



Nasdaq ISE Trade Combo Feed Specification

VERSION 1.0.1

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Nasdaq ISE Trade Combo Feed – Version 1.01

Nasdaq ISE Trade Combo Feed

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1. Overview

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

- Complex Strategy Ticker Messages: Displays last trade information along with opening price, cumulative volume, high and low prices for the day.
- Administrative and market event messages including:
 - Complex Strategy Directory messages to be disseminated to relay basic option symbol and contract information for those securities traded on the options market.
 - Strategy Trading action messages to inform market participants when a specific security is halted or released for trading on the options market.

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:

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

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.

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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.	7:00am
"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	4:15:00pm

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	longer generate new executions for options that trade during extended hours.	
"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. 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.</i>	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.

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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. <i>N</i> th leg has <i>LegId</i> = <i>N</i> -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

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	Leg Ratio	22n + 51	4	Integer	Leg Ratio
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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 Ticker Message

The ticker message is used to send real time trade information. The format is as follows:

Ticker Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"t" = Strategy Ticker Message
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 Complex StrategyDirectory Message.
Last Price	11	8	Integer	Most recent price.
Size	19	4	Integer	Last traded quantity.
Volume	23	4	Integer	Total traded quantity.
High	27	8	Integer	High price for the day.
Low	35	8	Integer	Low price for the day.
First	43	8	Integer	Opening price for the day
Trade Condition	51	1	Alpha	Same value as the Trade Condition sent to OPRA for this trade. To obtain a list of Trade Conditions, refer to the NOTES below.

NOTES:

- All prices in this message are in fixed point format with 12 whole number places followed by 8 decimal digits
- The Trade Condition is the same as defined in the OPRA specification: http://www.opradata.com/specs/opra_input_binary_part_spec.pdf. The OPRA Trade Condition is enumerated in the "Message Type" field of the "Equity and Index Last Sale" message (Category "a") in the specification document. The specification has a table of the possible Message Types (Trade Condition) along with a detailed description of each type. Always refer to the www.opradata.com website to ensure the possible Trade Conditions sent out by this feed, which are consistent with the Trade Conditions defined by OPRA

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, since many of the messages are not fixed length by message type. For example, the best bid or ask update message varies in length from 9 to 15 bytes depending on the encoding of the PriceSize data type;
- 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.

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 30000000 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	30000000	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	00 01 4D 91
	> Security Symbol	31	"OIH1"	4F 49 48 31 20 20
	> LegID	37	0	00
	> Expiration Year	38	2017	11
	> Expiration Month	39	1	01
	> 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 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 – Complex Strategy Ticker Message

At 3:58:44.891234567 pm, the system sends a *Ticker* message for strategy id 3000000, last price \$1.1000, size 16, volume 127535, high \$1.8000, low \$0.9200, first \$1.0000.

Ticker Message			
Name	Offset	Value	Hex Value
Message Type	0	"t"	74
Timestamp	1	15:58:44.891234567	34 51 0E B5 31 07
Strategy Id	7	3000000	00 2D C6 C0
Last Price	11	1.10000000	00 00 00 00 06 8E 77 80
Size	19	16	00 00 00 00 10
Volume	23	127535	00 01 F2 2F
High	27	1.80000000	00 00 00 00 0A BA 95 00
Low	35	0.92000000	00 00 00 00 05 7B CF 00
First	43	1.00000000	00 00 00 00 05 F5 E1 00
Trade Condition	51	"<blank>"	20

Network byte stream (in hex):

- 74 34 51 0E B5 31 07 00 2D C6 C0 00 00 00 00 06 8E 77 80 00 00 00 10 00 01 F2 2F 00 00 00 00 0A BA 95 00 00 00 00 00 05 7B CF 00 00 00 00 00 05 F5 E1 00 20

Appendix B – Document Revision Control Log

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

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

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

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

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

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

April 19, 2017: Nasdaq ISE Trade 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 5, 2017: ISE Trade Combo Feed - Version 1.01

- Clarifying all complex instrument prices will be signed integers

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

- Corrected System Event message layout.

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

- Clarifying negative prices will be represented with a negative integer

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

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

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

- Initial specification.