Name	Offset	Length	Value	Notes
Paired quantity	20	4	Integer	The total amount that are eligible to be matched at the Current Reference Price. 0 for Price Improvement (PRISM) Auction.
Imbalance Direction	24	1	Alpha	Indicates the market side of the imbalance "B" = buy imbalance "S" = sell imbalance
Imbalance Price	25	4	Integer	The imbalance price.
Imbalance Volume	29	4	Integer	The imbalance volume.
Customer/ Firm Indicator	33	1	Alpha	For Order Exposure (Auction Type=I) only. Indicates the order capacity: "C" = Customer "F" = Firm/ Joint Back Office (JBO) "M" = On-floor Market Maker "P" = Professional Customer "B" = Broker Dealer/ Non Registered Market Maker
Best Bid Price	34	4	Integer	Best Bid Price or zero (0) if the book is crossed. Not supported on BX Options. Always set to '0'
Best Bid Quantity	38	4	Integer	Bid volume at top of book, or zero (0) if the book is crossed. Not supported on BX Options. Always set to '0'
Best Ask price	42	4	Integer	Best Ask Price or zero (0) if the book is crossed. Not supported on BX Options. Always set to '0'
Best Ask Quantity	46	4	Integer	Bid Ask at top of book, or zero (0) if the book is crossed. Not supported on BX Options. Always set to '0'

4.8. End of Replay Sequence Message (Only for SoupBINTCP)

The End of replay Sequence message reflects the sequence number at the time replay of existing messages is complete.

The firms can then use this sequence number to resume on the real time Mold channel.

End of Replay Sequence Message

Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"M" = End of Replay Sequence Message
Sequence Number	1	20	Alpha Numeric	Sequence number once the replay is complete. Use this sequence number to resume on the real time Mold channel.

Note: This field is ASCII representation of the sequence number.

5. Support

- For general product support for Nasdaq data feeds, please contact Clientsuccess@nasdaq.com.