# BOX Binary Market Data Feed Specifications

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# 1 Introduction

The BOX Binary Market Data Feed broadcasts real-time trading information (trades, quotes, market depth, strategies) and other statistical information for BOX Exchange LLC ("BOX") listings.

## 1.1 Objective

The objective of the BOX Binary Market Data Feed specifications document is to provide BOX Market Participants and Data Recipients[1] with functional design information.

## 1.2 Scope

This document defines the communications interface and message formats.

## 1.3 Audience

This document is intended for the business and technical teams.

## 1.4 Related Documents

- Network Connectivity Guide

## 1.5 BOX Contact

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

[1] As used within this Specification Guide, the term "Data Recipient" shall mean a Person that receives Market Data from the Exchange or an authorized Third-Party Distributor pursuant to a Market Data Agreement.

# 2 Binary Market Data Feed

## 2.1 Overview

The Binary Market Data Feed has the following features:

- A numeric "Product ID" is used to represent any Option[2] or Complex[3] Order and is used in all business messages ins. The **ProductID** is the **unique key** for a given instrument across all trading slices of the BOX trading system.
- Binary numeric fields of 2 bytes (Short) and 4 bytes (Long) are used to represent quantity fields. Most messages related to market depth and top of the book updates will use the short version to be more compact and achieve low latency. For simplicity, trade, auction, exposition related messages as well as all Complex Order related messages are only offered in the longer version.
- Similarly, two price formats are offered: a short-unsigned price (2 bytes with 2 implied decimal places) and a long-signed price (8 bytes with 4 implied decimal places). Most messages utilize the short version of the price for smaller message footprint. All Complex Order related messages will use the long-signed price version.
- Top of Book (referred as a 2-sided Quote) update is optimized to send only a 1-sided Quote with the side (bid or ask) which has changed. A 2-sided Quote update message will be sent out when both sides (bid and ask) have changed. To further ensure low latency and lower bandwidth utilization, the 1-sided and 2-sided Top of Book messages are also offered in a short version for Options instruments.
- Similar to Quote updates, the Market Depth updates for Options will be offered in short (compact price and quantity fields), or long version (normal price and quantity fields)
- For both top of book and market depth messages, Public Customer Interest will be identified when present at the best level of price (bid and/or ask). Additionally for top of book, Implied price present will be identified if present at the top of book (bid and/or ask).
- Binary Market Data Feed messages are delivered within a Binary Block which has the maximum User Datagram Protocol ("UDP") Packet size of 1,500 bytes. A given UDP Packet will contain only one Binary Block which in turn can contain multiple messages to ensure high throughput. Message sequence number, size of the block and size of each message are available to ensure data integrity of the transmitted binary block.
- The Binary Market Data Feed is offered with redundant multicast "A" and "B" feeds, with both feeds sending out the same messages and sequence numbers within their

[2] As used within this Specification Guide, the term "Option" shall mean the purchase or sale of one options series in a given underlying security.
[3] As used within this Specification Guide, the term "Complex" shall mean the simultaneous purchase and/or sale of two or more different options series in the same underlying security.

respective Multicast Lines. The B feed is redundant in case of hardware or network failure of the A Feed.

- The A and B Feeds offer 4 Multicast Lines:
  - Line ‘1’ for Top of Book feed
  - Line ‘5’ for Market Depth of the 5 best limits
  - Line ‘C’ for Complex Order feed
  - Line ‘P’ for Auctions
- In case of messages lost from the Multicast Lines, Data Recipients can request a re-transmission of those messages over a Transmission Control Protocol (“TCP”)-Internet Protocol (“IP”) by specifying the Multicast Line and the desired range of Message Sequences to be retransmitted.
- Furthermore, Data Recipients can request a re-transmission of all products dictionary at any time without having to read dictionary messages from beginning of the day.
- Binary Market Data Feed retransmission service also offers a Snapshot of the Top of Book and a Snapshot of the full Market Depth of all products (Options and Complex Orders Instruments) which can be requested anytime during the normal trading hours. Additionally, a Line Status message is sent to indicate the latest (or most recent) message sequence number of each line.
- There are no Start and End of Day Summary messages.

## 2.2 Binary Market Data Feed Trading Day Schedule

Messages are transmitted following the schedule illustrated below.

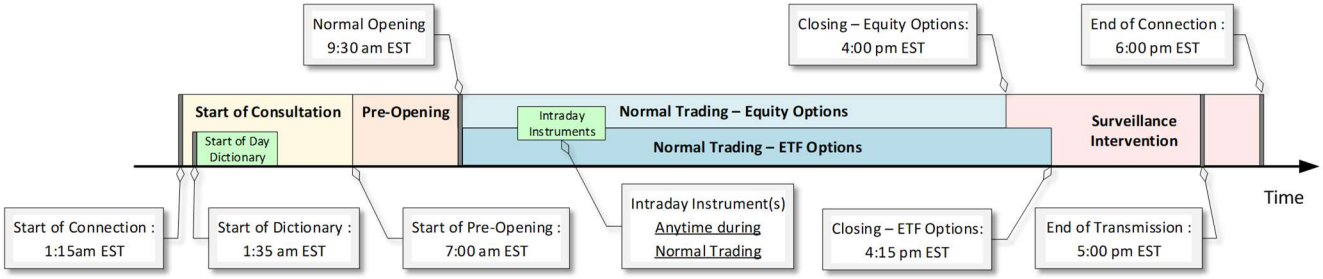


**Figure 1 – Binary Market Data Feed Trading Day Schedule**

- Data Recipients can connect at 1:15 a.m. (EST), the start of broadcasting. The Start of Day (or Initial) Dictionary is sent at 1:35 a.m. (EST).
- Heartbeat messages are sent during the Start of Consultation period when there are no business messages being sent.
- Pre-Opening of all Options Groups is scheduled at 7:00 a.m. (EST), whereby Data Recipients are expected to receive an Options Opening Price message when a Theoretical Opening Price is generated.
- Opening at 9:30 a.m. (EST) is followed by Normal Trading period where Data Recipients are expected to receive all types of business messages including periodic Heartbeats. During Normal Trading, Data Recipients should expect to receive Intraday Instruments anytime.
- Market Close is at 4:00 p.m. (EST) for Equity Options, and 4:15 p.m. (EST) for certain ETF Options, after which a Surveillance Intervention period starts. In this period until End of Transmission, Data Recipients may receive trade cancel and new trades due to Market Operations cancelling trades followed by trade corrections.
- End of Transmission is signalled at 5:00 p.m. (EST), and End of Connection is at 6:00 p.m. (EST) where all Data Recipients are disconnected.
- There are no Start and End of Day summaries.

### 2.2.1 Half-day Trading

For Half-day Trading days, Closing Time for Equity Options is 1:00 p.m. (EST), and Closing Time of certain ETF Options is 1:15 p.m. (EST) followed by Surveillance Intervention after market close.

All other times (Start of Connection, Start of Dictionary, Start of Pre-Opening, and End of Transmission, End of Connection) are the same.

## 2.3 Data Types

In the following tables, the “Data Type” column indicates the field’s data format using a number of bytes (enclosed in brackets).

| Data Type | Range in numeric value |
|---|---|
| **X(N)** | Alphanumeric – All characters (letters, numbers and others such as space)<br>Right justified, zero filled, with the exception of the following fields, which are left justified, and blank filled:<br>• Class Symbol e.g. ‘AAPL1 ‘ (6 bytes long)<br>• Underlying Symbol ‘AAPL ‘ (10 bytes long)<br>• Complex Order Symbol ‘AAPL_IMCO_1234AB ‘ (30 bytes) |
| **B(N)** | Represents an **Unsigned Binary** number where (N) is the number of bytes.<br>• B(2) from (0 to 65,535)<br>• B(4) from (0 to 4,294,967,295)<br>**Codification:** Little-Endian |
| **SB(N)** | Represents a **Signed Binary number** from N is number of bytes<br>• SB(2) from (-32,768 to +32,767) decimal<br>• SB(4) from (-2,147,483,648 to +2,147,483,647) decimal<br>**Codification:** Little-Endian |
| **P(N,M)** | Represents an **Unsigned Binary Price** field where N is the number of bytes with an implied number of decimal places M<br>Example:<br>• P(2,2) from (0.00 to +655.35) in decimal<br>**Codification**: Little-Endian |
| **SP(N,M)** | Represents a **Signed Binary Price** field where N is the number of bytes with an implied number of decimal places M<br>Example:<br>• SP(8,4) from (- 922,337,203,685,477.5808 to + 922,337,203,685,477.5807) in decimal<br>**Codification**: Little-Endian |
| **F(N)** | Filler field of N bytes will be zero filled (0x00).<br>Reserved for future use. |
| **BF(N)** | Bit field of N bytes. |

## 2.4 Message Delivery

All messages from the Multicast feed and the TCP-Retransmit feed are delivered within Binary Blocks.

- Each Binary Block indicates the total number of bytes and number of messages contained within the Block. Each Binary Block is a container of messages, and it represents at most a UDP Packet size including the size of the Binary Block Header.
- The **Message Sequence Number** referenced in the Binary Block Header represents the sequence number of the 1st message within the Block. Subsequent messages have an implied sequence number which is 1 greater than the previous message up to the maximum **Number of Messages** identified in the Binary Block Header. This is shown by the diagram below where the implied sequence number of a message is enclosed in (). The sum of (Message Sequence Number and Number of Messages) of a given Block will identify the 1st Message Sequence Number of the next Binary Block.

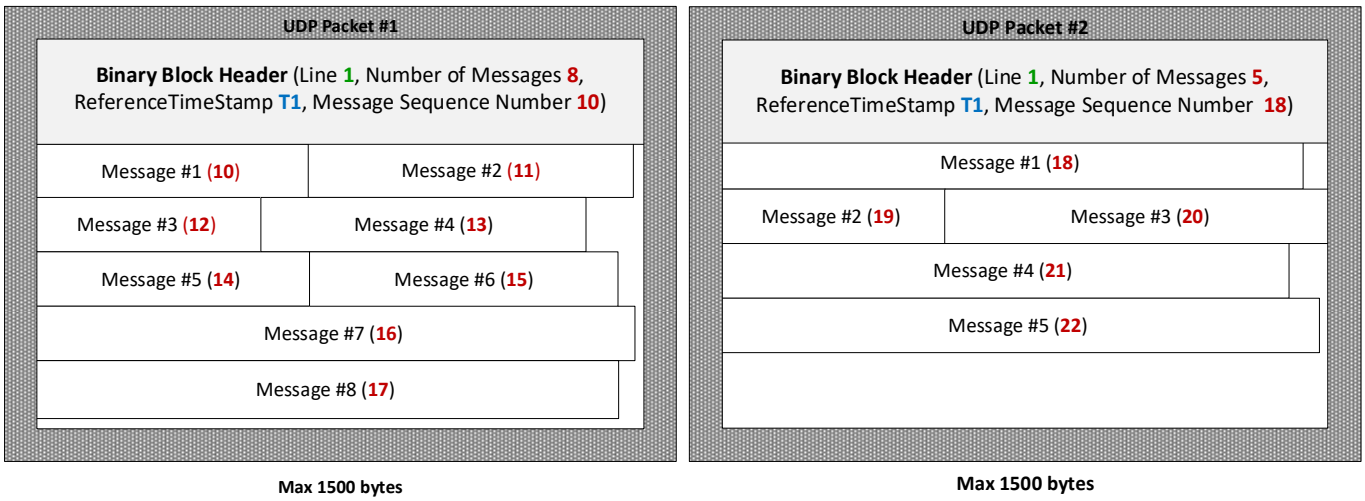


**Figure 2 – Example of Message Delivery with Binary Block (Line 1)**

- The Binary Block Header also contains the **Reference Timestamp** from which the timestamp of each message (as was generated by the Trading Engine) can be computed using the message **TimeOffset**.
- Each Block may contain data up to a maximum of 1,500 bytes including the size of the Binary Block Header.
    - Messages contained within a Binary Block can be of different types and messages length. A **BlockContentBitField** identifies that at least one type of a message is present in the Block (refer to Section 2.4.2).
    - Technical messages such as Start/End Retransmission messages, and Heartbeat messages are sent in their own Binary Block.
- A UDP packet frame contains only one Binary Block. If a given message cannot be entirely packaged within a given Block, that message will be delivered in the next Binary Block.

### 2.4.1 Binary Messages Block Header: 32 bytes

Outgoing: From BOX to Data Recipient

All messages outgoing will be packaged within a Binary Block whose header is defined below:

| Field Name | Offset | Data Type (Length) | Description |
|---|---|---|---|
| Block Size | 0 | B(2) | Size in bytes of entire transmission block including the Block Header |
| Number of Messages in Block | 2 | B(2) | Number of messages contained in this transmission block |
| Block Content Bit Field | 4 | BF(4) | Bit field which indicates the type of business messages contained within this transmission Block. |
| Line Name | 8 | X(1) | **Multicast and Retransmission Lines:**<br>• 1: Top of Book<br>• 5: Market Depth<br>• C: Complex<br>• P: Auction<br>**Retransmission only:**<br>• D: Dictionary<br>• T: Snapshot of Top of Book.<br>• M: Snapshot of Market Depth |
| *Filler* | *9* | *F(7)* | *Zero-filled (0x00)* |
| Reference Timestamp | 16 | B(8) | The number of nano seconds from epoch 1/1/1970, 00:00:00 UTC.<br>This timestamp is to be used as Reference Timestamp for all messages within that Binary Block. |
| Message Sequence Number | 24 | B(8) | The Message Sequence Number represents the sequence number of the **first** message within the Block.<br>**Note:**<br>• Sequencing is per Multicast Line and Trading Slice<br>• There is no validation of Sequence for incoming messages. |
| **Length (bytes)** | **32** | | |

### 2.4.2 Block Content Bit Field

The Block Content Bit Field gives an indication of the presence of at least one message type.

| BIT | Bit value (0) | Bit value (1) |
|---|---|---|
| 0 | Real-Time Multicast Line Transmission | Retransmission Request |
| 1 | Sequenced Transmission with same sequence as original Multicast Line | Sequenced retransmission but different sequence than original Multicast Line |
| 2 | Business (Application) messages | Administrative messages |
| 3 | No Option Instrument | Option Instrument present |
| 4 | No Complex Instrument | Complex Instrument present |
| 5 | No Opening Price | Opening Price present |
| 6 | No Market Depth | Market Depth Present |
| 7 | Market Depth without Customer | Market Depth with Customer |
| 8 | No Top of Book | Top of Book present |
| 9 | Top of Book without Customer | Top of Book with Customer |
| 10 | No Auction | Auction present |
| 11 | No Exposition | Exposition Present |
| 12 | No Trade and Trade Cancel | Trade and/or Trade Cancel present |
| 13 | No Trading Status | Trading Status present |
| 14 | No Retransmission Delimiter | Retransmission Delimiter present |
| *Bit 15 to 31 are reserved for future use* | | |

### 2.4.3 Block Content Bit Field Example

**Example1**: A Binary Block which is sent as follows for a multicast transmission:

| BIT | Bit value (0) | Bit value (1) | Value |
|---|---|---|---|
| 0 | Real-Time Multicast Line Transmission | Retransmission Request | 0 |
| 1 | Sequenced Transmission | Sequenced retransmission but different sequence than original Multicast Line | 0 |
| 2 | Business Messages | Administrative messages | 0 |
| 3 | No Option Instrument | Option Instrument present | 0 |
| 4 | No Complex Instrument | Complex Instrument present | 0 |
| 5 | No Opening Price | Opening Price present | 1 |
| 6 | No Market Depth | Market Depth Present | 1 |
| 7 | Market Depth without Customer | Market Depth with Customer | 0 |
| 8 | No Top of Book | Top of Book present | 0 |
| 9 | Top of Book without Customer | Top of Book with Customer | 0 |
| 10 | No Auction | Auction present | 1 |
| 11 | No Exposition | Exposition Present | 0 |
| 12 | No Trade and Trade Cancel | Trade and/or Trade Cancel present | 0 |
| 13 | No Trading Status | Trading Status present | 1 |
| 14 | No Retransmission Delimiter | Retransmission Delimiter present | 0 |
| *All other Bits (15-31) are zeros* | | | |
| | | **BlockContentBitField (Value in Decimal)** | **9312** |

**Example2**: A Binary Block which is sent as follows for a retransmission request:

| BIT | Bit value (0) | Bit value (1) | Value |
|---|---|---|---|
| 0 | Real-Time Multicast Line Transmission | Retransmission Request | 1 |
| 1 | Sequenced Transmission | Sequenced retransmission but different sequence than original Multicast Line | 1 |
| 2 | Business Messages | Administrative messages | 0 |
| 3 | No Option Instrument | Option Instrument present | 0 |
| 4 | No Complex Instrument | Complex Instrument present | 0 |
| 5 | No Opening Price | Opening Price present | 1 |
| 6 | No Market Depth | Market Depth Present | 0 |
| 7 | Market Depth without Customer | Market Depth with Customer | 0 |
| 8 | No Top of Book | Top of Book present | 1 |
| 9 | Top of Book without Customer | Top of Book with Customer | 1 |
| 10 | No Auction | Auction present | 0 |
| 11 | No Exposition | Exposition Present | 0 |
| 12 | No Trade and Trade Cancel | Trade and/or Trade Cancel present | 1 |
| 13 | No Underlying Trading Status | Underlying Trading Status present | 0 |
| 14 | No Retransmission Delimiter | Retransmission Delimiter present | *0* |
| *All other Bits (15-31) are zeros* | | | |
| | | **BlockContentBitField (Value in Decimal)** | **4899** |

## 2.5 Binary Market Data Feed Distribution

The Binary Market Data Feed is distributed across 12 separate Feeds, one per Trading Slice as shown below:

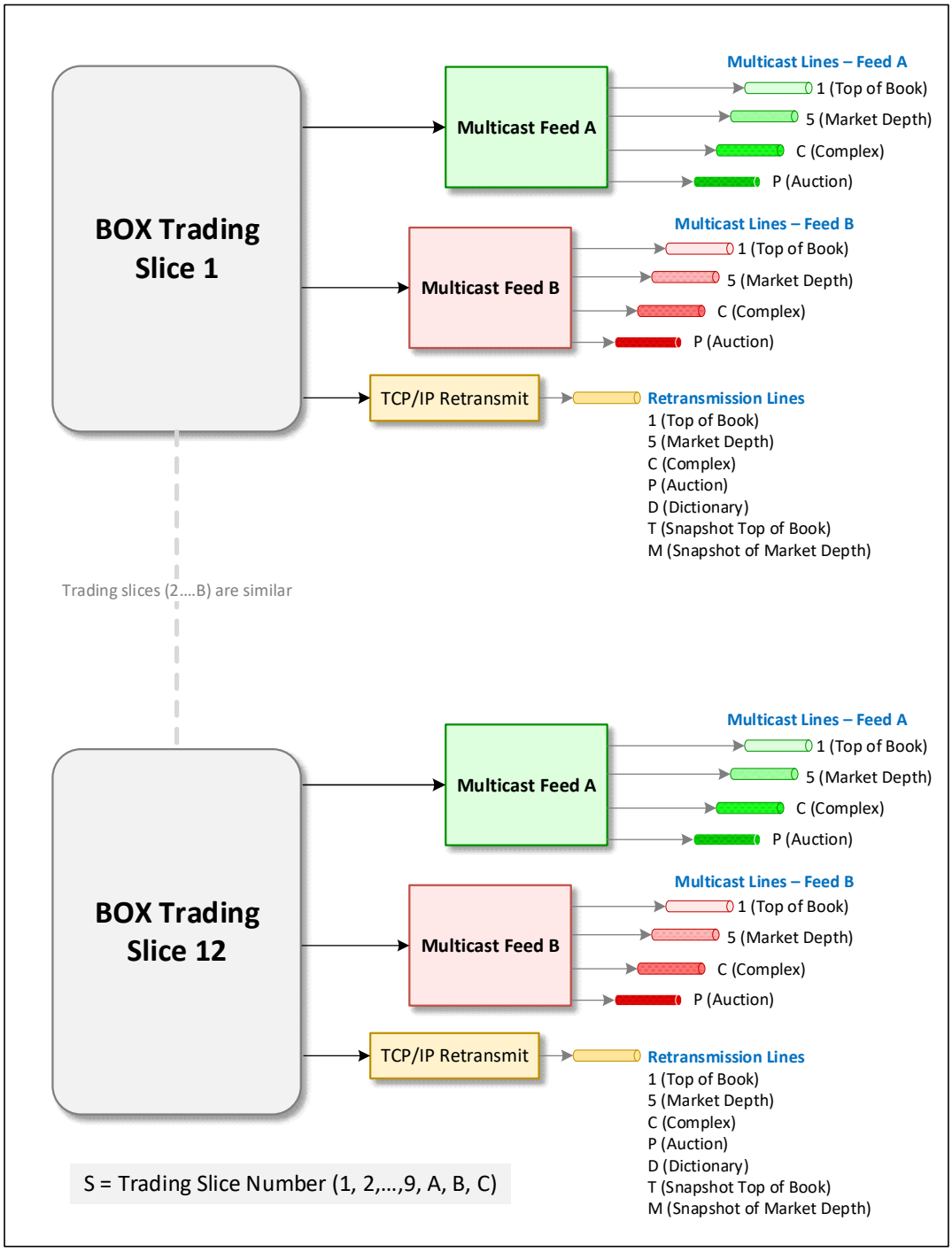


**Figure 3 - Binary Market Data Feed Distribution**

### 2.5.1 Multicast Feeds (A and B) and Multicast Lines (1, 5, C, P)

For each Trading Slice, Binary Multicast Feed is offered as 2 separate but identical feeds A and B. Data Recipients can subscribe to either the Multicast Feed Top of Book (1), Market Depth (5), Complex (C) or Auction (P) lines offered on each of the feeds A and B.

The message types which make up each of those lines are summarized in the table below. Refer to the Section 3 for Message Description.

<table>
<tr><th>Multicast Line</th><th colspan="2">Business Message Types</th></tr>
<tr><td rowspan="9">Line 1<br>Top of Book</td><td>[Message Type] Option-related</td><td>[Message Type] Complex-related</td></tr>
<tr><td>[20] Non-FLEX Option Instrument<br>[21] FLEX Option Instrument</td><td>[25] Non-FLEX Complex Instrument<br>[26] FLEX Complex Instrument</td></tr>
<tr><td>[58] Option Opening Price</td><td>Non-applicable</td></tr>
<tr><td>[50] 2-sided Quote Long<br>[52] 2-sided Quote Short</td><td>[60] 2-sided Quote Long</td></tr>
<tr><td>[59] Request for Quote</td><td>Non-applicable</td></tr>
<tr><td>[70] 1-sided Quote Long<br>[72] 1-sided Quote Short</td><td>[80] 1-sided Quote Long</td></tr>
<tr><td>[90] Trade<br>[91] Trade Cancel</td><td>[95] Trade<br>[96] Trade Cancel</td></tr>
<tr><td>[100] Auction<br>[101] Exposition</td><td>[105] Auction<br>[106] Exposition</td></tr>
<tr><td>[110] Trading Status</td><td>Non-applicable</td></tr>
<tr><td rowspan="9">Line 5<br>Market Depth</td><td>[Message Type] Option-related</td><td>[Message Type] Complex-related</td></tr>
<tr><td>[20] Non-FLEX Option Instrument<br>[21] FLEX Option Instrument</td><td>[25] Non-FLEX Complex Instrument<br>[26] FLEX Complex Instrument</td></tr>
<tr><td>[58] Option Opening Price</td><td>Non-applicable</td></tr>
<tr><td>[30] Market Depth Long<br>[32] Market Depth Short</td><td>[40] Market Depth Long</td></tr>
<tr><td>[59] Request for Quote</td><td>Non-applicable</td></tr>
<tr><td>[90] Trade<br>[91] Trade Cancel</td><td>[95] Trade<br>[96] Trade Cancel</td></tr>
<tr><td>[100] Auction<br>[101] Exposition</td><td>[105] Auction<br>[106] Exposition</td></tr>
<tr><td>[110] Trading Status</td><td>Non-applicable</td></tr>
</table>

<table>
<tr><th>Multicast Line</th><th>Business Message Types</th></tr>
<tr><td>Line P<br>Auction Line</td><td>
<table>
<tr><th>[Message Type] Option-related</th><th>[Message Type] Complex-related</th></tr>
<tr><td>[20] Non-FLEX Option Instrument<br>[21] FLEX Option Instrument</td><td>[25] Non-FLEX Complex Instrument<br>[26] FLEX Complex Instrument</td></tr>
<tr><td>[90] Trade<br>[91] Trade Cancel</td><td>[95] Trade<br>[96] Trade Cancel</td></tr>
<tr><td>[100] Auction<br>[101] Exposition</td><td>[105] Auction<br>[106] Exposition</td></tr>
</table>
</td></tr>
<tr><td>Line C<br>Complex Line</td><td>
<table>
<tr><th>[Message Type] Option-related</th><th>[Message Type] Complex-related</th></tr>
<tr><td>[20] Non-FLEX Option Instrument<br>[21] FLEX Option Instrument</td><td>[25] Non-FLEX Complex Instrument<br>[26] FLEX Complex Instrument</td></tr>
<tr><td></td><td>[40] Market Depth Long</td></tr>
<tr><td>[90] Trade<br>[91] Trade Cancel</td><td>[95] Trade<br>[96] Trade Cancel</td></tr>
<tr><td></td><td>[105] Auction<br>[106] Exposition</td></tr>
</table>
</td></tr>
</table>

# 3 Messages

## 3.1 Message Types

### 3.1.1 Technical Messages Overview

| Message Type | Message Name | From Client | From BOX |
|---|---|---|---|
| **TCP/IP Connection and Disconnection** | | | |
| 01 | Login | X | |
| 02 | Login Acknowledgement | | X |
| 03 | Logout | X | |
| 04 | Logout Acknowledgement | | X |
| **Retransmission Service Messages** | | | |
| 05 | Retransmission Request | X | |
| 06 | Retransmission Begin | | X |
| 07 | Retransmission End | | X |
| 08 | Retransmission Line Status | | X |
| 12 | Error Message | | X |
| **Other Messages** | | | |
| 09 | Heartbeat | | X |
| 11 | End of Transmission | | X |

### 3.1.2 Business Messages Overview

| Message Type | Message Name | Line 1 (Top Book) | Line 5 (Market Dept) | Line C (Complex) | Line P (Auction) |
|---|---|---|---|---|---|
| **Dictionary of Instruments** | | | | | |
| 20 | Non-FLEX Option Instrument | X | X | X | X |
| 21 | FLEX Option Instrument | X | X | X | X |
| 25 | Complex Non-FLEX Instrument | X | X | X | X |
| 26 | Complex FLEX Instrument | X | X | X | X |
| **Market Depth** | | | | | |
| 30 | Options Market Depth Long | | X | | |
| 32 | Options Market Depth Short | | X | | |
| 40 | Complex Market Depth Long | | X | X | |
| **Opening Price** | | | | | |
| 58 | Option Opening Price | X | X | | |
| **2-sided Quote (Top of Book both sides)** | | | | | |
| 50 | Option 2-sided Quote Long | X | | | |
| 52 | Option 2-sided Quote Short | X | | | |
| 60 | Complex 2-sided Quote Long | X | | | |
| **1-sided Quote (Top of Book by side)** | | | | | |
| 70 | Option 1-sided Quote Long | X | | | |
| 72 | Option 1-sided Quote Short | X | | | |
| 80 | Complex 1-sided Quote Long | X | | | |
| **Trade and Trade Cancels** | | | | | |
| 90 | Option Trade | X | X | X | X |
| 91 | Option Trade Cancel | X | X | X | X |
| 95 | Complex Order Trade | X | X | X | X |
| 96 | Complex Order Trade Cancel | X | X | X | X |
| **Auction and Exposition** | | | | | |
| 100 | Option Auction | X | X | | X |
| 101 | Option Exposition | X | X | | X |
| 105 | Complex Order Auction | X | X | X | X |

| Message Type | Message Name | Line 1 (Top Book) | Line 5 (Market Dept) | Line C (Complex) | Line P (Auction) |
|---|---|---|---|---|---|
| 106 | Complex Order Exposition | X | X | X | X |
| **Request for Quote** | | | | | |
| 59 | Option Request for Quote | X | X | | |
| **Underlying Status** | | | | | |
| 110 | Trading Status | X | X | X | X |

### 3.1.3 Message Header

Binary messages, both Technical and Business, will have a Header as follows:

| Field Name | Offset | Data Type (Length) | Description |
|---|---|---|---|
| Message Length | 0 | B(2) | Size in bytes of the entire message including the Header. |
| Message Type | 2 | B(1) | Message Type (Refer to Section 3.1) |
| *Filler* | *3* | *F(1)* | *Zero-filled (0x00)* |
| Time Offset from Reference Time | 4 | B(4) | The number of nanoseconds from the Reference Timestamp of the Block Header<br>Reference Timestamp plus TimeOffset gives the timestamp of that message as emitted by the Trading Engine. |
| **Length (bytes)** | **8** | | |

For all messages sent by the Data Recipient to BOX, the **TimeOffset** field in the Message Header can be left 0x00 (zero-filled).

## 3.2 Technical Messages

### 3.2.1 Message Type 01 – Login (TCP Retransmission)

Incoming Message: From Data Recipient to BOX

This message is used by Data Recipients to login to the TCP Retransmission Service.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 40 bytes<br>• Message Type = 06 |
| User | 8 | X(16) | As provided by BOX (for future use) |
| Password | 24 | X(16) | As provided by BOX (for future use) |
| **Length (bytes)** | **40** | | |

### 3.2.2 Message Type 02 – Login Acknowledgement (TCP Retransmission)

Outgoing Message: From BOX to Data Recipient

On successful login, BOX returns an acknowledgement to the Data Recipient.

Data Recipient can then request a retransmission.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 02 |
| **Length (bytes)** | **8** | | |

### 3.2.3 Message Type 03 – Logout (TCP Retransmission)

Incoming Message: From Data Recipient to BOX

This message is used by Data Recipients to logout from the TCP Retransmission Service.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 03 |
| **Length (bytes)** | **8** | | |

### 3.2.4 Message Type 04 – Logout Acknowledgement (TCP Retransmission)

Outgoing Message: From BOX to Data Recipient

This message acknowledges the successful logout of Data Recipient from the TCP Retransmission Service.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 04 |
| **Length (bytes)** | **8** | | |

### 3.2.5 Message Type 05 - Retransmission Request

Incoming Message: From Data Recipient to BOX

This message is used by Data Recipient to request retransmission of messages by Retransmission Request Types (refer to Section 4.1 for more information).

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 32 bytes<br>• Message Type = 05 |
| Line Name | 8 | X(1) | Specific line name for which market data retransmission is being requested<br>**Values:**<br>1: Top of Book<br>5: Market Depth<br>C: Complex<br>P: Auction<br>D: Dictionary<br>T: Snapshot Top of Book<br>M: Snapshot of Market Depth |
| *Filler* | *9* | *F(6)* | *Zero filled 0x00* |
| Start Message Sequence Number | 16 | B(8) | Starting **Message** Sequence number |
| End Message Sequence Number | 24 | B(8) | Ending **Message** Sequence number |
| **Length (bytes)** | **32** | | |

### 3.2.6 Message Type 06 – Retransmission Begin (TCP Retransmission)

Outgoing Message: From BOX to Data Recipient

This message is to inform Data Recipients about the beginning of a Retransmission.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 06 |
| **Length (bytes)** | **8** | | |

### 3.2.7 Message Type 07 – Retransmission End (TCP Retransmission)

Outgoing Message: From BOX to Data Recipient

This message is to inform Data Recipients about the End of a Retransmission.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 07 |
| **Length (bytes)** | **8** | | |

### 3.2.8 Message Type 08 – Retransmission Line Status

Outgoing Message: From BOX to Data Recipient

This message will be sent on a request to retransmit Line "T" (Top of the Book) Snapshot or Line "M" (Market Depth). It indicates the last message number sent for each line of that trading slice.

| Field Name | | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|---|
| **Message Header** | | 0 | 8 | Message Header<br>• Message Length = up to 160 bytes<br>• Message Type = 08 |
| *Filler1* | | *8* | *F(7)* | *Zero-Filled (0x00)* |
| Number of Lines | | 15 | B(1) | Number of lines (1 to 9)<br>(LineID below starts at 0) |
| Up to 9 times | Line Name | 16+LineID*16 | X(1) | Name of the Line |
| | *Filler2* | 17+LineID*16 | *F(7)* | *Zero-Filled (0x00)* |
| | Last Message Sequence Number | 24+LineID*16 | B(8) | Sequence Number of the last Message transmitted so far for the above Line |
| **Length (bytes) up to** | | **160** | | |

### 3.2.9 Message Type 09 – Heartbeat

Outgoing Message: From BOX to Data Recipient

The Heartbeat message is sent out if no messages are sent by BOX for more than one second after the broadcast has started. This message acts as an assurance that the line is up. This message will continue to be sent until the End of Transmission message (Message Type 11) is sent.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 16 bytes<br>• Message Type = 09 |
| Time | 8 | B(8) | Time in nanoseconds of the Heartbeat<br>Time is number of nano seconds from epoch 1/1/1970, 00:00:00 UTC |
| **Length (bytes)** | **16** | | |

A Heartbeat message will be sent in its own Binary Block:

- Number of Messages is set to 1 corresponding to the Heartbeat message
- Message Sequence Number is not incremented and will correspond the Message Sequence Number of last transmitted application message.

An example of Heartbeat messages is shown in Appendix A1.

### 3.2.10 Message Type 11 – End of Transmission

Outgoing Message: From BOX to Data Recipient

This message will be sent to indicate that the day's transmission is complete. This message will be sent at approximately 5:00 p.m. (EST) daily. After this hour, no market data messages will be transmitted. Transmission will resume the following day at 1:00 a.m. (EST).

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Message Length = 8 bytes<br>• Message Type = 11 |
| **Length (bytes)** | **8** | | |

### 3.2.11 Message Type 12 – Error Message

Outgoing Message: From BOX to Data Recipient

This message will be sent to indicate an error. For list of possible Error Code and associated Error Text, please refer to Section 5.3.

| Field Name | Offset | Data Type (Length) | Definition / Validation Rules |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header<br>• Length = 96 bytes<br>• Message Type = 12 |
| Message Type In Error | 8 | B(1) | Message Type which caused the Error |
| Error Code | 9 | B(1) | Error code |
| *Filler* | *10* | *F(6)* | *Zero filled 0x00* |
| Error Text | 16 | X(80) | Error Text |
| **Length (bytes)** | **96** | | |

## 3.3 Business Messages

This section lists the business messages sent out on the Binary Market Data Feed.

### 3.3.1 Dictionary Messages

**Instrument Broadcast and Snapshot**

- Initial Configuration of Instruments is disseminated at 1:35am. for Equity and ETF Options only (no FLEX and Complex Instruments are available at this time).
- During Normal Trading, Participants may create FLEX products, FLEX Complex Instruments and Non-FLEX Complex Instruments. Occasionally, Market Operations may list Non-FLEX (OCC standard listed) and Adjusted series during the Pre-Opening or Normal Trading Phase.
- The above instruments are broadcasted on all Multicast lines of each Trading Slice.
- Data Recipients may request all products using the Retransmit of Dictionary as detailed in section 4.3.1.

**Instrument Identification – Unique Keys**

- The fields (**Group + Instrument ID)** combination is a unique symbol representation of Instruments. These fields are required by SAIL Participants[4] when entering Orders or Bulk Quotes.
- **Product ID** is a unique numeric identifier encoded on 4 bytes, which is used as Primary Key in all business messages. The ProductID is unique across all Trading Slices.
- The **Product ID** of **Regular OCC-Listed and Adjusted series** will **be the same** from their first trading day until expiry. In other words, the Product ID for those instruments will persist until the last trading day of the product.
- The **Product ID** of the following types of Instruments will be **unique for the day only** and will be **reset** to a new value on the next trading day. In other words, the Product ID does not persist but may take another value on the next trading day:
    - FLEX Options (both Physical-Settled and Cash-Settled)
    - Complex Order Instruments with legs as Non-FLEX Options
    - Complex Order Instruments with legs as FLEX Options.

[4] As used in this Specifications Guide, the term “SAIL Participant” shall mean a Participant using BOX’s proprietary ASCII-based protocol “SAIL” for market making and/or order entry.

**Root Symbol**

- Contains the Root Symbol for OCC-listed non-FLEX series e.g. 'AAPL  '.
- For FLEX Options, Root Symbol is prefixed by (1, 2, 3, 4) to indicate the type of FLEX (e.g. '1AAPL ') – the field Option Type indicates the type of FLEX.
- For Adjusted series, Root Symbol is suffixed by a numeric (1…9) (e.g. 'AAPL1').
- For a FLEX on Adjusted series the Root Symbol is prefixed by (1,2,3,4) for the FLEX part and suffixed by a numeric (1…9) for the Adjusted Symbol (e.g. '1AAPL1').

#### 3.3.1.1 Message Type 20 – Non-FLEX Option Instrument

#### 3.3.1.2 Message Type 21 –FLEX Option Instrument

Outgoing Message: From BOX to Data Recipient

Non-FLEX and FLEX Options Instruments have the same message structure below:

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Length = 56 bytes<br>Applicable messages:<br>• Message Type = 20 (Non-FLEX Option)<br>• Message Type = 21 (FLEX Option) |
| Product ID | 8 | B(4) | System-wide unique identifier for the instrument:<br>• For non-FLEX Options, persistent until expiry<br>• FLEX Options, reset daily |
| Unique Group ID | 12 | 2 | System-wide unique identifier of an Option Group related to an Underlying. |
| Group | 14 | X(2) | Group identification within the Trading Slice.<br>A group contains the instruments derived from the underlying it is associated to. |
| Instrument ID | 16 | X(4) | Exchange code Identifying the instrument |
| Root Symbol | 20 | X(6) | Root symbol of the Standard or Adjusted series Option / FLEX Option |
| Expiration Year | 26 | B(2) | Year of instrument expiration |
| Expiration Month | 28 | B(1) | Month of instrument expiration from 01 to 12. |
| Expiration Day | 29 | B(1) | Day of instrument expiration from 01 to 31. |
| Call Put Code | 30 | B(1) | 0: Put<br>1: Call |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Option Type | 31 | B(1) | Non-FLEX Option Type [Message Type 20]<br>0: American Standard (non-FLEX) Option (includes adjusted series)<br><br>FLEX Option on Equity/ETF [Message Type 21]<br>1: American FLEX Option, Physical Delivery<br>2: European FLEX Option, Physical Delivery<br>3: American FLEX Option, Cash Delivery<br>4: European FLEX Option, Cash Delivery |
| Strike Price | 32 | SP(8,4) | Strike Price of the Option |
| Underlying Symbol | 40 | X(10) | Underlying symbol represented by the Root Symbol of the option |
| Tick Increment Indicator | 50 | X(2) | Defined in Tick Table (refer to Section 5.1) |
| Posting Action | 52 | B(1) | 0: No Restriction (Opening and Closing accepted)<br>1: Closing Only Orders |
| *Filler1* | *53* | *F(11)* | *Zero filled (0x00)* |
| **Length (bytes)** | **64** | | |

### 3.3.1.3 Message Type 25 – Complex Non-FLEX Instrument

### 3.3.1.4 Message Type 26 – Complex FLEX Instrument

Outgoing Message: From BOX to Data Recipient

Complex Instruments with Non-FLEX Legs and Complex Instruments with FLEX Legs share the same message structure but have different Message Types as follows:

| Field Name | | Offset | Data Type | Description |
|---|---|---|---|---|
| **Message Header** | | 0 | 8 | Message Length up to 200 bytes<br>• Message Type = 25 (Complex Non-FLEX Instrument)<br>• Message Type = 26 (Complex FLEX Instrument) |
| Product ID | | 8 | B(4) | Unique identifier for the Complex instrument. Resets Daily |
| Group | | 12 | X(2) | Group Identification within the system. A group contains the instruments derived from the underlying it is associated to. |
| Instrument ID | | 14 | X(4) | Exchange code identifying the instrument |
| Complex Instrument Symbol | | 18 | X(30) | Exchange defined Complex Instrument Symbology |
| Minimum Price Limit | | 48 | SP(8,4) | Minimum price authorized for the complex order instrument |
| Maximum Price Limit | | 56 | SP(8,4) | Maximum price authorized for the complex order instrument |
| Tick Increment Indicator | | 64 | X(2) | Refer to Tick Table in Section 5.1. |
| *Filler1* | | *66* | *F(5)* | *Zero-filled 0x00* |
| Number Of Legs | | 71 | B(1) | Number of legs of complex order instrument Range from 2 to 16 |
| Repeating Block (each 8 bytes long) up to 16 times. *LegPosition* starts at 0 (first leg) and increments by 1 for each leg | | | | |
| From 2 to 16 | Leg Product ID | 72+LegPosition*8 | B(4) | Unique Identifier for the Leg:<br>Refer to:<br>• Non-FLEX Option [Message Type 20]<br>• FLEX Option [Message Type 21] |
| | Leg Ratio | 76+LegPosition*8 | SB(4) | Leg Ratio of the Complex Instrument |
| **Length Up to 200 bytes** | | | | |

### 3.3.2 Option Opening Price

Limit, Market and Market on Opening Orders and Quotes entered on the BOX Book during the Pre-Opening state may lock and cross each other, and the Trading Engine will compute a Theoretical Opening Price (TOP) at which the crossing and locking orders and quotes will be matched at the TOP.

Whenever a TOP is calculated, an Option Opening Price (Message Type 58) will be broadcasted with information about the calculated TOP, total Bid and Ask sizes, Customer Bid and Ask sizes as well as Market on Opening (MOO) Bid and Ask sizes eligible to trade at the calculated TOP.

#### 3.3.2.1 Message Type 58 – Option Opening Price

Outgoing Message: From BOX to Data Recipient

This message is used to disseminate the Opening Price on an Option instrument. There is no opening for Complex Order Instruments as well as FLEX Options.

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Length = 56 bytes<br>• Message Type = 58 |
| Product ID | 8 | B(4) | Unique identifier for the instrument |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>Applicable state:<br>• 1: Pre-opening |
| Opening Price Bit field | 13 | BF(1) | Bit 0: 0: No MOO orders on **Bid** Side; 1: MOO orders on **Bid** Side<br>Bit 1: 0: No MOO orders on **Ask** Side; 1: MOO orders on **Ask** Side<br>Bit 2: 0: No Public Customer on **Bid** Side; 1: Public Customer on **Bid** Side<br>Bit 3: 0: No Public Customer on **Ask** Side; 1: Public Customer on **Ask** Side<br>*Bit 4-7: Reserved for future use* |
| *Filler1* | *14* | *F(2)* | *Zero filled (0x00)* |
| **Opening Price** | 16 | SP(8,4) | Opening Price for the above Option Instrument |
| Bid Size | 24 | B(4) | Total Bid Size eligible to trade at the Opening Price |
| Public Customer Bid Size | 28 | B(4) | Total Public Customer Bid Size eligible to trade at the Opening Price |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Market On Opening Bid Size | 32 | B(4) | Total MOO (Market on Opening) Bid Size eligible to trade at the Opening Price |
| Total Number of Bid Orders | 36 | B(4) | Total Number of orders on the Bid side eligible to trade at the Opening Price |
| Ask Size | 40 | B(4) | Total Ask Size eligible to trade at the Opening Price |
| Public Customer Ask Size | 44 | B(4) | Total Public Customer Ask Size eligible to trade at the Opening Price |
| Market On Opening Ask Size | 48 | B(4) | Total MOO (Market on Opening) Ask Size eligible to trade at the Opening Price |
| Total Number of Ask Orders | 52 | B(4) | Total Number of orders on the Ask side eligible to trade at the Opening Price |
| **Length (bytes)** | **56** | | |

### 3.3.3 Market Depth messages

Market Depth messages are disseminated as follows:

| Content | Description | Identified by: |
|---|---|---|
| **Book Depth up to 5 limits** | • Market Depth messages are generated for the 5 best limits (marked with Level 1 to 5) of a given book (Option and Complex Order instruments), where each level represents the aggregate quantity and number of orders by side at that price.<br>• For each level, the "Market Level Bit Field" is set as follows:<br>  ○ Bits (0 to 3) indicates the change of price and/or size on Bid and Ask sides for each market level depth.<br>  ○ Other Bits are not applicable. | **Levels** (1 to 5) |
| **Implied / Legging** | • The best Implied price on a Complex Order book and best Legging price on an Option book is also calculated and disseminated within the same Market Depth message as a separate level marked as Level 6.<br>• For the implied level, the "Market Level Bit Field" is set as follows:<br>  ○ Bits (6 and 7) indicate presence of the Implied on the Bid/Ask side. | **Level 6** (Implied) |
| **Customer Presence** | • Whenever there is a Public Customer order on the best limit (Limit 1), a Market Depth will be sent out as a Level 0 to identify the quantity and number of customer orders on either or both sides Level 1.<br>• A Level 0 (Public Customer presence) will be disseminated in addition to a Level 1 within the same Market Depth message.<br>• Note that a Customer Presence is only shown if available at Level 1. No Customer Presence is indicated for Level (2 to 5) and Level (6) Implied. | **Level 0** (Public Customer) |

#### Market Depth (MD) Long and Short versions.

- For Options Market Depth, both a Long and Short versions of the message will be available.
- For Complex Instrument Market Depth, **only** a long version of the message which supports negative prices and large quantities will be available.

### 3.3.3.1 Message Type 30 – Option Market Depth Long

### 3.3.3.2 Message Type 40 – Complex Market Depth Long

Outgoing Message: From BOX to Data Recipient

The above Market Depth (MD) messages share the same message structure (as documented below) and can have a size up to 296 bytes (Level 1 to 5, Level 0 for Customer Presence, and Level 6 for Implied).

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Type fields:**<br>Message Length = up to 296 bytes<br><br>**Applicable Market Depth (MD) Types**<br>• Message Type (30) – Option MD Long<br>• Message Type (40) – Complex MD Long |
| Product ID | 8 | B(4) | Daily unique identifier for the instrument (Option or Complex Instrument) |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |
| *Filler1* | *13* | *F(2)* | *Zero-Filled (0x00)* |
| Number Of Levels | 15 | B(1) | Up to 7 levels.<br>This is a repeating Block of 40 bytes for each Level.<br><br>LevelID below starts from 0 and may go up to 6 (up to 7 levels in total). |

| Field Name | | Offset | Data Type | Field Name |
|---|---|---|---|---|
| Up to 7 Times | Market Level | 16+LevelID*40 | B(1) | Market Depth Levels:<br>• 0: Public Customer presence at Level 1<br>• 1: Level 1<br>• 2: Level 2<br>• 3: Level 3<br>• 4: Level 4<br>• 5: Level 5<br>• 6: Implied (or Legging) |
| | Market Level Bitfield | 17+LevelID*40 | B(1) | **Bit 0 and 1: Bid side**<br>(applicable to Level 1 to 6)<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br><br>**Bit 2 and 3: Ask side**<br>(applicable to Level 1 to 6)<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br><br>**Bit 4 and 5: Public Customer**<br>(applicable to Level 0)<br>**Bit 4**<br>0 No PC Presence on Bid (Level 1)<br>1 PC Presence on Bid (Level 1)<br>**Bit 5**<br>0 No PC Presence on Ask (Level 1)<br>1 PC Presence on Ask (Level 1)<br><br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied on Bid Side<br>1 Implied present on Bid Side<br>**Bit 7**<br>0 No Implied on Ask Side<br>1 Implied present on Ask Side |
| | *Filler2* | 18+LevelID*40 | *F(6)* | *Filler (zero-filled 0x00)* |

| Field Name | | Offset | Data Type | Field Name |
|---|---|---|---|---|
| | Bid Price | 24+LevelID*40 | SP(8,4) | Bid price of the instrument |
| | Bid Size | 32+LevelID*40 | B(4) | Number of contracts at the Bid Price |
| | Number of Bid Orders | 36+LevelID*40 | B(4) | Number of Bid orders at the Bid Price |
| | Ask Price | 40+LevelID*40 | SP(8,4) | Ask price of the instrument |
| | Ask Size | 48+LevelID*40 | B(4) | Number of contracts at the Ask Price |
| | Number of Ask Orders | 52+LevelID*40 | B(4) | Number of Ask orders at the Ask Price |
| **Length (up to)** | | **296 bytes** | | |

#### 3.3.3.3 Message Type 32 – Option Market Depth (MD) Short

Outgoing Message: From BOX to Data Recipient

Market Depth (MD) Short message is applicable to Options only as is described below:

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Type fields:**<br>Message Length up to 128 bytes<br>Message Type (32) – Option Market Depth Short |
| Product ID | 8 | B(4) | Unique identifier for the instrument |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |

| Field Name | | Offset | Data Type | Description |
|---|---|---|---|---|
| *Filler1* | | *13* | *F(2)* | *Zero-Filled (0x00)* |
| Number Of Levels | | 15 | B(1) | Up to 7 levels.<br>This is a repeating Block of 16 bytes for each Level.<br>LevelID below starts from 0 and may go up to 6 (or 7 levels in total shown below). |
| Up to 7 times | Market Level | 16+LevelID*16 | B(1) | Market Depth Levels:<br>• 0: Public Customer presence at Level 1<br>• 1: Level 1<br>• 2: Level 2<br>• 3: Level 3<br>• 4: Level 4<br>• 5: Level 5<br>• 6: Implied (or Legging) |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Market Level Bitfield | 17+LevelID*16 | B(1) | **Bit 0 and 1: Bid side**<br>(applicable to Level 1 to 6)<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br><br>**Bit 2 and 3: Ask side**<br>(applicable to Level 1 to 6)<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br><br>**Bit 4 and 5: Public Customer**<br>(applicable to Level 0)<br>**Bit 4**<br>0 No PC Presence on Bid (Level 1)<br>1 PC Presence on Bid (Level 1)<br>**Bit 5**<br>0 No PC Presence on Ask (Level 1)<br>1 PC Presence on Ask (Level 1)<br><br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied on Bid Side<br>1 Implied present on Bid Side<br>**Bit 7**<br>0 No Implied on Ask Side<br>1 Implied present on Ask Side |
| *Filler2* | *18+LevelID*16* | *F(2)* | *Filler (zero-filled 0x00)* |
| Bid Price | 20+LevelID*16 | P(2,2) | Bid price for option |
| Bid Size | 22+LevelID*16 | B(2) | Number of option contracts represented by the Bid Price |
| Number of Bid Orders | 24+LevelID*16 | B(2) | Number of Bid orders, present at a given moment, in the order book. |
| Ask Price | 26+LevelID*16 | P(2,2) | Ask price for option series |

| Field Name | | Offset | Data Type | Description |
|---|---|---|---|---|
| | Ask Size | 28+LevelID*16 | B(2) | Number of option contracts represented by the Ask Price |
| | Number of Ask Orders | 30+LevelID*16 | B(2) | Number of ask orders, present at a given moment, in the order book. |
| **Length (up to)** | | **128 bytes** | | |

### 3.3.4 Quote (Top of Book) messages

#### 2-sided Quote Long/Short

A 2-sided Quote (Long/Short) is only disseminated if **both** sides (Bid and Ask price and/or quantity) have changed.

| Content | Description |
|---|---|
| Best Limit | A 2-sided Quote (Long/Short) is sent when **both** sides (Bid and Ask) have changed from the previous best limit.<br>A 2-sided Quote (Long/Short) message is sent out where "Market Level Bit Field" is as follows:<br>• Bits (0 to 3) indicate the change of price and/or size on Bid and Ask sides.<br>• Other Bits are not applicable.<br>The best limit Bid Price and Ask Price may include the best **Implied** or **Legging** Price if there is one present at that price.<br>• Bit 6 set to 1 indicates the presence of an Implied Bid; and,<br>• Bit 7 set to 1 indicates the presence of an Implied Ask |
| Best Limit with Customer Presence | Whenever there is a Public Customer order on the best limit, a 2-sided Quote (Long/Short) message is sent out where the "Market Level Bit Field" is as follows:<br>• Bits 4 and 5 indicate the presence of Customer on the Bid and Ask sides and the "Bid Public Customer Size" and "Ask Public Customer Size" represent the number of contracts of Public Customer on each side |

**2-sided Quote (Top of Book) Long and Short versions.**

- For larger prices and quantities or prices with negative values, a 2-sided Quote Long version will be disseminated. In this version all Prices are signed on 8 bytes with 4 implicit decimal (Data Type SP(8,4)) and all Quantities are on 4 bytes (Data Type B(4)).
- When prices are positive (e.g. for Options) and both prices and quantities are small, all prices will be encoded on 2 bytes with 2 implicit decimal places P(2,2) and quantity on unsigned 2 bytes B(2) in a shorter and more compact 2-sided Quote Short message. Short version is applicable for Options only.

#### 3.3.4.1 Message Type 50 – Option 2-Sided Quote - Long

#### 3.3.4.2 Message Type 60 – Complex 2-Sided Quote - Long

Outgoing Message: From BOX to Data Recipient

The Option and Complex 2-sided Quote Long have the same message structure as described below:

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Length = 64 bytes<br>Message Types:<br>• MessageType 50: Option 2-sided Quote Long<br>• MessageType 60: Complex 2-sided Quote Long |
| Product ID | 8 | B(4) | Daily unique identifier for the Instrument |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Quote Indicator Bitfield | 13 | BF(1) | **Bit 0 and 1: Bid side**<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br><br>**Bit 2 and 3: Ask side**<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br><br>**Bit 4 and 5: Public Customer (PC)**<br>**Bit 4**<br>0 No PC Presence at Bid Price<br>1 PC Presence at Bid Price<br>**Bit 5**<br>0 No PC Presence at Ask Price<br>1 PC Presence at Ask Price<br><br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied Bid on Top of Book<br>1 Implied Bid present on Top of Book<br>**Bit 7**<br>0 No Implied Ask on Top of Book<br>1 Implied Ask present on Top of Book |
| *Filler1* | *14* | *F(2)* | *Zero-filled (0x00)* |
| Bid Price | 16 | SP(8,4) | Bid price for option (or complex order instrument) – represents the Top of Book Price |
| Bid Size | 24 | B(4) | Aggregate size of contracts available at this Bid Price |
| Bid Public Customer Size | 28 | B(4) | Aggregate size of Public Customer contracts at this Bid Price |
| Number of Bid Orders | 32 | B(4) | Number of Bid orders at this Bid Price |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| *Filler2* | *36* | *F(4)* | *Zero-filled (0x00)* |
| Ask Price | 40 | SP(8,4) | Ask price for option (or complex order instrument) – represents the Top of Book Price |
| Ask Size | 48 | B(4) | Aggregate size of contracts available at this Ask Price |
| Ask Public Customer Size | 52 | B(4) | Aggregate size of Public Customer contracts at this Ask Price |
| Number of Bid Orders | 56 | B(4) | Number of Ask orders at this Ask Price |
| *Filler3* | *60* | *F(4)* | *Zero-filled (0x00)* |
| **Length (bytes)** | **64** | | |

#### 3.3.4.3 Message Type 52 – Option 2-Sided Quote - Short

Outgoing Message: From BOX to Data Recipient

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Header fields:**<br>Message Length = 32 bytes<br>**Applicable Message Types:**<br>For Options Instrument only<br>• MessageType 52: Option 2-sided Quote Short |
| Product ID | 8 | B(4) | Daily unique identifier for the Instrument |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Quote Indicator Bitfield | 13 | B(1) | **Bit 0 and 1: Bid side**<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br>**Bit 2 and 3: Ask side**<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br>**Bit 4 and 5: Public Customer**<br>**Bit 4**<br>0 No PC Presence at Bid Price<br>1 PC Presence at Bid Price<br>**Bit 5**<br>0 No PC Presence at Ask Price<br>1 PC Presence at Ask Price<br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied Bid on Top of Book<br>1 Implied Bid present on Top of Book<br>**Bit 7**<br>0 No Implied Ask on Top of Book<br>1 Implied Ask present on Top of Book |
| *Filler* | *14* | *F(2)* | *Zero-filled (0x00)* |
| Bid Price | 16 | P(2,2) | Best Bid price for the option instrument (including Legging Price) |
| Bid Size | 18 | B(2) | Aggregate size of contracts available at this Bid Price |
| Bid Public Customer Size | 20 | B(2) | Aggregate size of Public Customer contracts at this Bid Price |
| Number of Bid Orders | 22 | B(2) | Number of Bid orders at this Bid Price |
| Ask Price | 24 | P(2,2) | Best Ask price for the option instrument (including Legging Price) |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Ask Size | 26 | B(2) | Aggregate size of contracts available at this Ask Price |
| Ask Public Customer Size | 28 | B(2) | Aggregate size of Public Customer contracts at this Ask Price |
| Number of Ask Orders | 30 | B(2) | Number of Ask orders at this Ask Price |
| **Length (bytes)** | **32** | | |

### 1-sided Quote Long/Short

- A 1-sided Quote is **only** disseminated when one side, either the Bid or the Ask side of the best limit has changed from its previous values (price, size or customer size).
- Data Recipients must ensure that they keep the other side until another 1-sided Quote, or a 2-sided Quote updates the other side.
- Similar to the 2-sided Quote, the 1-sided Quote is offered in two formats:
  - Short with smaller positive price P(2,2) and size B(2) and a
  - Long with larger price including negative values SP(8,4) and larger size B(4)
- 1-sided Quote Long is available for both Options and Complex.
- 1-sided Quote Short is available for Options only.

### 3.3.4.4 Message Type 70 – Option 1-Sided Quote Long

### 3.3.4.5 Message Type 80 – Complex 1-Sided Quote Long

Outgoing Message: From BOX to Data Recipient

Option and Complex 1-Side Quote Long have the same message structure below:

| Field Name | Offset | Date Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Header fields:**<br>Message Length = 40 bytes<br><br>**Message Types:**<br>• Message Type 70: Option 1-Sided Quote Long<br>• Message Type 80: Complex 1-Sided Quote Long |
| Product ID | 8 | B(4) | Daily unique identifier for the Instrument. |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |

| Field Name | Offset | Date Type | Description |
|---|---|---|---|
| Quote Indicator Bitfield | 13 | BF(1) | **Bit 0 and 1: Bid side**<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br>**Bit 2 and 3: Ask side**<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br>**Bit 4 and 5: Public Customer**<br>**Bit 4**<br>0 No PC Presence at Bid Price<br>1 PC Presence at Bid Price<br>**Bit 5**<br>0 No PC Presence at Ask Price<br>1 PC Presence at Ask Price<br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied Bid on Top of Book<br>1 Implied Bid present on Top of Book<br>**Bit 7**<br>0 No Implied Ask on Top of Book<br>1 Implied Ask present on Top of Book |
| *Filler* | *14* | *F(1)* | *Zero-filled 0x00* |
| Side | 15 | B(1) | 0: Buy 1: Sell |
| Price | 16 | SP(8,4) | Best Price of the option or complex order instrument – including Implied or Legging. |
| Size | 24 | B(4) | Number of option (or complex order instrument) contracts represented at that Price. |
| Customer Size | 28 | B(4) | Number of option contracts (or complex order instrument) represented by Public Customer orders on this side and at that Price. |
| Number of Orders | 32 | B(4) | Number of orders present at that Price for the above Side. |
| *Filler* | *36* | *F(4)* | *Zero-filled 0x00* |
| **Length (bytes)** | **40** | | |

### 3.3.4.6 Message Type 72 – Option 1-Sided Quote Short

Outgoing Message: From BOX to Data Recipient

| Field Name | Offset | Date Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Header fields:**<br>Message Length = 24 bytes<br><br>**Message Types:**<br>Applicable to options only<br>• Message Type 72: Option 1-Sided Quote Short |
| Product ID | 8 | B(4) | Daily unique identifier for the Instrument |
| Status | 12 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 6: Reserved<br>• 7: Suspended<br>• 8: Surveillance Intervention<br>• 9: Closed |

| Field Name | Offset | Date Type | Description |
|---|---|---|---|
| Quote Indicator Bitfield | 13 | BF(1) | **Bit 0 and 1: Bid side**<br>**Bit 0**<br>0 Same Bid Price as Previous<br>1 Bid Price has changed<br>**Bit 1**<br>0 Same Bid Size as Previous<br>1 Bid Size has changed<br><br>**Bit 2 and 3: Ask side**<br>**Bit 2**<br>0 Same Ask Price as Previous<br>1 Ask Price has changed<br>**Bit 3**<br>0 Same Ask Size as Previous<br>1 Ask Size has changed<br><br>**Bit 4 and 5: Public Customer (PC)**<br>**Bit 4**<br>0 No PC Presence at Bid Price<br>1 PC Presence at Bid Price<br>**Bit 5**<br>0 No PC Presence at Ask Price<br>1 PC Presence at Ask Price<br><br>**Bit 6 and 7: Implied Indicator**<br>**Bit 6**<br>0 No Implied Bid on Top of Book<br>1 Implied Bid present on Top of Book<br>**Bit 7**<br>0 No Implied Ask on Top of Book<br>1 Implied Ask present on Top of Book |
| *Filler* | *14* | *F(1)* | *Zero-filled 0x00* |
| Side | 15 | B(1) | 0: Buy<br>1: Sell |
| Price | 16 | P(2,2) | Best Price of the option (including Legging Price if any). |
| Size | 18 | B(2) | Number of option contracts represented at that Price. |
| Customer Size | 20 | B(2) | Number of option contracts represented by Public Customer orders on this side and at that Price. |
| Number of Orders | 22 | B(2) | Number of orders present at that Price for the above Side. |
| **Length (bytes)** | **24** | | |

### 3.3.5 Message Type 59 – Option Request for Quote

Outgoing Message: From BOX to Data Recipient

This message is sent out to Data Recipients to request a quote on a given Product ID. Product ID can only be for Non-FLEX Options.

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Header fields<br>Message Length = 16<br>Message Type = 59 |
| Product ID | 8 | B(4) | Daily unique identifier for the Instrument – applicable to Non-FLEX Option only. |
| Size | 12 | B(4) | Size of the market requested. |
| **Length (bytes)** | **16** | | |

### 3.3.6 Trade and Trade Cancellations

Trade messages are used to disseminate all types of executions on the BOX Book (Option) and on the BOX Complex Order Book. To accommodate all prices (positive and negative) and sizes, only a long version of the Trade message is provided.

Option and Complex Order Trade and Trade Cancel share the same message structure but can be distinguished by different Message Types.

**Trade Identification**

- An Option (BOX Book) trade is uniquely identified by the **ProductID** of the Option instrument and its **TradeNumber**. The TradeNumber diffused in the message is the same as that disseminated on SAIL execution notice messages The TradeNumber of a cancelled trade is the same as its original Trade Number.
- Similarly, a Complex trade (Complex Order Book) trade is uniquely identified by the (**ProductID** of the Complex instrument and its **TradeNumber**). The TradeNumber diffused in the message is the same as that disseminated on SAIL execution notice messages The TradeNumber of a cancelled trade is the same as its original Trade Number.
- A Complex Trade and resulting Leg Trades can be linked together using the **MatchNumber** field.

**Auction Related Trades**

- Trades resulting from an Auction will be identified using the ProductID and AuctionId fields.

**OPRA Trade Indicators**

- The context in which the Trade was done is identified by the **Trade Indicator** field which uses the OPRA Code. The list of codes applicable to BOX is described in Section 5.2.

#### 3.3.6.1 Message Type 90 – Option Trade

#### 3.3.6.2 Message Type 91 – Option Trade Cancel

#### 3.3.6.3 Message Type 95 – Complex Order Trade

#### 3.3.6.4 Message Type 96 – Complex Order Trade Cancel

Outgoing Message: From BOX to Data Recipient

Option and Complex Trade/Trade Cancel messages have the same message structure as described below:

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | **Message Length**:56 bytes<br>**Message Types:**<br>• Message Type 90 – Option Trade<br>• Message Type 91 – Option Trade Cancel<br>• Message Type 95 – Complex Order Trade<br>• Message Type 96 – Complex Order Trade Cancel |
| Product ID | 8 | B(4) | Daily unique identifier for the instrument |
| Trade Number | 12 | B(4) | Unique Trade Identifier for this Product ID |
| Trade Price | 16 | SP(8,4) | Price at which the trade took place (or trade cancel) |
| Trade Volume | 24 | B(4) | Number of contracts of the trade (or trade cancel) |
| Trade Indicator (OPRA Code) | 28 | X(1) | Trade indicators use the OPRA Code.<br>Refer to Section 5.2 for description of Trade Indicator |
| Customer Indicator | 29 | B(1) | Identifies if Trade is a Public Customer<br>0: Not a Public Customer<br>1: Public Customer |
| *Filler1* | *30* | *F(2)* | *Zero-filled (0x00)* |
| Match Number | 32 | X(8) | Unique Identifier to link all trades resulting from a Complex Order match |
| Auction ID | 40 | B(4) | Used with ProductId to uniquely identify trades which results from an Auction (PIP, Solicitation, Facilitation) |
| *Filler2* | 44 | F(12) | *Zero-filled (0x00)* |
| **Length (bytes)** | **56** | | |

### 3.3.7 Auctions and Exposition

Auctions (Price Improvement Process, Facilitation, Solicitation) and Exposition of an order for both Option and Complex are disseminated via Auction and Exposition types of messages.

All these messages share the same structure but have different message types to distinguish between option/complex and auction/exposition.

**Auctions**

- An Auction message is disseminated to indicate the **Type** of auction (Price Improvement Process, Facilitation or Solicitation) which has been started (Status: 0 Start), and the Price, Side and Quantity fields represents the InitO (Initial Order or “Agency Order”).
- The **AuctionID** field paired with **ProductID** is a unique identification of the auction in the system. The AuctionID field is to be used by Participants to enter improvements orders for that given auction and product.
- The **AuctionEnd** time identifies the normal expected end time of the auction relative to its start time.
- When an Auction ends, the corresponding Auction message will be sent with Status 1: “End”.

**Exposition**

- An Exposition message with field Type 3: (Exposition) is disseminated when an Order on the BOX Book is exposed or when an Order on the Complex Order Book is exposed.
- The (Status: 0 Start) indicates the start of the exposition and the normal expected Exposition End Time is identified by the field End Time.
- The fields Price, Side and Quantity and Order ID relate to the Order being exposed.
- If the Exposed Order completely trades or the Exposition time is expired, a new Exposition message will be sent out with Status 1: “End” to indicate that the exposition has ended.

**Message Types**

- Only one version of Auction and Exposition message is offered for both Options and Complex using signed Price SP(8,4) and Quantity B(4).

#### 3.3.7.1 Message Type 100 – Option Auction

#### 3.3.7.2 Message Type 101 – Option Exposition

#### 3.3.7.3 Message Type 105 – Complex Order Auction

#### 3.3.7.4 Message Type 106 – Complex Order Exposition

Outgoing Message: From BOX to Data Recipient

Option and Complex Auction messages as well as Option and Complex Exposition messages have the same message structure as described below:

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Length:56 bytes<br>Message Types:<br>• Message Type 100 – Option Auction<br>• Message Type 101 – Option Exposition<br>• Message Type 105 – Complex Order Auction<br>• Message Type 106 – Complex Order Exposition |
| Product ID | 8 | B(4) | Daily unique identifier for the instrument (option or complex). |
| Auction ID or Order ID | 12 | B(4) | **Auction ID**: Auction unique sequential number unique per ProductID and per trading day.<br><br>**Order ID**: Exposed order unique sequential number unique per ProductID and per trading day. |
| Type | 16 | B(1) | Defined the type of auction or exposition.<br>• 0: Price Improvement Process (PIP)<br>• 1: Facilitation Crossing Mechanism<br>• 2: Solicitation Crossing Mechanism<br>• 3: Exposition |
| Status | 17 | B(1) | Status of the auction or exposition<br>• 0: Start<br>• 1: End |
| *Filler1* | *18* | *F(5)* | *Zero-filled 0x00* |
| Side | 23 | B(1) | Represents the side of the InitO for an auction or side of the order being exposed.<br>0: Buy<br>1: Sell |
| Price | 24 | SP(8,4) | For auctions, this is the price of the Initial Order.<br>For exposition, this is the price of the exposed order. |
| Size | 32 | B(4) | For auctions, this is the quantity of the Initial Order.<br>For exposition, this is the quantity of the exposed order. |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Customer Indicator | 36 | B(1) | **For an Auction:**<br>Represents Account Type of the “Agency Order” or order opposite to the Initiating Order side.<br>**For an Exposition:**<br>Represents the Account Type of the order being exposed.<br>Customer Indicator can take the following values:<br>• 0: Non-Public Customer account<br>• 1: Public-Customer account |
| *Filler2* | *37* | *F(9)* | *Zero-filled 0x00* |
| Firm ID | *46* | B(2) | May optionally contains the Identification of the Firm whose order is being exposed. Applies to<br>• Message Type 101 – Option Exposition<br>• Message Type 106 – Complex Order Exposition<br><br>Does not apply to auction-related messages:<br>• Message Type 100 – Option Auction<br>• Message Type 105 – Complex Order Auction<br>Firm ID will be zero-filled for Messages (100 and 105) |
| End Time | 48 | B(8) | Auction or Exposition End time in nanoseconds. Contains the number of nanoseconds from Epoch 1/1/1970, 00:00:00 UTC |
| **Length (bytes)** | **56** | | |

### 3.3.8 Trading Status

The trading status of Options on a given Underlying is signaled by the Trading Status Message Type 110.

**Status**

- The Status field gives the current trading state of all FLEX and Non-FLEX Options as well as all Complex Orders with Options on the given Underlying.

**Opening Type**

- A Group of Options normally opens automatically, i.e. automatically moves from Pre-Opening (Status 1), Opening (Status 2) and to Normal Trading (Status 3) when the Underlying Symbol starts trading on its primary exchange. For that Option Group, the Opening Type will be 0 (Auto) and the Scheduled Opening Time will be set to 0 (zeros).
- However, Market Operations Center (MOC) may under special circumstances manually schedule a Group Opening. In that case, the Opening Type will be 1 (Manual) and Scheduled Opening Time gives the time at which the Option Group is set to be opened.

**Quoting Obligations**

- For a given Option Group, the Quoting Width identifies the maximum Bid-Ask spread differential allowed for Market Maker quotes on options on that Underlying.
- The Quoting Width Type indicates whether the Quote Width is standard (0) or if a special quoting relief (1) has been applied.

#### 3.3.8.1 Message Type 110 – Trading Status

Outgoing Message: From BOX to Data Recipient

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Message Header | 0 | 8 | Message Length = 40 bytes<br>Message Type = 110 |
| Group | 8 | X(2) | Exchange-defined Identification of the Option group related to an Underlying |
| Unique Group ID | 10 | B(2) | Unique Group Identification of the Option group |
| Underlying Symbol | 12 | X(10) | Underlying Symbol associated with that Group |
| Status | 22 | B(1) | Defines the Trading state of the Instrument (refer to Section 5.4 for status definitions)<br>• 0: Initial<br>• 1: Pre-opening<br>• 2: Opening<br>• 3: Normal Trading<br>• 4: Forbidden<br>• 5: Trading Halted<br>• 8: Surveillance Intervention<br>• 9: Closed |
| Opening Type | 23 | B(1) | 0: Auto<br>1: Scheduled |
| Group Trading Eligibility | *24* | BF(1) | **Bit 0: RTH**<br>0 Not eligible for Regular Trading Hours (RTH)<br>1 Eligible for Regular Trading Hours (RTH)<br>**Bit (0:7): Future Use** |
| Current Trading Session | 25 | B(1) | Identifies the current trading session.<br>0: No trading<br>1: Regular Trading (RTH) |
| *Filler1* | *26* | *F(6)* | *Zero-filled (0x00)* |
| Scheduled Opening Time | 32 | B(8) | Opening Time in Nanoseconds (if Opening Type is 1:Scheduled) otherwise will be zero-filled.<br>Time is number of nano seconds from epoch 1/1/1970, 00:00:00 UTC. |

| Field Name | Offset | Data Type | Description |
|---|---|---|---|
| Quoting Width | 40 | P(2,2) | Maximum Quote Width (in $) allowed for this Group. |
| Quoting Width Type | 42 | B(1) | 0: Standard quoting obligations[5]<br>1: Special quoting relief applied[6] |
| *Filler2* | *43* | *F(5)* | *Zero-filled (0x00)* |
| **Length (bytes)** | **48** | | |

[5] The maximum bid/ask differential for Market Maker Quoting is a $5 spread.
[6] The maximum bid/ask differential for Market Maker Quoting is a multiple of a $5 spread applied as a Special Spread Relief.

# 4 Retransmission

## 4.1 Retransmission Request Types

The table below lists the types of retransmission request available.

| Retransmission Type | Input from Data Recipient | Delivery from BOX |
|---|---|---|
| **Top of Book (Line 1)** | Retransmission Request (Message 05)<br>Line Name = **1**<br>Start Message Sequence and End Message Sequence as requested by Data Recipient | Messages received within specified message sequence range as was originally transmitted in real-time on that Line (**1**). |
| **Market Depth (Line 5)** | Retransmission Request (Message 05)<br>Line Name = **5**<br>Start Message Sequence and End Message Sequence as desired by Data Recipient | Messages received within specified message sequence range as was originally transmitted in real-time on that Line (**5**). |
| **Complex (Line C)** | Retransmission Request (Message 05)<br>Line Name = **C**<br>Start Message Sequence and End Message Sequence as desired by Data Recipient | Messages received within specified message sequence range as was originally transmitted in real-time on that Line (**C**). |
| **Auction (Line P)** | Retransmission Request (Message 05)<br>Line Name = **P**<br>Start Message Sequence and End Message Sequence as desired by Data Recipient | Messages received within specified message sequence range as was originally transmitted in real-time on that Line (**P**). |
| **Dictionary Snapshot (Line D)** | Retransmission Request (Message 05)<br>Line Name = **D**<br>Start Message Sequence and End Message Sequence as desired by Data Recipient<br>If Data Recipient wishes to receive all instruments from start of day until time of request, Start Message Sequence and End Message Sequence must be both set to 0 | Dictionary (**D**) messages per the specified message sequence range or all dictionary messages from start of day to now. |

| Retransmission Type | Input from Data Recipient | Delivery from BOX |
|---|---|---|
| **Last Top of Book Snapshot (Line T)** | Retransmission Request (Message 05)<br>**Line** Name = **T**<br>Start Message Sequence and End Message Sequence must be set as 0 (zero) | The snapshot of the Top of Book (**T**) for each instrument at the time of request. |
| **Last Market Depth Snapshot (Line M)** | Retransmission Request (Message 05)<br>**Line** Name = **M**<br>Start Message Sequence and End Message Sequence must be set as 0 (zero) | The snapshot of the full Market Depth (**M**) for each instrument at the time of request. |

## 4.2 Retransmission Begin and End Delimiters within Binary Blocks

The Retransmission Begin and End act as Delimiters to signal the Start and End of a retransmission request respectively. Each of those messages will be sent out in its own Binary Block as follows:

- The Retransmission Begin (MessageType 06) Message Sequence Number will be set equal to sequence number of the **first** Message Sequence Number in that Block.
- The Retransmission End (MessageType 07) Message Sequence Number will be set equal to sequence number of the **last** retransmitted Message.

The Begin and End Retransmission Delimiter messages are shown below:

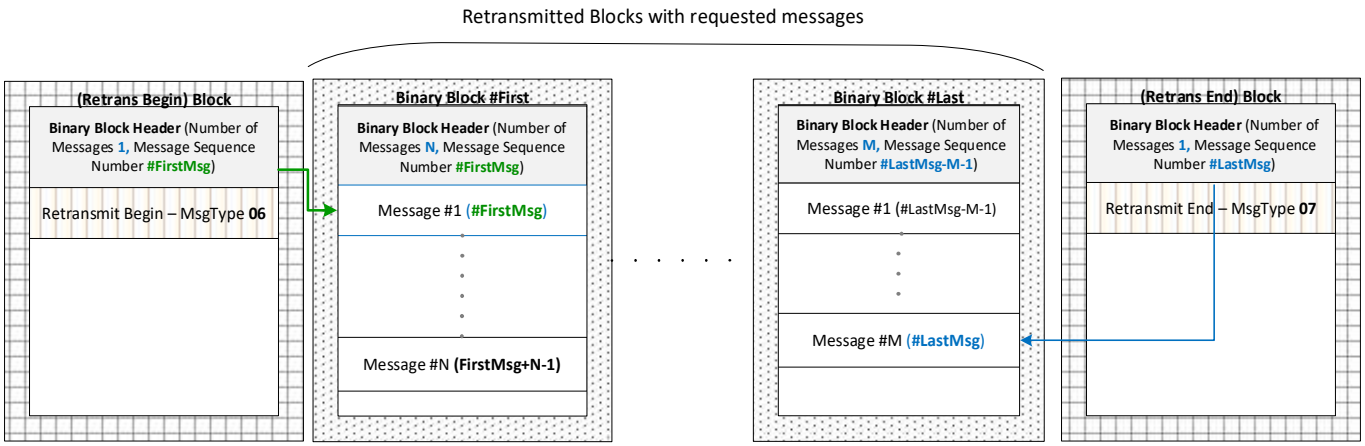


**Figure 4 – Usage of Begin and End Retransmission delimiter messages**

### 4.2.1 TCP/IP Retransmission of messages from Multicast Lines (1, 5, C, P)

The Retransmission Service over TCP/IP protocol allows retransmission of missed or dropped packets from any of the Lines (1,5, C,P).

A retransmission can be requested as follows:

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| TCP/IP Connection<br>Login (Message Type 01) | → | Authenticate User and Ack |
| | ← | Login Ack (Message Type 02) |
| **Retransmission Request of**<br>Specify Line Name:<br>(Message Type 05)<br>Line 1 = Top of Book<br>Line 5 = Market Depth<br>Line C = Complex<br>Line P = Auction<br>- StartMessageSequence = X<br>- EndMessageSequence = Y | → | Process Retransmission Request |
| | ← | Retransmission Begin<br>(MessageType 06) **(1)** |
| | ← | **Retransmission of messages (2)**<br>• Multiple messages depending on the line transmitted from Message Sequence X to Y inclusive. |
| | ← | Retransmission End<br>(MessageType 07) **(3)** |
| Logout (Message Type 03) | → | Disconnect Data Recipient |
| | ← | Logout Ack (Message Type 04) |

1) Retransmission Begin (Message Type 06) will be sent out in its own Binary Block with the Message Sequence Number X which is the first message in the next Binary Block

   Block Bitfield will be set as:

   - Bit ‘0’ set as ‘1’ (TCP-IP Retransmission)
   - Bit ‘1’ set as ‘0’ (Sequenced Transmission per original transmission)
   - Bit ‘14’ set as ‘1’ (Retransmission Delimiter present)

2) Retransmitted messages from Multicast Line will be done within one or multiple Blocks starting with Message Sequence X and ending with Message Sequence Y

Block Bitfield will be set as:

- Bit '0' set as '1' (TCP-IP Retransmission)
- Bit '1' set as '0' (Sequenced Transmission per original transmission)
- Other Bits are set/unset based on the content of type of messages enclosed within.

3) Retransmission End (Message Type 07) will be sent out in its own Binary Block with the Message Sequence Number Y, which was the last Message retransmitted

Block Bitfield will be set as:

- Bit '0' set as '1' (TCP-IP Retransmission)
- Bit '1' set as '0' (Sequenced Transmission per original transmission)
- Bit '14' set as '1' (Retransmission Delimiter present)

### 4.2.2 Example of Retransmission from a Multicast Line (1, 5, C, P)

Suppose on Line 1 (of Trading Slice '*1*') the following messages were broadcasted so far within their respective Binary Blocks as shown below:

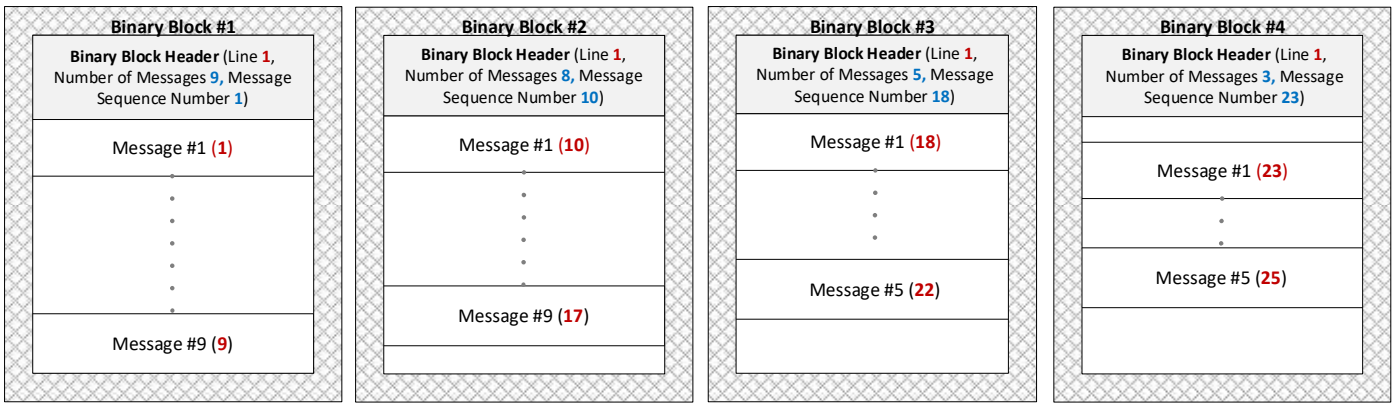


**Figure 5 - Example of Transmission from a Multicast Line**

If the Data Recipient requests retransmission specifying Line '*1*', with Begin Message Sequence 12 to End Message Sequence 24, the Retransmission service will send:

- One or many Binary Blocks starting with Message Sequence 12 and ending with Message Sequence 24.
- It is not guaranteed that the number of Blocks used will be same as the original transmission, fewer blocks may be required to retransmit the same number of messages per the requested range.

The requested messages will be re-transmitted in Binary Block with the following Block Bitfields:

- Bit '0' will be marked with value of '1' for "TCP-IP Retransmission",
- Bit '1' will be marked as 1 (for sequenced transmission per the original transmission on that line) and
- the remaining Bits will be set depending on the types of messages contained in each retransmitted block.

The retransmitted blocks will be delimited by the following messages:

- Retransmit Begin (Message Type 06) whose Message Sequence Number will point to the first requested message. Note that the Retransmit Begin (Message Type 06) does not increment the Message Sequence Number.
- Retransmit End (Message Type 07) Message Sequence Number will point to the last retransmitted Message Sequence Number. (Note that the Retransmit End (Message Type 07) does not increment the Message Sequence Number).

The delimiter messages and retransmitted blocks for the above example will be as follows:

- Originally 3 Binary Block were used on Line 1 to transmit messages from 12 to 24, however on retransmission, this range of messages can be sent out using 2 Binary Blocks only.

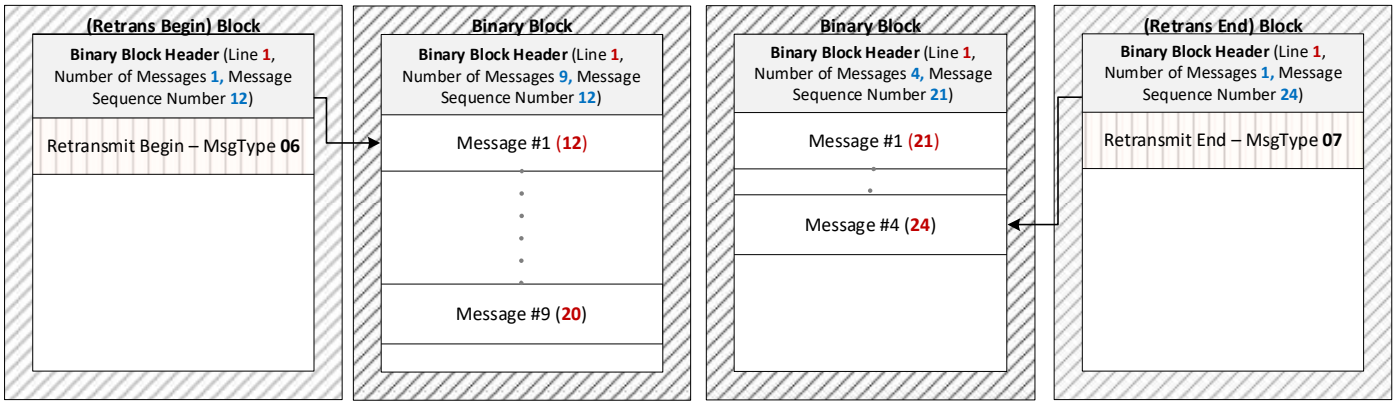


**Figure 6 - Example of Re-transmission from a Multicast Line**

## 4.3 TCP/IP Snapshot Services

In addition to the above TCP/IP Retransmission service, the following are available:

- Snapshot of all traded Instrument dictionary by Trading Slice
- Snapshot of the latest Top of the Book of all instruments by Trading Slice.
- Snapshot of the latest Market Depth of all instruments by Trading Slice.

### 4.3.1 Snapshot of Dictionary

Options Instruments are disseminated at start of day at 1:35am EST on each of the Multicast Lines (1, 5) by Trading Slice (s).

Intraday, Complex, FLEX Options and Complex FLEX Instruments may be created by Participants.

Retransmission of the Dictionary will provide the complete list of instruments for that slice from the start of the day up to the time at which the request was initiated by the Data Recipient.

The Retransmission of Dictionary will not follow the original transmission per the Multicast Line; the **BlockContentBitField** will be marked as follows:

- Bit '0' set to '1' (TCP-IP Retransmission)
- Bit '1' set to '1' (Sequenced retransmission but different sequence than original Multicast Line)
- Bit '2' set to '1' (Instrument Dictionary)

Data Recipients may request the entire dictionary (per Trading Slice) any time during the day as follows:

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| TCP/IP Connection<br>Login (Message Type 01) | → | Authenticate User and Ack |
| | ← | Login Ack (Message Type 02) |
| **Retransmission Request of Dictionary** (Message Type 05)<br>• Line = **D**<br>• **D** = Dictionary<br>• StartMessageSequence = 0<br>• EndMessageSequence = 0 | → | Process Retransmission of Dictionary (Instruments) from start of day to now. |
| | ← | Retransmission Begin [Message Type 06] **(1)** |

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| | ← | **Dictionary messages (2)**<br>• Non-FLEX Option [Message Type 20]<br>• FLEX Option [Message Type 21]<br>• Non-FLEX Complex Instruments [Message Type 25]<br>• FLEX Complex Instruments [Message Type 26] |
| | ← | Retransmission End [Message Type 07] **(3)** |
| Logout (Message Type 03) | → | Disconnect Data Recipient |
| | ← | Logout Ack (Message Type 04) |

1) Retransmission Begin [Message Type 06] will be sent out in its own Binary Block with BlockContentBitField set as:
   - Bit '0': 1 (TCP-IP Retransmission)
   - Bit '1': 1 (Sequenced retransmission but different sequence than original Multicast Line)
   - Bit '14' set as '1' (Retransmission Delimiter present)

2) Retransmitted Instrument messages are sent in Binary Blocks but not necessarily as was originally transmitted on the Multicast Lines. Similarly, the BlockContentBitField will be as follows:
   - Bit '0' set to '1' (TCP-IP Retransmission)
   - Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)
   - Bit '2' set to '1' (Instrument Dictionary)

3) Retransmission End (Message Type 07) will be sent out in its own Binary Block with BlockContentBitField will be set as:
   - Bit '0': 1 (Retransmission Request)
   - Bit '1': 1 (Sequenced retransmission but different sequence than original Multicast Line)
   - Bit '14' set as '1' (Retransmission Delimiter present)

### 4.3.2 Example of Instrument Dictionary Snapshot

Suppose on Line 1 (Top of Book) the following dictionary messages were broadcasted so far within their respective Binary Blocks as shown below.

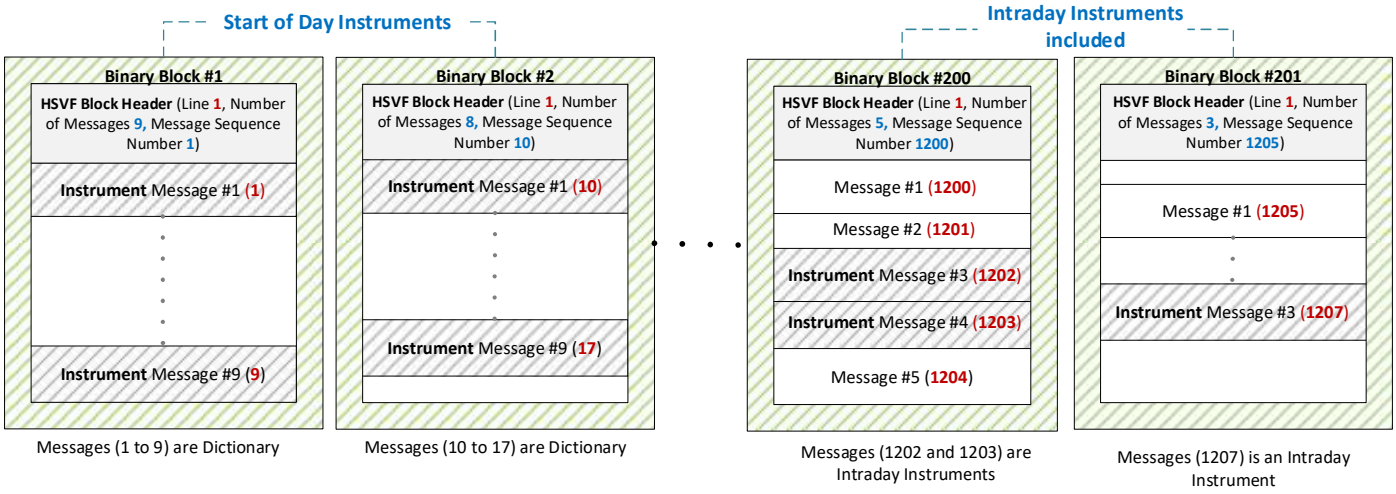


**Figure 7 – Example of Dictionary transmission over Multicast Line**

Assuming that Start of Dictionary (or Initial Configuration) at 1:35 am was accomplished with Dictionary messages with Message Sequence Number (1 to 17) as shown above.

Assuming that during Normal Trading, some intraday instruments were created or listed and those were broadcasted as follows on the above Multicast Line:

- Binary Block 200 with Instruments having Message Sequence 1202 and 1203
- Binary Block 201 with Instruments having Message Sequence 1207

When the snapshot of all Instruments is requested, all instruments from Start of Day transmission (Messages Sequence 1 to 17) as well as all Intraday instruments created intraday (Messages 1202, 1203 and 1207) above will be received. The retransmission will not have the same Message Sequence Numbers as the Instruments in the Multicast Line above.

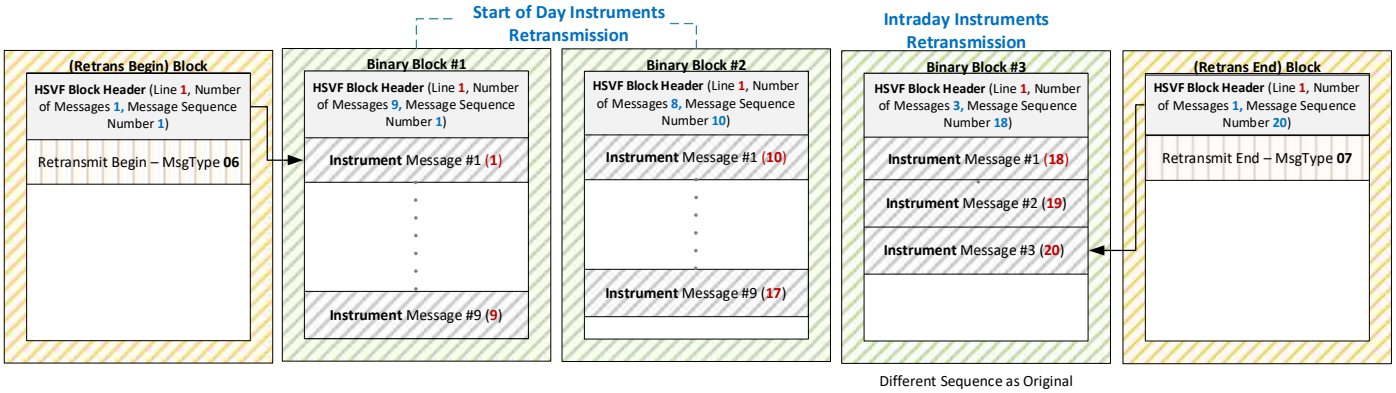


**Figure 8 – Retransmission of Dictionary Line over TCP-IP**

### 4.3.3 Snapshot of Last Top of Book (Line T)

The latest BOX BBO (Best Bid and Offer) for all instruments and their corresponding Trading Status by Trading Slice can be requested as follows:

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| TCP/IP Connection<br>Login (Message Type 01) | → | Authenticate User and Ack |
| | ← | Login Ack (Message Type 02) |
| **Retransmission Request of Top of Book** (Message Type 05)<br>• Line = **T**<br>• T = TopOfBook<br>• StartMessageSequence = 0<br>• EndMessageSequence = 0 | → | Process Retransmission of Latest Top of Book for all Instruments for that trading slice |
| | ← | Retransmission Begin [Message Type 06] **(1)** |
| | ← | **Top of Book messages (2)**<br>Option/Complex 2-sided Quote Long [50/60]<br>Option 2-sided Quote Short [52] |
| | ← | Retransmission End [Message Type 07] **(3)** |
| | ← | Retransmission Line Status [Message Type 08] **(4)** |
| Logout (Message Type 03) | → | Disconnect Data Recipient |
| | ← | Logout Ack (Message Type 04) |

1) Retransmission Begin [Message Type 06] will be sent out in its own Binary Block with BlockContentBitField set as:
   - Bit '0': 1 (Retransmission Request)
   - Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)
   - Bit '14' set as '1' (Retransmission Delimiter present)

| |
|---|
| 2) Retransmitted Top of Book messages are sent in Binary Blocks but not necessarily as was originally transmitted on the Multicast Lines. Similarly, the BlockContentBitField will be as follows:<br>- Bit '0' set to '1' (Retransmission Request)<br>- Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)<br>- Bit '4' set to either '0' or '1' (Top of Book without or with Public Customer interest) |
| 3) Retransmission End (Message Type 07) will be sent out in its own Binary Block with BlockContentBitField will be set as:<br>- Bit '0': 1 (Retransmission Request)<br>- Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)<br>- Bit '14' set as '1' (Retransmission Delimiter present) |
| 4) At the end of the Top of The Book retransmission, a Retransmission Line Status message is sent out to indicate the last Message Sequence Number which has been transmitted for each Multicast Line of that given Trading Slice. |

### 4.3.4 Snapshot of Market Depth (Line M)

The latest complete Market Depth for all instruments and their corresponding Trading Status by Trading Slice can be requested as follows:

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| TCP/IP Connection<br>Login (Message Type 01) | → | Authenticate User and Ack |
| | ← | Login Ack (Message Type 02) |
| **Retransmission Request of Top of Book** (Message Type 05)<br>• Line = **M**<br>• M = MarketDepth<br>• StartMessageSequence = 0<br>• EndMessageSequence = 0 | → | Process Retransmission of MarketDepth for all Instruments for that trading slice |
| | ← | Retransmission Begin [Message Type 06] **(1)** |

| Data Recipient | Flow | BOX Retransmit Server (by Trading Slice) |
|---|---|---|
| | ← | **MarketDepth (MD) Messages (2)**<br>Option MD Long [Msg30] / Complex MD Long [Msg40]<br>Option MD Short [Msg 32] |
| | ← | Retransmission End [Message Type 07] **(3)** |
| | ← | Retransmission Line Status [Message Type 08] **(4)** |
| Logout (Message Type 03) | → | Disconnect Data Recipient |
| | ← | Logout Ack (Message Type 04) |

1) Retransmission Begin [Message Type 06] will be sent out in its own Binary Block with BlockContentBitField set as:
   - Bit '0': 1 (Retransmission Request)
   - Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)
   - Bit '14' set as '1' (Retransmission Delimiter present)

2) Retransmitted Market Depth messages are sent in Binary Blocks but not necessarily as was originally transmitted on the Multicast Lines. Similarly, the BlockContentBitField will be as follows:
   - Bit '0' set to '1' (Retransmission Request)
   - Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)
   - Bit '4' set to either '0' or '1' (Top of Book without or with Public Customer interest)

3) Retransmission End (Message Type 07) will be sent out in its own Binary Block with BlockContentBitField set as:
   - Bit '0': 1 (Retransmission Request)
   - Bit '1' set to '1' (Sequenced retransmission but different from original Multicast Line)
   - Bit '14' set as '1' (Retransmission Delimiter present)

4) At the end of the Market Depth retransmission, a Retransmission Line Status message is sent out to indicate the last Message Sequence Number which has been transmitted for each Multicast Line of that given Trading Slice.

# 5 Field Description

## 5.1 Tick Table

| | Tick Increment | |
|---|---|---|
| **Tick Table Name** | **Order Price <= 3.00$** | **Order Price > 3.00$** |
| **T1** | 0.01 | 0.01 |
| **T2** | 0.01 | 0.05 |
| **T3** | 0.05 | 0.10 |

- Regular Option Classes follow Tick Table T3.
- Limited Pennies Option Classes follow Tick Table T2.
- Penny Option Classes follow Tick Table T1 (Penny).
- All Options PIP, Facilitation and Solicitation follow Tick Table T1 (Penny).
- All Complex PIP, Facilitation and Solicitation follow Tick Table T1 (Penny).
- All FLEX Options and Complex follow Tick Table T1 (Penny).
- All Non-FLEX Complex follow Tick Table T1 (Penny).

## 5.2 Trade Indicator (OPRA Code)

The following table defines the Trade Indicator equivalent to the OPRA Message Type as used in the OPRA Category “a” (Equity and Index Last Sale) message, as per the OPRA Specifications.
(https://cdn.opraplan.com/documents/OPRA_Pillar_Input_Specification.pdf)

| Trade Indicator | Description (adapted from OPRA specs) |
|---|---|
| `I` `(AUTO)` | **Option trade:**<br>Transaction was executed electronically on the option book (between an incoming order against a resting or exposed order or quote)<br>Note that trades at opening on options will be marked as “I”. |
| `A` `(CANC)` | **Trade Cancellation:**<br>Transaction previously reported is now to be cancelled.<br>On BOX, all transactions being cancelled (opening, late, in or out of sequence) will be marked as “A” |

| Trade Indicator | Description (adapted from OPRA specs) |
|---|---|
| B (OSEQ) | **Trade Correction of current day option trade:** Transaction is being reported **late and is out of sequence**, i.e., later transactions have been reported for the particular option contract. |
| S (ISOI) | **Intermarket Sweep Order (ISO) trade:** Transaction was the execution of an order identified as an Intermarket Sweep Order (ISO). Processed like normal transaction. |
| a (SLAN) | **Single-Leg Auction Non-ISO:** Transaction was the execution of an electronic order which was “stopped” at a price and traded in a two-sided auction mechanism that goes through an exposure period. Such auctions mechanisms include and not limited to Price Improvement, Facilitation or Solicitation Mechanism. |
| c (SLCN) | **Single-Leg Cross Non-ISO** Transaction was the execution of an electronic order which was “stopped” at a price and traded in a two sided crossing mechanism that does not go through an exposure period. Such crossing mechanisms include and not limited to Customer to Customer Cross and QCC with a single option leg. |
| e (SLFT) | **Single-Leg Floor Trade** Transaction represents a non-electronic trade executed on a trading floor. Execution of Paired and Non-Paired Auctions and Cross orders on an exchange floor are also included in this category. |
| f (MLET) | **Multi-Leg auto electronic trade** Transaction represents an electronic execution of a Complex order traded on the BOX Complex Order book. |
| g (MLAT) | **Multi-Leg Auction** Transaction was the execution of an electronic Complex order which was “stopped” at a price and traded in a two sided auction mechanism that goes through an exposure period in a Complex Order Book. Such auctions mechanisms include and not limited to Price Improvement, Facilitation or Solicitation Mechanism. |
| h (MLCT) | **Multi-Leg Cross** Transaction was the execution of an electronic Complex order which was “stopped” at a price and traded in a two sided crossing mechanism that does not go through an exposure period. Such crossing mechanisms include and not limited to Customer to Customer Cross and QCC with two or more options legs. |

| Trade Indicator | Description (adapted from OPRA specs) |
|---|---|
| `i` (MLFT) | **Multi-Leg floor trade**<br>Transaction represents a non-electronic Complex order trade executed against other Complex order(s) on a trading floor. Execution of Paired and Non-Paired Auctions and Cross orders on an exchange floor are also included in this category. |
| `j` (MESL) | **Multi-Leg auto-electronic trade against single leg(s)**<br>Transaction represents an electronic execution of a Complex order traded against option orders/quotes. |
| `l` (MASL) | **Multi-Leg Auction against single leg(s)**<br>Transaction was the execution of an electronic Complex order which was “stopped” at a price and traded in a two sided auction mechanism that goes through an exposure period and trades against single-leg (option) orders/ quotes. Such auctions mechanisms include and not limited to Price Improvement, Facilitation or Solicitation Mechanism. |
| `m` (MFSL) | **Complex/Multi-Leg floor trade against single leg(s)**<br>Transaction represents a non-electronic Complex order trade executed on a trading floor against single-leg (option) orders/ quotes. Execution of Paired and Non-Paired Auctions on an exchange floor are also included in this category. |
| `‘‘` (blank) | **Trade Correction of previous day trade**<br>This “As-of-Trade” will be disseminated on the Binary Market Data Feed but is not sent to OPRA. This trade indicator (‘ ‘ blank) is not defined in OPRA but will be used in the context of an “As-of-trade” correction on BOX. |

## 5.3 Error Codes and Description

The following table displays the Error Text that will appear in an Error Message.

BOX reserves the right to add new Error Codes and their associated Error Text without a change to the current Binary Protocol version. Data Recipients must ensure that their application can support new Error Codes and Error Text. This information will be communicated via a Notice.

| Error Code | Text |
|---|---|
| 1 | Unknown Message Type |
| 2 | Invalid Message Length |
| 3 | Invalid Characters |
| 4 | Invalid Protocol Version |

| Error Code | Text |
|---|---|
| 5 | Invalid Line Name |
| 6 | Maximum Number of Concurrent Retransmission Request Reached |
| 7 | Invalid Sequence Number Range |
| 8 | Continuous Feed Request in Progress |

## 5.4 Instrument and Group Phase Definition

| | | Applicable to: | |
|---|---|---|---|
| **Phase / State** | **Description** | **Group** | **Instrument** |
| 0 | **Initial**<br>Status sent prior to Pre-Opening phase when Start-of-Day Dictionary is sent out. | | |
| 1 | **Pre-opening**<br>This phase allows Participants to enter, modify, and cancel orders and quotes. Orders and quotes introduced during this period contribute to the calculation of the Theoretical Opening Price (TOP) but are not traded.<br>Only Orders and quotes on Options are allowed in Pre-Opening. Complex Orders are not allowed in Pre-Opening. | X | X |
| 2 | **Opening**<br>At the scheduled opening time and reception of Underlying market opening and NBBO from another exchange, orders/quotes are matched, and trades are generated at the last calculated TOP. | X | X |
| 3 | **Normal Trading**<br>The switch to the Normal Trading Session phase marks the end of the opening processes.<br>Quotes, different type of orders and auctions are allowed to be entered, modified, or cancelled and trading is allowed per BOX Rules. | X | X |

| | | Applicable to: | |
|---|---|---|---|
| **Phase / State** | **Description** | **Group** | **Instrument** |
| 4 | **Forbidden**<br>In this state, either the Group (all options instruments) or specific instrument(s) are not allowed to trade.<br>Entry of quotes, different type of orders and auctions are not permitted. | X | X |
| 5 | **Trading Halted**<br>Trading of all instruments within a Group is not allowed due to a Trading Halt or delisting of a Group.<br>In this state, Participants are not allowed to enter or modify their order or quotes but are allowed to cancel their orders/quotes entered prior to the Trading Halt. | X | X |
| 6 | **Reserved**<br>Individual Instruments within a Group which cannot be opened during the Opening phase (See 2 above "Opening") go into a Reserved State.<br>Participants are allowed to enter, modify or cancel their orders/quotes until the Instrument resumes trading. | | X |
| 7 | **Suspended**<br>An instrument in Suspended state allows Participants to cancel their orders or quotes. The Instrument is not in a Trading State. | | X |
| 8 | **Surveillance Intervention**<br>This state is reserved for Market Operation Centre (MOC) interventions.<br>Participants are not allowed to enter orders or quotes but may cancel their previously entered orders or quotes. | X | X |
| 9 | **Closed**<br>This state signals the closing all of instruments and groups.<br>Participants are not allowed to enter, modify or cancel any orders or quotes. | X | X |

# 6 Message Examples

## 6.1 Binary Messages Block Header

| Field Name | Data | Value Description |
|---|---|---|
| Block Size | 68 03 | Example block 872 bytes long |
| Number of Messages in Block | 0B 00 | Example block has 11 messages |
| Block Content Bit Field | 48 20 00 00 | Bits set for Option, Market Depth, and Trading Status. |
| Line Name | 35 | Ascii '5' |
| Filler | 00 00 00 00<br>00 00 00 | |
| Reference Timestamp | 00 5A F9 11<br>54 D0 17 18 | 1736085240872000000 nanoseconds since epoch |
| Message Sequence Number | 64 00 00 00<br>00 00 00 00 | This block starts with message sequence number 100 |

## 6.2 Technical Messages Examples

### 6.2.1 Message Type 01 – Login (TCP Retransmission)

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 28 00 | Length of 40 |
| Message Type | 01 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| User | 00 00 00 00<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00 | As provided by BOX (for future use) |
| Password | 00 00 00 00<br>00 00 00 00<br>00 00 00 00<br>00 00 00 00 | As provided by BOX (for future use) |

### 6.2.2 Message Type 02 – Login Acknowledgement (TCP Retransmission)

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 08 00 | Length of 8 |
| Message Type | 02 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |

### 6.2.3 Message Type 03 – Logout (TCP Retransmission)

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 08 00 | Length of 8 |
| Message Type | 03 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |

### 6.2.4 Message Type 04 – Logout Acknowledgement (TCP Retransmission)

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 08 00 | Length of 8 |
| Message Type | 04 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |

### 6.2.5 Message Type 05 - Retransmission Request

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 20 | Length of 32 |
| Message Type | 05 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Line Name | 31 | Line ‘1’ |
| Filler | 00 00 00 00 00 00 00 | Zero-Filled (0x00) |
| Start Message Sequence Number | 40 E2 01 00 00 00 00 00 | Start with message sequence 123,456 |
| End Message Sequence Number | F1 FB 09 00 00 00 00 00 | End with message sequence 654,321 |

### 6.2.6 Message Type 07 – Retransmission End (TCP Retransmission)

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 08 00 | Length of 8 |
| Message Type | 07 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |

### 6.2.7 Message Type 08 – Retransmission Line Status

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 40 00 | Length 64 |
| Message Type | 08 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Filler1 | 00 00 00 00 00 00 00 | |
| Number of Lines | 03 | |
| Line Name (index 0) | 31 | Line ‘1’ |
| Filler (index 0) | 00 00 00 00 00 00 00 | |
| Last Message Sequence Number (index 0) | A0 86 01 00 00 00 00 00 | Sequence number 100,000 |
| Line Name (index 1) | 35 | Line ‘5’ |
| Filler (index 1) | 00 00 00 00 00 00 00 | |
| Last Message Sequence Number (index 1) | 20 A1 07 00 00 00 00 00 | Sequence number 500,000 |
| Line Name (index 2) | 44 | Line ‘D’ |
| Filler (index 2) | 00 00 00 00 00 00 00 | |

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 40 00 | Length 64 |
| Message Type | 08 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Last Message Sequence Number (index 2) | 40 E2 01 00<br>00 00 00 00 | Start with message sequence 123,456 |

### 6.2.8 Message Type 09 – Heartbeat

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 10 00 | Length 16 |
| Message Type | 09 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Time | 00 59 C9 4B<br>C8 CB 17 18 | 1736080242500000000 ns since epoch.<br>Corresponds to 2025/01/05 at 12:30:42.500 UTC. |

### 6.2.9 Message Type 11 – End of Transmission

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 08 00 | Length 8 |
| Message Type | 0B | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |

### 6.2.10 Message Type 12 – Error Message

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 60 00 | Length 96 |
| Message Type | 0C | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Message Type In Error | 05 | Message Type 05 – Retransmission Request caused error. |
| Error Code | 05 | Invalid line name |
| Filler | 00 00 00 00<br>00 00 | Zero filled 0x00 |
| Error Text | 20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 20<br>20 20 20 49<br>6E 76 61 6C<br>69 64 20 6C<br>69 6E 65 20<br>6E 61 6D 65 | Error text (preceded by 59 spaces):<br>“ Invalid line name” |

## 6.3 Business Messages

### 6.3.1 Message Type 20 – Non-FLEX Option Instrument

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 14 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 19 09 00 00 | ID of 2329 |
| Unique Group ID | 9B | ID of 155 |
| Group | 30 31 | “01” |
| Instrument ID | 30 4F 46 30 | “0OF0” |
| Root Symbol | 41 41 42 20 20 20 | “AAB “ |
| Expiration Year | EB 07 | 2027 |
| Expiration Month | 01 | January |
| Expiration Day | 01 | 1st |
| Call Put Code | 01 | Call |
| Option Type | 00 | Standard, non-flex option |
| Strike Price | 9C FF 63 00 00 00 00 00 | 6553500 which translates to 655.35 |
| Underlying Symbol | 41 41 42 20 20 20 20 20 20 20 | “AAB “ |
| Tick Increment Indicator | 54 31 | “T1” |
| Posting Action | 00 | No restriction |
| Filler1 | 00 00 00 00 00 00 00 00 00 00 00 | Zero filled (0x00) |

### 6.3.2 Message Type 21 – FLEX Option Instrument

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 15 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | B6 2C 00 00 | ID of 11,446 |
| Unique Group ID | CF | ID of 207 |
| Group | 30 31 | “01” |
| Instrument ID | 30 4F 47 30 | “0OG0” |
| Root Symbol | 31 41 41 42 20 20 | “1AAB “ |
| Expiration Year | EE 07 | 2030 |
| Expiration Month | 01 | January |
| Expiration Day | 01 | 1st |
| Call Put Code | 01 | Call |
| Option Type | 01 | American FLEX Option, Physical-Delivery |
| Strike Price | 9C FF 63 00 00 00 00 00 | 6553500 which translates to 655.35 |
| Underlying Symbol | 41 41 42 20 20 20 20 20 20 20 | “AAB “ |
| Tick Increment Indicator | 54 31 | “T1” |
| Posting Action | 00 | No restricition |
| Filler1 | 00 00 00 00 00 00 00 00 00 00 00 | Zero filled (0x00) |

### 6.3.3 Message Type 25 – Complex Non-FLEX Instrument

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 58 00 | Length of 88 |
| Message Type | 19 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | A0 2B 00 00 | ID of 11168 |
| Group | 64 31 | “d1” |
| Instrument ID | 30 32 30 30 | “0200” |
| Complex Instrument Symbol | 41 41 42 5F 49 4D 43 4F 5F 64 31 30 32 30 30 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 | “AAB_IMCO_d10200 “ |
| Minimum Price Limit | 64 00 9C FF FF FF FF FF | -6553500 which translates to -655.35 |
| Maximum Price Limit | 9C FF 63 00 00 00 00 00 | 6553500 which translates to 655.35 |
| Tick Increment Indicator | 54 31 | “T1” |
| Filler1 | 00 00 00 00 00 | Zero-filled 0x00 |
| Number Of Legs | 2 | |
| Leg Product ID (index 0) | 6B 09 00 00 | ID = 2411 |
| Leg Ratio (index 0) | 01 00 00 00 | Ratio = 1 |
| Leg Product ID (index 1) | 19 09 00 00 | ID = 2329 |
| Leg Ratio (index 1) | 01 00 00 00 | Ratio = 1 |

### 6.3.4 Message Type 26 – Complex FLEX Instrument

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 58 00 | Length of 88 |
| Message Type | 1A | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | B8 2C 00 00 | ID of 11448 |
| Group | 64 31 | “d1” |
| Instrument ID | 30 32 30 30 | “0400” |
| Complex Instrument Symbol | 41 41 42 5F 49 4D 43 4F 5F 64 31 30 34 30 30 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 | “AAB_IMCO_d10400 “ |
| Minimum Price Limit | 64 00 9C FF FF FF FF FF | -6553500 which translates to -655.35 |
| Maximum Price Limit | 9C FF 63 00 00 00 00 00 | 6553500 which translates to 655.35 |
| Tick Increment Indicator | 54 31 | “T1” |
| Filler1 | 00 00 00 00 00 | Zero-filled 0x00 |
| Number Of Legs | 2 | |
| Leg Product ID (index 0) | B6 2C 00 00 | ID = 11446 |
| Leg Ratio (index 0) | 01 00 00 00 | Ratio = 1 |
| Leg Product ID (index 1) | B7 2C 00 00 | ID = 11447 |
| Leg Ratio (index 1) | 01 00 00 00 | Ratio = 1 |

### 6.3.5 Message Type 58 – Option Opening Price

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length of 56 |
| Message Type | 3A | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 00 | Pre-opening |
| Opening Price Bit field | 06 | MOO on Ask side, Public Customer on bid side |
| Filler1 | 00 00 | Zero filled (0x00) |
| Opening Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Bid Size | D2 04 00 00 | 1234 |
| Public Customer Bid Size | D2 04 00 00 | 1234 |
| Market On Opening Bid Size | 00 00 00 00 | 0 |
| Total Number of Bid Orders | 01 00 00 00 | 1 |
| Ask Size | 64 00 00 00 | 100 |
| Public Customer Ask Size | 00 00 00 00 | 0 |
| Market On Opening Ask Size | 64 00 00 00 | 100 |
| Total Number of Ask Orders | 01 00 00 00 | 1 |

### 6.3.6 Message Type 30 – Option Market Depth Long

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 30 00 | Length of 96 |
| Message Type | 1E | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 00 | Initial |
| Filler1 | 00 00 | |
| Number Of Levels | 02 | |
| Market Level (index 0) | 00 | Level 0 – Public Customer |
| Market Level Bitfield (index 0) | 13 | Public Customer presence at bid and bid price and size has changed |
| Filler2 (index 0) | 00 00 00 00 00 00 | |
| Bid Price (index 0) | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Bid Size (index 0) | D2 04 00 00 | 1234 |
| Number of Bid Orders (index 0) | 0A 00 00 00 | 10 |
| Ask Price (index 0) | 00 00 00 00 00 00 00 00 | |
| Ask Size (index 0) | 00 00 00 00 | |
| Number of Ask Orders (index 0) | 00 00 00 00 | |
| Market Level (index 1) | 01 | Level 1 |
| Market Level Bitfield (index 1) | 0C | Ask Price and Size has changed |

| Field Name | Data | Value Description |
|---|---|---|
| Filler2 (index 1) | 00 00 00 00 00 00 | |
| Bid Price (index 1) | 00 00 00 00 00 00 00 00 | |
| Bid Size (index 1) | 00 00 00 00 | |
| Number of Bid Orders (index 1) | 00 00 00 00 | |
| Ask Price (index 1) | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Ask Size (index 1) | D2 04 00 00 | 1234 |
| Number of Ask Orders (index 1) | 0A 00 00 00 | 10 |

### 6.3.7 Message Type 40 – Complex Market Depth Long

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | B(2) | |
| Message Type | B(1) | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | A0 2B 00 00 | ID of 11168 |
| Status | 00 | Initial |
| Filler1 | 00 00 | |
| Number Of Levels | 02 | |
| Market Level (index 0) | 00 | Level 0 – Public Customer |
| Market Level Bitfield (index 0) | 13 | Public Customer presence at bid and bid price and size has changed |
| Filler2 (index 0) | 00 00 00 00 00 00 | |

| Field Name | Data | Value Description |
|---|---|---|
| Bid Price (index 0) | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Bid Size (index 0) | D2 04 00 00 | 1234 |
| Number of Bid Orders (index 0) | 0A 00 00 00 | 10 |
| Ask Price (index 0) | 00 00 00 00 00 00 00 00 | |
| Ask Size (index 0) | 00 00 00 00 | |
| Number of Ask Orders (index 0) | 00 00 00 00 | |
| Market Level (index 1) | 01 | Level 1 |
| Market Level Bitfield (index 1) | 0C | Ask Price and Size has changed |
| Filler2 (index 1) | 00 00 00 00 00 00 | |
| Bid Price (index 1) | 00 00 00 00 00 00 00 00 | |
| Bid Size (index 1) | 00 00 00 00 | |
| Number of Bid Orders (index 1) | 00 00 00 00 | |
| Ask Price (index 1) | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Ask Size (index 1) | D2 04 00 00 | 1234 |
| Number of Ask Orders (index 1) | 0A 00 00 00 | 10 |

### 6.3.8 Message Type 32 – Option Market Depth (MD) Short

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 20 00 | Length of 32 |
| Message Type | 20 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 03 | Normal Trading |
| Filler1 | 00 00 | Zero-Filled (0x00) |
| Number Of Levels | 01 | 1 level |
| Market Level (index 0) | 01 | Level 1 |
| Market Level Bitfield (index 0) | 01 | Bid price has changed |
| Filler2 (index 0) | 00 00 | |
| Bid Price (index 0) | DC FF | 65500 which is 655.00 |
| Bid Size (index 0) | 64 00 | 100 |
| Number of Bid Orders (index 0) | 09 00 | 9 |
| Ask Price (index 0) | 00 00 | |
| Ask Size (index 0) | 00 00 | |
| Number of Ask Orders (index 0) | 00 00 | |

### 6.3.9 Message Type 50 – Option 2-Sided Quote - Long

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 40 00 | Length 64 |
| Message Type | 32 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 9F | Bid price and size, ask price and size all changed. Public Customer presence at bid, implied at ask. |
| Filler1 | 00 00 | |
| Bid Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Bid Size | D2 04 00 00 | 1234 |
| Bid Public Customer Size | 0A 00 00 00 | 10 |
| Number of Bid Orders | 0A 00 00 00 | 10 |
| Filler2 | 00 00 00 00 | |
| Ask Price | 70 30 00 00 00 00 00 00 | 12400 which is 1.2400 |
| Ask Size | 64 00 00 00 | 100 |
| Ask Public Customer Size | 00 00 00 00 | |
| Number of Bid Orders | 03 00 00 00 | |
| Filler3 | 00 00 00 00 | |

### 6.3.10 Message Type 60 – Complex 2-Sided Quote – Long

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 40 00 | Length 64 |
| Message Type | 3C | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | B8 2C 00 00 | ID of 11448 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 9F | Bid price and size, ask price and size all changed. Public Customer presence at bid, implied at ask. |
| Filler1 | 00 00 | |
| Bid Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Bid Size | D2 04 00 00 | 1234 |
| Bid Public Customer Size | 0A 00 00 00 | 10 |
| Number of Bid Orders | 0A 00 00 00 | 10 |
| Filler2 | 00 00 00 00 | |
| Ask Price | 70 30 00 00 00 00 00 00 | 12400 which is 1.2400 |
| Ask Size | 64 00 00 00 | 100 |
| Ask Public Customer Size | 00 00 00 00 | |
| Number of Bid Orders | 03 00 00 00 | |
| Filler3 | 00 00 00 00 | |

### 6.3.11 Message Type 52 – Option 2-Sided Quote - Short

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 20 00 | Length 32 |
| Message Type | 34 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 9F | Bid price and size, ask price and size all changed. Public Customer presence at bid, implied at ask. |
| Filler1 | 00 00 | |
| Bid Price | 7B 00 00 00 | 123 which is 1.23 |
| Bid Size | D2 04 | 1234 |
| Bid Public Customer Size | 0A 00 | 10 |
| Number of Bid Orders | 0A 00 | 10 |
| Ask Price | 7C 00 00 00 | 124 which is 1.24 |
| Ask Size | 64 00 | 100 |
| Ask Public Customer Size | 00 00 | |
| Number of Bid Orders | 03 00 | |

### 6.3.12 Message Type 59 – Option Request for Quote

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 10 00 | Length 16 |
| Message Type | 3B | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Size | 64 00 00 00 | 100 |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 03 | Bid price and size changed |
| Filler1 | 00 | |
| Side | 00 | Buy |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Size | 0A 00 00 00 | 10 |
| Number of Orders | 0A 00 00 00 | 10 |
| Filler2 | 00 00 00 00 | |

### 6.3.13 Message Type 80 – Complex 1-Sided Quote Long

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 28 00 | Length 40 |
| Message Type | 50 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | A0 2B 00 00 | ID of 11168 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 0C | Ask price and size changed |
| Filler1 | 00 | |
| Side | 01 | Sell |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Size | 0A 00 00 00 | 10 |
| Number of Orders | 0A 00 00 00 | 10 |
| Filler2 | 00 00 00 00 | |

### 6.3.14 Message Type 72 – Option 1-Sided Quote Short

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 18 00 | Length 24 |
| Message Type | 48 | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Status | 03 | Normal Trading |
| Quote Indicator Bitfield | 03 | Bid price and size changed |
| Filler1 | 00 | |
| Side | 00 | Buy |
| Price | 7B 00 | 123 which is 1.23 |
| Size | D2 04 | 1234 |
| Customer Size | 0A 00 | 10 |
| Number of Orders | 0A 00 | 10 |

### 6.3.15 Message Type 90 – Option Trade

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 5A | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Trade Number | 2E 16 00 00 | 5678 |
| Trade Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Trade Volume | D2 04 00 00 | 1234 |
| Trade Indicator (OPRA Code) | 49 | 'I' |
| Customer Indicator | 00 | Not a Public Customer |
| Filler1 | 00 00 | |
| Match Number | 30 30 30 30 30 30 30 30 | "00000000" |
| Auction ID | D2 04 00 00 | 1234 |
| Filler2 | 00 00 00 00 00 00 00 00 00 00 00 00 | |

### 6.3.16 Message Type 91 – Option Trade Cancel

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 5B | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Trade Number | 2E 16 00 00 | 5678 |
| Trade Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Trade Volume | D2 04 00 00 | 1234 |
| Trade Indicator (OPRA Code) | 41 | 'A' |
| Customer Indicator | 00 | Not a public customer |
| Filler1 | 00 00 | |
| Match Number | 30 30 30 30 30 30 30 30 | "00000000" |
| Auction ID | D2 04 00 00 | 1234 |
| Filler2 | 00 00 00 00 00 00 00 00 00 00 00 00 | |

### 6.3.17 Message Type 90 – Option Trade

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 5A | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Trade Number | 2E 16 00 00 | 5678 |
| Trade Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Trade Volume | D2 04 00 00 | 1234 |
| Trade Indicator (OPRA Code) | 49 | 'I' |
| Customer Indicator | 00 | Not a Public Customer |
| Filler1 | 00 00 | |
| Match Number | 30 30 30 30 30 30 30 30 | "00000000" |
| Auction ID | D2 04 00 00 | 1234 |
| Filler2 | 00 00 00 00 00 00 00 00 00 00 00 00 | |

### 6.3.18 Message Type 91 – Option Trade Cancel

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 38 00 | Length 56 |
| Message Type | 5B | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Trade Number | 2E 16 00 00 | 5678 |
| Trade Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Trade Volume | D2 04 00 00 | 1234 |
| Trade Indicator (OPRA Code) | 41 | 'A' |
| Customer Indicator | 00 | Not a Public Customer |
| Filler1 | 00 00 | |
| Match Number | 30 30 30 30 30 30 30 30 | "00000000" |
| Auction ID | D2 04 00 00 | 1234 |
| Filler2 | 00 00 00 00 00 00 00 00 00 00 00 00 | |

### 6.3.19 Message Type 100 – Option Auction

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 88 00 | Length 56 |
| Message Type | 64 | |
| Filler | 00 | |
| Time Offset From Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Auction ID or Order ID | D2 04 00 00 | 1234 |
| Type | 00 | PIP |
| Status | 00 | Start |
| Filler1 | 00 00 00 00 00 | |
| Side | 00 | Buy |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Indicator | 01 | Public Customer |
| Filler2 | 00 00 00 00 00 00 00 00 00 | |
| Firm ID | 00 00 | |
| End Time | 00 00 00 00 00 00 00 00 | Empty since a start message |

### 6.3.20 Message Type 101 – Option Exposition

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 88 00 | Length 56 |
| Message Type | 65 | |
| Filler | 00 | |
| Time Offset From Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Auction ID or Order ID | D2 04 00 00 | 1234 |
| Type | 03 | Exposition |
| Status | 00 | Start |
| Filler1 | 00 00 00 00 00 | |
| Side | 00 | Buy |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Indicator | 01 | Public Customer |
| Filler2 | 00 00 00 00 00 00 00 00 00 | |
| Firm ID | 05 00 | |
| End Time | 00 00 00 00 00 00 00 00 | Empty since a start message |

### 6.3.21 Message Type 105 – Complex Order Auction

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 88 00 | Length 56 |
| Message Type | 69 | |
| Filler | 00 | |
| Time Offset From Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Auction ID or Order ID | D2 04 00 00 | 1234 |
| Type | 00 | PIP |
| Status | 00 | Start |
| Filler1 | 00 00 00 00 00 | |
| Side | 00 | Buy |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Indicator | 01 | Public Customer |
| Filler2 | 00 00 00 00 00 00 00 00 00 | |
| Firm ID | 00 00 | |
| End Time | 00 00 00 00 00 00 00 00 | Empty since a start message |

### 6.3.22 Message Type 106 – Complex Order Exposition

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 88 00 | Length 56 |
| Message Type | 6A | |
| Filler | 00 | |
| Time Offset From Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Product ID | 6B 09 00 00 | ID = 2411 |
| Auction ID or Order ID | D2 04 00 00 | 1234 |
| Type | 03 | Exposition |
| Status | 00 | Start |
| Filler1 | 00 00 00 00 00 | |
| Side | 00 | Buy |
| Price | 0C 30 00 00 00 00 00 00 | 12300 which is 1.2300 |
| Size | D2 04 00 00 | 1234 |
| Customer Indicator | 01 | Public Customer |
| Filler2 | 00 00 00 00 00 00 00 00 00 | |
| Firm ID | 05 00 | |
| End Time | 00 00 00 00 00 00 00 00 | Empty since a start message |

### 6.3.23 Message Type 110 – Trading Status

| Field Name | Data | Value Description |
|---|---|---|
| Message Length | 28 00 | Length 40 |
| Message Type | 6E | |
| Filler | 00 | |
| Time Offset from Reference Time | 00 2F 68 59 | 1500000000 ns after the reference time on the block header |
| Group | 30 31 | “01” |
| Unique Group ID | 9B | ID of 155 |
| Underlying Symbol | 41 41 42 20 20 20 20 20 20 20 | “AAB “ |
| Status | 02 | Opening |
| Opening Type | 00 | Auto |
| Group Trading Eligibility | 01 | 1 for Eligible for RTH |
| Current Trading Session | 01 | 1 for Regular Trading |
| Filler1 | 00 00 00 00 00 00 | |
| Scheduled Opening Time | 00 00 00 00 00 00 00 00 | |
| Quoting Width | F4 01 00 00 | 500 which is 5.00 |
| Quoting Width Type | 00 | Normal |
| Filler2 | 00 00 00 00 00 | |

# Appendix A

## A.1 Heartbeat

Each Heartbeat message is sent in its own Binary Block and is sent if there are no messages on the Line.

The Message Sequence Number of the Heartbeat Block is not incremented and will contain the **last** Message Sequence number sent on that Line.

Example:

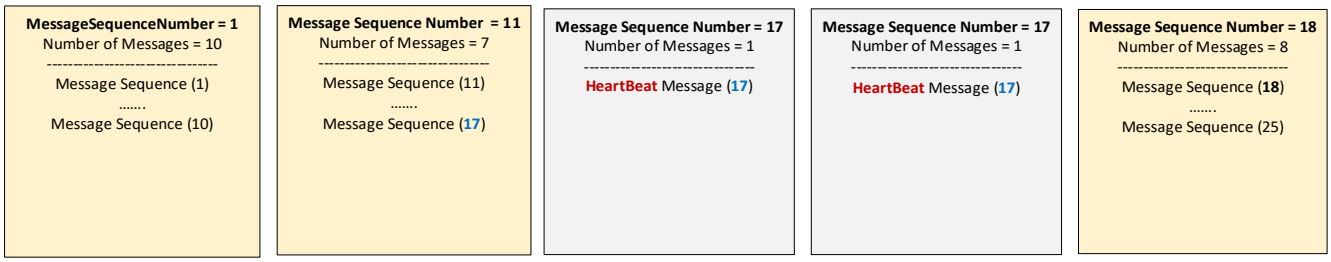


**Figure 9 – Example of Heartbeat messages**

## A.2 HSVF[7] versus Binary Market Data Feed

| Category | HSVF | Binary Market Data Feed |
|---|---|---|
| **Sequence Number** | Sequence Number defined in Header of each message | Message Sequence Number of first message in the Block from which Sequence Number of a given message can be derived based on its position within the Block |
| **Instrument Description** | Each message uses an Instrument Description field which contains the complete characteristics of the instrument (e.g., Class Symbol, Strike Price, Expiration etc.) | The complete instrument description is only available in the Option Instrument or Complex Order Instrument messages.<br>An Instrument (Option or Complex) is referred to in all other messages by its:<br>• ProductId |
| **Price fields** | Numeric field with separate field for sign (+ or -) and fraction indicator field for number of decimals | Price is represented in Binary format:<br>• Long Price - Signed Binary 8 and with 4 decimals<br>• Short Price - Un-Signed Binary 2 and with 2 decimals<br>Refer to Section 2.3 for details. |
| **Quantity fields** | Numeric field with and indicator code for multiplier (100, 1000, etc.) | Quantity is represented in Binary<br>• Long Quantity – Binary 4<br>• Short Quantity – Binary 2<br>Refer to Section 2.3 for details. |
| **Market Depth messages** | Different message structure for<br>• Option Market Depth (HSVF H)<br>• Complex Order Market Depth (HSVF HS) | Same message structure for Option Market Depth and Complex Order Market Depth.<br>Long version:<br>• Option Market Depth Long<br>• Complex Order Market Depth Long<br>Short version:<br>• Option Market Depth Short |
| **Quote message (2 sided) [Top of Book]** | Separate message structure for<br>• Option Quote (HSVF F)<br>• Complex Order Quote (HSVF FS) | Same message structure for Option Two-sided Quote and Complex Order Two-sided Quote.<br>Long version:<br>• Option 2 sided-Quote Long |

[7] As used within this Specification Guide, the term “HSVF” shall mean High Speed Vendor Feed. The HSVF is a separate data feed that is iteration of BOX’s proprietary market data feed prior to what is covered in this document.

| Category | HSVF | Binary Market Data Feed |
|---|---|---|
| | | • Complex Order 2 sided-Quote Long<br>Short version:<br>• Option 2 sided-Quote Short |
| **Quote message (1 sided) [Top of Book]** | Not present | Same message structure for Option 1-sided Quote and Complex Order 1-sided Quote with Long and Short versions:<br>Long version:<br>• Option 1-Sided Quote Long<br>• Complex Order 1-Sided Quote Long<br>Short version:<br>• Option 1-Sided Quote Short |
| **Trade / Trade Cancel messages** | Separate message structure for Option Trade (HSVF C) and Complex Order Trade (HSVF CS), Option Trade Cancel (HSVF I) and Complex Order Trade Cancel (HSVF IS) | Same message structure for Option Trade/TradeCancel and Complex Order Trade/Trade Cancel:<br>• Option Trade<br>• Complex Order Trade<br>• Option Trade Cancel<br>• Complex Order Trade Cancel<br><br>Trade Indicator (markers) are aligned with OPRA codes<br>Other fields of interest:<br>• TradeNumber<br>• AuctionId<br>• MatchNumber |
| **Auction messages** | <u>Auction Start:</u><br>Separate message structure for start of an Option Auction (HSVF M) and Complex Order Auction (HSVF MS)<br><br><u>Improvement Orders sent to Auction:</u><br>Separate message structure for improvement of an Option Auction (HSVF O) and Complex Order Auction (HSVF OS) | Same message structure for Option Auction and Complex Order Auction<br>• Option Auction<br>• Complex Order Auction<br><br>No messages for Improvement or Cancellation of untraded Improvement in Auction. |

| Category | HSVF | Binary Market Data Feed |
|---|---|---|
| | (Note: Although defined in HSVF protocol, these messages are not disseminated in production)<br><br><u>Cancellation of Improvement Orders not traded in auction:</u><br>Separate message structure for notification of deletion of untraded improvement in an Option Auction (HSVF T) and Complex Order Auction (HSVF TS) | |
| **Exposition messages** | <u>Exposed Orders:</u><br>Separate message structure for exposition of an Option (HSVF O) and exposition of a Complex Order (HSVF OS) with Type being “Exposition” | <u>Exposed Orders:</u><br>Same message structure for Option Exposition and Complex Order Exposition<br>• Option Exposition<br>• Complex Order Exposition |
| **Summary Messages** | Separate message structure for Option Summary (HSVF N) and Complex Order Summary (HSVF NS).<br>Also beginning of summary messages for Options (Q) and Complex Order (QS)<br>Summary messages are sent at Start of Day, after trade cancellation, and End of Day | EOD Summary messages are not present in the Binary Feed |
| **Group Status / Group Opening** | <u>Group Status:</u><br>• HSVF Group Status (GR)<br>• HSVF Complex Order Group Status<br><u>Group Opening:</u><br>• HSVF Group Opening Time (GC) | <u>Trading Status</u><br>• Group Status and Group opening time are defined within the same message.<br>• Complex Order Group Status is removed – complex order trading state will follow the Group / Instrument Status of its leg’s instruments.<br>• Trading Status also contain the Quote Width applicable for that given Group or Underlying. |

# Document History

| Version | Date (MM/DD/YYYY) | Change Description |
|---|---|---|
| 1.0 | 04/23/2026 | Initial Document. |