



Nasdaq ISE Order Combo Feed Specification

VERSION 1.01

AUGUST 23, 2017



Nasdaq ISE Order Combo Feed – Version 1.01

Nasdaq ISE Order Combo Feed

Table of Contents

1. Overview	3
2. Architecture	4
3. Data Types	5
4. Message Formats	6
4.1. System Event Message	7
4.2. Complex Strategy Directory Message	8
4.3. Strategy Trading Action Message	11
4.4. Strategy Open/Closed Message	12
4.5. Complex Strategy Order on Book Message	13
4.6. Complex Strategy Auction Message	14
5. Support	16
Appendix A – Sample messages	17
Appendix B – Document Revision Control Log	20

1. Overview

The Nasdaq ISE Order Combo Feed is a direct data feed product in the ISE system offered by Nasdaq that features the following:

- Advises participants that a new Complex Order is resting on the book.
- Announces that a new complex auction order is in the market. For public (exposed) auctions, auction responses are also disclosed for some auctions.
- Administrative and market event messages including:
 - Complex Strategy Directory messages to be disseminated to relay complex instrument definitions for the defined complex instruments on the ISE exchange.
 - Strategy Trading action messages to inform market participants when a specific strategy is halted or released for trading on the options market.

NOTE: This feed cannot be used to build the order book.

2. Architecture

The 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 and alphanumeric data. The messages that make up this protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

The options system offers the data feed in two protocol options:

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

The feed is composed of a Multicast and Soup channel.

Please note that Nasdaq provides local redundancy in the NY Metro Area (local "A" and "B" feeds), as well as the remote Chicago Region ("C" and "D" feeds). The secondary "C" and "D" feeds are available for general use, however please note that performance characteristics will be reduced due to the remote location of these feeds.

Both the local primary ("A feed") and local secondary ("B feed") will be hosted by servers co-located with the local trading system and will have identical performance characteristics. The remote primary ("C feed") and remote secondary ("D feed") will be hosted by servers co-located with the remote trading system and will have identical (but reduced) performance characteristics. The messages in each of the "A", "B", "C" and "D" feeds are identical: Mold or Soup messages will have the same Mold or Soup sequence numbers across all of the streams.

The Glimpse snapshot is available in Soup connections only. Just like in the real-time stream, there are two local "A" and "B" connections as well as two remote "C" and "D" connections.

In the event of disaster recovery, the "C" and "D" feeds should be used as primary feeds when order entry is switched from the NY Metro Area to the Chicago Region.

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, 4 or 6 bytes long.

Prices are 2, 4 or 8 byte Integer fields. When an 8 byte price is converted to a decimal format, prices are in fixed point format with 12 whole number places followed by 8 decimal digits. 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.

Negative prices will be indicated with a negative integer at the start of the price field.

Time is expressed as a 6 byte Integer, representing the number of nanoseconds past midnight of the current day.

Note, all complex instrument prices will be signed integers.

4. Message Formats

This feed supports four basic types of messages:

- System Events
- Administrative Data and Market Events
- Announcements of new resting orders in the book
- Announcements of auctions

Within the system event and administrative types, the options system may support multiple message formats as outlined below.

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
Timestamp	1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Event Code	7	1	Alpha	Refer to System Event Codes below
Current Year	8	2	Integer	The current calendar year (example: 2016).
Current Month	10	1	Integer	The current calendar month, with values 1 to 12 inclusive, January=1, etc.
Current Day	11	1	Integer	The current calendar day, with values 1 to 31 inclusive.
Version	12	1	Integer	Version of this interface. Currently set to 1.
Sub-version	13	1	Integer	Sub-version of this interface. Currently set to 0.

System Event Codes		
Code	Explanation	When (typically)
"O"	<i>Start of Messages.</i> This is always the first message sent in any trading day.	After ~12:30am
"S"	<i>Start of System Hours.</i> This message indicates that the options system is open and ready to start accepting orders.	3:00am
"Q"	<i>Start of Opening Process.</i> This message is intended to indicate that the options system has started its opening auction process.	9:30:00am
"N"	<i>Start of Normal Hours Closing Process.</i> This message is intended to indicate that the options system will no longer generate new executions for options that trade during normal hours.	4:00:00pm
"L"	<i>Start of Late Hours Closing Process.</i> This message is intended to indicate that the options system will no longer generate new executions for options that trade during extended hours.	4:15:00pm
"E"	<i>End of System Hours.</i> This message indicates that the options system is now closed.	~5:15pm
"C"	<i>End of Messages.</i> This is always the last message sent in any trading day.	~5:20pm
"W"	<i>End of WCO Early closing.</i> This message is intended to indicate that the exchange will no longer accept any new orders or changes to existing Orders on last trading date of WCO options.	12:00 Noon

4.2. Complex Strategy Directory Message

Whenever a complex order is added in the system for an underlying, the order is normalized and results in either the creation of a new complex strategy or is added to an existing strategy. A Complex Strategy Message containing the strategy definition will be sent. For GTC orders, these will be assigned each trading day and will not be persistent across trading days. Complex Strategy Directory messages for complex instruments with GTC orders from previous day are sent once per instrument, typically before the "Start of System Hours" System Event. The Strategy ID assigned for a new complex strategy is unique for a particular complex instrument for a trading session.

Nasdaq ISE Order Combo Feed Specification

Complex Strategy Directory Message					
Name		Offset	Length	Value	Notes
Message Type		0	1	Integer	"R" = Complex Strategy Directory Message
Timestamp		1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Strategy ID		7	4	Integer	ISE's Strategy ID assigned daily, valid while there are any open complex orders for the day
StrategyType		11	1	Alpha	"V" = Vertical Spread "T" = Time Spread "D" = Diagonal Spread "S" = Straddle "G" = Strangle "C" = Combo "R" = Risk Reversal "A" = Ratio Spread "U" = Custom
Source		12	1	Integer	Identifies the source of the Strategy, valid for the trading day
Underlying Symbol		13	13	Alphanumeric	Underlying Symbol for the strategy. All legs in this strategy belong to this Underlying
Number of Legs		26	1	Integer	Number of legs in the strategy NOTE: Leg field offsets below are an equation, where "n" is the zero based leg number (0, 1, ...)
Leg information, legs repeated. n = 0, 1 and so on...	Option ID	22n + 27	4	Integer	ISE's Option ID for this leg, valid for the trading day. The same ID as the corresponding Option in the Options Directory Message. Zero (0) for Stock Leg.
	Security Symbol	22n + 31	6	Alphanumeric	Denotes the option root symbol (security symbol)
	Leg ID	22n + 37	1	Integer	Leg identifier within this strategy. This is an exchange-assigned 0-based index. E.g. Nth leg has <i>LegId</i> =N-1.
	Expiration Year	22n + 38	1	Integer	Last two digits of the year of the option expiration
	Expiration Month	22n + 39	1	Integer	Expiration Month of the option (1-12)
	Expiration Day	22n + 40	1	Integer	Day of the Month of expiration (1-31)
	Explicit Strike Price	22n + 41	8	Integer	Denotes the explicit strike price of the option. Refer to Data Types for field processing notes. Zero (0) for Stock Leg.
	Option Type	22n + 49	1	Alpha	Option Type: "C" = Call "P" = Put Blank (" ") for Stock Leg.
	Side	22n + 50	1	Alpha	Indicates the side of the leg: "B" = Leg is on Buy side "S" = Leg is on Sell side

Nasdaq ISE Order Combo Feed Specification

	Leg Ratio	$22n + 51$	4	Integer	Leg Ratio
--	-----------	------------	---	---------	-----------

Strategy Directory Notes:

- 1) Firm should note that they will only receive Strategy Directory messages for the symbol range associated with the matching engine serving that connection.
- 2) 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.
- 3) This is a sequenced message and therefore can be replayed upon re-connection.

4.3. Strategy Trading Action Message

ISE uses this administrative message to indicate the current trading status of a strategy within the ISE Options Market.

Whenever a strategy is created and assigned a Strategy ID, ISE will send a Strategy Trading Action Message with current trading state "T" (Trading) or "H" (Halted) soon after the Complex Strategy directory message is sent. Trading firms should assume that all strategies are eligible for trading. ISE will send out a Trading Action message with "H"(HALTED) when a strategy is halted for trading. Thereafter throughout the trading day the Trading Action message is used to relay changes in trading status for the strategy. Messages will be sent when the strategy is halted or is released for trading.

Strategy Trading Action Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Integer	"H" = Strategy Trading Action Message
Timestamp	1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Strategy ID	7	4	Integer	ISE's Strategy ID assigned daily, valid while there are any open complex orders for the day
Current Trading State	11	1	Integer	Reflects the current trading state for the strategy on the ISE market. The allowable values are: H = Halt in effect T = Trading Resumed

Please note that recipients should continue to process the Trading Action message in order to determine if a strategy is in a Halt state during the day.

4.4. Strategy Open/Closed Message

The options system uses this administrative message to indicate when an strategy has completed the opening process and is now available for auto execution or when the option has closed and is no longer available for auto execution.

The system disseminates the Strategy Open/Closed Message for each complex strategy as soon as the opening is completed. Upon receipt of the message with "Open State" = "Y", the recipient is advised that the strategy denoted in the message is now available for auto execution within the options system. Upon receipt of the message with "Open State" = "N", the recipient is advised that the strategy is no longer eligible for auto-execution within the options system.

Security Open/Closed Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"O" = Security Open/Closed
Timestamp	1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Strategy ID	7	4	Integer	Integer ID of the option, as defined in the Options Directory Message.
Open State	11	1	Alpha	Reflects the current eligibility for auto execution of the options security in the options market. The allowable values are: Y = Open for auto execution N = Closed for auto execution

Note: Recipients should continue to process the Strategy Trading Action message in order to determine if a contract is in a Halt state for the day. A strategy Open message should **not** override the Strategy Trading action message indicating if an index or equity option is halted. Recipients should use both messages in tandem to indicate if the issue is halted and/or or open for auto execution.

4.5. Complex Strategy Order on Book Message

An Order on Book message is generated for all the following situations whenever an order free from any display restrictions is reported by the matching engine. In all such cases the order size to be displayed is as reported by the matching engine:

- New – Whenever a new order is entered, including GTC orders from the previous day
- Change/Partial Fill – Whenever the order is changed or partially filled and if the order continues to be free of display restrictions

Please note that the Order on Book message is not generated whenever the order is cancelled or completely filled.

Order on Book Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"L" = Complex Strategy Order on Book
Timestamp	1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Strategy ID	7	4	Integer	Integer ID of the strategy, as defined in the Strategy Directory Message.
Order Type	11	1	Alpha	'M' = Market 'L' = Limit
Side	12	1	Alpha	'B' = Bid 'A' = Offer (Ask) ' ' (blank) = not set (hidden)
Price	13	4	Integer	Price of the order in fixed point format with 6 whole number places followed by 4 decimal digits.
Size	17	4	Integer	Size of the order
Exec Flag	21	1	Alpha	'N' = None 'A' = AON
Order Capacity	22	1	Alpha	'C' = Customer 'D' = Customer Professional 'F' = Firm 'B' = Broker/Dealer – Customer 'K' = Broker/Dealer - Firm 'E' = Proprietary 'N' = Away Market Maker 'M' = Market Maker
Scope	23	1	Alpha	'L' = Local 'N' = National
Owner ID	24	6	Alpha	Spaces when not set
Giveup	30	6	Alpha	Spaces when not set
CMTA	36	6	Alpha	Spaces when not set

4.6. Complex Strategy Auction Message

This message is used to announce strategy auctions. The start of auction is announced, followed by possible updates on the auction, and announcing the end of the auction.

Some fields, at the discretion of the originator of the Order, may be hidden. Possible hidden fields are: Side, Price, Size, Owner ID, Giveup and CMTA.

For the end of auction announcement most of the fields will be blanked or zeroed out. Refer to the message definition for more details.

Complex Strategy Auction Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"J" = Complex Strategy Auction
Timestamp	1	6	Integer	The time, expressed as the number of nanoseconds after midnight.
Strategy ID	7	4	Integer	Integer ID of the option, as defined in the Options Directory Message.
Auction ID	11	4	Integer	Integer which uniquely identifies the auction.
Order Type	15	1	Alpha	'M' = Market 'L' = Limit
Side	16	1	Alpha	'B' = Bid 'A' = Offer (ask) ' ' (blank) = not set (hidden)
Price	17	4	Integer	Price in fixed point format with 6 whole number places followed by 4 decimal digits.
Size	21	4	Integer	Size
Exec Flag	25	1	Alpha	'N' = None 'A' = AON
Order Capacity	26	1	Alpha	'C' = Customer 'D' = Customer Professional 'F' = Firm 'B' = Broker/Dealer - Customer 'K' = Broker/Dealer - Firm 'E' = Proprietary 'N' = Away Market Maker 'M' = Market Maker
Scope	27	1	Alpha	'L' = Local 'N' = National
Owner ID	28	6	Alpha	Spaces when not set
Giveup	34	6	Alpha	Spaces when not set
CMTA	40	6	Alpha	Spaces when not set
Auction Event	46	1	Alpha	'S' = Start 'U' = Auction Update 'E' = End of Auction
Auction Type	47	1	Alpha	'E' = Exposure 'C' = Facilitation 'S' = Solicitation 'P' = PIM
Number of Responses	48	1	Integer	Number of auction Responses. Next two fields repeat that number of times. Allowable values for this field are 0 or 1.

Nasdaq ISE Order Combo Feed Specification

Repeating Fields	Response Price	8n + 49 or 0	4 or 0	Integer	Price of the auction response in fixed point format with 6 whole number places followed by 4 decimal digits. The response, if shown (zero if not shown) is the best response on the contra side. Note, <i>Response Price</i> of 0 is a valid price for Exposure auctions if <i>Response Size</i> is not 0
	Response Size	8n + 53 or 0	4 or 0	Integer	Size of the auction response (zero if not shown).

5. Support

- For general product support for NASDAQ data feeds, please contact NASDAQ Market Data Distribution at 301.978.5307 or dataproductions@nasdaqomx.com.
- For technical support for NASDAQ data feeds, please contact NASDAQ Systems Engineering at devsupport@nasdaq.com.

Appendix A – Sample messages

Each message defined in this protocol has an example to clarify how the message is parsed. Some points to consider:

- The encapsulating protocol defines the message length, in bytes. This can be used as an aid to parsing the messages;
- The first byte of the message is always message type. Once the type of the message is known, the rest of the message can be parsed from the definitions of the messages.

Example 1 – System Event Message

At 9:30:00.123456789 am, the system sends a *System Event* message which announces a Start of Opening Process event for date April 23, 2017. The version of this interface is 1.0.

System Event Message			
Name	Offset	Value	Hex Value
Message Type	0	"S"	53
Timestamp	1	9:30:00.123456789	1F 1A D6 35 BD 15
Event Code	7	"Q"	51
Current Year	8	2017	07 E1
Current Month	10	4	04
Current Day	11	23	17
Version	12	1	01
Sub-Version	13	0	00

Network byte stream (in hex):

- 53 1F 1A D6 35 BD 15 51 07 E1 04 17 01 00

Example 2 – Complex Strategy Directory Message

At 6:30:00.234567891 am, the system sends an *Options Directory* message describing a strategy having ID 3000000 with the following properties: leg 1: equity option, expiration date 1/20/2017, strike price \$29.10000000, type call option to buy , leg 2: equity option, expiration date 3/20/2017, strike price \$29.10000000, type call option to buy in ratio 1:1.

Complex Strategy Directory Message			
Name	Offset	Value	Hex Value
Message Type	0	"R"	52
Timestamp	1	6:30:00.234567891	15 48 4A AB 48 D3
Strategy Id	7	3000000	00 2D C6 C0
StrategyType	11	"T" = Time Spread	54
Source	12	2	02
Underlying Symbol	13	"OIH"	4F 49 48 20 20 20 20 20 20 20 20 20 20
Number of Legs	26	2	02
Leg 1	>OptionID	27	85393
	> Security Symbol	31	"OIH1"
	> LegID	37	0
	> Expiration Year	38	2017
	> Expiration Month	39	1

Nasdaq ISE Order Combo Feed Specification

	> Expiration Day	40	20	14
	> Explicit Strike Price	41	\$29.1	00 00 00 00 AD 73 13 80
	> Option Type	49	Call	43
	> Side	50	Buy	42
	> Leg Ratio	51	1	00 00 00 01
Leg 2	> OptionID	55	85394	00 01 4D 92
	> Security Symbol	59	"OIH1"	4F 49 48 31 20 20
	> LegID	65	01	01
	> Expiration Year	66	2017	11
	> Expiration Month	67	3	03
	> Expiration Day	68	20	14
	> Explicit Strike Price	69	\$29.1	00 00 00 00 AD 73 13 80
	> Option Type	77	Call	43
	> Side	78	Buy	42
	> Leg Ratio	79	1	00 00 00 01

Network byte stream (in hex):

- 52 15 48 4A AB 48 D3 00 2D C6 C0 54 02 4F 49 48 20 20 20 20 20 20 20 20 20 20 20 20 02 00 01 4D 91 4F 49 48 31 20 20 00 11 01 14 00 00 00 00 AD 73 13 80 43 42 00 00 00 01 00 01 4D 92 4F 49 48 31 20 20 00 11 03 14 00 00 00 00 AD 73 13 80 43 42 00 00 00 01

Example 3 – Strategy Trading Action Message

At 1:51:45.234567891 pm, the system sends a *Trading Action* message indicating that complex strategy with id 3000000 has been halted.

Trading Action Message			
Name	Offset	Value	Hex Value
Message Type	0	"H"	48
Timestamp	1	13:51:45.234567891	2D 63 77 C7 62 D3
Strategy Id	7	3000000	00 2D C6 C0
Current Trading State	11	"H"	48

Network byte stream (in hex):

- 48 2D 63 77 C7 62 D3 00 2D C6 C0 48

Example 4 – Complex Strategy Order on Book Message

At 2:24:38.123123123 pm, the system sends an Complex Strategy Order on Book message indicating that a customer limit order priced at \$1.5300 with 58 contracts has been entered into the system. No owner, giveup or CMTA is displayed for this order.

Order on Book Message			
Name	Offset	Value	Hex Value
Message Type	0	"L"	4C
Timestamp	1	14:24:38.123123123	2F 2E D1 19 B1 B3
Strategy Id	7	3000000	00 2D C6 C0
Order Type	11	"L"	4C

Nasdaq ISE Order Combo Feed Specification

Side	12	"A" (Ask, Offer)	41
Price	13	1.5300	00 00 3B C4
Size	17	58	00 00 00 3A
Exec Flag	21	"N"	4E
Order Capacity	22	"C"	43
Scope	23	"L"	4C
Owner ID	24	" <spaces> "	20 20 20 20 20 20
Giveup	30	" <spaces> "	20 20 20 20 20 20
CMTA	36	" <spaces> "	20 20 20 20 20 20

Network byte stream (in hex):

- 4C 2F 2E D1 19 B1 B3 00 2D C6 C0 4D 41 00 00 3B C4 00 00 00 3A 4E 43 4C 20
20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20

Example 7 – Complex Strategy Auction Message

At 12:25:43.321321321 pm, the system sends an *Auction* message for an option with option ID 853923 and auction ID 11584697 with the following attributes: for a customer limit order, bid side at price \$1.2700, size 10 contracts, no owner, giveup or CMTA specified. It is an update to a Facilitation auction and has 1 response, with a price of \$1.2800, size 2.

Auction Message			
Name	Offset	Value	Hex Value
Message Type	0	"J"	4A
Timestamp	1	12:25:43.321321321	28 B1 9D C5 FF 69
Strategy Id	7	3000000	00 2D C6 C0
Auction Id	11	11584697	00 B0 C4 B9
Order Type	15	"L"	4C
Side	16	"B" (Bid)	42
Price	17	1.2700	00 00 31 9C
Size	21	10	00 00 00 0A
Exec Flag	25	"N"	4E
Order Capacity	26	"C"	43
Scope	27	'L'	4C
Owner ID	28	" <spaces> "	20 20 20 20 20 20
Giveup	34	" <spaces> "	20 20 20 20 20 20
CMTA	40	" <spaces> "	20 20 20 20 20 20
Auction Event	46	"U"	55
Auction Type	47	"F"	46
Number of Responses	48	1	01
Response Price	49	1.2800	00 00 31 9D
Response Size	53	2	00 00 00 02

Network byte stream (in hex):

- [illegible]

Appendix B – Document Revision Control Log

August 23, 2017: ISE Order Combo Feed - Version 1.01

- Adjusting system event enumeration "S" *Start of System Hours* to 3:00 AM

June 13, 2017: ISE Order Combo Feed - Version 1.01

- Adjusting system event enumeration "O" *Start of Messages* to 12:30 AM

May 30, 2017: ISE Order Combo Feed - Version 1.01

- Adding system event enumeration "W" for early close on expiration day of WCO (FX) options

April 26, 2017: ISE Order Combo Feed - Version 1.01

- Adding order capacity enumeration "F" for Firm to Order on Book and Auction messages

April 19, 2017: ISE Order Combo Feed - Version 1.01

- Adding Security Symbol to Complex Strategy Directory Message
- Removing FX Opening System Event Enumeration as FX products will open at 9:30 with other options

April 3, 2017: ISE Order Combo Feed - Version 1.01

- Adding *Scope* field to support Do Not Trade Through visibility to the *Complex Strategy Order* and *Auction Notification* Messages
- Clarifying all complex instrument prices will be signed integers

March 21, 2017: ISE Order Combo Feed - Version 1.01

- Corrected System Event message layout.

March 9, 2017: ISE Order Combo Feed - Version 1.01

- Clarifying negative prices will be represented with a negative integer
- Clarifying *ResponsePrice* of 0 is valid for Exposure Auctions if *ResponseSize* is not 0

January 13, 2017: ISE Order Combo Feed - Version 1.01

- Changing *Start of Currency Opening Process* system even enumeration from "W" to "F"

November 29, 2016: ISE Order Combo Feed - Version 1.0

- Initial specification.

December 13, 2016: ISE Order Combo Feed - Version 1.01

- Extended Order capacity valid values.
- Added text for auction message description.