



# Nasdaq ISE Depth Combo Feed Specification

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Nasdaq ISE Depth Combo Quote Feed – Version 1.0

Nasdaq ISE Depth Combo Feed  
Nasdaq ISE Glimpse for Depth Combo Feed

## Table of Contents

<b>1. Overview</b>	<b>3</b>
<b>2. Architecture</b>	<b>4</b>
<b>3. Data Types</b>	<b>4</b>
<b>4. Message Formats</b>	<b>5</b>
<b>4.1. System Event Message</b>	<b>5</b>
<b>4.2. Complex Strategy Directory Message</b>	<b>7</b>
<b>4.3. Strategy Trading Action Message</b>	<b>10</b>
<b>4.4. Strategy Open/Closed Message</b>	<b>11</b>
<b>4.5. <i>Strategy Depth Incremental Message</i></b>	<b>12</b>
<b>4.6. Complex Strategy Ticker Message</b>	<b>14</b>
<b>5. Glimpse for Depth Combo Quote Feed</b>	<b>15</b>
<b>6. Support</b>	<b>16</b>
<b>Appendix A – Strategy Depth Incremental message Examples</b>	<b>17</b>
<b>A.1 – Update Action = New Price Level</b>	<b>17</b>
<b>A.2 – Update Action = Change Price Level</b>	<b>19</b>
<b>A.3 – Update Action = Delete Price Level</b>	<b>20</b>
<b>A.4 – Update Action = Delete From Price Level</b>	<b>21</b>
<b>Appendix B – Sample messages</b>	<b>22</b>
<b>Appendix C – Document Revision Control Log</b>	<b>25</b>

## 1. Overview

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

- Top five price levels of the order book: This feed displays the bids and offers at the top five price levels of the book. All displayable quote and order interest is aggregated into the total quantity. The aggregated quantity of Customer and Professional Customer orders are also displayed at each of the top five price levels of both sides.
- 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:
  - 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.
- A separate connection for obtaining snapshots, called Glimpse, enabling the user to reconnect intra day and be current with the live stream. Connecting to Glimpse intra day obtains a snapshot of all System Events, Option definitions, Option States, and the top five bid and offer price levels for all options configured for this stream. The snapshot of the stream is taken at the point in time when the user connects and logs in to Glimpse. The snapshot is tagged with a sequence number, the point at which one can listen to the live stream.

## 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:

<b>Protocol Option</b>	<b>Number of Outbound Channels</b>
<a href="#">SoupBinTCPv3.00</a>	Multiple output channels, each channel supporting a subset of securities, the range defined by first letter of underlying
<a href="#">MoldUDP64v1.00</a>	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 three basic types of messages:

- System Events
- Administrative Data and Market Events
- Best bid and offer price level updates
- Ticker information

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	9:30:00am

## Nasdaq ISE Depth Combo Feed Specification

	auction process.	
"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. 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.



# Nasdaq ISE Depth 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 <b>NOTE:</b> 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 $LegId = N - 1$ .
	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 Depth Combo Feed Specification

	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

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. Strategy Depth Incremental Message**

This message is used to send information regarding any of the top five price levels of an option's order book. The message may contain multiple repeating items, each of which updates one side of one price level. All repeating items within the message relate to the same option.

##### **Usage**

###### **Update Action – New Price Level**

When a new price level is created in the order book, a Strategy Depth Incremental message is sent with "Update Action" set to "N" (New). This indicates:

- That the new price level is to be inserted at the specified price level.
- All existing rows in the order book at this level or lower are to be pushed down. If there were already five price levels then the last price level should be deleted.
- There is no explicit instruction to delete the bottom price level when inserting a new price level.

The field "Price Level" is used to identify which price level is to be inserted. If it is set to one:

- It is to be inserted at the top, regardless of the prices.
- The subscriber's application should check that there are no prices better than this price level and if they do exist then they should be deleted. This should not happen in normal operation.

###### **Update Action – Change Price Level**

If a Strategy Depth Incremental message is sent with "Update Action" set to "C" (Change), this would indicate:

- A change at the given price level.
- All fields on the specified side at the price level should be updated.

###### **Update Action – Delete Price Level**

If a Strategy Depth Incremental message is sent with "Update Action" set to "D" (Delete), this would indicate:

- The indicated price level is to be deleted.
- All lower (worse) price levels move up.

###### **Update Action – Delete From Price Level**

When a Strategy Depth Incremental message is sent with "Update Action" set to "F" (Delete From), this would indicate:

- All price levels starting at the indicated price level are to be deleted.
- This message can be used to clear the book on one side (Price Level = 1).

Examples of how this message is to be processed is described in an appendix of this specification.

# Nasdaq ISE Depth Combo Feed Specification

Strategy Depth Incremental Message					
Name	Offset	Length	Value	Notes	
Message Type	0	1	Alpha	"K" = Strategy Depth Incremental	
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	
Quote Condition	11	1	Integer	<space> = regular quote/autox eligible "X" = Pre-Open/Halted	
Bid Market Size	12	4	Integer	The aggregate market size on Bid side.	
Ask MarketSize	16	4	Integer	The aggregate market size on Ask side.	
Bid NTT Market Size	20	4	Integer	The aggregate market size on Bid side.	
Ask NTT MarketSize	24	4	Integer	The aggregate market size on Ask side.	
Number of Depth Incrementals	28	1	Integer	Number of times the following 7 fields repeat. If the number of incrementals is N (the value of this field), then the offsets are evaluated "N" times, with values 0 to N-1 inclusive.	
Repeated Number of Depth Incrementals times	Update Action	29 + 23n or 29 + 3n	1	Alpha	'N' = New 'C' = Change 'D' = Delete 'F' = Delete From
	Side	30 + 23n or 30 + 3n	1	Alpha	'B' = Bid 'A' = Offer (Ask)
	Level	31 + 23n or 31 + 3n	1	Integer	The numeric order of the price level, where "1" is the (best) price level. With is feed, this field has a value from 1 to 5 inclusive.
	Price	32 + 23n	4 or 0	Integer	Price level's price (fixed point format with 6 whole number places followed by 4 decimal digits). See <b>NOTE</b> below
	Size	36 + 23n	4 or 0	Integer	Number of aggregated contracts in price level. See <b>NOTE</b> below
	Cust Size	40 + 23n	4 or 0	Integer	Aggregated Customer Professional quantity in the price level. See <b>NOTE</b> below
	ProCust Size	44 + 23n	4 or 0	Integer	Aggregated Customer quantity in the price level. See <b>NOTE</b> below
	NTTSize	48 + 23n	4 or 0	Integer	Limit size that can't be traded through See <b>NOTE</b> below

**NOTE:** The Price, Size, Cust Size and ProCust Size fields are present for "New" and "Change" Update Actions only. If Update Action is "Delete" or "Delete From", these fields are absent. Therefore, each repeating Update section of the message will be 23 (Add, Change) or 3 (Delete, Delete From) bytes long.

#### 4.6. 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](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](http://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. Glimpse for Depth Combo Quote Feed

Depth Combo QuoteFeed has a mechanism for out-of-band recovery: Glimpse for Depth Combo Quote Feed. Connecting to Glimpse intra day obtains a snapshot of System Events, Strategy definitions, Strategy Trading states, and the top five price levels in all order books streamed by this feed connection. The snapshot of the live stream is taken at the point in time when the user connects and logs in to Glimpse. The snapshot is tagged with a sequence number, the point which one can listen to the live stream.

The Glimpse connection is available in the SoupBinTCPv3.00 protocol.

In addition to all the previously described messages, the Glimpse connection uses an additional message; the Snapshot Message. This message serves two purposes:

- To denote the end of the snapshot;
- To tag the snapshot to a sequence number of the live stream. The sequence number in the message reflects the Depth Combo Quote Feed sequence number at the time the Glimpse spin was requested (logged in to the Soup connection).

Snapshot Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	Alpha	"M" = End of Snapshot Message
Sequence Number	1	20	Numeric	Depth Combo Quote Feed sequence number when the Glimpse snapshot was taken. To keep the stream current, process the Depth Combo Quote Feed messages beginning with the message sequence number in this snapshot message. Note: While Depth Combo Quote Feed is a binary data feed, the SoupBINTCP protocol uses ASCII characters for the sequence number in the logon request message format.



## 6. Support

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

## Appendix A – Strategy Depth Incremental message Examples

Strategy Depth Incremental Messages are used to send changes to any of the top five price levels. The message contains multiple repeating items, each of which updates one side of one price level. All repeating items in one message relate to the same option.

Refer to “*Strategy Depth Incremental Message*” sections in this document for the format of this message.

The following examples explain how the update action field is used to maintain the view of the book.

### **A.1 – Update Action = New Price Level**

When a new price level is created in the order book, a Depth Incremental message is sent with “Update Action” set to “N” (New). This indicates:

- That the new price level is to be inserted at the specified price level.
- All existing rows in the order book at this level or lower are to be pushed down. If there were already five price levels then the last price level should be deleted.
- There is no explicit instruction to delete the bottom price level when inserting a new price level.

The field “Price Level” is used to identify which price level is to be inserted. If it is set to one:

- It is to be inserted at the top, regardless of the prices.
- The subscriber’s application should check that there are no prices better than this price level and if they do exist then they should be deleted. This should not happen in normal operation.



# Nasdaq ISE Depth Combo Feed Specification

4	0.92	60	0	0	0
5	0.90	50	0	0	0

### A.2 – Update Action = Change Price Level

If a Strategy Depth Incremental message is sent with "Update Action" set to "C" (Change), this would indicate:

- A change at the given price level.
- All fields on the specified side at the price level should be updated.

**Example 2:** An order at the top price level is partially executed. For this example the book's initial state is "**Book State 2**" above. The partial execution reduces the contracts from 20 to 10.

Partial execution of 10 contracts in top price level (10 contracts remaining).

Depth Incremental			
Name	Offset	Value	Hex Value
Message Type	0	"K"	4B
Timestamp	1	9:45:12.123456789	1F EF 2D A5 5D 15
Strategy Id	7	3000000	00 2D C6 C0
Quote Condition	11	<space>	20
Bid Market Size	12	0	00 00 00 00
Ask Market Size	16	0	00 00 00 00
Bid NTT Market Size	20	0	00 00 00 00
Ask NTT Market Size	24	0	00 00 00 00
Number of Depth Incrementals	28	1	01
Update Action	29	"C" (Change)	43
Side	30	"B" (Bid)	42
Level	31	1	01
Price	32	0.98	00 00 00 62
Size	36	10 (new size)	00 00 00 0A
Cust Size	40	0	00 00 00 00
ProCust Size	44	10 (new size)	00 00 00 0A
NTT Size	48	0	00 00 00 00

Network byte stream of Depth Incremental message (in hex):

- 4B 1F EF 2D A5 5D 15 00 2D C6 C0 20 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 43 42 01 00 00 00 62 00 00 00 0A 00 00 00 00 00 00 00 0A 00 00 00 00

**Book State 3:** State of the book after the order is executed

Strategy Id= 3000000										
Bid (0 Market Orders)						Ask (0 Market Orders)				
NTT Bid (0 Market Orders)						NTT Ask (0 Market Orders)				
Level	Price	Size	Cust	ProCust	NTT Size	Price	Size	Cust	ProCust	NTT Size
1	0.98	10	0	10	0	1.00	50	0	0	0
2	0.97	30	15	0	0					
3	0.94	80	0	10	0					
4	0.92	60	0	0	0					
5	0.90	50	0	0	0					

**A.3 – Update Action = Delete Price Level**

If a Depth Incremental message is sent with “Update Action” set to “D” (Delete), this would indicate:

- The indicated price level is to be deleted.
- All lower (worse) price levels move up.

**Example 3:** The remaining quantity at the top price level of the bid side is deleted. For this example the book’s initial state is “**Book State 3**” above.

Deletion of the top price level on the bid side (note that there no prices or sizes associated with the Delete action).

A new price level 0.89(1) is added at level 5.

Strategy Depth Incremental Message			
Name	Offset	Value	Hex Value
Message Type	0	“K”	4B
Timestamp	1	10:07:25.345678912	21 25 97 E2 06 40
Strategy Id	7	3000000	00 2D C6 C0
Quote Condition	11	<space>	20
Bid Market Size	12	0	00 00 00 00
Ask Market Size	16	0	00 00 00 00
Bid NTT Market Size	20	0	00 00 00 00
Ask NTT Market Size	24	0	00 00 00 00
Number of Depth Incrementals	28	2	02
Update Action	29	“D” (Change)	44
Side	30	“B” (Bid)	42
Level	31	1	01
Update Action	32	“N” (New)	4E
Side	33	“B” (Bid)	42
Level	34	1	01
Price	35	0.89	00 00 22 C4
Size	39	1	00 00 00 01
Cust Size	43	0	00 00 00 00
ProCust Size	47	1	00 00 00 01
NTT Size	51	0	00 00 00 00

Network byte stream of Depth Incremental message (in hex):

- 4B 21 25 97 E2 06 40 00 2D C6 C0 20 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 44 42 01 4E 42 01 00 00 22 C4 00 00 00 01 00 00 00 00 00 00 00 01 00 00 00 00

**Book State 4:** State of the book after the top bid price level is deleted and a new price level appears at level 5

Strategy Id= 3000000										
Bid (0 Market Orders)						Ask (0 Market Orders)				
NTT Bid (0 Market Orders)						NTT Ask (0 Market Orders)				
Level	Price	Size	Cust	ProCust	NTT Size	Price	Size	Cust	ProCust	NTT Size
1	0.97	30	15	0	0	1.00	50	0	0	0
2	0.94	80	0	10	0					
3	0.92	60	0	0	0					
4	0.90	50	0	0	0					

5	0.89	1	0	1	0
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#### A.4 – Update Action = Delete From Price Level

When a Depth Incremental message is sent with “Update Action” set to “F” (Delete From), this would indicate:

- All price levels starting at the indicated price level are to be deleted.
- This message can be used to clear the book on one side (Price Level = 1).

**Example 4:** Clear the book. For this example the book’s initial state is “**Book State 4**” above.

A Depth Incremental message is sent to clear the book (note that there no prices or sizes associated with the Delete From action).

Depth Incremental – Short Form Message			
Name	Offset	Value	Hex Value
Message Type	0	“K”	4B
Timestamp	1	10:15:58.456789123	21 9D 0F B0 38 83
Strategy Id	7	3000000	00 2D C6 C0
Quote Condition	11	<space>	20
Bid Market Size	12	0	00 00 00 00
Ask Market Size	16	0	00 00 00 00
Bid NTT Market Size	20	0	00 00 00 00
Ask NTT Market Size	24	0	00 00 00 00
Number of Depth Incrementals	28	2	01
Update Action	29	“F” (Delete From)	46
Side	30	“B” (Bid)	42
Level	31	1 (bid side_)	01
Update Action	32	“F” (Delete From)	46
Side	33	“A” (Offer, Ask)	41
Level	34	1 (ask side)	01

Network byte stream of Depth Incremental message (in hex):

- 4B 21 9D 0F B0 38 83 00 2D C6 C0 20 02 46 42 01 46 41 01

The book is now cleared.

## Appendix B – 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 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

## Nasdaq ISE Depth Combo Feed Specification

				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 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 – Strategy Open/Closed Message**

At 9:30:00.345678912 am, the system sends a *Strategy Open/Closed* message indicating that strategy with id 3000000 is open for auto execution.

Security Open/Closed Message			
Name	Offset	Value	Hex Value
Message Type	0	"O"	4F



## Nasdaq ISE Depth Combo Feed Specification

Timestamp	1	9:30:00.345678912	1F 1A E3 74 94 40
Strategy Id	7	3000000	00 2D C6 C0
Open State	11	"Y"	59

Network byte stream (in hex):

- 4F 1F 1A E3 74 94 40 00 2D C6 C0 59

### **Example 5 – 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 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

### **Example 6 – Snapshot Message**

The last message of the Glimpse snapshot is a *Snapshot* message to complete the snapshot. In this example the final message of the snapshot indicates that the snapshot is complete and the recipient should process data on the live stream starting at Sequence Number 123456789 (i.e. the snapshot is a picture of the live stream from sequence 1 to 123456788 inclusive).

Snapshot Message			
Name	Offset	Value	Hex Value
Message Type	0	"M"	4D
Sequence Number	1	"00000000000123456789" (zero-padded ASCII number)	30 30 30 30 30 30 30 30 30 30 30 30 31 32 33 34 35 36 37 38 39

Network byte stream (in hex):

- 4D 30 30 30 30 30 30 30 30 30 30 30 30 31 32 33 34 35 36 37 38 39

## Appendix C – Document Revision Control Log

### August 23, 2017: ISE Depth Combo Feed - Version 1.0

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

### June 13, 2017: ISE Depth Combo Feed - Version 1.0

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

### May 30, 2017: ISE Depth Combo Feed - Version 1.0

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

### April 19, 2017: Nasdaq ISE Trade Combo Feed - Version 1.0

- 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: Nasdaq ISE Trade Combo Feed - Version 1.0

- Clarifying all complex instrument prices will be signed integers

### March 21, 2017: ISE Trade Combo Feed - Version 1.0

- Corrected System Event message layout.

### March 9, 2017: ISE Depth Combo Quote Feed - Version 1.0

- Changing *Quote Condition* enumeration to "X" for pre-open/halt in Strategy Depth Incremental Message
- Clarifying negative prices will be represented with a negative integer

### January 13, 2017: ISE Depth Combo Quote Feed - Version 1.0

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

### November 29, 2016: ISE Depth Combo Quote Feed - Version 1.0

- Initial specification.