



BOXSM
E X C H A N G E



BOXSM
O P T I O N S

High Speed Vendor Feed

SOLA HSVF Multicast Specifications Guide for BOX

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Section 1 Introduction

The BOX Exchange (referred to in this guide as BOX) High Speed Vendor Feed (HSVF) User Datagram Protocol (UDP) Multicast is comprised of Trades, Quotes, Market Depth, Strategies, Summaries and other Statistics. Information is provided on all BOX listings.

The UDP provides the HSVF Recipient a faster dissemination flow of messages. HSVF Recipients are to use UDP lines to obtain the Market Data Dissemination flow from HSVF Repeaters; each UDP line contains a specific Market, aMarket Depth, and a protocol version.

The current Protocol version is C7.

1.1 Objective

The main objective of the Specifications Guide is to provide information to HSVF Recipient for the functional design of their application intended to receive the HSVF feed.

1.2 Scope

This Specifications Guide defines the communications interface and message formats for the high-speed transmission which broadcasts real-time trading and statistical information from BOX.

1.3 BOX Contact

Market Operations Center
Toll Free: 1-866-768-8845
boxmoc@boxoptions.com

Section 2 Trading Overview

All messages which comprise the HSVF are transmitted to the user on a dedicated line. Each message type is fixed in format. Re-transmission of any data is available on the transmission line.

2.1 Interface

BOX broadcasts the HSVF using both the UDP and TCP/IP broadcast interface as follows:

- Real-time Market Data Dissemination Flow is broadcasted according to a defined timeline using the UDP interface to allow Recipients to connect.
- The TCP interface retransmission can be used by Recipients to perform queries of missing messages of the UDP Feed.

2.2 HSVF Schedule on a Typical Day

During a typical day, all messages that comprise the BOX are transmitted following the schedule illustrated below.

Recipients can connect at 1:15 a.m., which is when the broadcast starts, and the dictionary is sent at 1:30 a.m. Until the opening of the market, information regarding the instrument keys, summaries, quote/market depth is broadcasted. The connection ends at 6:00 pm after the market closure.

Table 1: HSVF Schedule – Information Broadcasted at Each Trading Phase

Trading Phases/ Information Broadcasted		Other Messages	Instrument Keys	Summary	Quote/Market Depth
Start of connection	1:15 a.m.	X			
Dictionary	1:30 a.m.	X	X	X	X
Pre-opening	7:00 a.m.	X	X		X
Opening/Trading	9:30 a.m.	X	X		X
Closing on Equity Options	4:00 p.m.	X			
Closing on ETF and Index Options	4:15 p.m.	X			

Trading Phases/ Information Broadcasted		Other Messages	Instrument Keys	Summary	Quote/Market Depth
End of day Summaries	4:40 p.m.	X	X	X	
End of day for HSVF	4:40 p.m.	X			
End of connection	6:00 p.m.	X			

2.3 Transmission Format

A UDP packet can contain multiple HSVF messages. The UDP packet is built as follows:

UDP Packet			
HSVF Message 1	HSVF Message 2	HSVF Message N

A packet can have a maximum of 1000 characters.

Each message is framed by an STX and an ETX character. The format used is:

HSVF Message			
STX	Message Header	Message Body	ETX

STX and ETX indicate the beginning and the end of the record being transmitted.

2.4 Data Format

Each message consists of a standard message header followed by the message body, which varies in format according to the message type.

The standard message header attached to all messages has the following format.

Table 2: Message Header

Field Name	Length	Type	Definition / Validation Rules
Sequence Number	9	N	<p>Each message is assigned a sequence number starting at '000000001' every day and incremented by 1 for each message sent.</p> <p>Note: Message sequencing is per Line. There is no validation of message sequence for incoming messages.</p> <p>The sequence numbers will range from 000000001 to 999999999 (decimal, ASCII).</p> <p>Retransmitted messages will contain the original sequence numbers.</p> <p>Sequence Number greater than 999999999 (decimal, ASCII) will be reset back and re-start at Sequence Number 000000000 and increment by 1 for each new message sent.</p>
Message Type	2	X	Identifies the type of message being sent. Format is left-aligned, right 'blank' filled (if necessary).

2.5 TCP Retransmission Capability

Action	Particulars
<p>Normal UDP Connection (Refer to Section 2.2, 'Table 1: for the Start of connection time)</p> <p>Table 1:</p>	<ol style="list-style-type: none"> 1. Recipient connects to specific IP address and UDP port; 12 slices are available, each representing a subset of BOX traded instruments; on each slice, 4 different Feeds are available (See the <i>BOX Connectivity Guide</i>). 2. Exchange sends data to Recipient starting with the next available message. The first message of the day has sequence number 000000001. Message type received depends on the feed selected.

<p>Retransmission (From a specific Sequence number of a specific interval of messages)</p>	<ol style="list-style-type: none"> 1. Recipient connects to specific IP address and TCP port. 2. Recipient sends a Login message (Message Type LI). BOX sends back a Login Acknowledgement message (Message Type KI). 3. Recipient sends a Retransmission Request message (Message Type RT) or a Retransmission Request Extended message (Message Type RX) specifying the feed id and the message range to retransmit. 4. BOX sends a Retransmission Begins message (Message Type RB). 5. BOX sends all requested messages. 6. BOX sends a Retransmission Ends (Message Type RE) message indicating that all requested messages have been retransmitted. <p>Note: For more information Retransmission Request message (Message Type RT) and Retransmission Request Extended message (Message Type RX), refer to Section 2.5.1 – Retransmission Before and After the Billion Message-Mark.</p>
<p>Disconnection</p>	<ol style="list-style-type: none"> 1. Recipient disconnects from the UDP port. 2. Recipient sends a Logout message (Message Type LO) to terminate their TCP Retransmission connection.

2.5.1 Retransmission Before and After the Billion Message-Mark

When requesting a retransmission of messages, the following will happen depending on the number of messages sent for that day as specified by the examples below:

Total Number of Messages Less Than 1 Billion

Retransmission Request (Message Type RT)		
Start	End	Outcome
200,000,000	300,000,000	Messages sequences from 200,000,000 to 300,000,000 will be re-transmitted
400,000,000	350,000,000	The Retransmission Request message (Message Type RT) is rejected because the billion message-mark has not been surpassed, and the End Sequence Number must be greater than the Start Sequence Number

Total Number of Messages Greater Than 1 Billion

Retransmission Request (Message Type RT)		
Start	End	Outcome
200,000,000	300,000,000	Since the number of messages has passed a billion, the End Sequence will be interpreted as (1B + End Sequence = 1.3B) In this case, HSVF will return message sequences from 200,000,000 to 999,999,999, roll-over to 000,000,000, and continue to 300,000,000, with the last 300,000,000 messages corresponding to messages after the 1 billion message-mark
999,999,900	100,000,000	Since the number of messages has passed a billion, the End Sequence will be interpreted as (1B + End Sequence = 1.1B) In this case, HSVF will return message sequences from 999,999,900 to 999,999-999, roll-over to 000,000,000, and continue to 100,000,000, with the last 100,000,000 messages corresponding to messages after the 1 billion message-mark
999,999,999	999,999,999	Similarly, in this case, HSVF will return message sequences from 999-999-999, roll-over to 000-000-000, and continue to 999-999,999, with the last 999,999,999 messages corresponding to messages after the billion message-mark

Limitations for Retransmission Request (Message Type RT)

The highest start sequence is limited to 999,999,999. Therefore, it is not possible to request a range of messages starting above 1 billion. For instance, to obtain messages from 1.2 billion to 1.3 billion, the Recipient would need to request 999,999,999 to 300,000,000.

Recipients may use the Retransmission Request Extended message (Message Type RX) to facilitate retransmission requests of messages past the 1-billion message mark. The Retransmission Request Extended message (Message Type RX) allows up to sequence number 9,999,999,999 by using 10 digits in the Start and End fields.

Extended Retransmission Request (Message Type RX)		
Start	End	Outcome
1,000,000	9,999,999,999	Message sequence from 1,000,000 to 9,999,999,999 will be re-transmitted
1,000,000	100	An error will be returned to indicate end message number smaller than start message number

2.5.2 Retransmission of Dictionary and Top of the Book Snapshot

Retransmission Request (Message Type RT)/ Retransmission Request Extended (Message Type RX)			
Start	End	Line	Outcome
1 000 000	2 000 000	D	Dictionary messages (Message Type J, JS) between message number 1,000,000 to 2,000,000 will be retransmitted
N/A	N/A	T	Retransmit Line Status Request to be sent for all lines followed by Top of the Book Snapshot (Message Type F, FS) will be transmitted for all Options and Complex Instruments as well as instruments created intraday

Note: Recipients may use the Retransmission Request message (Message Type RT) or the Retransmission Request Extended message (Message Type RX) to request a retransmission of the Dictionary messages or a Top of the Book Snapshot.

Section 3 Messages

3.1 Message Types

This section lists a summary of all HSVF message types.

Note: HSVF users must have the ability to skip and ignore any message that is not defined below. Because new message types may be defined in future versions of the protocol, anyone using this version of the HSVF protocol must be able to avoid impact of undefined new message types they may receive.

3.1.1 Technical Messages

Message Type	Description	Reference in This Guide
TCP Retransmission Messages		
ER	Error Message	3.3.1
KI	Login Acknowledgement	3.3.2
KO	Logout Acknowledgement	3.3.3
LI	Login	3.3.4
LO	Logout	3.3.5
RB	Retransmission Begins	3.3.6
RE	Retransmission Ends	3.3.7
RL	Retransmission Request Line Status	3.3.10
RT	Retransmission Request	3.3.8
RX	Retransmission Request Extended	3.3.9
Other Messages		
U	End of Transmission	3.3.11
V	Circuit Assurance	3.3.12

Message Type	Description	Reference in This Guide
Z	System Time Stamp	3.3.13

3.1.2 Business Messages

Message Type	Description	Reference in This Guide
Trade Messages		
C	Option Trade	3.4.1
CS	Complex Order Instrument Trade	3.4.2
Request for Quotes Messages (RFQ)		
D	Option Request for Quote (RFQ)	3.4.3
Quote Messages		
F	Option Quote	3.4.4
FS	Complex Order	3.4.5
Market Depth Messages		
H	Option Market Depth	3.4.9
HS	Complex Order Market Depth	3.4.10
Trade Cancellation Messages		
I	Option Trade Cancellation	3.4.11
IS	Complex Order Trade Cancellation	3.4.12
Instrument Keys Messages		
J	Option Instrument Keys	3.4.13
JS	Complex Order Instrument Keys	3.4.14

Message Type	Description	Reference in This Guide
Summary Messages		
N	Option Summary	3.4.17
NS	Complex Order Summary	3.4.18
Beginning of Summary Messages		
Q	Beginning of Options Summary	3.4.19
QS	Beginning of Complex Order Summary	3.4.22
Group Messages		
GC	Group Opening Time	3.4.6
GR	Group Status	3.4.7
GS	Complex Order Group Status	3.4.8
Other Messages		
S	End of Sales	3.4.23
Improvement Messages		
M	Start of Auction on Option	3.4.15
MS	Start of Auction on Complex Instruments	3.4.16
O	Start of Exposition on Option	3.4.19
OS	Start of Exposition on Complex Order	3.4.20
T	End of Auction or Exposition on Option	3.4.24
TS	End of Auction or Exposition on Complex Order	3.4.25

3.2 Conventions

In the following tables, the **Length (Bytes)** column represents the length in bytes of the described field, and the Data Type column will be represented by the following characters: **A** = Alphabetic, **N** = Numeric, **X** = Alphanumeric.

- Whenever a field is indicated as being blank, it contains the ASCII space character (hex 20).
- **Alphabetic fields – A:** letters (A to Z) left justified, blank filled unless stated otherwise.
- **Numeric fields – N:** numbers (0 to 9), right justified, zero filled with a possibility to see a ' ' (blank; ASCII character hex 20).
- **Alphanumeric fields – X:** all characters possible (numbers, letters, others), right justified, zero filled, with the exception of the following fields, which are left justified, and blank filled:
 - Root Symbol (Options related messages)
 - Instrument External Code
 - Symbol (Strategy related messages)
- The Filler field can have any format; numeric, alphanumeric, ASCII space character (hex 20).

3.2.1 Instrument Description – 20 Bytes

The Instrument is identified when needed by the following fields.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Root Symbol	6	X	Symbol for the Option series <u>FLEX Symbology:</u> Root Symbol is prefixed by one of the following: <ul style="list-style-type: none"> • '1' (American FLEX Option, Physical-Settled) • '2' (European FLEX Option, Physical-Settled) • '3' (American FLEX Option, Cash-Settled) • '4' (European FLEX Option, Cash-Settled)
Expiry Month Code	1	A	Delivery month for the contract and identifies the Option as a Call or a Put
Filler	1		Filler (Filler data type will vary according to the message)
Strike Price	7	N	Strike Price of the option in full
Strike Price Fraction Indicator	1	X	Defines the number of decimal places or fraction positions
Expiry Year	2	N	Last 2 digits of the option expiry year
Expiry Day	2	N	Delivery day for the contract

3.3 Technical Messages

3.3.1 Message Type ER: Error Message – 95 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
ErrorCode	4	N	Send back when a LI, LO or RT, RX message receive is invalid or rejected
ErrorMsg	80	X	Error Message

3.3.2 Message Type KI: Login Acknowledgement (TCP Retransmission Mode) – 11 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

3.3.3 Message Type KO: Logout Acknowledgement (TCP Retransmission Mode) – 11 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

3.3.4 Message Type LI: Login (TCP Retransmission Mode) – 51 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
User	16	X	Not validated by BOX (future use)
Password	16	X	Not validated by BOX (future use)
TimeStamp	6	N	Format HHMMSS
Protocol Version	2	X	HSVF Protocol version (C7)

3.3.5 Message Type LO: Logout (TCP Retransmission Mode) – 11 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

3.3.6 Message Type RB: Retransmission Begin (TCP Retransmission Mode) – 11 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

3.3.7 Message Type RE: Retransmission End (TCP Retransmission Mode) – 11 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

3.3.8 Message Type RL: Retransmission Request Line Status – Up to 120 Bytes

This message will be sent on a request to retransmit Line T of the Top of the Book Snapshot which will indicate the last message number sent for each line configured for the current slice.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules	
Message Header	11	X	Refer to Message Header	
Number of Lines	1	N	Number of lines 1 to 9	
Up to 9 times	Line Name	2	X	Specific line name on which market is disseminated. Refer to Network Access Specifications for more information regarding available lines.
	Last Message Sent	10	N	Last sent message number for that line on 10 digits

3.3.9 Message Type RT: Retransmission Request – 31 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Line	2	X	Specific line name on which market is disseminated Refer to Network Access Specifications for more information regarding available lines.
Start	9	N	Starting message number
End	9	N	Ending message number

Note: Start and End fields are not used on Line T of the Top of the Book Snapshot.

3.3.10 Message Type RX: Retransmission Request Extended – 33 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Line	2	X	Specific line name on which market is disseminated. Refer to the Network Connectivity Guide for BOX Options for more information regarding available lines.
Start	10	N	Starting message number
End	10	N	Ending message number

Note: Start and End fields are not used on Line T of the Top of the Book Snapshot.

3.3.11 Message Type U: End of Transmission – 18 Bytes

This message will be sent to indicate that the day's transmission is complete. After the day's transmission is complete (refer to Section 2.2, 'Table 1: for the End of connection time), no HSVF messages will be transmitted. Transmission will resume the following day at the Start of connection time (Refer to Section 2.2, 'Table 1: for the Start of connection time).

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Time	6	N	Time at which the message is transmitted HHMMSS

3.3.12 Message Type V: Circuit Assurance – 17 Bytes

This message is sent out if no messages are sent by BOX every second after the broadcast has started (i.e. at the termination of the Test Loop message). This will be an assurance that the line is up.

This message will continue to be sent until the End of Transmission message (Message Type U) is sent. The Circuit Assurance message will repeat the sequence number of the previous record transmitted, except if it is a retransmit message, (i.e. it will not increase the sequence number).

Note: These messages will rarely be sent; at the beginning or at the end of the day.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Time	6	N	Time at which the message is transmitted (HHMMSS)

3.3.13 Message Type Z: System Time Stamp – 20 Bytes

This message is sent out every second and contains the time stamp when it was originally transmitted by the trading engine. Broadcast starts during the pre-opening and continues until the end of day disconnection of all clients (refer to Section 2.2, 'Table 1: for the End of connection time). The sequence number in the message header is incremented by 1 for each message sent.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Trading Engine Time Stamp	9	N	Time stamp generated by the SOLA® Trading Engine (HHMMSSmmm)

3.4 Business Messages

3.4.1 Message Type C: Option Trade – 76 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the trade occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Volume	8	N	Number of contracts for the trade Refer to Indicator Code
Trade Price	6	N	Price at which the transaction took place
Trade Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Net Change Sign +/-	1	X	For the net change field
Net Change	6	N	Net change = last trade price - previous close
Net Change Fraction Indicator	1	X	Fraction indicator for the net change price Refer to Price and Fraction Indicator Code
OPRA Trade Marker	1	X	Contains the OPRA Trade Marker for both Non-FLEX Single-Leg Floor (QOO) and FLEX Single-Leg Floor (FOO) Other types of trades will be ' ' blank
Filler	5	X	Filler
Timestamp	6	N	Time of transaction (HHMMSS)
Filler	7	N	Filler (will be set to zeros)
Filler	1	X	Filler
Price Indicator Marker	1	A	Identifies the type of transaction Refer to Price Indicator Markers

3.4.2 Message Type CS: Strategy Trade – 79 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the trade occurred Q by default
Instrument Description	30	X	Complex Order Instrument symbol. The individual legs are defined in Message Type JS.
Volume	8	N	Total number of contracts traded Refer to Indicator Code
Trade Price Sign +/-	1	X	For Trade Price field (sign)
Trade Price	6	N	Price at which the transaction took place
Trade Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Net Change Sign	1	X	+ or - sign
Net Change	6	N	Net change = last trade price – previous close
Net Change Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
OPRA Trade Marker	1	X	Contains the OPRA Trade Marker for both Non-FLEX Complex/Multi-Leg Floor (QOO) and FLEX Complex/Multi-Leg Floor (FOO) trades. Other types of trades will be ' ' (blank)
Filler	5	X	Filler
Timestamp	6	N	Time of transaction HHMMSS
Price Indicator Marker	1	X	Identifies type of transaction Refer to Price Indicator Markers

3.4.3 Message Type D: Option Request for Quote (RFQ) – 40 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Requested Size	8	X	Size of the market requested Refer to Indicator Code

3.4.4 Message Type F: Option Quote – 68 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Bid Price	6	X	Bid price for the option series
Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Bid Size	5	X	Number of option contracts represented by the Bid Price If size is greater than 99999, the 5th character becomes an exponent Refer to Indicator Code
Ask Price	6	X	Ask price for the option series
Ask Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Ask Size	5	X	Number of option contracts represented by the Ask Price If size is greater than 99999, the 5th character becomes an exponent Refer to Indicator Code
Filler	1	X	Filler

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Instrument Status Marker	1	A	Indicates instrument status Refer to Status Markers
Public Customer Bid Size	5	X	Number of option contracts represented by Public Customer orders on the bid side Refer to Indicator Code
Public Customer Ask Size	5	X	Number of option contracts represented by Public Customer orders on the ask side Refer to Indicator Code

3.4.5 Message Type FS: Complex Order Quote – 79 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Instrument Description	30	X	Complex Order Instrument symbol The legs (underlying) are defined in Message Type JS
Bid Price Sign	1	X	+ or - sign
Bid Price	6	X	Bid price for the option series
Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Bid Size	5	X	Number of futures contracts represented by the Bid Price If size is greater than 99999, the 5th character becomes an exponent Refer to Indicator Code
Ask Price sign	1	X	+ or - sign
Ask Price	6	X	Ask price for the option series
Ask Price Fraction Indicator	1	N	Defines number of decimal places or fraction positions. Refer to Price and Fraction Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Ask Size	5	X	The number of option contracts represented by the Ask Price If size is greater than 99999, the 5th character becomes an exponent Refer to Indicator Code
Instrument Status Marker	1	X	Indicates instrument status Refer to Status Markers
Public Customer Bid Size	5	X	Number of option contracts represented by Public Customer orders on the bid side Refer to Indicator Code
Public Customer Ask Size	5	X	Number of option contracts represented by Public Customer orders on the ask side Refer to Indicator Code

3.4.6 Message Type GC: Group Opening Time – 25 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Root Symbol	6	X	Root symbol of the instrument group
Group Status	1	A	Value is O
Schedule Time	6	N	Opening time of the instrument group (HHMMSS format)

3.4.7 Message Type GR: Group Status – 19 Bytes

This message will be sent when a group of trading instruments enters a new status. Refer to BOX Website (<http://www.boxexchange.com/>) for a complete list of the trading hours schedule for BOX products

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Root Symbol	6	X	Root symbol of the instrument group
Group Status	1	A	Group status of the trading instrument Refer to Status Markers

3.4.8 Message Type GS: Group Status (Strategies) – 15 Bytes

This message will be sent when a Strategy group of trading instruments enters a new status. All strategies have a predetermined group that can be found in the Strategy Instrument Keys message (Message Type JS).

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Group of the Complex Order Instrument	2	X	Group of the Complex Order Instrument
Group Status	1	A	Group status of the trading instrument Refer to Status Markers

3.4.9 Message Type H: Option Market Depth – Up to 208 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the quote occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Instrument Status Marker	1	A	Instrument status Refer to Status Markers

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules	
Number of Levels	1	N	Number of levels for the trading instrument 1 to 6	
Up to 6 times	Level of Market Depth	1	X	Level of market depth 1 to 6 = Regular market depth A = Implied prices P = Public Customer volume
	Bid Price	6	X	Bid price for the option series For Implied, it represents the best (1 st limit) indicative implied bid price
	Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
	Bid Size	5	X	Number of option contracts represented by the Bid Price For Implied, represents the indicative quantity at the best (1 st limit) implied bid price If size is greater than 99999, the 5 th character becomes an exponent
	Number of Bid Orders	2	X	Number of bid orders, present at a given moment, in the order book For Implied, represents the indicative number of implied bid orders making up the implied bid size at that implied bid price If greater than 99-> the 2 nd character becomes an exponent Refer to Indicator Code
	Ask Price	6	X	Ask price for the option series For Implied, represents the best (1 st limit) indicative implied ask price
	Ask Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
	Ask Size	5	X	Number of option contracts represented by the Ask Price If size is greater than 99999, the 5 th character becomes an exponent Refer to Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Number of Ask Orders	2	X	Number of Ask Orders, present at a given moment, in the order book If greater than 99-> the 2 nd character becomes an exponent Refer to Indicator Code

3.4.10 Message Type HS: Complex Order Market Depth – Up to 230 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules	
Message Header	11	X	Refer to Message Header	
Exchange ID	1	A	Exchange on which the quote occurred Q by default	
Instrument Description	30	X	Complex Order Instrument symbol. Individual legs are defined in Message Type JS.	
Instrument Status Marker	1	A	Instrument status Refer to Status Markers	
Number of Levels	1	N	Number of levels for the trading instrument 1 - 6	
Up to 6 times	Level of Market Depth	1	X	Level of market depth 1 to 6 = regular market depth A = Implied prices P = Public Customer volume
	Bid Price Sign	1	X	+ or - sign
	Bid Price	6	X	Bid price for option series
	Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
	Bid Size	5	X	Number of strategy units represented by the Bid Price For Implied, it represents the indicative quantity at the best (1 st limit) implied bid price If size is greater than 99999, the 5 th character becomes an exponent Refer to Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Number of Bid Orders	2	X	Number of Bid Orders, present at a given moment, in the order book If greater than 99-> the 2 nd character becomes an exponent Refer to Indicator Code
Ask Price Sign	1	X	+ or - sign
Ask Price	6	X	Ask price for the option series
Ask Price Fraction Indicator	1	N	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Ask Size	5	X	The number of strategy units represented by the Ask Price If size is greater than 99999, the 5 th character becomes an exponent Refer to Indicator Code
Number of Ask Orders	2	X	Number of Ask Orders, present at a given moment, in the order book If greater than 99-> the 2 nd character becomes an exponent Refer to Indicator Code

3.4.11 Message Type I: Option Trade Cancellation – 68 Bytes

A cancellation will reduce the total volume, value and transactions by the amount of the cancelled trade. A cancellation message is followed by an Option Summary message (message type N) which will reflect the corrected market.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the trade occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Volume	8	N	Number of contracts being cancelled Refer to Indicator Code
Trade Price	6	N	Price at which the transaction took place

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Trade Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
OPRA Trade Marker	1	X	Contains the OPRA Trade Marker for trade cancellation of both Non-FLEX Single-Leg Floor (QOO) and FLEX Single-Leg Floor (FOO) Other types of trades will be ' ' blank
Filler	5		Filler
Timestamp	6	N	Time of cancellation transaction HHMMSS
Filler	7	N	Open Interest will no longer be populated. This field is now a Filler (set to zeros)
Filler	1		Filler
Price Indicator Marker	1	A	Identifies the type of transaction Refer to Price Indicator Markers

3.4.12 Message Type IS: Strategy Trade Cancellation – 71 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the trade occurred Q by default
Instrument Description	30	X	Complex Order Instrument symbol. The individual legs are defined in Message Type JS.
Volume	8	X	Number of contracts being cancelled Refer to Indicator Code
Trade Price sign	1	X	+ or - sign
Trade Price	6	N	Represent the price at which the transaction took place
Trade Price Fraction Indicator	1	X	Defines the number of decimal places or fraction positions Refer to Price and Fraction Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
OPRA Trade Marker	1	X	Contains the OPRA Trade Marker for trade cancellation of both Non-FLEX Complex/Multi-Leg Floor (QOO) and FLEX Complex/Multi-Leg Floor (FOO) trades. Other types of trades will be ' ' (blank)
Filler	5		Filler
Timestamp	6	N	Time of cancellation transaction HHMMSS
Price Indicator Marker	1	A	Identifies the type of transaction. Refer to Price Indicator Markers

3.4.13 Message Type J: Option Instrument Keys – 119 Bytes

Option Instrument Keys messages (Message Type J) will be sent:

- At the beginning and the end of the day with associate Summary message
- Anytime during the day if a threshold limit was changed for an instrument

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Exchange on which the trade occurred Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Strike Price Currency	3	X	Currency used for the Option Strike Price Refer to Strike Price Currency Codes
Maximum Number of Contracts per Order	6	N	Maximum authorized number of contracts per order Refer to Indicator Code
Minimum Number of Contracts per Order	6	N	Minimum authorized number of contracts per order Refer to Indicator Code
Maximum Threshold Price	6	N	Maximum threshold price authorized for an option contract Refer to Indicator Code
Maximum Threshold Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Minimum Threshold Price	6	N	Minimum threshold price authorized for an option contract Refer to Indicator Code
Minimum Threshold Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Tick Increment	6	X	Precision with which the price of an order limit can be expressed Refer to Tick Table
Tick Increment Fraction Indicator	1	N	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Option Type	1	N	Type of option A = American E = European
Market Flow Indicator	2	X	Defines the type of instruments Refer to Market Feed Indicators
Group Instrument	2	X	Group of the instrument
Instrument	4	X	Instrument
Instrument External Code	30	X	External identifier used by traders when entering an order
Option Marker	2	A	Refer to Markers for Options
Underlying Symbol Root	10	X	Symbol root for the underlying security

3.4.14 Message Type JS: Complex Order Instrument Keys – Up to 747 Bytes

Complex Order Instrument Keys messages (Message Type JS) will be sent

- at the beginning and the end of the day with its associated summary message and
- when a Complex Order instrument is created during trading hours.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Instrument Description	30	X	Complex Order Instrument symbol. The individual legs are defined in this message.
Expiry Year	2	N	Expiration year of the Complex Instrument leg with the closest expiration (format is YY)
Delivery Month	1	A	Delivery month code of the Complex Instrument leg with the closest expiration Refer to Month Codes
Expiry Day	2	N	Expiry day of the Complex Instrument leg with the closest expiration
Max Number of Contracts per Order	6	X	Maximum authorized number of contracts per order Refer to Indicator Code
Min Number of Contracts per Order	6	X	Minimum authorized number of contracts per order Refer to Indicator Code
Max Threshold Price Sign	1	X	+ or - sign
Max Threshold Price	6	X	Maximum threshold price authorized for an option contract Refer to Indicator Code
Max Threshold Price Fraction Indicator	1	X	Number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Min Threshold Price Sign	1	X	+ or - sign
Min Threshold Price	6	X	Minimum threshold price authorized for an option contract Refer to Indicator Code
Min Threshold Price Fraction Indicator	1	X	Number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Tick Increment	6	X	Precision used when expressing the price of an order limit Refer to Tick Table (Price Fraction Rules)
Tick Increment Fraction Indicator	1	N	Defines the number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Filler	2	X	Filler
Group	2	X	Group of the instrument

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules	
Instrument	4	X	Code identifying the instrument	
Instrument External Code	30	X	External identifier used by traders when entering an order	
Complex Order Instrument Allow Implied	1	A	Complex Order Instrument support of Implied Price. N = No C = Continuous Implied S = Snapshot Implied	
Number of Legs	2	N	Number of legs in the Complex Order Instrument 2 to 16	
From 2 to 16 times	Leg Ratio Sign	1	X	+ = Buy the leg - = Sell the leg
	Leg Ratio	8	N	Quantity (bought or sold) 1 to 99999999
	Leg Symbol	30	X	Instrument External Code of the leg

3.4.15 Message Type M – Start of Auction on Option – 84 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Improvement Phase Sequential Number	6	N	Indicates the number of an Improvement Phase. Sequential number unique per Instrument and per trading day
Initial Order Price	6	N	Indicates the price of the Initial Order
Initial Order Price Fraction Indicator	1	X	Refer to Price and Fraction Indicator Code
Initial Order Quantity	8	X	Indicates the quantity of the Initial Order

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Initial Order Side	1	A	Indicates the dealer side of the Initial Order B = Buy S = Sell
Improvement Phase Expiry Time	8	A	Indicates the expiry time of the Improvement Phase (value is in HHMMSSCC)
Improvement Process Expiry Duration	4	N	Indicates the expiry duration of the Improvement Phase (value is in SSCC)
Minimum Quantity for Improvement Order	8	X	Enables market makers to know the minimum quantity for an Improvement Order during the Improvement Phase
Percentage Assured to Initial Order	8	X	Indicates the minimum guaranteed percentage quantity given to the Initiating Recipient Ex: 00040.00 stands for 40.00 %
Auction Type	1	X	Indicating the auction type G = Regular PIP B = Solicitation C = Facilitation
Filler	1	A	Default value space

3.4.16 Message Type MS: Start of Auction on Complex Order – 94 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Instrument Description	30	X	Complex Order Instrument symbol. The individual legs are defined in Message Type JS.
Improvement Phase Sequential Number	6	N	Indicates the number of an Improvement Phase. Sequential number unique per Instrument and per trading day
Initial Order Price Sign	1	X	+ or - sign
Initial Order Price	6	N	Indicates the price of the Initial Order

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Initial Order Price Fraction Indicator	1	X	Refer to Indicator Code
Initial Order Quantity	8	X	Indicates the quantity of the Initial Order
Initial Order Side	1	A	Indicates the dealer side of the Initial Order B = Buy S = Sell
Improvement Phase Expiry Time	8	A	Indicates the expiry time of the Improvement Phase (value is in HHMMSSCC)
Improvement Process Expiry Duration	4	N	Indicates the expiry duration of the Improvement Phase (value is in SSCC)
Minimum Quantity for Improvement Order	8	X	Enables market makers to know the minimum quantity for an Improvement Order during the Improvement Phase
Percentage Assured to Initial Order	8	X	Indicates the minimum guaranteed percentage quantity given to the Initiating Recipient Ex: 00040.00 stands for 40.00 %
Auction Type	1	X	Indicating the auction type G = PIP B = Solicitation C = Facilitation

3.4.17 Message Type N: Option Summary – 127 Bytes

Option Summary messages (Message Type N) are sent:

- At the beginning of the day. The first Option Summary message (Message Type N) sent defines the instruments traded on that day and contain the closing/reference price in the Last Price field. All other price fields contain zero values. Any other message sent during the day contain details of the last trade.
- Any Option Summary message (Message Type N) sent after the Beginning of Options Summary message (Message Type Q) contains the list of trading instruments for the day (sent prior to market opening) or the summaries after the close of the market for BOX Options (refer to [Section 2.2](#), 'Table 1:').
- After a trade cancellation if extreme values have been changed (Open/High/Low/Last).
- At the end of the day with relevant data such as the Open/High/Low/Last/Volume
- During the day when new instruments are added.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Identifies the exchange for the option Q by default
Instrument Description	20	X	Option Instrument symbol
Bid Price	6	N	Closing or most recent bid price
Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Bid Size	5	X	Number of contracts represented by the Bid Price If size is greater than 99999, the 5 th character becomes an exponent Refer to Indicator Code
Ask Price	6	N	Closing or most recent ask price
Ask Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Ask Size	5	X	Number of contracts represented by the Ask Price If size is greater than 99999, the 5 th character becomes an exponent Refer to Indicator Code
Last Price	6	N	Closing or most recent trade price
Last Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Filler	7	N	Open Interest will no longer be populated. This field is now a Filler of 0 (zeros)
Tick	1	X	Determined by the difference between last price and the previous different trade price '+' = uptick '-' = downtick
Volume	8	N	Total number of contracts traded or current volume if sent after a cancellation
Net Change Sign +/-	1	X	For net change field

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Net Change	6	N	Net change = last trade price - previous close Net change will be zero if the option did not trade on the last business day or did not trade today
Net Change Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Open Price	6	N	Price of the first trade of the day
Open Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
High Price	6	N	Highest trade price of the day or current high price if sent after a cancellation
High Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Low Price	6	N	Lowest trade price of the day or current low price if sent after a cancellation
Low Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Option Marker	2	A	Refer to Markers for Options
Underlying Symbol	10	X	Symbol root for the underlying security
Reference Price	6	N	Reference Price of the Option
Reference Price Fraction Indicator	1	X	Number of decimal places or fraction positions Refer to Price and Fraction Indicator Code

3.4.18 Message Type NS: Complex Order Summary – 116 Bytes

Complex Order Summary messages (Message Type NS) will be sent:

- At the beginning of the day. The first Complex Order Summary message (Message Type NS) sent defines the instruments traded on that day and contain the closing price in the Last Price field. All other price fields contain zero values. Any other message sent during the day contain details of the last trade.
- Any Complex Order Summary message (Message Type NS) sent after the Beginning of Complex Order Summary message (Message Type QS) contains the list of trading Complex Order instruments for the day (sent prior to market opening)

or the summaries after the close of the market for BOX Options (refer to [Section 2.2](#), 'Table 1:).

- After a trade cancellation if extreme values have been changed (Open/High/Low/Last).
- At the end of the day with relevant data such as the Open/High/Low/Last/Volume
- During the day when new instruments are added.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Identification of the exchange for the future Q by default
Instrument Description	30	X	Complex Order Instrument symbol
Bid Price sign	1	X	+ or - sign
Bid Price	6	N	Closing bid or most recent bid
Bid Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Bid Size	5	X	Number of contracts represented by the Bid Price. Refer to Indicator Code
Ask Price Sign	1	X	+ or - sign
Ask Price	6	N	Closing ask or most recent ask
Ask Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Ask Size	5	X	Number of contracts represented by the Ask Price.
Last Price Sign +/-	1	X	For the Last Price field
Last Price	6	N	Last Trade Price for the contract or the current price if sent after a cancellation
Last Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Open Price Sign	1	X	+ or - sign
Open Price	6	N	Price of the first trade of the day
Open Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
High Price Sign	1	X	+ or - sign
High Price	6	N	Highest trade price of the day or current high price if sent after a cancellation
High Price Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Low Price Sign	1	X	+ or - sign
Low Price	6	N	Lowest Trade Price of the day or current low price if sent after a cancellation
Low Price Fraction Indicator	1	X	Defines number of decimal or fraction positions Refer to Price and Fraction Indicator Code
Net Change Sign	1	X	+ or - sign
Net Change	6	N	Net change = last trade price - previous close Net change will be zero if the option did not trade on the last business day or did not trade today.
Net Change Fraction Indicator	1	X	Defines number of decimal places or fraction positions Refer to Price and Fraction Indicator Code
Volume	8	N	Total number of contracts traded or current volume if sent after cancellation Refer to Indicator Code

3.4.19 Message Type O: Start of Exposition on Option – 80 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Instrument Description	20	X	Refer to Instrument Description – 20 Bytes
Order Side	1	X	The Must-Be-Filled side ('B' for Buy, 'S' for Sell)
Type of Order	1	X	Type of limit entered P: Exposed Order

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Limit Entered for an Order	6	X	For a buy order, represents the highest price that the order issuer is willing to pay For a sell order, represents the lowest price at which the order issuer is willing to sell
Limit Fraction Indicator	1	X	Refer to Price and Fraction Indicator Code
Order Quantity	8	X	Refer to Indicator Code
Order Sequence Number	6	N	Allocated by the trading engine at each valid order entry
Filler	6	N	Filler (set to zeros)
Clearing Account	1	X	Indicates the account type for which an order was entered using the clearing house member's account typology. 6 = Public Customer 7 = Broker Dealer 8 = Market Maker T = Professional Customer W = Broker Dealer cleared as Customer X = Away Market Maker
Filler	1	A	Default value space
End of the Exposition	8	N	HHMMSSCC "
Auction Type	1	X	Indicates the auction type F = Exposed Order
FirmId	4	X	Indicates the FirmId
CMTA	4	X	Indicates the CMTA

3.4.20 Message Type OS: Start of Exposition on Complex Order – 91 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Instrument Description	30	X	Complex Order Instrument symbol. The individual legs are defined in Message Type JS.
Order Side	1	X	The Must-Be-Filled side ('B' for Buy, 'S' for Sell)
Type of Order	1	X	Type of limit entered P = Exposed Order
Limit Entered for an Order sign	1	X	+ or - sign
Limit Entered for an Order	6	N	For a buy order, represents the highest price that the order issuer is willing to pay For a sell order, represents the lowest price at which the order issuer is willing to sell
Limit Fraction Indicator	1	X	Refer to Price and Fraction Indicator Code
Order Quantity	8	X	Refer to Indicator Code
Order Sequence Number	6	N	Allocated by the trading engine at each valid order entry
Filler	6	N	Filler (set to zeros)
Type of Clearing Account for Member that Owns the Order	1	X	Indicates the account type for which an order was entered using the clearing house member's account typology. 6 = Public Customer 7 = Broker Dealer 8 = Market Maker T = Professional Customer W = Broker Dealer cleared as Customer X = Away Market Maker
Filler	1	A	Default value space
End of the Exposition	8	N	HHMMSSCC "
Auction Type	1	X	Indicating the auction type F = Exposed Order
FirmId	4	X	Indicates the FirmId
CMTA	4	X	Indicates the CMTA

3.4.21 Message Type Q: Beginning of Options Summary – 12 Bytes

This message indicates that the beginning and the end of day Options Summary messages (message type N) are to follow. Other messages can be interspersed with the summary messages.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Identifies the exchange Q by default

3.4.22 Message Type QS: Beginning of Complex Order Summary – 12 Bytes

This message indicates that the beginning or the end of day Complex Order Summary messages (message type NS) are to follow. Other messages can be interspersed with the summary messages.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Identifies the exchange Q by default

3.4.23 Message Type S: End of Sales – 18 Bytes

This message will be sent when there is no more trading activity to be transmitted. This will occur after the closing of the market.

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Reserved	1	A	Reserved for future use
Time	6	N	Time at which the message is transmitted (HHMMSS)

3.4.24 Message Type T: Start of Exposition on Complex Order on Option – 47 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
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Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Instrument Description	20	X	Options Instrument symbol
Deletion Type	1	N	1 = Deletion of a precise order 3 = Deletion of all orders
Order Sequence Number	6	N	Allocated by the trading engine at each valid order entry
Order Side	1	X	B = Buy S = Sell <Blank> = all
Improvement Phase Sequential Number	6	N	Number of an Improvement Phase. Not relevant when the message refers to an Exposed Order. Sequential number unique per Instrument and per trading day
Auction Type	1	X	Auction type or if the message is related to an exposed order. G = Regular PIP B = Solicitation C = Facilitation F = Exposed Order

3.4.25 Message Type TS: End of Auction or Exposition on Complex Instruments – 57 Bytes

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Message Header	11	X	Refer to Message Header
Exchange ID	1	A	Q by default
Instrument Description	30	X	Complex Order Instrument symbol
Deletion Type	1	N	1 = Deletion of a precise order 3 = Deletion of all orders
Order Sequence Number	6	N	Allocated by the trading engine at each valid order entry

Field Name	Length (Bytes)	Data Type	Definition/Validation Rules
Order Side	1	X	B = Buy S = Sell <Blank> = all
Improvement Phase Sequential Number	6	N	Number of an Improvement Phase. Not relevant when the message refers to an Exposed Order. Sequential number unique per Instrument and per trading day
Auction Type	1	X	Auction type or if the message is related to an exposed order G = PIP B = Solicitation C = Facilitation F = Exposed Order

Section 4 Fields Description

4.1 Price and Fraction Indicator Code

The Price field is a six-character numeric field.

Note: The exception to the above is for MarketOnOpen (MOO) orders, where the Price field contains '000OUV' with a Fraction Indicator Code of '0'. '000OUV' stands for 'Opening Price' as calculated by the trading engine during the pre-opening phase.

The delineation of the whole number portion of the price and the decimal/fractional portion of the price will be defined by the Fraction Indicator (FI) Code. Furthermore, the FI indicates the manner in which the price is displayed visually. This implies that all zero fractions may be sent in order to maintain consistency in the visual alignment of the implied decimal places. The all zero fraction is replaced by spaces for visual display.

No truncation of price data is permitted by this Specification, except for high-order zeros for products that trade in fractions of 1/10,000,000 or smaller. Should such a truncation be necessary, then it is implicit from the FI, which is 7, 8, or 9.

All fractions are expressed as fractions or in decimals as defined by the price fraction rules of the particular product (section [Tick Table](#)). The **Fraction Indicator Code** is one alphanumeric character as shown.

Fraction	Code	Fraction	Code
1/1	0	-1/1	A
1/10	1	-1/10	B
1/100	2	-1/100	C
1/1,000	3	-1/1,000	D
1/10,000	4	-1/10,000	E
1/100,000	5	-1/100,000	F
1/1,000,000	6	-1/1,000,000	G
1/10,000,000	7		
1/100,000,000	8		
1/1,000,000,000	9		

4.1.1 Tick Table (Price Fraction Rules)

Price Range	Tick Increment Field value	Fraction Indicator (F.I.)	Minimum Tick increment
Order Price below \$3.00	0000T1	2	\$0.05
Order Price equal or above \$3.00	0000T1	2	\$0.10
All PIP, Facilitation and Solicitation orders, at any price	0000T1	2	\$0.01

4.2 Markers for Options

First Letter (Currency or Type of Market)	
Marker	Description
B	Trading in British Pound
C	Trading in Canadian Dollar
D	Danish Krone
E	Trading in Swiss Franc
F	Trading in Euro
U	Trading in US Dollar
Y	Trading in Japanese Yen
Second Letter (Type of Options)	
Marker	Description
Blank	Regular Options

4.3 Status Markers

Status		Used In	
Marker	Description	Group Messages	Instrument Messages
Y	Pre-opening phase	X	X
O	Opening phase	X	X
T	Opened for Trading	X	X
F	Forbidden phase	X	X
H	Trading Halted	X	X
R	Reserved phase (goes into a state as pre-opening where orders can be sent, modified, or canceled)		X
S	Suspended phase (goes into a state as pre-opening where orders can be sent, modified, or cancelled)		X
Z	Frozen		X
A	Surveillance Intervention phase (Consultation phase)	X	X
C	Closed	X	X
B	Beginning of day inquiries	X	X
BLANK	If not used		

4.4 Price Indicator Markers

Price Indicator		Will Impact The ...				
Marker	Description	Opening Price	High Price	Low Price	Last Price	Volume
A	As-Of trades					X
C	Trades performed at the end of a PIP allocation phase	X	X	X	X	X
L	Late trade (Transaction is being reported late and is out of sequence)					X
O	Trades performed during the opening	X	X	X	X	X
S	Reference price (volume field zero-filled)					
W	Trades resulting from the transmission of an ISO Inbound order	X	X	X	X	X
X	Trades performed when the market is crossed					X
G	Contingent Trade, price of the trade was not controlled against the NBBO	X	X	X	X	X
I	Trade involving an implied order or Leg Trade of a Complex Order instrument	X	X	X	X	X
P	Trade done on a Complex Order Instrument					X
BLANK	Actual transaction took place	X	X	X	X	X

4.5 Indicator Code

This indicator code is used for Bid/Ask Size and Volume.

Indicator Code	Description (The Size of the Bid/Ask Field is in ...)	
C	100	(Hundreds)
D	1,000	(Thousands)
E	10,000	(Ten-Thousands)
F	100,000	(Hundred-Thousands)
G	1,000,000	(Millions)
H	10,000,000	(Ten-Millions)
I	100,000,000	(Hundred-Millions)
J	1,000,000,000	(Billions)

Example

Data	Message Sent	Recipient Should Display...
Bid size of 120575	Size field will indicate 1205C	120500
Volume of 258,487,797	Volume will indicate 2584877C	258,487,700

4.6 Strike Price Currency Codes

Currency	
Code	Description
USD	US \$
CAD	Canadian \$
Blank	Not provided

4.7 Month Codes for Options

Call Options		
A – January	E – May	I – September
B – February	F – June	J – October
C – March	G – July	K – November
D – April	H – August	L – December
Put Options		
M – January	Q – May	U – September
N – February	R – June	V – October
O – March	S – July	W – November
P – April	T – August	X – December

4.8 Complex Order Instrument (Strategy) Month Code

The rule for determining the Month Code of a Complex Order Instrument in the JS – Complex Order Instrument is determined from the closest expiry leg(s) as follows:

- If the closest expiry leg(s) have the same option type (i.e. either all legs are Call Options or all legs are Put Options), then the Strategy Month Code is the corresponding month code of any of the leg as defined in the above table (section 4.7)
- If the closest expiry legs have different option type (i.e. some leg(s) are Call Options and the other leg(s) are Put Options), then the Strategy Month Code is chosen as the month code of the Call Option Leg as defined in the above table (section 4.7)

4.9 Market Feed Indicators

First Letter	Type of Instrument	Second Letter	Type of Underlying
O	Options	E X	Index Equities or ETF
L	Long Term	E	Equities or ETF
F	FLEX Option	E	Equities or ETF

4.10 OPRA Trade Marker

The following OPRA Trade Markers will be disseminated in the messages C, CS, I, and IS and apply to both Non-FLEX and FLEX Options and Complex/Multi-Leg Instruments.

Marker	Description
e	Single-Leg Floor Trade
i	Complex/Multi-Leg Floor Trade
m	Complex/Multi-Leg Floor Trade against Single-Leg
A	Regular or Complex and Multi-Leg Floor Trade Cancellation
' ' (blank)	For all other types of trades and trade cancelled

Document History

Version	Date (mm/dd/yyyy)	Change Description
1.0	03/17/2015	First release of HSVF UDP Multicast Specifications.
1.1	06/12/2015	Section 2.6- Addition of Notes
1.2	12/20/2016	Sections 3.4.23 and 3.4.24 Updated O and OS messages: added 2 fields (FirmId and CMTA) (Protocol version C6)
1.3	01/10/2017	Section 3.4.6: Update of Message GC (added ScheduleTime field) Grouped field descriptions contained in sections 4, 5, 6 under Section 4- Fields Description.
	07/26/2018	Section 3.4.14 Update of Message JS Section 3.4.17 Update of Message NS
	09/20/2018	<ul style="list-style-type: none"> • Protocol version C7 • Section 3.2.1: Strike Price Code replaced by filler • Section 3.3.8: Update of Message Type RT • Section 3.4.6: Update of Message Type GC • Section 3.4.21: Update of Message Type M • Sections 3.4.25 and 3.4.26: Update of Messages T and TS • Sections 3.4.2, 3.4.5, 3.4.9, 3.4.10, 3.4.12, 3.4.14, 3.4.22, 3.4.24 (Messages CS, FS, H, HS, IS, JS, MS, OS): Update of Instrument Description field • Section 4.9 Option Price Strike Codes removed
1.4	06/29/2020	This document version has been rolled-back. Please refer to Version 1.5 below. <ul style="list-style-type: none"> • Protocol Version C8 • Updated section 4.4 Price Indicator Markets
1.5	02/02/2021	<ul style="list-style-type: none"> • Roll-back of Protocol C8 • As of this version, HSVF latest protocol is C7 • Sequence Number roll-over 1 billion messages (Table 2 – Message Header) • Note on Retransmission after 1 billion message sequence (section 3.3.8) • Added new section 4.8 – Complex Order (Strategy) Instrument Month Code
1.6	03/12/2021	<ul style="list-style-type: none"> • Added Section 2.5.1 - Retransmission before and after the billion-message mark
1.7	06/06/2022	<ul style="list-style-type: none"> • Section 3.4.14 – Message Type JS – Complex Order Instrument Keys - Support of 16 legs

Version	Date (mm/dd/yyyy)	Change Description
1.8	10/17/2023	<ul style="list-style-type: none"> • Section 3.2.1 – Instrument Description <ul style="list-style-type: none"> ○ Added FLEX Symbology for American and European FLEX Options, Physical-Settled • Section 4.9 – Market Feed Indicators <ul style="list-style-type: none"> ○ Added new value 'F' as 1st letter of Market Feed Indicator to indicate a FLEX Option
1.9	02/07/2024	<ul style="list-style-type: none"> • New Retransmission features: <ul style="list-style-type: none"> ○ Updated Section 2.5 Retransmission Capability ○ Added section 2.5.2- Retransmission of Dictionary and Top of the Book Snapshot ○ Updated Section 3.1.1 – Technical Messages ○ Updated Section 3.3.8 - Message Type RT ○ Added section 3.3.9 - Message Type RX ○ Added section 3.3.10 - Message Type RL • OPRA Trade Marker for Floor Trades added in the following: <ul style="list-style-type: none"> ○ Section 3.4.1 – Message Type C – Option Trade ○ Section 3.4.2 – Message Type CS – Strategy Trade ○ Section 3.4.11 – Message Type I – Option Trade Cancellation ○ Section 3.4.12 – Message Type IS – Strategy Trade Cancellation • Open Interest from OCC will no longer be disseminated by BOX. The field is converted to a filler (zero-filled) in the following section: <ul style="list-style-type: none"> ○ Section 3.4.1 – Message Type C – Option Trade ○ Section 3.4.11 – Message Type I – Option Trade Cancellation ○ Section 3.4.16 – Message Type N – Option Summary ○ Table 1 - Removed Open Interest dissemination in HSVF Feed Schedule
2.0	09/18/2024	<ul style="list-style-type: none"> • Section 3.2.1 – Instrument Description Added FLEX Symbology for American and European FLEX Options, Cash-Settled

Version	Date (mm/dd/yyyy)	Change Description
2.1	12/09/2025	<ul style="list-style-type: none"> • Section 2.2 – HSVF Schedule on a Typical Day <ul style="list-style-type: none"> ○ Updated the time for the End of connection • Section 3.1.2 – Business Messages <ul style="list-style-type: none"> ○ Removed Message Type L ○ Update the message name for Message Types: M, MS, O, OS, T, TS • Section 3.4 – Business Messages <ul style="list-style-type: none"> ○ Reordered messages alphabetically by Message Type (some heading numbers where changed) ○ Removed section on obsoleted Message Type L: Bulletins (was section 3.4.15) ○ Section 3.4.19 – Message Type O: Start of Exposition on Option <ul style="list-style-type: none"> ▪ Updated message name ▪ Changed unused Improvement Phase Sequential Number field to Filler. ○ Section 3.4.20 – Message Type OS: Start of an Exposition on Complex Order <ul style="list-style-type: none"> ▪ Updated message name ▪ Changed unused Improvement Phase Sequential Number field to Filler. ○ Section 3.4.24 – Message Type T: Start of an Exposition on Complex Order on Option <ul style="list-style-type: none"> ▪ Updated message name ▪ Updated Deletion field to remove the now obsolete option 2 (Deletion of all previous orders in the specified side) ○ Section 3.4.25 – Message Type TS: End of Auction or Exposition on Complex Instruments <ul style="list-style-type: none"> ▪ Updated message name ▪ Updated Deletion field to remove the now obsolete option 2 (Deletion of all previous orders in the specified side) • Section 4.2 – Marker for Options <ul style="list-style-type: none"> ○ Removed unsupported currency markers • Section 4.3 – Status Markers <ul style="list-style-type: none"> ○ Removed obsolete markers: B, Z • Section 4.4 – Price Indicator Markers <ul style="list-style-type: none"> ○ Removed obsolete marker: S • Section 4.6 – Strike Price Currency Codes <ul style="list-style-type: none"> ○ Removed unsupported currency codes • Section 4.9 – Market Feed Indicators <ul style="list-style-type: none"> ○ Modified description in Type of Underlying for indicators: ○ Removed obsolete indicator: L