
# US Equities/Options Multicast PITCH Specification

Version 2.31.1

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# Contents

# 1 Introduction

## 1.1 Overview

Note that this specification will be the standard Multicast PITCH specification to be used for BATS BYX Exchange (NJ2/NY5), BZX Exchange (NJ2/NY5), EDGA Exchange (NY5) and EDGX Exchange (NY5) platforms. The specifications for the EDGA/EDGX platforms in NY4 can be found at the following links:

- Next Gen Multicast Market Data Manual (EDGA/EDGX)

BATS members may use Multicast PITCH to receive real-time depth of book quotations, execution information and auction update information during auctions for BATS listed securities. BATS Auction Update and Auction Summary messages support the BATS Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the BATS US Equities Auction Process specification for more information on BATS Auctions.

A WAN-Shaped and Gig-Shaped version of the Multicast PITCH feed may be available from one or both of BATS' datacenters. Members may choose to take one or more of the following Multicast PITCH feed options depending on their location and connectivity to BATS.

Multicast PITCH Feed Descriptions:

| Exchange | Shaping (Gig/WAN) | Served From Data Center (Primary/Secondary) | Multicast Feed ID |
|---|---|---|---|
| BATS Options | Gig | Primary | OA |
| BATS Options | WAN | Primary | OC |
| BATS Options | WAN | Secondary | OE |
| BYX Exchange | Gig | Primary | YA |
| BYX Exchange | WAN | Primary | YC |
| BYX Exchange | WAN | Secondary | YE |
| BZX Exchange | Gig | Primary | ZA |
| BZX Exchange | WAN | Primary | ZC |
| BZX Exchange | WAN | Secondary | ZE |
| EDGA Exchange | Gig | Primary | AA |
| EDGA Exchange | WAN | Primary | AC |
| EDGA Exchange | WAN | Secondary | AE |
| EDGX Exchange | Gig | Primary | XA |
| EDGX Exchange | WAN | Primary | XC |
| EDGX Exchange | WAN | Secondary | XE |

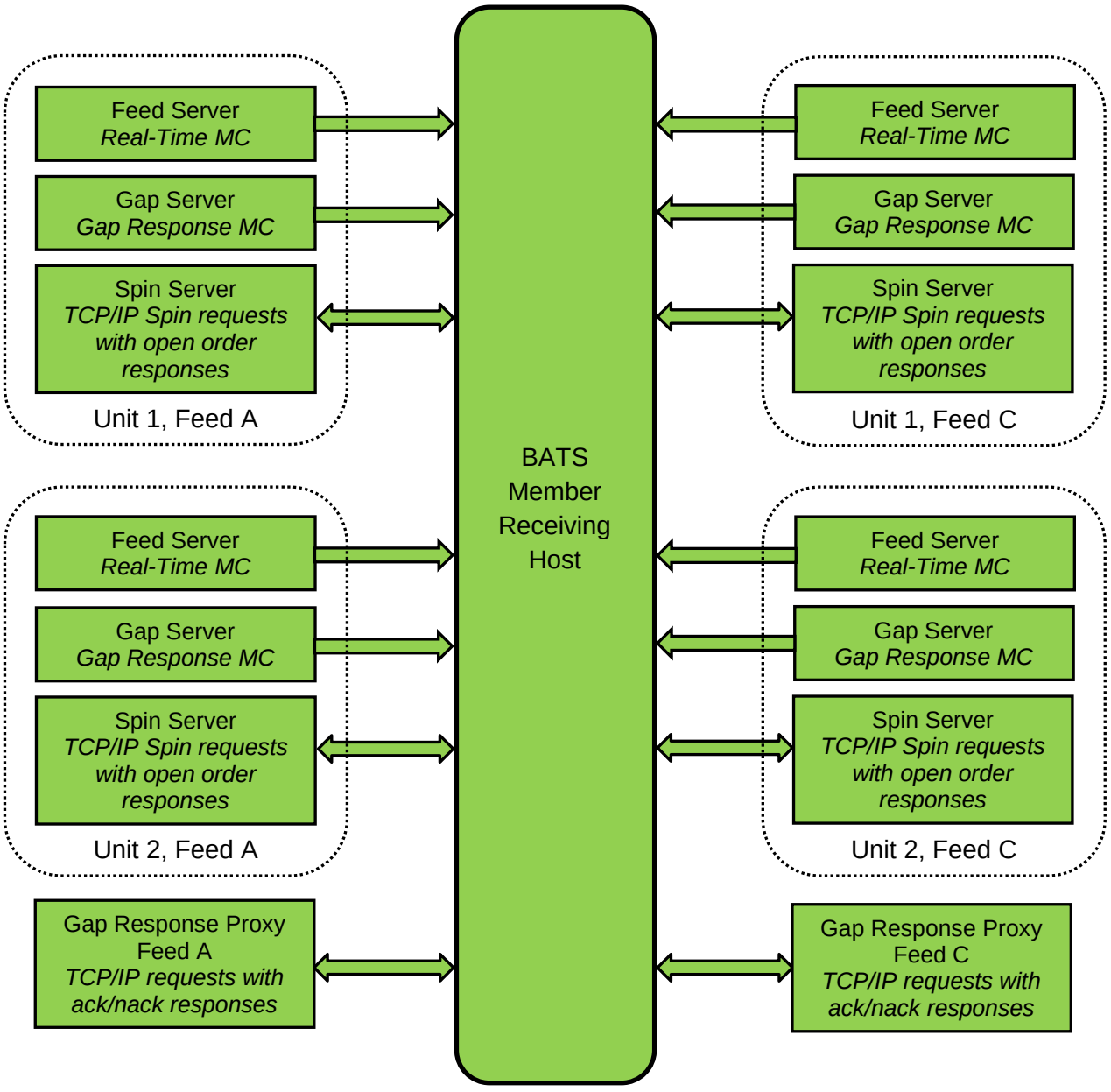
## 1.2 Feed Connectivity Requirements

- Gig Shaped feeds are available to members with a minimum of 1 Gb/s of connectivity to BATS via cross connect or dedicated circuit.
- WAN-Shaped feeds are available to members who meet the minimum bandwidth requirements to BATS via cross-connect, dedicated circuit, or a supported carrier.

Members with sufficient connectivity may choose to take both the Gig-Shaped and WAN-shaped feeds from one of BATS datacenters and arbitrate the feeds to recover lost data. Alternatively, members may choose to arbitrate feeds from both datacenters. It should be noted that feeds from the secondary datacenter will have additional latency for those co-located with BATS in the primary datacenter due to proximity and business continuity processing.

BATS Multicast PITCH real-time events are delivered using a published range of multicast addresses divided by symbol range units. Dropped messages can be requested using a TCP/IP connection to one of BATS' Gap Request Proxy (GRP) servers with replayed messages being delivered on a separate set of multicast ranges reserved for packet retransmission. Intraday, a spin of all open orders may be requested from a Spin Server. This allows a client to become current without requesting a gap for all messages up to that point in the day.

The following diagram is a logical representation Multicast PITCH feed message flow between BATS and a member feed handler that is listening to the “A” and “C” instances of two units:



## 1.3 Symbol Ranges, Units, and Sequence Numbers

Symbols will be separated into units by a published alphabetical distribution. Symbol distribution will not change intra-day. BATS does, however, reserve the right to add multicast addresses or change the symbol distribution with prior notice to members. Care should be taken to ensure that address changes, address additions, and symbol distribution changes can be supported easily.

Message sequence numbers are incremented by one for every sequenced message within a particular symbol unit. It is important to understand that one *or more* units will be delivered on a single multicast address. As with symbol ranges, unit distribution across multicast addresses will not change intra-day, but may change after notice has been given.

Symbol distribution across units as well as unit distribution across multicast addresses are identical for real-time and gap response multicast addresses.

## 1.4 Options Specific Symbol Processing

BATS has implemented a symbol mapping mechanism for the options Multicast PITCH feeds due to the large size of options symbols and to keep the options Multicast PITCH specification consistent with the equities Multicast PITCH specification. This symbol mapping mechanism significantly reduces the size of the Multicast PITCH feed for options and allows members to use the same feed handler for BATS equity and options exchanges.

Real-time symbol mapping messages are available on each unit's multicast feed. `Symbol Mapping` messages are used to map the 6 character feed symbol (used in all other Pitch 2.X messages) to an OSI symbol. `Symbol Mapping` messages are un-sequenced messages and are sent continuously from pre-market through the end of trading. The rate is variable and will be adjusted as bandwidth allows.

In addition to the symbol mapping events available on the Multicast PITCH feed, a downloadable file with current mappings is available via the Listed Series (csv) link on the Market Data page of the BATS Options web site.

## 1.5 Gap Request Proxy and Message Retransmission

Requesting delivery of missed data is achieved by connecting to a BATS Gap Request Proxy (GRP). Members who do not wish to request missed messages do not need to connect to a GRP for any reason or listen to the multicast addresses reserved for message retransmission. Members choosing to request missed data will need to connect to their assigned GRP, log in, and request gap ranges as necessary. All gap requests will be responded to with a `Gap Response` message. A `Gap Response` *Status* code of Accepted signals that the replayed messages will be delivered via the appropriate gap response multicast address. Any other `Gap Response` *Status* code will indicate the reason that the request cannot be serviced.

Gap requests are limited in message count, frequency, and age by the GRP. Gap requests will only be serviced if they are within a defined sequence range of the current multicast sequence

number for the requested unit. Members will receive a total daily allowance of gap requested messages. In addition, each member is given renewable one second and one minute gap request limits.

If more than one gap request is received for a particular unit/sequence/count combination within a short timeframe, all requests will receive a successful `Gap Response` message from the GRP, but only a single replayed message will be sent on the gap response multicast address.

If overlapping gap requests are received within a short period of time, the gap server will only send the union of the sequence ranges across grouped gap requests. Members will receive gap responses for their requested unit/sequence/count, but receivers should be prepared for the gap responses to be delivered via multicast in non-contiguous blocks.

Gap acknowledgements or rejects will be delivered to users for every gap request received by the GRP. Users should be prepared to see replayed multicast data before or after the receipt of the gap response acknowledgement from the GRP.

## 1.6 Spin Servers

A Spin Server is available for each unit. The server allows members to connect via TCP and receive a spin of all currently open orders and symbols with limited trading conditions on that unit. By using the spin, a member can get the current BATS book quickly in the middle of the trading session without worry of gap request limits. The Spin Server for each unit listens on its own address and/or TCP port.

Upon successful login and periodically thereafter, a `Spin Image Available` message is sent which contains a sequence number indicating the most recent message applied to the book. Using a `Spin Request` message, a member may request a spin for the orders up to a sequence number noted within one of the *last ten* `Spin Image Available` messages distributed. If the `Spin Request` submitted does not present a sequence number that matches one of the last ten `Spin Image Available` messages distributed, the spin will return orders up to the next closest sequence number reported through a `Spin Image Available` message that is greater than the sequence number requested.

In the case a Member sends a sequence number in a `Spin Request` that is higher than the sequence number reported by the most recent `Spin Image Available` message, the next spin image to be generated will be returned when it is available. If the requested sequence number is still higher at that time, an “O” (Out of Range) error will be generated.

A spin consists only of `Add Order` (expanded, long and/or short), `Trading Status` and `Time` messages. `Trading Status` messages will be sent in spins for all symbols that are not “H”alted (**this will change to “S”uspended effective 11/10/14 in BATS Options and effective 11/14/14 in BYX/BZX**), which results in at least one message for every symbol that has not been “H”alted (**also changing to “S”uspended on effective dates noted above**) since system startup. Spins will not contain any message for an order which is no longer on the book. While receiving the spin, the member must buffer multicast messages received. If the

`Spin Image Available` message sequence number is the Member's reference point, multicast messages with larger sequence numbers should be buffered. If a non-`Spin Image Available` sequence number is the Member's reference point which they send in their `Spin Request`, they should buffer from that point on, but note that the spin they will receive sequence numbers beyond that point which they may disregard. When a `Spin Finished` message is received, the buffered messages must be applied to spun copy of the book to bring it current.

Section 6.7 shows an example flow of messages between a member and BATS' Multicast PITCH feed and Spin Server.

# 2 Protocol

BATS users may use the PITCH 2.X protocol over multicast to receive real-time full depth of book quotations and execution information direct from BATS.

PITCH 2.X cannot be used to enter orders. For order entry, refer to the BATS FIX Specification.

All visible orders and executions are reflected via the PITCH 2.X feed. All orders and executions are anonymous, and do not contain any member identity.

## 2.1 Message Format

The messages that make up the PITCH 2.X protocol are delivered using BATS `Sequenced Unit Header` which handles sequencing and delivery integrity. All messages delivered via multicast as well as to/from the Gap Request Proxy (GRP) will use the `Sequenced Unit Header` for handling message integrity.

All UDP delivered events will be self-contained. Developers can assume that UDP delivered data will not cross frame boundaries and a single Ethernet frame will contain only one Sequenced Unit Header with associated data.

TCP/IP delivered events from the GRP may cross frames as the data will be delivered as a stream of data with the TCP/IP stack controlling Ethernet framing.

The PITCH data feed is comprised of a series of dynamic length sequenced messages. Each message begins with Length and Message Type fields. BATS reserves the right to add message types and grow the length of any message without notice. Members should develop their decoders to deal with unknown message types and messages that grow beyond the expected length. Messages will only be grown to add additional data to the end of a message.

## 2.2 Data Types

The following field types are used within the `Sequenced Unit Header`, GRP messages, and PITCH 2.X.

- **Alphanumeric** fields are left justified ASCII fields and space padded on the right.
- **Binary** fields are unsigned and sized to "Length" bytes and ordered using Little Endian convention (least significant byte first).
- **Binary Short Price** fields are unsigned Little Endian encoded 2 byte binary fields with 2 implied decimal places (denominator = 100).
- **Binary Long Price** fields are unsigned Little Endian encoded 8 byte binary fields with 4 implied decimal places (denominator = 10,000).
- **Bit Field** fields are fixed width fields with each bit representing a boolean flag (the 0 bit is the lowest significant bit; the 7 bit is the highest significant bit).
- **Printable ASCII** fields are left justified ASCII fields that are space padded on the right that may include ASCII values in the range of 0x20 – 0x7e.

## 2.3 Message Framing

Depth of book update messages will be combined into single UDP frame where possible to decrease message overhead and total bandwidth. The count of messages in a UDP frame will be communicated using the BATS `Sequenced Unit Header`. Framing will be determined by the server for each unit and site. The content of the multicast across feeds (e.g. A/B & Gig-Shaped/WAN-Shaped) will be identical, but framing will not be consistent across feeds. Receiving processes that receive and arbitrate multiple feeds cannot use frame level arbitration to fill gaps.

## 2.4 BATS Sequenced Unit Header

The BATS `Sequence Unit Header` is used for all BATS Multicast PITCH messages as well as messages to and from the Gap Request Proxy (GRP) and Spin Servers.

Sequenced and un-sequenced data may be delivered using the `Sequenced Unit Header`. Un-sequenced headers will have a 0 value for the sequence field and potentially for the unit field. All messages sent to and from the GRP and Spin Server are un-sequenced while multicast may contain sequenced and un-sequenced messages.

Sequenced messages have implied sequences with the first message having the sequence number contained in the header. Each subsequent message will have an implied sequence one greater than the previous message up to a maximum of count messages. Multiple messages can follow a `Sequenced Unit Header`, but a combination of sequenced and un-sequenced messages cannot be sent with one header.

The sequence number for the first message in the next frame can be calculated by adding the *Hdr Count* field to the *Hdr Sequence*. This technique will work for sequenced messages and heartbeats.

| **Sequenced Unit Header** | | | | |
|---|---|---|---|---|
| **Field** | **Offset** | **Length** | **Value/Type** | **Description** |
| Hdr Length | 0 | 2 | Binary | Length of entire block of messages. Includes this header and *Hdr Count* messages to follow. |
| Hdr Count | 2 | 1 | Binary | Number of messages to follow this header. |
| Hdr Unit | 3 | 1 | Binary | Unit that applies to messages included in this header. |
| Hdr Sequence | 4 | 4 | Binary | Sequence of first message to follow this header. |
| **Total Length = 8 bytes** | | | | |

## 2.5 Execution IDs

The 1st character of an Execution ID (after converting to a 9 character base 36 number zero-padded on the left) may be used to differentiate between internal matched trades, internal auction fills, and routed trades as follows:

- 0 (zero) = BATS Internal Match
- C = Auction Fill
- R = Routed Trade

## 2.6 Heartbeat Messages

The BATS `Sequenced Unit Header` with a count field set to "0" will be used for heartbeat messages. During trading hours heartbeat messages will be sent from the GRP and all multicast addresses if no data has been delivered within 1 second. Heartbeat messages never increment the sequence number for a unit, but can be used to detect gaps on the real-time multicast channels during low update rate periods.

Heartbeats on the real-time multicast addresses during trading hours will have a *Hdr Sequence* value equal to the sequence of the next sequenced message to be sent for the unit. Heartbeats on gap multicast addresses will always have the *Hdr Sequence* field set to 0. All heartbeat messages sent to and from the GRP are considered un-sequenced and should have sequence and unit fields set to 0.

Outside of trading hours BATS sends heartbeat messages on all real-time and gap channels with a sequence of "0" to help users validate multicast connectivity. Heartbeat messages may not be sent from 12:00 am – 1:00 am ET or during maintenance windows.

BATS expects heartbeat messages to be sent to the GRP on live connections no less than every 5 seconds. Failure to receive 2 consecutive heartbeat messages will result in the GRP terminating the client connection.

# 3 Gap Request Proxy Messages

The following messages are used for initializing a TCP/IP connection to the Gap Request Proxy (GRP) and to request message retransmissions. Members only need to implement the following messages if gap requests will be made. The following messages will not be delivered using multicast.

## 3.1 Login

The `Login` message is the first message sent to the GRP by a user's process after the connection to the GRP is established. Failure to login before sending any other message type will result in the connection being dropped by the GRP.

| **Login** | | | | |
|---|---|---|---|---|
| **Field** | **Offset** | **Length** | **Value/Type** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x01 | `Login` Message |
| SessionSubId | 2 | 4 | Alphanumeric | *SessionSubId* supplied by BATS |
| Username | 6 | 4 | Alphanumeric | *Username* supplied by BATS |
| Filler | 10 | 2 | Alphanumeric | (space filled) |
| Password | 12 | 10 | Alphanumeric | *Password* supplied by BATS |
| **Total Length = 22 bytes** | | | | |

## 3.2 Login Response

The `Login Response` message is sent by the GRP to a user's process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

| **Login Response** | | | | |
|---|---|---|---|---|
| **Field** | **Offset** | **Length** | **Value/Type** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x02 | `Login Response` Message |
| Status | 2 | 1 | Alphanumeric | Accepted or reason for reject |
| **Total Length = 3 bytes** | | | | |

| Login Response - Status Codes | |
|---|---|
| 'A' | Login Accepted |
| 'N' | Not authorized (Invalid Username/Password) |
| 'B' | Session in use |
| 'S' | Invalid Session |

## 3.3 Gap Request

The `Gap Request` message is used by a user's process to request retransmission of a sequenced message (or messages) by one of BATS' gap servers.

| Gap Request | | | | |
|---|---|---|---|---|
| **Field** | **Offset** | **Length** | **Value/Type** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x03 | `Gap Request` Message |
| Unit | 2 | 1 | Binary | *Unit* that the gap is requested for |
| Sequence | 3 | 4 | Binary | *Sequence* of first message (lowest sequence in range) |
| Count | 7 | 2 | Binary | *Count* of messages requested |
| **Total Length = 9 bytes** | | | | |

## 3.4 Gap Response

The `Gap Response` message is sent by the GRP in response to a `Gap Request` message. The *Unit* and *Sequence* fields will match the values supplied in the `Gap Request` message. A `Gap Response` message, with a Status of Accepted or reason for failure, will be sent for each `Gap Request` message received by the GRP.

| Gap Response | | | | |
|---|---|---|---|---|
| **Field** | **Offset** | **Length** | **Value/Type** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x04 | `Gap Response` Message |
| Unit | 2 | 1 | Binary | *Unit* the gap was requested for |
| Sequence | 3 | 4 | Binary | *Sequence* of first message in request |
| Count | 7 | 2 | Binary | *Count* of messages requested |
| Status | 9 | 1 | Alphanumeric | Accepted or reason for reject |
| **Total Length = 10 bytes** | | | | |

| Gap Response - Status Codes | |
|---|---|
| 'A' | Accepted |
| 'O' | Out of range (ahead of sequence or too far behind) |
| 'D' | Daily gap request allocation exhausted |
| 'M' | Minute gap request allocation exhausted |
| 'S' | Second gap request allocation exhausted |
| 'C' | Count request limit for one gap request exceeded |
| 'I' | Invalid Unit specified in request |
| 'U' | Unit is currently unavailable |

* - All non-'A' status codes should be interpreted as a reject.

# 4 PITCH 2.X Messages

With the exception of `Time` messages, each PITCH message reflects the order addition, order deletion, order modification or execution of an order in the system.

## 4.1 Time

A `Time` message is sent whenever the source time for a unit passes over a second boundary. All subsequent time offset fields for the same unit will use the new `Time` value as the base until another `Time` message is received for the same unit.

| **Time** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x20 | `Time` Message |
| Time | 2 | 4 | Binary | Number of whole seconds from midnight Eastern Time |
| **Total Length = 6 bytes** | | | | |

## 4.2 Unit Clear

The `Unit Clear` message instructs feed recipients to clear all orders for the BATS book in the unit specified in the `Sequenced Unit Header`. This message will be sent at startup each day. It would also be distributed in certain recovery events such as a data center fail-over.

| **Unit Clear** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x97 | `Unit Clear` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| **Total Length = 6 bytes** | | | | |

## 4.3 Add Order

An `Add Order` message represents a newly accepted visible order on the BATS book. It includes a day-specific Order Id assigned by BATS to the order.

| **Add Order (long)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x21 | `Add Order` Message (long) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Day-specific identifier assigned to this order |
| Side Indicator | 14 | 1 | Alphanumeric | "B" = Buy Order<br>"S" = Sell Order |
| Quantity | 15 | 4 | Binary | Number of shares/contracts being added to the book (may be less than the number entered). |
| Symbol | 19 | 6 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 25 | 8 | Binary Long Price | The limit order price |
| Add Flags | 33 | 1 | Bit Field | Bit 0 - Display<br>0 – Order is not aggregated in the BATS SIP quote<br>1 – Order is aggregated in the BATS SIP quote |
| **Total Length = 34 bytes** | | | | |

| **Add Order (short)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x22 | `Add Order` Message (short) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Day-specific identifier assigned to this order |
| Side Indicator | 14 | 1 | Alphanumeric | "B" = Buy Order<br>"S" = Sell Order |
| Quantity | 15 | 2 | Binary | Number of shares/contracts being added to the book (may be less than the number entered). |
| Symbol | 17 | 6 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 23 | 2 | Binary Short Price | The limit order price |
| Add Flags | 25 | 1 | Bit Field | Bit 0 - Display<br>0 – Order is not aggregated in the BATS SIP quote<br>1 – Order is aggregated in the BATS SIP quote |
| **Total Length = 26 bytes** | | | | |

The following **expanded** version of the `Add Order` message has been made available to accommodate larger symbol sizes possible through the ISRA plan.

| **Add Order (expanded)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2F | `Add Order` Message (expanded) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Day-specific identifier assigned to this order |
| Side Indicator | 14 | 1 | Alphanumeric | "B" = Buy Order<br>"S" = Sell Order |
| Quantity | 15 | 4 | Binary | Number of shares/contracts being added to the book (may be less than the number entered). |
| Symbol | 19 | 8 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 27 | 8 | Binary Long Price | The limit order price |
| Add Flags | 35 | 1 | Bit Field | Bit 0 - Display<br>0 – Order is not aggregated in the BATS SIP quote<br>1 – Order is aggregated in the BATS SIP quote |
| ParticipantID | 36 | 4 | Alphanumeric | *Optionally specified.*<br>If specified, MPID or "RTAL" for retail specified orders (equities) or Executing Broker (options) of firm attributed to this quote. Space filled otherwise. |
| **Total Length = 40 bytes** | | | | |

## 4.4 Order Modification Messages

Order Modification messages refer to an Order ID previously sent with an `Add Order` message. Multiple Order Modification messages may modify a single order and the effects are cumulative. Modify messages may update the size and/or the price of an order on the book. When the remaining size of an order reach zero, the order is dead and should be removed from the book.

### 4.4.1 Order Executed

`Order Executed` messages are sent when a visible order on the BATS book is executed in whole or in part. The execution price equals the limit order price found in the original `Add Order` message or the limit order price in the latest `Modify Order` message referencing the *Order Id*.

| **Order Executed** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x23 | `Order Executed` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that was executed |
| Executed Quantity | 14 | 4 | Binary | Number of shares/contracts executed |
| Execution Id | 18 | 8 | Binary | BATS generated day-unique execution identifier of this execution. Execution Id is also referenced in the `Trade Break` message |
| **Total Length = 26 bytes** | | | | |

### 4.4.2 Order Executed at Price/Size

`Order Execution at Price/Size` messages are sent when a visible order on the BATS book is executed in whole or in part at a different price than the limit price on the original `Add Order` message or the limit order price in the latest `Modify Order` message referencing the *Order Id*. If the *Remaining Quantity* field contains a 0 the order should be completely removed from the book.

`Order Execution at Price/Size` messages may also be sent in the event the existing size for Order Id is not equal to Executed Quantity + Remaining Quantity. In this case the order should be prioritized the same as a new order.

| **Order Executed at Price/Size** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x24 | `Order Executed at Price/Size` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that was executed |
| Executed Quantity | 14 | 4 | Binary | Number of shares/contracts executed |
| Remaining Quantity | 18 | 4 | Binary | Number of shares/contracts remaining after the execution |
| Execution Id | 22 | 8 | Binary | BATS generated day-unique execution identifier of this execution. Execution Id is also referenced in the `Trade Break` message |
| Price | 30 | 8 | Binary Long Price | The execution price of the order |
| **Total Length = 38 bytes** | | | | |

### 4.4.3 Reduce Size

`Reduce Size` messages are sent when a visible order on the BATS book is partially reduced.

| **Reduce Size (long)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x25 | `Reduce Size` Message (long) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that has been reduced |
| Canceled Quantity | 14 | 4 | Binary | Number of shares/contracts canceled |
| **Total Length = 18 bytes** | | | | |

| **Reduce Size (short)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x26 | `Reduce Size` Message (short) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that has been reduced |
| Canceled Quantity | 14 | 2 | Binary | Number of shares/contracts canceled |
| **Total Length = 16 bytes** | | | | |

### 4.4.4 Modify Order

The `Modify Order` message is sent whenever an open order is visibly modified. The *Order Id* refers to the *Order Id* of the original `Add Order` message.

Note that `Modify Order` messages that appear to be "No Ops" (i.e. they do not appear to modify any relevant fields) will still lose priority.

| **Modify (long)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x27 | `Modify Order` Message (long) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that has been modified |
| Quantity | 14 | 4 | Binary | Number of shares/contracts associated with this order after this modify (may be less than the number entered) |
| Price | 18 | 8 | Binary Long Price | The limit order price after this modify |
| Modify Flags | 26 | 1 | Bit Field | Bit 0 - Display<br>0 – Order is not aggregated in the BATS SIP quote<br>1 – Order is aggregated in the BATS SIP quote<br>Bit 1 - Maintain Priority<br>0 - Reset Priority<br>1 - Maintain Priority |
| **Total Length = 27 bytes** | | | | |

| **Modify (short)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x28 | `Modify Order` Message (short) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that has been modified |
| Quantity | 14 | 2 | Binary | Number of shares/contracts associated with this order after this modify (may be less than the number entered) |
| Price | 16 | 2 | Binary Short Price | The limit order price after this modify |
| Modify Flags | 18 | 1 | Bit Field | Bit 0 - Display<br>0 – Order is not aggregated in the BATS SIP quote<br>1 – Order is aggregated in the BATS SIP quote<br>Bit 1 - Maintain Priority<br>0 - Reset Priority<br>1 - Maintain Priority |
| **Total Length = 19 bytes** | | | | |

### 4.4.5 Delete Order

The `Delete Order` message is sent whenever an open order is completely canceled. The *Order Id* refers to the Order Id of the original `Add Order` message.

| **Delete** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x29 | `Delete Order` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | *Order Id* of a previously sent `Add Order` message that has completely cancelled |
| **Total Length = 14 bytes** | | | | |

## 4.5 Trade

The `Trade` message provides information about executions of non-displayed orders on the BATS book and routed executions to other trading centers. `Trade` messages are necessary to calculate BATS execution-based data. `Trade` messages do not alter the book and can be ignored if messages are being used solely to build a book.

No `Add Order` message is sent for hidden orders, and thus, no modify order messages may be sent when hidden orders are executed. Instead, a `Trade` message is sent whenever a hidden or routed order is executed in whole or in part. A `Trade` message is also sent when there is an execution against any non-displayed portion of a reserve order. As with visible orders, hidden, routed and reserve orders may be executed in parts. A complete view of all BATS executions can be built by combining all `Order Executed` messages and `Trade` messages.

The *Order ID* of a hidden order is obfuscated by default in the `Trade` message, but may be optionally disseminated for a member's own orders upon request. As such, partial executions against the same hidden order will by default have different *Order IDs*.

| **Trade (long)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2A | `Trade` Message (long) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Obfuscated *Order ID* or *Order Id* of the executed order. |
| Side Indicator | 14 | 1 | Alphanumeric | Always "B" = Buy Order regardless of resting side |
| Quantity | 15 | 4 | Binary | Incremental number of shares/contracts executed |
| Symbol | 19 | 6 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 25 | 8 | Binary Long Price | The execution price of the order |
| Execution Id | 33 | 8 | Binary | BATS generated day-unique execution identifier of this trade. *Execution Id* is also referenced in the `Trade Break` message. |
| **Total Length = 41 bytes** | | | | |

| **Trade (short)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2B | `Trade` Message (short) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Obfuscated *Order ID* or *Order Id* of the executed order. |
| Side Indicator | 14 | 1 | Alphanumeric | Always "B" = Buy Order regardless of resting side |
| Quantity | 15 | 2 | Binary | Incremental Number of shares/contracts executed |
| Symbol | 17 | 6 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 23 | 2 | Binary Short Price | The execution price of the order |
| Execution Id | 25 | 8 | Binary | BATS generated day-unique execution identifier of this trade. *Execution Id* is also referenced in the `Trade Break` message. |
| **Total Length = 33 bytes** | | | | |

The following **expanded** version of the Trade message has been made available to accommodate larger symbol sizes possible through the ISRA plan.

| **Trade (expanded)** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x30 | `Trade` Message (long) |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Order Id | 6 | 8 | Binary | Obfuscated *Order ID* or Order Id of the executed order. |
| Side Indicator | 14 | 1 | Alphanumeric | Always "B" = Buy Order regardless of resting side |
| Quantity | 15 | 4 | Binary | Incremental number of shares/contracts executed |
| Symbol | 19 | 8 | Printable ASCII | *Symbol* right padded with spaces. |
| Price | 27 | 8 | Binary Long Price | The execution price of the order |
| Execution Id | 35 | 8 | Binary | BATS generated day-unique execution identifier of this trade. *Execution Id* is also referenced in the `Trade Break` message. |
| **Total Length = 43 bytes** | | | | |

## 4.6 Trade Break

The `Trade Break` message is sent whenever an execution on BATS is broken. Trade breaks are rare and only affect applications that rely upon BATS execution-based data. Applications that simply build a BATS book can ignore `Trade Break` messages.

| **Trade Break** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2C | `Trade Break` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Execution Id | 6 | 8 | Binary | BATS execution identifier of the execution that was broken. *Execution Id* refers to previously sent `Order Executed` or `Trade` message. |
| **Total Length = 14 bytes** | | | | |

## 4.7 End of Session

The `End of Session` message is sent for each unit when the unit shuts down. No more sequenced messages will be delivered for this unit, but heartbeats from the unit may be received.

| **End of Session** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2D | `End of Session` Message |
| Timestamp | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| **Total Length = 6 bytes** | | | | |

## 4.8 Symbol Mapping (Options Only)

A `Symbol Mapping` message is used to map the 6 character multicast feed symbol field to an OSI symbol. These messages are not sequenced (sequence = 0) and are sent continuously through the day at variable rates as bandwidth allows.

| **Symbol Mapping** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x2E | `Symbol Mapping` Message |
| Feed Symbol | 2 | 6 | Printable ASCII | *Symbol* right padded with spaces. |
| OSI Symbol | 8 | 21 | Printable ASCII | OSI Symbol |
| Symbol Condition | 29 | 1 | Alphanumeric | "N" = Normal<br>"C" = Closing Only |
| **Total Length = 30 bytes** | | | | |

## 4.9 Trading Status

The `Trading Status` message is used to indicate the current trading status of a security. A `Trading Status` message will be sent whenever a security's trading status changes.

**Equities**
*Trading Status* of "H" (**changing to "S" effective 11/14/14**) is to be implied at system startup for all symbols. Starting at 6AM ET (**effective 11/14/14**), BATS will send a *Trading Status* of "A" once orders can be accepted for queuing in preparation for the market open. At 8AM ET, BATS will send a *Trading Status* of "T" as symbols are open for trading on the BATS platform.

A `Trading Status` message will also be sent:

- for Regulatory "H"alts in any security as well as the "T"rading resumption for the same security.
- in the event of an Exchange specific "S"uspension.
- for BATS Listed securities that are in a "Q"uoting period for auctions.
- to indicate a Reg SHO price test is in effect.

**Options**
A `Trading Status` message will be sent for all securities that are Halted, Trading or Quoting.

*Trading* Status of "H" (**changing to "S" effective 11/10/14**) is to be implied at system startup for all series. Starting at 8AM ET, BATS will send a *Trading Status* of "Q" once orders can be accepted for queuing in preparation for the market open. Sometime after 9:30AM ET, BATS will send a *Trading Status* of "T" as series are open for trading on the BATS platform. Note *Trading Status* of "Q" can also be explicitly disseminated during a Regulatory Halt Quoting Period.

A `Trading Status` message will also be sent:

- for a Regulatory Halt "Q"uoting Period in any series where the underlying has experienced a Regulatory Halt as well as the "T"rading resumption for the same series.
- in the event of an Exchange specific "S"uspension.

| **Trading Status** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | Length of this message including this field |
| Message Type | 1 | 1 | 0x31 | `Trading Status` message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Symbol | 6 | 8 | Printable ASCII | *Symbol* right padded with spaces. |
| Trading Status | 14 | 1 | Alpha | "A" = Accepting Orders for Queuing<br>"H" = Halted<br>"Q" = Quote-Only<br>"S" = Exchange Specific Suspension<br>"T" = Trading |
| Reg SHO Action | 15 | 1 | Alphanumeric | "0" = No price test in effect<br>"1" = Reg SHO price test restriction in effect |
| Reserved1 | 16 | 1 | Alpha | Reserved |
| Reserved2 | 17 | 1 | Alpha | Reserved |
| **Total Length = 18 bytes** | | | | |

## 4.10 Auction Update (BZX Exchange Only)

`Auction Update` messages are used to disseminate BATS price and size information during auctions for BATS listed securities. The `Auction Update` messages are sent every five seconds during a Halt/IPO Quote-Only period. Opening `Auction Update` messages are disseminated every five seconds between 9:28 and 9:30 a.m. Closing `Auction Update` messages are distributed every five seconds between 3:55 and 4:00 p.m.

BATS `Auction Update` messages support the BATS Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the BATS US Equities Auction Process specification for more information on BATS Auctions.

The `Auction Update` message has the following format:

| **Auction Update** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field. |
| Message Type | 1 | 1 | 0x95 | `Auction Update` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp. |
| Stock Symbol | 6 | 8 | Printable ASCII | *Stock Symbol* right padded with spaces. |
| Auction Type | 14 | 1 | Alphanumeric | "O" = Opening Auction<br>"C" = Closing Auction<br>"H" = Halt Auction<br>"I" = IPO Auction |
| Reference Price | 15 | 8 | Binary | BBO Collared auction price (see Auction Process Spec). |
| Buy Shares | 23 | 4 | Binary | Number of shares on buy side at the *Reference Price*. |
| Sell Shares | 27 | 4 | Binary | Number of shares on sell side at the *Reference Price*. |
| Indicative Price | 31 | 8 | Binary | Price at which the auction book and the continuous book would match. |
| Auction Only Price | 39 | 8 | Binary | Price at which the auction book would match using **only** *Eligible Auction Orders* (see Auction Process Spec). |
| **Total Length = 47 bytes** | | | | |

## 4.11 Auction Summary (BZX Exchange Only)

`Auction Summary` messages are used to disseminate the results of an auction of a BATS listed security. An Opening `Auction Summary` message for each BATS listed security is sent at the conclusion of its opening auction at 9:30 a.m. and represents the BATS official opening price. A Closing `Auction Summary` message for each BATS listed security is sent at the conclusion of its closing auction at 4:00 p.m. and represents the BATS official closing price. An IPO `Auction Summary` message for each BATS listed security is sent at the conclusion of the IPO Auction and represents the official BATS IPO opening price.

BATS `Auction Summary` messages support the BATS Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the BATS US Equities Auction Process specification for more information on BATS Auctions.

The `Auction Summary` message has the following format:

| **Auction Summary** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | Length of this message including this field. |
| Message Type | 1 | 1 | 0x96 | `Auction Summary` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp. |
| Stock Symbol | 6 | 8 | Printable ASCII | *Stock Symbol* right padded with spaces. |
| Auction Type | 14 | 1 | Alphanumeric | "O" = Opening Auction<br>"C" = Closing Auction<br>"H" = Halt Auction<br>"I" = IPO Auction |
| Price | 15 | 8 | Binary | Auction price |
| Shares | 23 | 4 | Binary | Cumulative number of shares executed during the auction |
| **Total Length = 27 bytes** | | | | |

## 4.12 Retail Price Improvement (BYX Exchange Only)

The `Retail Price Improvement` message is only available on the BYX Exchange. This message is a Retail Liquidity Indicator (RLI) that includes symbol and side, but not price and size. An RLI will be disseminated when there is a Retail Price Improving (RPI) order present for a symbol on the BYX Exchange order book OR to indicate a RPI order is no longer available. RPI orders offer price improvement in increments of $.001 to Retail Member Organizations.

The `Retail Price Improvement` message has the following format:

| **Retail Price Improvement** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | Length of this message including this field |
| Message Type | 1 | 1 | 0x98 | `Retail Price Improvement` Message |
| Time offset | 2 | 4 | Binary | Nanosecond offset from last unit timestamp |
| Symbol | 6 | 8 | Printable ASCII | *Symbol* right padded with spaces. |
| Retail Price Improvement | 14 | 1 | Alpha | "B" = Buy Side RPI<br>"S" = Sell Side RPI<br>"A" = Buy & Sell RPI<br>"N" = No RPI |
| **Total Length = 15 bytes** | | | | |

# 5 Order Representation

## 5.1 Hidden Orders

BATS obfuscates the *OrderID* for all trade messages generated from non-displayed liquidity on the BATS book, including executions from hidden orders. By default, *OrderID*s on trade messages are obfuscated in the data feed.

## 5.2 Reserve Orders

To better protect reserve orders, BATS handles executions against reserve orders as follows:

1. The displayed and non-displayed portions of an execution against a reserve order are separated into two (2) executions on the PITCH feed.

2. One execution represents the displayed size and carries the displayed *OrderID*. This is reported as an `Execution` (0x23) of the displayed portion of the order.

3. The second execution represents the hidden size executed and has an obfuscated *OrderID* so that the displayed and hidden executions cannot be linked. This is reported by a `Trade` (0x2A, 0x2B, or 0x30) with the obfuscated *OrderID*.

4. The execution against the hidden portion of the order is reported after displayed, non-displayed, and peg executions at the same price matching the BATS Exchange Priority Rule 11.12.

5. When the displayed portion of the reserve order is refreshed, the order is assigned a new *OrderID* on the PITCH feed. This is reported by an `Add Order` (0x21, 0x22, or 0x2F) when the remainder is nonzero.

## 5.3 OrderID Obfuscation Opt-out

Members who do not wish for their orders to be subject to the *OrderID* obfuscation defined in Sections 5.1 and 5.2 may opt-out at the port level, via request to the BATS Trade Desk. An opt-out will impact all `Trade` messages (0x2A, 0x2B, or 0x30) generated from non-displayed liquidity on a given order.

# 6 Spin Messages

## 6.1 Login

The `Login` message is the first message sent to the Spin Server by a user's process after the connection to the Spin Server is established. Failure to login before sending any other message type will result in the connection being dropped by the Spin Server.

The format of the `Login` message for the Spin Server is identical to that of the GRP described previously in Section 3.1.

## 6.2 Login Response

The `Login Response` message is sent by the Spin Server to a user's process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

The format of the `Login` message for the Spin Server is identical to that of the GRP described previously in Section 3.2.

## 6.3 Spin Image Available

The `Spin Image Available` message is sent once per second and indicates through what sequence number a spin is available.

| **Spin Image Available** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x80 | `Spin Image Available` Message |
| Sequence | 2 | 4 | Binary | Spin is available which is current through this sequence number |
| **Total Length = 6 bytes** | | | | |

## 6.4 Spin Request

The `Spin Request` message is used by a user's process to request transmission of a spin of the unit's order book. Refer to Section 1.6 for more complete details regarding *Sequence* specification as well as buffering requirements.

| Spin Request | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x81 | `Spin Request` Message |
| Sequence | 2 | 4 | Binary | Sequence number from a `Spin Image Available` message received by the member |
| **Total Length = 6 bytes** | | | | |

## 6.5 Spin Response

The `Spin Response` message is sent in response to a user's `Spin Request` message indicating whether a spin will be sent.

| Spin Response | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x82 | `Spin Response` Message |
| Sequence | 2 | 4 | Binary | Sequence number from a `Spin Image Available` message received by the member |
| Order Count | 6 | 4 | Binary | Number of `Add Order` messages which will be contained in this spin |
| Status | 10 | 1 | Alphanumeric | Accepted or reason for reject |
| **Total Length = 11 bytes** | | | | |

| Spin Response - Status Codes | |
|---|---|
| 'A' | Accepted |
| 'O' | Out of Range (*Sequence* requested is greater than *Sequence* available by the next spin) |
| 'S' | Spin already in progress (only one spin can be running at a time) |

* - All non-'A' status codes should be interpreted as a reject.

## 6.6 Spin Finished

The `Spin Finished` message is sent to indicate that all messages for the spin requested have been sent. A `Spin Finished` message is only sent if a `Spin Request` was not rejected. Upon receipt of a `Spin Finished` message, any buffered multicast messages should be applied to the member's copy of the book to make it current.

| **Spin Finished** | | | | |
|---|---|---|---|---|
| **Field Name** | **Offset** | **Length** | **Type/(Value)** | **Description** |
| Length | 0 | 1 | Binary | *Length* of this message including this field |
| Message Type | 1 | 1 | 0x83 | `Spin Finished` Message |
| Sequence | 2 | 4 | Binary | Sequence number from the `Spin Request` message |
| **Total Length = 6 bytes** | | | | |

## 6.7 Spin Server Usage Example

The following diagram (see next page) shows the exchange of messages over time between a member and BATS' Multicast PITCH feed and spin server. Note that while the example alone may seem to imply `Add Order` messages only would be sent on a spin, this is not the case. `Trading Status` message may be sent at the beginning of the spin session and `Auction Update` messages may be found mixed between `Add Order` messages according to their timestamps.

At time 1, the member has no state of the book and desires to become current. The member caches the received Multicast PITCH messages (sequences 310172 and 310173) for later use. Since the member has no book, they cannot yet be applied.

At time 5, the member has successfully logged into the Spin Server and has cached another message, sequence 310174.

At time 7, the member receives a `Spin Image Available` message which indicates that the spin server is capable of giving them a spin of all open orders as of sequence 310169. The member does not have all messages cached after 310169 (they are missing 310170 and 310171), so this spin is not useful to the member.

At time 10, the member receives a `Spin Image Available` message which is useful since it would be a spin of all orders up to and including sequence 310175 and the member has all messages after 310175 cached.

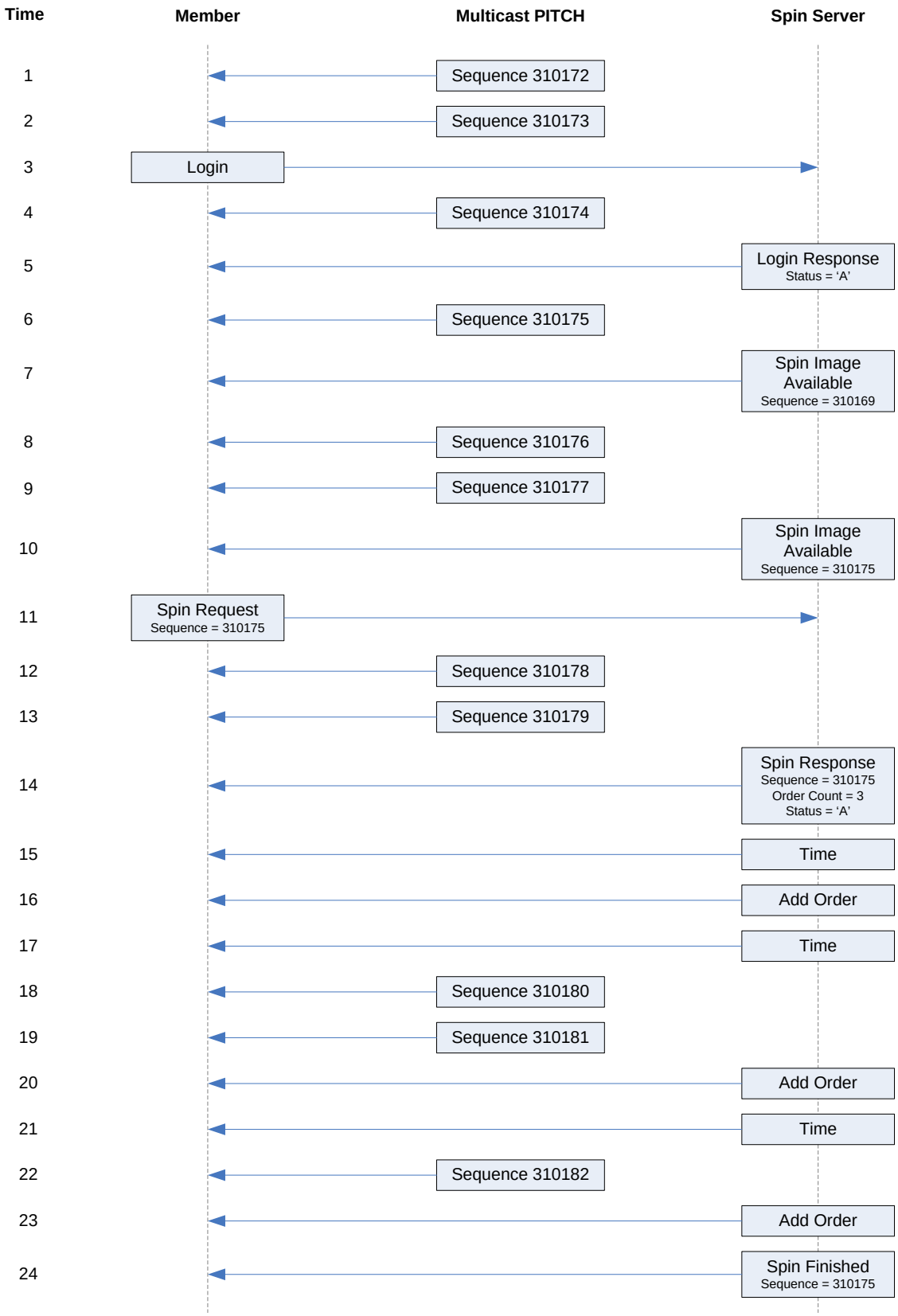
At time 11, the member sends a `Spin Request` for all messages up to and including 310175 and continues to cache Multicast PITCH messages received.

At time 14, the spin server acknowledges the spin request and indicates that three open orders will be sent.

At time 24, the spin server indicates that it has finished sending all open orders. The member must then apply the cached messages from sequence number 310176 through current.

**Notes:**

- Spin Servers are available for each unit. Members may need to employ multiple Spin Servers depending upon their architecture.
- As a rule of thumb, in its equities markets BATS typically has ~400,000 open orders across all units, or an average of about 12,500 orders per unit. In options, BATS typically has greater the 3.2 million open orders across all units, or an average of about 100,000 orders per unit. The actual number per unit varies depending upon activity in individual symbols. Expect this number to increase and plan accordingly.



# 7 Message Types

## 7.1 Gap Request Proxy Messages

| | |
|---|---|
| 0x01 | Login |
| 0x02 | Login Response |
| 0x03 | Gap Request |
| 0x04 | Gap Response |

## 7.2 Spin Server Messages

| | |
|---|---|
| 0x01 | Login |
| 0x02 | Login Response |
| 0x80 | Spin Image Available |
| 0x81 | Spin Request |
| 0x82 | Spin Response |
| 0x83 | Spin Finished |

## 7.3 PITCH 2.X Messages

| | |
|---|---|
| 0x20 | Time |
| 0x21 | Add Order - Long |
| 0x22 | Add Order – Short |
| 0x23 | Order Executed |
| 0x24 | Order Executed at Price/Size |
| 0x25 | Reduce Size – Long |
| 0x26 | Reduce Size – Short |
| 0x27 | Modify Order – Long |
| 0x28 | Modify Order – Short |
| 0x29 | Delete Order |
| 0x2A | Trade – Long |
| 0x2B | Trade – Short |
| 0x2C | Trade Break |
| 0x2D | End of Session |
| 0x2E | Symbol Mapping (Options only) |
| 0x2F | Add Order – Expanded |
| 0x30 | Trade – Expanded |
| 0x31 | Trading Status |
| 0x95 | Auction Update (BZX Exchange only) |
| 0x96 | Auction Summary (BZX Exchange only) |
| 0x97 | Unit Clear |
| 0x98 | Retail Price Improvement (BYX Exchange only) |

# 8 Example Messages

Each of the following message types must be wrapped by a sequenced or unsequenced unit header as described in Section 2.4. Note that in the following examples, each byte is represented by two hexadecimal digits.

## 8.1 Login Message

```
Length       16                              22 bytes
Type         01                              Login
SessionSubId 30 30 30 31                     “0001”
Username     46 49 52 4D                     “FIRM”
Filler       20 20                           “  ”
Password     41 42 43 44 30 30 20 20 20 20   “ABCD00    ”
```

## 8.2 Login Response Message

```
Length     03                                3 bytes
Type       02                                Login Response
Status     41                                Login accepted
```

## 8.3 Gap Request Message

```
Length     09                                9 bytes
Type       03                                Gap Request
Unit       01                                Unit 1
Sequence   3B 10 00 00                       First message: 4155
Count      32 00                             50 messages
```

## 8.4 Gap Response Message

```
Length     08                                8 bytes
Type       04                                Gap Response
Unit       01                                Unit 1
Sequence   3B 10 00 00                       First message: 4155
Status     41                                Accepted
```

## 8.5 Spin Image Available Message

```
Length     06                                6 bytes
Type       80                                Spin Image Available
Sequence   3B 10 00 00                       Sequence: 4155
```

## 8.6 Spin Request Message

```
Length     06                                6 bytes
Type       81                                Spin Request
Sequence   3B 10 00 00                       Sequence: 4155
```

## 8.7 Spin Response Message

| | | |
|---|---|---|
| Length | 0B | 11 bytes |
| Type | 82 | Spin Request |
| Sequence | 3B 10 00 00 | Sequence: 4155 |
| Order Count | 42 00 00 00 | 66 orders |
| Status | 41 | Accepted |

## 8.8 Spin Finished Message

| | | |
|---|---|---|
| Length | 06 | 6 bytes |
| Type | 83 | Spin Finished |
| Sequence | 3B 10 00 00 | Sequence: 4155 |

## 8.9 Time Message

| | | |
|---|---|---|
| Length | 06 | 6 bytes |
| Type | 20 | Time |
| Time | 98 85 00 00 | 34,200 seconds = 09:30 AM Eastern |

## 8.10 Unit Clear

| | | |
|---|---|---|
| Length | 06 | 6 bytes |
| Type | 97 | Unit Clear |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |

## 8.11 Add Order – Long

| | | |
|---|---|---|
| Length | 22 | 34 bytes |
| Type | 21 | Add Order - Long |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side Indicator | 42 | Buy |
| Quantity | 20 4E 00 00 | 20,000 shares |
| Symbol | 5A 56 5A 5A 54 20 | ZVZZT |
| Price | 5A 23 00 00 00 00 00 00 | $0.9050 |
| AddBitField1 | 01 | Displayed |

## 8.12 Add Order – Short

| | | |
|---|---|---|
| Length | 1A | 26 bytes |
| Type | 22 | Add Order - Short |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side Indicator | 42 | Buy |
| Quantity | 20 4E | 20,000 shares |
| Symbol | 5A 56 5A 5A 54 20 | ZVZZT |
| Price | 0A 28 | $102.50 |
| AddBitField1 | 01 | Displayed |

## 8.13 Add Order – Expanded

| | | |
|---|---|---|
| Length | 28 | 40 bytes |
| Type | 2F | Add Order - Expanded |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side Indicator | 42 | Buy |
| Quantity | 20 4E 00 00 | 20,000 shares |
| Symbol | 5A 56 5A 5A 54 20 20 20 | ZVZZT |
| Price | 5A 23 00 00 00 00 00 00 | $0.9050 |
| AddBitField1 | 01 | Displayed |
| MPID | 4D 50 49 44 | MPID |

## 8.14 Order Executed

| | | |
|---|---|---|
| Length | 1A | 26 bytes |
| Type | 23 | Order Executed |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Executed Quantity | 64 00 00 00 | 100 shares |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |

## 8.15 Order Executed at Price/Size

| | | |
|---|---|---|
| Length | 26 | 38 bytes |
| Type | 24 | Order Executed at Price/Size |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Executed Quantity | 64 00 00 00 | 100 shares |
| Remaining | BC 4D 00 00 | 19,900 shares |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |
| Price | E8 A3 0F 00 00 00 00 00 | $102.50 |

## 8.16 Reduce Size – Long

| | | |
|---|---|---|
| Length | 12 | 18 bytes |
| Type | 25 | Reduce Size - Long |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Canceled Quantity | F8 24 01 00 | 75,000 shares |

## 8.17 Reduce Size – Short

| | | |
|---|---|---|
| Length | 10 | 16 bytes |
| Type | 26 | Reduce Size - Short |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Canceled Quantity | 64 00 | 100 shares |

## 8.18 Modify Order – Long

| | | |
|---|---|---|
| Length | 1B | 27 bytes |
| Type | 27 | Modify Order – Long |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Quantity | F8 24 01 00 | 75,000 shares |
| Price | E8 A3 0F 00 00 00 00 00 | $102.50 |
| ModifyBitField1 | 03 | Displayed & Maintains Priority |

## 8.19 Modify Order – Short

| | | |
|---|---|---|
| Length | 13 | 19 bytes |
| Type | 28 | Modify Order – Short |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Quantity | 64 00 | 100 shares |
| Price | 0A 28 | $102.50 |
| ModifyBitField1 | 03 | Displayed & Maintains Priority |

## 8.20 Delete Order

| | | |
|---|---|---|
| Length | 0E | 14 bytes |
| Type | 29 | Delete Order |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |

## 8.21 Trade – Long

| | | |
|---|---|---|
| Length | 29 | 41 bytes |
| Type | 2A | Trade - Long |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side | 42 | Buy |
| Quantity | F8 24 01 00 | 75,000 shares |
| Symbol | 5A 56 5A 5A 54 20 | ZVZZT |
| Price | E8 A3 0F 00 00 00 00 00 | $102.50 |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |

## 8.22 Trade – Short

| | | |
|---|---|---|
| Length | 21 | 33 bytes |
| Type | 2B | Trade - Long |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side | 42 | Buy |
| Quantity | 64 00 | 100 shares |
| Symbol | 5A 56 5A 5A 54 20 | ZVZZT |
| Price | 0A 28 | $102.50 |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |

## 8.23 Trade – Expanded

| | | |
|---|---|---|
| Length | 2B | 43 bytes |
| Type | 30 | Trade - Expanded |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | |
| Side | 42 | Buy |
| Quantity | F8 24 01 00 | 75,000 shares |
| Symbol | 5A 56 5A 5A 54 20 20 20 | ZVZZT |
| Price | E8 A3 0F 00 00 00 00 00 | $102.50 |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |

## 8.24 Trade Break

| | | |
|---|---|---|
| Length | 0E | 14 bytes |
| Type | 2C | Trade Break |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Execution Id | 34 2B 46 E0 BB 00 00 00 | 0AAP09VEC |

## 8.25 End of Session

| | | |
|---|---|---|
| Length | 06 | 6 bytes |
| Type | 2D | End of Session |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |

## 8.26 Symbol Mapping Message

| | | |
|---|---|---|
| Length | 1E | 30 bytes |
| Type | 2E | Symbol Mapping Message |
| Feed Symbol | 31 20 20 20 20 20 | |
| OSI Symbol | 4D 53 46 54 20 20 31 30<br>30 31 31 36 43 30 30 30<br>34 37 35 30 30 | MSFT  100116C00047500 |
| Symbol Condition | 44 | ‘C’ – Closing Only |

## 8.27 Trading Status Message

| | | |
|---|---|---|
| Length | 12 | 18 bytes |
| Type | 31 | Trading Status |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Symbol | 5A 56 5A 5A 54 20 20 20 | ZVZZT |
| Halt Status | 54 | T = Trading |
| Reg SHO Action | 30 | 0 = No price test |
| Reserved1 | 20 | |
| Reserved2 | 20 | |

## 8.28 Sequenced Unit Header with 2 Messages

**Sequenced Unit Header:**

| | | |
|---|---|---|
| Hdr Length | 31 00 | 49 bytes, including header |
| Hdr Count | 02 | 2 messages to follow |
| Hdr Unit | 01 | Unit 1 |
| Hdr Sequence | 01 00 00 00 | First message has sequence number 1 |

**Message 1: Add Order (Short)**

| | | |
|---|---|---|
| Length | 1A | 26 bytes |
| Message format | 22 | Add Order – Short |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | 631WC4000005 |
| Side Indicator | 42 | Buy |
| Quantity | E1 02 | 737 shares |
| Symbol | 5A 56 5A 5A 54 20 | ZVZZT |
| Price | 01 00 | 0.01 |
| Flags | 01 | Display |

**Message 2: Reduce Size (Short)**

| | | |
|---|---|---|
| Length | 10 | 16 bytes |
| Message format | 26 | Reduce Size – Short |
| Time offset | E8 D9 06 00 | 449,000 ns since last Time Message |
| Order Id | 05 40 5B 77 8F 56 1D 0B | 631WC4000005 |
| Canceled Quantity | E1 02 | 737 shares |

## 8.29 Auction Update Message

| | | |
|---|---|---|
| Length | 2F | 47 bytes |
| Type | 95 | Auction Update |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Symbol | 5A 56 5A 5A 54 20 20 20 | ZVZZT |
| Auction Type | 49 | I = IPO |
| Reference Prc | E8 A3 0F 00 00 00 00 00 | $102.50 |
| Buy Side Shrs | F8 24 01 00 | 75,000 shares |
| Sell Side Shrs | 20 4E 00 00 | 20,000 shares |
| Indicative Prc | E8 A3 0F 00 00 00 00 00 | $102.50 |
| Auct. Only Prc | E8 A3 0F 00 00 00 00 00 | $102.50 |

## 8.30 Retail Price Improvement Message

| | | |
|---|---|---|
| Length | 0F | 15 bytes |
| Type | 98 | Retail Price Improvement |
| Time offset | 18 D2 06 00 | 447,000 ns since last Time Message |
| Symbol | 5A 56 5A 5A 54 20 20 20 | ZVZZT |
| RPI | 41 | Buy & Sell RPI |

# 9 Multicast Configuration

## 9.1 US Equities Production Environment Configuration

### 9.1.1 Limitations/Configurations

The following table defines BATS current configuration for network and gap request limitations. These limitations are session based. BATS reserves the right to adjust the gap request limitations to improve the effectiveness of the gap request infrastructure.

| Period/Type | Limit/Setting | Notes |
|---|---|---|
| MTU | 1500 | BATS will send UDP messages up to 1500 bytes. Members should ensure that their infrastructure is configured accordingly. |
| Gig-Shaped Throttle | 1 Gb/s | The real-time and gap multicast head ends are configured to shape their output to this level to minimize packet loss. |
| WAN-Shaped Throttle | 100 Mb/s | |
| Gap Response Delay | 2 ms | The Gap Server will delay resending sequenced messages via multicast for the specified limit in order to satisfy multiple GRP gap requests with one multicast response. |
| Count | 100 | Any single gap request may not be for more than this number of dropped messages. |
| 1 Second | 320 Requests | This is the maximum number of retransmission requests allowed per second for each session. This is renewed every clock second. |
| 1 Minute | 1500 Requests | This is the maximum number of retransmission requests allowed per minute for each session. This is renewed every clock minute. |
| Day | 100,000 Requests | This is the maximum number of retransmission requests allowed per day for each session. |
| Within Range | 1,000,000 Messages | Users' retransmission requests must be within this many messages of the most recent sequence sent by the real-time feed per session. |

### 9.1.2 BZX/BYX/EDGA/EDGX Unit/Symbol Distribution

The following table describes the BATS symbol distribution across units.

**New Distribution:**

| Symbol Range Start | Unit |
|---|---|
| A | 1 |
| AH | 2 |
| AS | 3 |
| BF | 4 |
| C | 5 |
| CM | 6 |
| CT | 7 |
| DI | 8 |
| EC | 9 |
| EU | 10 |
| FD | 11 |
| GD | 12 |
| GW | 13 |
| I | 14 |
| IU | 15 |
| JO | 16 |
| LL | 17 |
| ME | 18 |
| MU | 19 |
| NV | 20 |
| PD | 21 |
| PS | 22 |
| RJ | 23 |
| SD | 24 |
| SP | 25 |
| SU | 26 |
| TM | 27 |
| TZ | 28 |
| UW | 29 |
| VU | 30 |
| X | 31 |
| *All BATS Listed Securities* | 32 |

Note - BATS reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.1.3 BZX Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NJ2 Primary Data Center | 208.90.208.253 |
| CH4 Secondary Data Center | 174.136.181.191 |
| NY5 Primary Data Center A feed* | 74.115.128.140 |
| NY5 Primary Data Center C feed* | 74.115.128.141 |
| NY5 Primary Data Center B feed* | 74.115.128.142 |
| NY5 Primary Data Center D feed* | 74.115.128.143 |

*Availability date TBD.

### 9.1.4 BYX Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NJ2 Primary Data Center | 174.136.167.1 |
| CH4 Secondary Data Center | 174.136.181.255 |
| NY5 Primary Data Center A feed | 74.115.128.144 |
| NY5 Primary Data Center C feed | 74.115.128.145 |
| NY5 Primary Data Center B feed | 74.115.128.146 |
| NY5 Primary Data Center D feed | 74.115.128.147 |

*Availability date TBD.

### 9.1.5 EDGA Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NY5 Primary Data Center A feed | 74.115.128.132 |
| NY5 Primary Data Center C feed | 74.115.128.133 |
| NY5 Primary Data Center B feed | 74.115.128.134 |
| NY5 Primary Data Center D feed | 74.115.128.135 |
| CH4 Secondary Data Center | 174.136.181.253 |

### 9.1.6 EDGX Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NY5 Primary Data Center A feed | 74.115.128.136 |
| NY5 Primary Data Center C feed | 74.115.128.137 |
| NY5 Primary Data Center B feed | 74.115.128.138 |
| NY5 Primary Data Center D feed | 74.115.128.139 |
| CH4 Secondary Data Center | 174.136.181.254 |

### 9.1.7 BZX Address/Unit Distribution

The following tables describe the unit distribution across the BZX Exchange Multicast PITCH feeds.

| NJ2 Primary Datacenter | | Gig-Shaped (ZA) | | WAN-Shaped (ZC) | | Gig-Shaped (ZB) | | WAN-Shaped (ZD) | |
|---|---|---|---|---|---|---|---|---|---|
| Unit | IP Port | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr |
| 1 | 30001 | 224.0.62.2 (208.90.209.241) | 224.0.62.3 (208.90.209.241) | 224.0.62.14 (208.90.209.217) | 224.0.62.15 (208.90.209.217) | 233.19.3.128 (208.90.209.225) | 233.19.3.129 (208.90.209.225) | 233.19.3.144 (208.90.209.209) | 233.19.3.145 (208.90.209.209) |
| 2 | 30002 | | | | | | | | |
| 3 | 30003 | | | | | | | | |
| 4 | 30004 | | | | | | | | |
| 5 | 30005 | 224.0.62.4 (208.90.209.242) | 224.0.62.5 (208.90.209.242) | 224.0.62.16 (208.90.209.217) | 224.0.62.17 (208.90.209.217) | 233.19.3.130 (208.90.209.225) | 233.19.3.131 (208.90.209.225) | 233.19.3.146 (208.90.209.209) | 233.19.3.147 (208.90.209.209) |
| 6 | 30006 | | | | | | | | |
| 7 | 30007 | | | | | | | | |
| 8 | 30008 | | | | | | | | |
| 9 | 30009 | 224.0.62.6 (208.90.209.243) | 224.0.62.7 (208.90.209.243) | 224.0.62.18 (208.90.209.217) | 224.0.62.19 (208.90.209.217) | 233.19.3.132 (208.90.209.226) | 233.19.3.133 (208.90.209.226) | 233.19.3.148 (208.90.209.209) | 233.19.3.149 (208.90.209.209) |
| 10 | 30010 | | | | | | | | |
| 11 | 30011 | | | | | | | | |
| 12 | 30012 | | | | | | | | |
| 13 | 30013 | 224.0.62.8 (208.90.209.244) | 224.0.62.9 (208.90.209.244) | 224.0.62.20 (208.90.209.217) | 224.0.62.21 (208.90.209.217) | 233.19.3.134 (208.90.209.226) | 233.19.3.135 (208.90.209.226) | 233.19.3.150 (208.90.209.209) | 233.19.3.151 (208.90.209.209) |
| 14 | 30014 | | | | | | | | |
| 15 | 30015 | | | | | | | | |
| 16 | 30016 | | | | | | | | |
| 17 | 30017 | 224.0.62.10 (208.90.209.245) | 224.0.62.11 (208.90.209.245) | 224.0.62.22 (208.90.209.218) | 224.0.62.23 (208.90.209.218) | 233.19.3.136 (208.90.209.227) | 233.19.3.137 (208.90.209.227) | 233.19.3.152 (208.90.209.210) | 233.19.3.153 (208.90.209.210) |
| 18 | 30018 | | | | | | | | |
| 19 | 30019 | | | | | | | | |
| 20 | 30020 | | | | | | | | |
| 21 | 30021 | 224.0.62.12 (208.90.209.246) | 224.0.62.13 (208.90.209.246) | 224.0.62.24 (208.90.209.218) | 224.0.62.25 (208.90.209.218) | 233.19.3.138 (208.90.209.227) | 233.19.3.139 (208.90.209.227) | 233.19.3.154 (208.90.209.210) | 233.19.3.155 (208.90.209.210) |
| 22 | 30022 | | | | | | | | |
| 23 | 30023 | | | | | | | | |
| 24 | 30024 | | | | | | | | |
| 25 | 30025 | 224.0.62.30 (208.90.209.247) | 224.0.62.31 (208.90.209.247) | 224.0.62.26 (208.90.209.218) | 224.0.62.27 (208.90.209.218) | 233.19.3.140 (208.90.209.228) | 233.19.3.141 (208.90.209.228) | 233.19.3.156 (208.90.209.210) | 233.19.3.157 (208.90.209.210) |
| 26 | 30026 | | | | | | | | |
| 27 | 30027 | | | | | | | | |
| 28 | 30028 | | | | | | | | |
| 29 | 30029 | 224.0.62.32 (208.90.209.248) | 224.0.62.33 (208.90.209.248) | 224.0.62.28 (208.90.209.218) | 224.0.62.29 (208.90.209.218) | 233.19.3.142 (208.90.209.228) | 233.19.3.143 (208.90.209.228) | 233.19.3.158 (208.90.209.210) | 233.19.3.159 (208.90.209.210) |
| 30 | 30030 | | | | | | | | |
| 31 | 30031 | | | | | | | | |
| 32 | 30032 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

**Availability date TBD. Members should not configure their networks or systems for these addresses.**

| NY5 Primary Datacenter | | Gig-Shaped [ZA] 174.136.161.160/28 | | WAN-Shaped [ZC] 174.136.161.176/28 | | Gig-Shaped [ZB] 174.136.161.192/28 | | WAN-Shaped [ZD] 174.136.161.208/28 | |
|---|---|---|---|---|---|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 30001 | 224.0.130.128 | 224.0.130.144 | 224.0.130.160 | 224.0.130.176 | 233.209.92.128 | 233.209.92.144 | 233.209.92.160 | 233.209.92.176 |
| 2 | 30002 | | | | | | | | |
| 3 | 30003 | | | | | | | | |
| 4 | 30004 | | | | | | | | |
| 5 | 30005 | 224.0.130.129 | 224.0.130.145 | 224.0.130.161 | 224.0.130.177 | 233.209.92.129 | 233.209.92.145 | 233.209.92.161 | 233.209.92.177 |
| 6 | 30006 | | | | | | | | |
| 7 | 30007 | | | | | | | | |
| 8 | 30008 | | | | | | | | |
| 9 | 30009 | 224.0.130.130 | 224.0.130.146 | 224.0.130.162 | 224.0.130.178 | 233.209.92.130 | 233.209.92.146 | 233.209.92.162 | 233.209.92.178 |
| 10 | 30010 | | | | | | | | |
| 11 | 30011 | | | | | | | | |
| 12 | 30012 | | | | | | | | |
| 13 | 30013 | 224.0.130.131 | 224.0.130.147 | 224.0.130.163 | 224.0.130.179 | 233.209.92.131 | 233.209.92.147 | 233.209.92.163 | 233.209.92.179 |
| 14 | 30014 | | | | | | | | |
| 15 | 30015 | | | | | | | | |
| 16 | 30016 | | | | | | | | |
| 17 | 30017 | 224.0.130.132 | 224.0.130.148 | 224.0.130.164 | 224.0.130.180 | 233.209.92.132 | 233.209.92.148 | 233.209.92.164 | 233.209.92.180 |
| 18 | 30018 | | | | | | | | |
| 19 | 30019 | | | | | | | | |
| 20 | 30020 | | | | | | | | |
| 21 | 30021 | 224.0.130.133 | 224.0.130.149 | 224.0.130.165 | 224.0.130.181 | 233.209.92.133 | 233.209.92.149 | 233.209.92.165 | 233.209.92.181 |
| 22 | 30022 | | | | | | | | |
| 23 | 30023 | | | | | | | | |
| 24 | 30024 | | | | | | | | |
| 25 | 30025 | 224.0.130.134 | 224.0.130.150 | 224.0.130.166 | 224.0.130.182 | 233.209.92.134 | 233.209.92.150 | 233.209.92.166 | 233.209.92.182 |
| 26 | 30026 | | | | | | | | |
| 27 | 30027 | | | | | | | | |
| 28 | 30028 | | | | | | | | |
| 29 | 30029 | 224.0.130.135 | 224.0.130.151 | 224.0.130.167 | 224.0.130.183 | 233.209.92.135 | 233.209.92.151 | 233.209.92.167 | 233.209.92.183 |
| 30 | 30030 | | | | | | | | |
| 31 | 30031 | | | | | | | | |
| 32 | 30032 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

| CH4 Secondary Datacenter | | WAN-Shaped [ZE] 174.136.181.160/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-timeMC** | **Gap ResponseMC** |
| 1 | 31001 | 233.19.3.80 | 233.19.3.81 |
| 2 | 31002 | | |
| 3 | 31003 | | |
| 4 | 31004 | | |
| 5 | 31005 | 233.19.3.82 | 233.19.3.83 |
| 6 | 31006 | | |
| 7 | 31007 | | |
| 8 | 31008 | | |
| 9 | 31009 | 233.19.3.84 | 233.19.3.85 |
| 10 | 31010 | | |
| 11 | 31011 | | |
| 12 | 31012 | | |
| 13 | 31013 | 233.19.3.86 | 233.19.3.87 |
| 14 | 31014 | | |
| 15 | 31015 | | |
| 16 | 31016 | | |
| 17 | 31017 | 233.19.3.88 | 233.19.3.89 |
| 18 | 31018 | | |
| 19 | 31019 | | |
| 20 | 31020 | | |
| 21 | 31021 | 233.19.3.90 | 233.19.3.91 |
| 22 | 31022 | | |
| 23 | 31023 | | |
| 24 | 31024 | | |
| 25 | 31025 | 233.19.3.92 | 233.19.3.93 |
| 26 | 31026 | | |
| 27 | 31027 | | |
| 28 | 31028 | | |
| 29 | 31029 | 233.19.3.94 | 233.19.3.95 |
| 30 | 31030 | | |
| 31 | 31031 | | |
| 32 | 31032 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.1.8 BYX Address/Unit Distribution

The following tables describe the unit distribution across the BYX Exchange Multicast PITCH feeds.

| NJ2 Primary Datacenter | | Gig-Shaped (YA) | | WAN-Shaped (YC) | | Gig-Shaped (YB) | | WAN-Shaped (YD) | |
|---|---|---|---|---|---|---|---|---|---|
| Unit | IP Port | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr |
| 1 | 30201 | 224.0.62.192 (174.136.167.17) | 224.0.62.193 (174.136.167.17) | 224.0.62.208 (174.136.167.113) | 224.0.62.209 (174.136.167.113) | 233.19.3.192 (174.136.167.33) | 233.19.3.193 (174.136.167.33) | 233.19.3.208 (174.136.167.105) | 233.19.3.209 (174.136.167.105) |
| 2 | 30202 | | | | | | | | |
| 3 | 30203 | | | | | | | | |
| 4 | 30204 | | | | | | | | |
| 5 | 30205 | 224.0.62.194 (174.136.167.18) | 224.0.62.195 (174.136.167.18) | 224.0.62.210 (174.136.167.113) | 224.0.62.211 (174.136.167.113) | 233.19.3.194 (174.136.167.33) | 233.19.3.195 (174.136.167.33) | 233.19.3.210 (174.136.167.105) | 233.19.3.211 (174.136.167.105) |
| 6 | 30206 | | | | | | | | |
| 7 | 30207 | | | | | | | | |
| 8 | 30208 | | | | | | | | |
| 9 | 30209 | 224.0.62.196 (174.136.167.19) | 224.0.62.197 (174.136.167.19) | 224.0.62.212 (174.136.167.113) | 224.0.62.213 (174.136.167.113) | 233.19.3.196 (174.136.167.34) | 233.19.3.197 (174.136.167.34) | 233.19.3.212 (174.136.167.105) | 233.19.3.213 (174.136.167.105) |
| 10 | 30210 | | | | | | | | |
| 11 | 30211 | | | | | | | | |
| 12 | 30212 | | | | | | | | |
| 13 | 30213 | 224.0.62.198 (174.136.167.20) | 224.0.62.199 (174.136.167.20) | 224.0.62.214 (174.136.167.113) | 224.0.62.215 (174.136.167.113) | 233.19.3.198 (174.136.167.34) | 233.19.3.199 (174.136.167.34) | 233.19.3.214 (174.136.167.105) | 233.19.3.215 (174.136.167.105) |
| 14 | 30214 | | | | | | | | |
| 15 | 30215 | | | | | | | | |
| 16 | 30216 | | | | | | | | |
| 17 | 30217 | 224.0.62.200 (174.136.167.21) | 224.0.62.201 (174.136.167.21) | 224.0.62.216 (174.136.167.114) | 224.0.62.217 (174.136.167.114) | 233.19.3.200 (174.136.167.35) | 233.19.3.201 (174.136.167.35) | 233.19.3.216 (174.136.167.106) | 233.19.3.217 (174.136.167.106) |
| 18 | 30218 | | | | | | | | |
| 19 | 30219 | | | | | | | | |
| 20 | 30220 | | | | | | | | |
| 21 | 30221 | 224.0.62.202 (174.136.167.22) | 224.0.62.203 (174.136.167.22) | 224.0.62.218 (174.136.167.114) | 224.0.62.219 (174.136.167.114) | 233.19.3.202 (174.136.167.35) | 233.19.3.203 (174.136.167.35) | 233.19.3.218 (174.136.167.106) | 233.19.3.219 (174.136.167.106) |
| 22 | 30222 | | | | | | | | |
| 23 | 30223 | | | | | | | | |
| 24 | 30224 | | | | | | | | |
| 25 | 30225 | 224.0.62.204 (174.136.167.23) | 224.0.62.205 (174.136.167.23) | 224.0.62.220 (174.136.167.114) | 224.0.62.221 (174.136.167.114) | 233.19.3.204 (174.136.167.36) | 233.19.3.205 (174.136.167.36) | 233.19.3.220 (174.136.167.106) | 233.19.3.221 (174.136.167.106) |
| 26 | 30226 | | | | | | | | |
| 27 | 30227 | | | | | | | | |
| 28 | 30228 | | | | | | | | |
| 29 | 30229 | 224.0.62.206 (174.136.167.24) | 224.0.62.207 (174.136.167.24) | 224.0.62.222 (174.136.167.114) | 224.0.62.223 (174.136.167.114) | 233.19.3.206 (174.136.167.36) | 233.19.3.207 (174.136.167.36) | 233.19.3.222 (174.136.167.106) | 233.19.3.223 (174.136.167.106) |
| 30 | 30230 | | | | | | | | |
| 31 | 30231 | | | | | | | | |
| 32 | 30232 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

**Availability date TBD. Members should not configure their networks or systems for these addresses.**

| NY5 Primary Datacenter | | Gig-Shaped [YA] 174.136.162.160/28 | | WAN-Shaped [YC] 174.136.162.176/28 | | Gig-Shaped [YB] 174.136.162.192/28 | | WAN-Shaped [YD] 174.136.162.208/28 | |
|---|---|---|---|---|---|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 30201 | 224.0.130.192 | 224.0.130.208 | 224.0.130.224 | 224.0.130.240 | 233.209.92.192 | 233.209.92.208 | 233.209.92.224 | 233.209.92.240 |
| 2 | 30202 | | | | | | | | |
| 3 | 30203 | | | | | | | | |
| 4 | 30204 | | | | | | | | |
| 5 | 30205 | 224.0.130.193 | 224.0.130.209 | 224.0.130.225 | 224.0.130.241 | 233.209.92.193 | 233.209.92.209 | 233.209.92.225 | 233.209.92.241 |
| 6 | 30206 | | | | | | | | |
| 7 | 30207 | | | | | | | | |
| 8 | 30208 | | | | | | | | |
| 9 | 30209 | 224.0.130.194 | 224.0.130.210 | 224.0.130.226 | 224.0.130.242 | 233.209.92.194 | 233.209.92.210 | 233.209.92.226 | 233.209.92.242 |
| 10 | 30210 | | | | | | | | |
| 11 | 30211 | | | | | | | | |
| 12 | 30212 | | | | | | | | |
| 13 | 30213 | 224.0.130.195 | 224.0.130.211 | 224.0.130.227 | 224.0.130.243 | 233.209.92.195 | 233.209.92.211 | 233.209.92.227 | 233.209.92.243 |
| 14 | 30214 | | | | | | | | |
| 15 | 30215 | | | | | | | | |
| 16 | 30216 | | | | | | | | |
| 17 | 30217 | 224.0.130.196 | 224.0.130.212 | 224.0.130.228 | 224.0.130.244 | 233.209.92.196 | 233.209.92.212 | 233.209.92.228 | 233.209.92.244 |
| 18 | 30218 | | | | | | | | |
| 19 | 30219 | | | | | | | | |
| 20 | 30220 | | | | | | | | |
| 21 | 30221 | 224.0.130.197 | 224.0.130.213 | 224.0.130.229 | 224.0.130.245 | 233.209.92.197 | 233.209.92.213 | 233.209.92.229 | 233.209.92.245 |
| 22 | 30222 | | | | | | | | |
| 23 | 30223 | | | | | | | | |
| 24 | 30224 | | | | | | | | |
| 25 | 30225 | 224.0.130.198 | 224.0.130.214 | 224.0.130.230 | 224.0.130.246 | 233.209.92.198 | 233.209.92.214 | 233.209.92.230 | 233.209.92.246 |
| 26 | 30226 | | | | | | | | |
| 27 | 30227 | | | | | | | | |
| 28 | 30228 | | | | | | | | |
| 29 | 30229 | 224.0.130.199 | 224.0.130.215 | 224.0.130.231 | 224.0.130.247 | 233.209.92.199 | 233.209.92.215 | 233.209.92.231 | 233.209.92.247 |
| 30 | 30230 | | | | | | | | |
| 31 | 30231 | | | | | | | | |
| 32 | 30232 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

| CH4 Secondary Datacenter | | WAN-Shaped (YE) 174.136.181.224/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-timeMC** | **Gap ResponseMC** |
| 1 | 31701 | 233.19.3.112 | 233.19.3.113 |
| 2 | 31702 | | |
| 3 | 31703 | | |
| 4 | 31704 | | |
| 5 | 31705 | 233.19.3.114 | 233.19.3.115 |
| 6 | 31706 | | |
| 7 | 31707 | | |
| 8 | 31708 | | |
| 9 | 31709 | 233.19.3.116 | 233.19.3.117 |
| 10 | 31710 | | |
| 11 | 31711 | | |
| 12 | 31712 | | |
| 13 | 31713 | 233.19.3.118 | 233.19.3.119 |
| 14 | 31714 | | |
| 15 | 31715 | | |
| 16 | 31716 | | |
| 17 | 31717 | 233.19.3.120 | 233.19.3.121 |
| 18 | 31718 | | |
| 19 | 31719 | | |
| 20 | 31720 | | |
| 21 | 31721 | 233.19.3.122 | 233.19.3.123 |
| 22 | 31722 | | |
| 23 | 31723 | | |
| 24 | 31724 | | |
| 25 | 31725 | 233.19.3.124 | 233.19.3.125 |
| 26 | 31726 | | |
| 27 | 31727 | | |
| 28 | 31728 | | |
| 29 | 31729 | 233.19.3.126 | 233.19.3.127 |
| 30 | 31730 | | |
| 31 | 31731 | | |
| 32 | 31732 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.1.9 EDGA Address/Unit Distribution

The following tables describe the unit distribution across production EDGA Exchange Multicast PITCH feeds.

| NY5 Primary Datacenter | | Gig-Shaped [AA] 174.136.170.160/28 | | WAN-Shaped [AC] 174.136.170.176/28 | | Gig-Shaped [AB] 174.136.170.192/28 | | WAN-Shaped [AD] 174.136.170.208/28 | |
|---|---|---|---|---|---|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 30301 | 224.0.130.0 | 224.0.130.16 | 224.0.130.32 | 224.0.130.48 | 233.209.92.0 | 233.209.92.16 | 233.209.92.32 | 233.209.92.48 |
| 2 | 30302 | | | | | | | | |
| 3 | 30303 | | | | | | | | |
| 4 | 30304 | | | | | | | | |
| 5 | 30305 | 224.0.130.1 | 224.0.130.17 | 224.0.130.33 | 224.0.130.49 | 233.209.92.1 | 233.209.92.17 | 233.209.92.33 | 233.209.92.49 |
| 6 | 30306 | | | | | | | | |
| 7 | 30307 | | | | | | | | |
| 8 | 30308 | | | | | | | | |
| 9 | 30309 | 224.0.130.2 | 224.0.130.18 | 224.0.130.34 | 224.0.130.50 | 233.209.92.2 | 233.209.92.18 | 233.209.92.34 | 233.209.92.50 |
| 10 | 30310 | | | | | | | | |
| 11 | 30311 | | | | | | | | |
| 12 | 30312 | | | | | | | | |
| 13 | 30313 | 224.0.130.3 | 224.0.130.19 | 224.0.130.35 | 224.0.130.51 | 233.209.92.3 | 233.209.92.19 | 233.209.92.35 | 233.209.92.51 |
| 14 | 30314 | | | | | | | | |
| 15 | 30315 | | | | | | | | |
| 16 | 30316 | | | | | | | | |
| 17 | 30317 | 224.0.130.4 | 224.0.130.20 | 224.0.130.36 | 224.0.130.52 | 233.209.92.4 | 233.209.92.20 | 233.209.92.36 | 233.209.92.52 |
| 18 | 30318 | | | | | | | | |
| 19 | 30319 | | | | | | | | |
| 20 | 30320 | | | | | | | | |
| 21 | 30321 | 224.0.130.5 | 224.0.130.21 | 224.0.130.37 | 224.0.130.53 | 233.209.92.5 | 233.209.92.21 | 233.209.92.37 | 233.209.92.53 |
| 22 | 30322 | | | | | | | | |
| 23 | 30323 | | | | | | | | |
| 24 | 30324 | | | | | | | | |
| 25 | 30325 | 224.0.130.6 | 224.0.130.22 | 224.0.130.38 | 224.0.130.54 | 233.209.92.6 | 233.209.92.22 | 233.209.92.38 | 233.209.92.54 |
| 26 | 30326 | | | | | | | | |
| 27 | 30327 | | | | | | | | |
| 28 | 30328 | | | | | | | | |
| 29 | 30329 | 224.0.130.7 | 224.0.130.23 | 224.0.130.39 | 224.0.130.55 | 233.209.92.7 | 233.209.92.23 | 233.209.92.39 | 233.209.92.55 |
| 30 | 30330 | | | | | | | | |
| 31 | 30331 | | | | | | | | |
| 32 | 30332 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

| CH4 Secondary Datacenter | | WAN-Shaped (AE) 174.136.182.112/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-timeMC** | **Gap ResponseMC** |
| 1 | 31301 | 233.19.3.48 | 233.19.3.49 |
| 2 | 31302 | | |
| 3 | 31303 | | |
| 4 | 31304 | | |
| 5 | 31305 | 233.19.3.50 | 233.19.3.51 |
| 6 | 31306 | | |
| 7 | 31307 | | |
| 8 | 31308 | | |
| 9 | 31309 | 233.19.3.52 | 233.19.3.53 |
| 10 | 31310 | | |
| 11 | 31311 | | |
| 12 | 31312 | | |
| 13 | 31313 | 233.19.3.54 | 233.19.3.55 |
| 14 | 31314 | | |
| 15 | 31315 | | |
| 16 | 31316 | | |
| 17 | 31317 | 233.19.3.56 | 233.19.3.57 |
| 18 | 31318 | | |
| 19 | 31319 | | |
| 20 | 31320 | | |
| 21 | 31321 | 233.19.3.58 | 233.19.3.59 |
| 22 | 31322 | | |
| 23 | 31323 | | |
| 24 | 31324 | | |
| 25 | 31325 | 233.19.3.60 | 233.19.3.61 |
| 26 | 31326 | | |
| 27 | 31327 | | |
| 28 | 31328 | | |
| 29 | 31329 | 233.19.3.62 | 233.19.3.63 |
| 30 | 31330 | | |
| 31 | 31331 | | |
| 32 | 31332 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.1.10 EDGX Address/Unit Distribution

The following tables describe the unit distribution across production EDGX Exchange Multicast PITCH feeds.

| NY5 Primary Datacenter | | Gig-Shaped [XA] 174.136.172.160/28 | | WAN-Shaped [XC] 174.136.172.176/28 | | Gig-Shaped [XB] 174.136.172.192/28 | | WAN-Shaped [XD] 174.136.172.208/28 | |
|---|---|---|---|---|---|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 30401 | 224.0.130.64 | 224.0.130.80 | 224.0.130.96 | 224.0.130.112 | 233.209.92.64 | 233.209.92.80 | 233.209.92.96 | 233.209.92.112 |
| 2 | 30402 | | | | | | | | |
| 3 | 30403 | | | | | | | | |
| 4 | 30404 | | | | | | | | |
| 5 | 30405 | 224.0.130.65 | 224.0.130.81 | 224.0.130.97 | 224.0.130.113 | 233.209.92.65 | 233.209.92.81 | 233.209.92.97 | 233.209.92.113 |
| 6 | 30406 | | | | | | | | |
| 7 | 30407 | | | | | | | | |
| 8 | 30408 | | | | | | | | |
| 9 | 30409 | 224.0.130.66 | 224.0.130.82 | 224.0.130.98 | 224.0.130.114 | 233.209.92.66 | 233.209.92.82 | 233.209.92.98 | 233.209.92.114 |
| 10 | 30410 | | | | | | | | |
| 11 | 30411 | | | | | | | | |
| 12 | 30412 | | | | | | | | |
| 13 | 30413 | 224.0.130.67 | 224.0.130.83 | 224.0.130.99 | 224.0.130.115 | 233.209.92.67 | 233.209.92.83 | 233.209.92.99 | 233.209.92.115 |
| 14 | 30414 | | | | | | | | |
| 15 | 30415 | | | | | | | | |
| 16 | 30416 | | | | | | | | |
| 17 | 30417 | 224.0.130.68 | 224.0.130.84 | 224.0.130.100 | 224.0.130.116 | 233.209.92.68 | 233.209.92.84 | 233.209.92.100 | 233.209.92.116 |
| 18 | 30418 | | | | | | | | |
| 19 | 30419 | | | | | | | | |
| 20 | 30420 | | | | | | | | |
| 21 | 30421 | 224.0.130.69 | 224.0.130.85 | 224.0.130.101 | 224.0.130.117 | 233.209.92.69 | 233.209.92.85 | 233.209.92.101 | 233.209.92.117 |
| 22 | 30422 | | | | | | | | |
| 23 | 30423 | | | | | | | | |
| 24 | 30424 | | | | | | | | |
| 25 | 30425 | 224.0.130.70 | 224.0.130.86 | 224.0.130.102 | 224.0.130.118 | 233.209.92.70 | 233.209.92.86 | 233.209.92.102 | 233.209.92.118 |
| 26 | 30426 | | | | | | | | |
| 27 | 30427 | | | | | | | | |
| 28 | 30428 | | | | | | | | |
| 29 | 30429 | 224.0.130.71 | 224.0.130.87 | 224.0.130.103 | 224.0.130.119 | 233.209.92.71 | 233.209.92.87 | 233.209.92.103 | 233.209.92.119 |
| 30 | 30430 | | | | | | | | |
| 31 | 30431 | | | | | | | | |
| 32 | 30432 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

| CH4 Secondary Datacenter | | WAN-Shaped (XE) 174.136.182.240/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-timeMC** | **Gap ResponseMC** |
| 1 | 31401 | 233.19.3.64 | 233.19.3.65 |
| 2 | 31402 | | |
| 3 | 31403 | | |
| 4 | 31404 | | |
| 5 | 31405 | 233.19.3.66 | 233.19.3.67 |
| 6 | 31406 | | |
| 7 | 31407 | | |
| 8 | 31408 | | |
| 9 | 31409 | 233.19.3.68 | 233.19.3.69 |
| 10 | 31410 | | |
| 11 | 31411 | | |
| 12 | 31412 | | |
| 13 | 31413 | 233.19.3.70 | 233.19.3.71 |
| 14 | 31414 | | |
| 15 | 31415 | | |
| 16 | 31416 | | |
| 17 | 31417 | 233.19.3.72 | 233.19.3.73 |
| 18 | 31418 | | |
| 19 | 31419 | | |
| 20 | 31420 | | |
| 21 | 31421 | 233.19.3.74 | 233.19.3.75 |
| 22 | 31422 | | |
| 23 | 31423 | | |
| 24 | 31424 | | |
| 25 | 31425 | 233.19.3.76 | 233.19.3.77 |
| 26 | 31426 | | |
| 27 | 31427 | | |
| 28 | 31428 | | |
| 29 | 31429 | 233.19.3.78 | 233.19.3.79 |
| 30 | 31430 | | |
| 31 | 31431 | | |
| 32 | 31432 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

## 9.2 US Options Production Environment Configuration

### 9.2.1 Limitations/Configurations

The following table defines BATS current configuration for network and gap request limitations. These limitations are session based. BATS reserves the right to adjust the gap request limitations to improve the effectiveness of the gap request infrastructure.

| Period/Type | Limit/Setting | Notes |
|---|---|---|
| MTU | 1500 | BATS will send UDP messages up to 1500 bytes. Members should ensure that their infrastructure is configured accordingly. |
| Gig-Shaped Throttle | 1 Gb/s | The real-time and gap multicast head ends are configured to shape their output to this level to minimize packet loss. |
| WAN-Shaped Throttle | 100 Mb/s | |
| Gap Response Delay | 2 ms | The Gap Server will delay resending sequenced messages via multicast for the specified limit in order to satisfy multiple GRP gap requests with one multicast response. |
| Count | 100 | Any single gap request may not be for more than this number of dropped messages. |
| 1 Second | 320 Requests | This is the maximum number of retransmission requests allowed per second for each session. This is renewed every clock second. |
| 1 Minute | 1500 Requests | This is the maximum number of retransmission requests allowed per minute for each session. This is renewed every clock minute. |
| Day | 100,000 Requests | This is the maximum number of retransmission requests allowed per day for each session. |
| Within Range | 1,000,000 Messages | Users' retransmission requests must be within this many messages of the most recent sequence sent by the real-time feed. |

### 9.2.2 Unit Distribution

The following table describes BATS symbol distribution across units.

| Symbol Range Start | Unit | Expiration Month | Calls or Puts |
|---|---|---|---|
| A | 1 | Front 2 Months | Puts |
| | 2 | Front 2 Months | Calls |
| | 3 | Months 3+ | Puts |
| | 4 | Months 3+ | Calls |
| BK | 5 | Front 2 Months | Puts |
| | 6 | Front 2 Months | Calls |
| | 7 | Months 3+ | Puts |
| | 8 | Months 3+ | Calls |
| DE | 9 | Front 2 Months | Puts |
| | 10 | Front 2 Months | Calls |
| | 11 | Months 3+ | Puts |
| | 12 | Months 3+ | Calls |
| GH | 13 | Front 2 Months | Puts |
| | 14 | Front 2 Months | Calls |
| | 15 | Months 3+ | Puts |
| | 16 | Months 3+ | Calls |
| IX | 17 | Front 2 Months | Puts |
| | 18 | Front 2 Months | Calls |
| | 19 | Months 3+ | Puts |
| | 20 | Months 3+ | Calls |
| NG | 21 | Front 2 Months | Puts |
| | 22 | Front 2 Months | Calls |
| | 23 | Months 3+ | Puts |
| | 24 | Months 3+ | Calls |
| SC | 25 | Front 2 Months | Puts |
| | 26 | Front 2 Months | Calls |
| | 27 | Months 3+ | Puts |
| | 28 | Months 3+ | Calls |
| TS | 29 | Front 2 Months | Puts |
| | 30 | Front 2 Months | Calls |
| | 31 | Months 3+ | Puts |
| | 32 | Months 3+ | Calls |

Note - BATS reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.2.3 Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NJ2 Primary Data Center | 174.136.165.1 |
| CH4 Secondary Data Center | 174.136.181.223 |
| NY5 Primary Data Center A feed* | 74.115.128.148 |
| NY5 Primary Data Center C feed* | 74.115.128.149 |
| NY5 Primary Data Center B feed* | 74.115.128.150 |
| NY5 Primary Data Center D feed* | 74.115.128.151 |

*Availability date TBD.

### 9.2.4 Address/Unit Distribution

The following tables describe the unit distribution across the BATS Options Multicast PITCH feeds.

| NJ2 Primary Datacenter | | Gig-Shaped (OA) | | WAN-Shaped (OC) | | Gig-Shaped (OB) | | WAN-Shaped (OD) | |
|---|---|---|---|---|---|---|---|---|---|
| Unit | IP Port | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr | Real-time MC (Src) Addr | Gap Resp. MC (Src) Addr |
| 1 | 30101 | 224.0.62.96 (174.136.165.225) | 224.0.62.97 (174.136.165.225) | 224.0.62.120 (174.136.165.193) | 224.0.62.121 (174.136.165.193) | 233.19.3.160 (174.136.165.241) | 233.19.3.161 (174.136.165.241) | 233.19.3.176 (174.136.165.201) | 233.19.3.177 (174.136.165.201) |
| 2 | 30102 | | | | | | | | |
| 3 | 30103 | | | | | | | | |
| 4 | 30104 | | | | | | | | |
| 5 | 30105 | 224.0.62.98 (174.136.165.226) | 224.0.62.99 (174.136.165.226) | 224.0.62.122 (174.136.165.193) | 224.0.62.123 (174.136.165.193) | 233.19.3.162 (174.136.165.241) | 233.19.3.163 (174.136.165.241) | 233.19.3.178 (174.136.165.201) | 233.19.3.179 (174.136.165.201) |
| 6 | 30106 | | | | | | | | |
| 7 | 30107 | | | | | | | | |
| 8 | 30108 | | | | | | | | |
| 9 | 30109 | 224.0.62.100 (174.136.165.227) | 224.0.62.101 (174.136.165.227) | 224.0.62.124 (174.136.165.193) | 224.0.62.125 (174.136.165.193) | 233.19.3.164 (174.136.165.242) | 233.19.3.165 (174.136.165.242) | 233.19.3.180 (174.136.165.201) | 233.19.3.181 (174.136.165.201) |
| 10 | 30110 | | | | | | | | |
| 11 | 30111 | | | | | | | | |
| 12 | 30112 | | | | | | | | |
| 13 | 30113 | 224.0.62.102 (174.136.165.228) | 224.0.62.103 (174.136.165.228) | 224.0.62.126 (174.136.165.193) | 224.0.62.127 (174.136.165.193) | 233.19.3.166 (174.136.165.242) | 233.19.3.167 (174.136.165.242) | 233.19.3.182 (174.136.165.201) | 233.19.3.183 (174.136.165.201) |
| 14 | 30114 | | | | | | | | |
| 15 | 30115 | | | | | | | | |
| 16 | 30116 | | | | | | | | |
| 17 | 30117 | 224.0.62.104 (174.136.165.229) | 224.0.62.105 (174.136.165.229) | 224.0.62.128 (174.136.165.194) | 224.0.62.129 (174.136.165.194) | 233.19.3.168 (174.136.165.243) | 233.19.3.169 (174.136.165.243) | 233.19.3.184 (174.136.165.202) | 233.19.3.185 (174.136.165.202) |
| 18 | 30118 | | | | | | | | |
| 19 | 30119 | | | | | | | | |
| 20 | 30120 | | | | | | | | |
| 21 | 30121 | 224.0.62.106 (174.136.165.230) | 224.0.62.107 (174.136.165.230) | 224.0.62.130 (174.136.165.194) | 224.0.62.131 (174.136.165.194) | 233.19.3.170 (174.136.165.243) | 233.19.3.171 (174.136.165.243) | 233.19.3.186 (174.136.165.202) | 233.19.3.187 (174.136.165.202) |
| 22 | 30122 | | | | | | | | |
| 23 | 30123 | | | | | | | | |
| 24 | 30124 | | | | | | | | |
| 25 | 30125 | 224.0.62.108 (174.136.165.231) | 224.0.62.109 (174.136.165.231) | 224.0.62.132 (174.136.165.194) | 224.0.62.133 (174.136.165.194) | 233.19.3.172 (174.136.165.244) | 233.19.3.173 (174.136.165.244) | 233.19.3.188 (174.136.165.202) | 233.19.3.189 (174.136.165.202) |
| 26 | 30126 | | | | | | | | |
| 27 | 30127 | | | | | | | | |
| 28 | 30128 | | | | | | | | |
| 29 | 30129 | 224.0.62.110 (174.136.165.232) | 224.0.62.111 (174.136.165.232) | 224.0.62.134 (174.136.165.194) | 224.0.62.135 (174.136.165.194) | 233.19.3.174 (174.136.165.244) | 233.19.3.175 (174.136.165.244) | 233.19.3.190 (174.136.165.202) | 233.19.3.191 (174.136.165.202) |
| 30 | 30130 | | | | | | | | |
| 31 | 30131 | | | | | | | | |
| 32 | 30132 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

**Availability date TBD. Members should not configure their networks or systems for these addresses.**

| NY5 Primary Datacenter | | Gig-Shaped [OA] 174.136.163.160/28 | | WAN-Shaped [OC] 174.136.163.176/28 | | Gig-Shaped [OB] 174.136.163.192/28 | | WAN-Shaped [OD] 174.136.163.208/28 | |
|---|---|---|---|---|---|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 30101 | 224.0.131.0 | 224.0.131.16 | 224.0.131.32 | 224.0.131.48 | 233.130.124.0 | 233.130.124.16 | 233.130.124.32 | 233.130.124.48 |
| 2 | 30102 | | | | | | | | |
| 3 | 30103 | | | | | | | | |
| 4 | 30104 | | | | | | | | |
| 5 | 30105 | 224.0.131.1 | 224.0.131.17 | 224.0.131.33 | 224.0.131.49 | 233.130.124.1 | 233.130.124.17 | 233.130.124.33 | 233.130.124.49 |
| 6 | 30106 | | | | | | | | |
| 7 | 30107 | | | | | | | | |
| 8 | 30108 | | | | | | | | |
| 9 | 30109 | 224.0.131.2 | 224.0.131.18 | 224.0.131.34 | 224.0.131.50 | 233.130.124.2 | 233.130.124.18 | 233.130.124.34 | 233.130.124.50 |
| 10 | 30110 | | | | | | | | |
| 11 | 30111 | | | | | | | | |
| 12 | 30112 | | | | | | | | |
| 13 | 30113 | 224.0.131.3 | 224.0.131.19 | 224.0.131.35 | 224.0.131.51 | 233.130.124.3 | 233.130.124.19 | 233.130.124.35 | 233.130.124.51 |
| 14 | 30114 | | | | | | | | |
| 15 | 30115 | | | | | | | | |
| 16 | 30116 | | | | | | | | |
| 17 | 30117 | 224.0.131.4 | 224.0.131.20 | 224.0.131.36 | 224.0.131.52 | 233.130.124.4 | 233.130.124.20 | 233.130.124.36 | 233.130.124.52 |
| 18 | 30118 | | | | | | | | |
| 19 | 30119 | | | | | | | | |
| 20 | 30120 | | | | | | | | |
| 21 | 30121 | 224.0.131.5 | 224.0.131.21 | 224.0.131.37 | 224.0.131.53 | 233.130.124.5 | 233.130.124.21 | 233.130.124.37 | 233.130.124.53 |
| 22 | 30122 | | | | | | | | |
| 23 | 30123 | | | | | | | | |
| 24 | 30124 | | | | | | | | |
| 25 | 30125 | 224.0.131.6 | 224.0.131.22 | 224.0.131.38 | 224.0.131.54 | 233.130.124.6 | 233.130.124.22 | 233.130.124.38 | 233.130.124.54 |
| 26 | 30126 | | | | | | | | |
| 27 | 30127 | | | | | | | | |
| 28 | 30128 | | | | | | | | |
| 29 | 30129 | 224.0.131.7 | 224.0.131.23 | 224.0.131.39 | 224.0.131.55 | 233.130.124.7 | 233.130.124.23 | 233.130.124.39 | 233.130.124.55 |
| 30 | 30130 | | | | | | | | |
| 31 | 30131 | | | | | | | | |
| 32 | 30132 | | | | | | | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration. Addresses in the gray area are pre-assigned but not available. Members should not configure their networks or systems for these addresses.

| CH4 Secondary Datacenter | | Options WAN-Shaped (OE) 174.136.181.192/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Response MC** |
| 1 | 31801 | 233.19.3.96 | 233.19.3.97 |
| 2 | 31802 | | |
| 3 | 31803 | | |
| 4 | 31804 | | |
| 5 | 31805 | 233.19.3.98 | 233.19.3.99 |
| 6 | 31806 | | |
| 7 | 31807 | | |
| 8 | 31808 | | |
| 9 | 31809 | 233.19.3.100 | 233.19.3.101 |
| 10 | 31810 | | |
| 11 | 31811 | | |
| 12 | 31812 | | |
| 13 | 31813 | 233.19.3.102 | 233.19.3.103 |
| 14 | 31814 | | |
| 15 | 31815 | | |
| 16 | 31816 | | |
| 17 | 31817 | 233.19.3.104 | 233.19.3.105 |
| 18 | 31818 | | |
| 19 | 31819 | | |
| 20 | 31820 | | |
| 21 | 31821 | 233.19.3.106 | 233.19.3.107 |
| 22 | 31822 | | |
| 23 | 31823 | | |
| 24 | 31824 | | |
| 25 | 31825 | 233.19.3.108 | 233.19.3.109 |
| 26 | 31826 | | |
| 27 | 31827 | | |
| 28 | 31828 | | |
| 29 | 31829 | 233.19.3.110 | 233.19.3.111 |
| 30 | 31830 | | |
| 31 | 31831 | | |
| 32 | 31832 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

## 9.3 US Equities Certification Environment Configuration

### 9.3.1 Unit/Symbol Distribution

The following table describes BATS symbol distribution across units.

| Symbol Range Start | Unit |
|---|---|
| A | 1 |
| AH | 2 |
| AS | 3 |
| BF | 4 |
| C | 5 |
| CM | 6 |
| CT | 7 |
| DI | 8 |
| EC | 9 |
| EU | 10 |
| FD | 11 |
| GD | 12 |
| GW | 13 |
| I | 14 |
| IU | 15 |
| JO | 16 |
| LL | 17 |
| ME | 18 |
| MU | 19 |
| NV | 20 |
| PD | 21 |
| PS | 22 |
| RJ | 23 |
| SD | 24 |
| SP | 25 |
| SU | 26 |
| TM | 27 |
| TZ | 28 |
| UW | 29 |
| VU | 30 |
| X | 31 |
| *All BATS Listed Securities* | 32 |

Note - BATS reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.3.2 Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NY5 BZX Certification Data Center | 74.115.128.129 |
| NY5 BYX Certification Data Center | 74.115.128.129 |
| NY5 EDGA Certification Data Center | 74.115.128.129 |
| NY5 EDGX Certification Data Center | 74.115.128.129 |

### 9.3.3 BZX Address/Unit Distribution

The following tables describe the unit distribution across certification BZX Exchange Multicast PITCH feeds out of the NY5 datacenter.

| | | 174.136.174.80/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 32001 | 224.0.74.236 | 224.0.74.237 |
| 2 | 32002 | | |
| 3 | 32003 | | |
| 4 | 32004 | | |
| 5 | 32005 | | |
| 6 | 32006 | | |
| 7 | 32007 | | |
| 8 | 32008 | | |
| 9 | 32009 | | |
| 10 | 32010 | | |
| 11 | 32011 | | |
| 12 | 32012 | | |
| 13 | 32013 | | |
| 14 | 32014 | | |
| 15 | 32015 | | |
| 16 | 32016 | | |
| 17 | 32017 | 224.0.74.238 | 224.0.74.239 |
| 18 | 32018 | | |
| 19 | 32019 | | |
| 20 | 32020 | | |
| 21 | 32021 | | |
| 22 | 32022 | | |
| 23 | 32023 | | |
| 24 | 32024 | | |
| 25 | 32025 | | |
| 26 | 32026 | | |
| 27 | 32027 | | |
| 28 | 32028 | | |
| 29 | 32029 | | |
| 30 | 32030 | | |
| 31 | 32031 | | |
| 32 | 32032 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.3.4 BYX Address/Unit Distribution

The following tables describe the unit distribution across certification BYX Exchange Multicast PITCH feeds out of the NY5 datacenter.

| | | 174.136.174.144/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 32201 | 224.0.74.232 | 224.0.74.233 |
| 2 | 32202 | | |
| 3 | 32203 | | |
| 4 | 32204 | | |
| 5 | 32205 | | |
| 6 | 32206 | | |
| 7 | 32207 | | |
| 8 | 32208 | | |
| 9 | 32209 | | |
| 0 | 32210 | | |
| 11 | 32211 | | |
| 12 | 32212 | | |
| 13 | 32213 | | |
| 14 | 32214 | | |
| 15 | 32215 | | |
| 16 | 32216 | | |
| 17 | 32217 | 224.0.74.234 | 224.0.74.235 |
| 18 | 32218 | | |
| 19 | 32219 | | |
| 20 | 32220 | | |
| 21 | 32221 | | |
| 22 | 32222 | | |
| 23 | 32223 | | |
| 24 | 32224 | | |
| 25 | 32225 | | |
| 26 | 32226 | | |
| 27 | 32227 | | |
| 28 | 32228 | | |
| 29 | 32229 | | |
| 30 | 32230 | | |
| 31 | 32231 | | |
| 32 | 32232 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.3.5 EDGA Address/Unit Distribution

The following tables describe the unit distribution across certification EDGA Exchange Multicast PITCH feeds out of the NY5 datacenter.

| | | 174.136.174.16/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 32401 | 224.0.74.224 | 224.0.74.225 |
| 2 | 32402 | | |
| 3 | 32403 | | |
| 4 | 32404 | | |
| 5 | 32405 | | |
| 6 | 32406 | | |
| 7 | 32407 | | |
| 8 | 32408 | | |
| 9 | 32409 | | |
| 10 | 32410 | | |
| 11 | 32411 | | |
| 12 | 32412 | | |
| 13 | 32413 | | |
| 14 | 32414 | | |
| 15 | 32415 | | |
| 16 | 32416 | | |
| 17 | 32417 | 224.0.74.226 | 224.0.74.227 |
| 18 | 32418 | | |
| 19 | 32419 | | |
| 20 | 32420 | | |
| 21 | 32421 | | |
| 22 | 32422 | | |
| 23 | 32423 | | |
| 24 | 32424 | | |
| 25 | 32425 | | |
| 26 | 32426 | | |
| 27 | 32427 | | |
| 28 | 32428 | | |
| 29 | 32429 | | |
| 30 | 32430 | | |
| 31 | 32431 | | |
| 32 | 32432 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.3.6 EDGX Address/Unit Distribution

The following tables describe the unit distribution across certification EDGX Exchange Multicast PITCH feeds out of the NY5 datacenter.

| | | 174.136.174.48/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 32301 | 224.0.74.228 | 224.0.74.229 |
| 2 | 32302 | | |
| 3 | 32303 | | |
| 4 | 32304 | | |
| 5 | 32305 | | |
| 6 | 32306 | | |
| 7 | 32307 | | |
| 8 | 32308 | | |
| 9 | 32309 | | |
| 10 | 32310 | | |
| 11 | 32311 | | |
| 12 | 32312 | | |
| 13 | 32313 | | |
| 14 | 32314 | | |
| 15 | 32315 | | |
| 16 | 32316 | | |
| 17 | 32317 | 224.0.74.230 | 224.0.74.231 |
| 18 | 32318 | | |
| 19 | 32319 | | |
| 20 | 32320 | | |
| 21 | 32321 | | |
| 22 | 32322 | | |
| 23 | 32323 | | |
| 24 | 32324 | | |
| 25 | 32325 | | |
| 26 | 32326 | | |
| 27 | 32327 | | |
| 28 | 32328 | | |
| 29 | 32329 | | |
| 30 | 32330 | | |
| 31 | 32331 | | |
| 32 | 32332 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

## 9.4 US Options Certification Environment Configuration

### 9.4.1 Unit Distribution

The following table describes BATS symbol distribution across units.

| Symbol Range Start | Unit | Expiration Month | Calls or Puts |
|---|---|---|---|
| A | 1 | Front 2 Months | Puts |
| | 2 | Front 2 Months | Calls |
| | 3 | Months 3+ | Puts |
| | 4 | Months 3+ | Calls |
| BK | 5 | Front 2 Months | Puts |
| | 6 | Front 2 Months | Calls |
| | 7 | Months 3+ | Puts |
| | 8 | Months 3+ | Calls |
| DE | 9 | Front 2 Months | Puts |
| | 10 | Front 2 Months | Calls |
| | 11 | Months 3+ | Puts |
| | 12 | Months 3+ | Calls |
| GH | 13 | Front 2 Months | Puts |
| | 14 | Front 2 Months | Calls |
| | 15 | Months 3+ | Puts |
| | 16 | Months 3+ | Calls |
| IX | 17 | Front 2 Months | Puts |
| | 18 | Front 2 Months | Calls |
| | 19 | Months 3+ | Puts |
| | 20 | Months 3+ | Calls |
| NG | 21 | Front 2 Months | Puts |
| | 22 | Front 2 Months | Calls |
| | 23 | Months 3+ | Puts |
| | 24 | Months 3+ | Calls |
| SC | 25 | Front 2 Months | Puts |
| | 26 | Front 2 Months | Calls |
| | 27 | Months 3+ | Puts |
| | 28 | Months 3+ | Calls |
| TS | 29 | Front 2 Months | Puts |
| | 30 | Front 2 Months | Calls |
| | 31 | Months 3+ | Puts |
| | 32 | Months 3+ | Calls |

Note - BATS reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

### 9.4.2 Multicast Routing Parameters

| Data Center | Rendezvous Point |
|---|---|
| NY5 Certification Data Center | 74.115.128.129 |

### 9.4.3 BATS Options Address/Unit Distribution

The following tables describe the unit distribution across certification BATS Options Multicast PITCH feeds out of the NY5 datacenter.

| | | 174.136.174.112/28 | |
|---|---|---|---|
| **Unit** | **IP Port** | **Real-time MC** | **Gap Resp. MC** |
| 1 | 32101 | 224.0.74.240 | 224.0.74.241 |
| 2 | 32102 | | |
| 3 | 32103 | | |
| 4 | 32104 | | |
| 5 | 32105 | | |
| 6 | 32106 | | |
| 7 | 32107 | | |
| 8 | 32108 | | |
| 9 | 32109 | | |
| 10 | 32110 | | |
| 11 | 32111 | | |
| 12 | 32112 | | |
| 13 | 32113 | | |
| 14 | 32114 | | |
| 15 | 32115 | | |
| 16 | 32116 | | |
| 17 | 32117 | 224.0.74.242 | 224.0.74.243 |
| 18 | 32118 | | |
| 19 | 32119 | | |
| 20 | 32120 | | |
| 21 | 32121 | | |
| 22 | 32122 | | |
| 23 | 32123 | | |
| 24 | 32124 | | |
| 25 | 32125 | | |
| 26 | 32126 | | |
| 27 | 32127 | | |
| 28 | 32128 | | |
| 29 | 32129 | | |
| 30 | 32130 | | |
| 31 | 32131 | | |
| 32 | 32132 | | |

Note - BATS reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

# 10 Connectivity

## 10.1 Supported Extranet Carriers

The WAN-Shaped feed will be made available to members through extranet carriers that have completed their multicast implementation and certified with BATS on a per-market basis. BATS has certified a number of carriers defined in the BATS US Equity/Options Connectivity Manual with respect to redistribution of BATS Multicast data feeds. For more information on receiving Multicast PITCH through any of these providers, reach out to the vendor contact noted in the Extranet Providers section of the Connectivity Manual.

## 10.2 Bandwidth Recommendation

The Gig-shaped feeds require 1Gbps of bandwidth while the WAN-shaped feeds require 100Mbps of bandwidth. BATS will use 90% of these respective bandwidths for Multicast PITCH to allow members to use the same physical connection for FIX order entry if desired.

## 10.3 Multicast Test Program

The ZIP file located at http://www.batstrading.com/resources/membership/mcast_pitch.zip contains a sample program that may be used to test Multicast PITCH feed connections and to troubleshoot Multicast issues. Refer to the included README file for build and usage information.

# 11 References

For more information on BATS Symbology, please refer to the BATS Symbology Reference document.

# 12 Support

Please e-mail questions or comments regarding this specification to tradedesk@bats.com.

## Revision History

| Document Version | Date | Description |
|---|---|---|
| 2.0.0 | 12/19/08 | Initial version 1.0.0. |
| 2.0.1 | 12/26/08 | Correction to Hdr Sequence example. |
| 2.0.2 | 01/06/09 | Symbol distribution update, IP information added. |
| 2.0.3 | 01/08/09 | Symbol distribution update. |
| 2.0.4 | 01/12/09 | Added Source IP and RP information. |
| 2.0.5 | 01/16/09 | Reference added for Multicast PITCH test program. |
| 2.0.6 | 01/21/09 | Length on Trade – Short example created. |
| 2.1.0 | 01/29/09 | Added information on Spin Servers & WAN Source IPs. |
| 2.2.0 | 05/27/09 | Added FLAG fields to the `Add` and `Modify` messages. |
| 2.2.1 | 06/03/09 | Added certification environment details. |
| 2.3.0 | 08/11/09 | Removed BOLT references. |
| 2.4.0 | 10/05/09 | Added extensions for options symbol mapping. |
| 2.5.0 | 11/13/09 | Updated to new technical specification template.<br>Modified Side Indicator to always be “B” regardless of resting side.<br>Added list of Extranets supporting Multicast PITCH redistribution for WAN-shaped feeds. |
| 2.5.1 | 12/01/09 | Missing Price row added to `Order Executed at Price/Size` message.<br>Multicast PITCH settings for Options Certification added. |
| 2.5.2 | 12/14/09 | Added logic for decoding internal matched vs. routed trades via Execution ID. |
| 2.6.0 | 01/12/10 | Expanded Form created for `Add Order` and `Trade` messages.<br>Added Symbol Distribution for US Options Production.<br>Updated Supported Carriers. |
| 2.6.1 | 02/10/10 | Added Multicast IP Ports for US Options Production. |
| 2.6.2 | 02/11/10 | Corrected “length” in example 11.25. |
| 2.6.3 | 02/19/10 | Modified source Multicast addresses for US Options Production in Section 7.4. |
| 2.6.4 | 02/26/10 | Updated Supported Carriers in Section 13.1 to highlight Equities vs. Options market differences. |
| 2.6.5 | 04/06/10 | Expanded Form implemented for `Add Order` and `Trade` messages for 8-character symbol support. |

| | | |
|---|---|---|
| 2.7.0 | 04/16/10 | Added references for BYX Equity Exchange.<br>BYX Multicast address tables added in Sections 6.5, 6.6 and 8.4.<br>Converted Feed IDs to 2 character format. |
| 2.7.1 | 06/02/10 | Completed updates to table in Section 6.6 for BYX detailing production address/unit distribution. |
| 2.7.2 | 06/09/10 | Obfuscate `Trade` message Order IDs by default |
| 2.7.3 | 07/20/10 | SAVVIS COIN B certified to redistribute Multicast PITCH for BATS Options. |
| 2.8.0 | 08/16/10 | Added "Order Representation" section.<br>Described OrderID obfuscation logic for reserve and hidden orders.<br>Updated feed symbol distribution for BATS Options.<br>Reordered various sections. |
| 2.9.0 | 09/03/10 | Added `Trading Status` message definition.<br>Added ability to receive `Trading Status` messages during a spin. |
| 2.9.1 | 09/16/10 | Updated Rendezvous Point addresses for BYX. |
| 2.9.2 | 09/21/10 | Corrected minor typo in `Trading Status` message type description. |
| 2.9.3 | 10/05/10 | Corrected typo in BYX WAN Shaped Gap response IP address. |
| 2.9.4 | 11/09/10 | Clarified `Modify Order` messages were a category of messages and not a specific message type. |
| 2.9.5 | 01/07/11 | `Order Executed at Price/Size` message clarification. |
| 2.9.6 | 02/02/11 | Clarified that `Trading Status` messages are presently applicable to Equities only. |
| 2.9.7 | 04/14/11 | Corrected BYX Certification Gap response IP address. |
| 2.10.0 | 05/09/11 | Added `Auction Update` message. Effective Date 10/7/11. |
| 2.10.1 | 05/25/11 | Corrected Options Production symbol distribution table.<br>Distribution has been in effect since 05/02/11. |
| 2.10.2 | 06/06/11 | Various changes based on feedback and internal discussions. |
| 2.10.3 | 06/27/11 | Minor formatting update. |
| 2.10.4 | 07/22/11 | Minor corrections to `Auction Update` messages applied.<br>Spin Session Example updated to include references to `Trading Status` and `Auction Update` messages.<br>Updated Options Production symbol distribution table.<br>Distribution to be effective 07/27/11. |

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| 2.10.5 | 08/01/11 | Added Quote-Only Halt Status in preparation for support of future BATS Listings.<br>Minor formatting updates. |
| 2.11.0 | 09/09/11 | Added Auction Update message. Effective date 10/7/11.<br>The first character of Execution IDs will use "C" for Auction Fills. Effective date 10/7/11. |
| 2.11.1 | 10/21/11 | Updated Example Messages with an Execution ID that meets the criteria defined in Section 2.5. |
| 2.12.0 | 11/16/11 | Published plans to convert from 24 units to 32 units in BATS Options effective 12/12/11 in production and from 2 to 8 matching units in certification on 11/28/11. |
| 2.12.1 | 12/10/11 | Removed references to previous unit distributions. |
| 2.13.0 | 01/31/12 | Published plans to convert from 12 units to 32 units in BATS BYX Exchange production environment effective 02/25/12. |
| 2.13.1 | 02/01/12 | Minor clarification added to Modify Order description. |
| 2.13.2 | 02/14/12 | Changed Symbol Range Start on unit 23 for BYX Exchange from 'SA' to 'S'. |
| 2.14.0 | 02/29/12 | Published plans to convert from 12 units to 32 units in BATS BZX Exchange production environment effective ~~04/14/12~~ (postponed to 05/12/12). |
| 2.15.0 | 03/07/12 | Added 4 byte MPID to the Add Order (expanded) message. Effective 5/7/12**.** |
| 2.15.1 | 04/02/12 | Updated effective date of 12 unit to 32 unit conversion for BATS BZX Exchange to be 05/12/12. |
| 2.15.2 | 05/04/12 | Cleaned up some errata in the section 8 Example Messages. |
| 2.15.3 | 05/17/12 | Removed references to previous unit distributions for BZX Exchange. |
| 2.16.0 | 06/01/12 | Added multicast IP addresses for Chicago, IL (CIL) secondary data center. |
| 2.16.1 | 06/06/12 | Updated multicast port ranges for CIL market data feeds. |
| 2.17.1 | 08/07/12 | Removed multicast IP addresses for Nutley, NJ (NNJ) secondary data center. |
| 2.17.2 | 08/13/12 | Updated Feed Descriptions with correct information following secondary datacenter migration. |
| 2.18.0 | 09/14/12 | Added `Unit Clear` message. Effective date 02/15/13.<br>Added `Retail Price Improvement` message support for the BYX Exchange. Effective date 11/05/12 (test symbols) and 01/11/13 (other defined symbols). |

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| 2.19.0 | 11/15/12 | Added multicast IP addresses for Weehawken, NJ redundant primary feeds (ZB, ZD, YB, YD, OB, OD). Availability date of the new feeds to be determined. |
| 2.19.1 | 11/29/12 | Fixed typo on multicast address tables for BYX and Options. |
| 2.19.2 | 03/28/13 | Revised OA and YA feed emitter source IP addresses. Effective date 04/15/13 and 04/22/13 respectively. |
| 2.19.3 | 04/24/13 | Added YB/YD release date – effective May 3, 2013.<br>Added OB/OD release date – effective May 7, 2013.<br>Added ZB/ZD release date – effective May 9, 2013.<br>Removed old OA and YA feed emitter source IP addresses. |
| 2.19.4 | 05/01/13 | Fixed source IP address typo on BZX ZB feed. |
| 2.19.5 | 05/15/13 | Removed redundant feed (B/D) effective dates. |
| 2.19.6 | 05/28/13 | Added field to `Symbol Mapping` Message type for ***Symbol Condition*** – effective July 18, 2013. |
| 2.19.7 | 06/06/13 | Added Unit Auction Summary (0x96), Unit Clear (0x97) and Retail Price Improvement (0x98) to list of message types. |
| 2.20.0 | 08/19/13 | Updated symbol distributions for BYX and BZX Exchange certification and production environments to accommodate a unit dedicated BATS Listed securities. Added 3rd Unit to BYX and BYX Exchange certification environments. |
| 2.20.1 | 08/28/13 | Updated BZX and BYX Equities GRP second request limits to 320/second. |
| 2.20.2 | 09/11/13 | Updated BZX Options GRP second request limit to 320/second. |
| 2.20.3 | 10/05/13 | GRP Retransmission limits updated to session based limits. Effective 10/10/13 for Options and 10/11/13 for Equities. |
| 2.20.4 | 01/29/14 | Updated `Trading Status` message definition to include Options market. Effective 03/06/14. |
| 2.30.0 | 04/04/14 | Version of Multicast PITCH Specification for the NY5 data center supporting EDGA, EDGX, BYX, BZX and BATS Options Exchange.<br>Requirement of `Spin Request` to match `Spin Image Available` sequence numbers has been relaxed. Effective on BYX, BZX and Options on 10/03/14.<br>`Spin Response` *Status* of 'O' no longer supported.<br>`Trading Status` of 'H' will be implied at system startup and 'T' will be sent as securities are available for trading. Effective on BYX, BZX and Options on 10/03/14.<br>`Add Order Expanded` *ParticipantID* may indicate "RTL" for retail specified orders in equities. |

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| 2.30.1 | 04/30/14 | Changed `Add Order Expanded` *ParticipantID* from being able to indicate "RTL" to "RETL" for retail specified orders in equities. |
| 2.30.2 | 06/05/14 | Changed `Add Order Expanded` *ParticipantID* from being able to indicate "RETL" to "RTAL" for retail specified orders in equities. Effective on BYX and BZX on 10/03/14. |
| 2.30.3 | 08/01/14 | `Trading Status` of 'A' will be distributed when BATS equity markets are accepting orders for queuing in preparation for the market open. **Effective on BYX, BZX on 11/14/14.**<br>`Trading Status` of 'Q' will be distributed when BATS equity markets are accepting orders for queuing in preparation for the market open. Effective on BATS Options on 10/03/14.<br>`Trading Status` of 'S' will be used to indicate an Exchange specific suspension in trading. Effective on BYX, BZX and Options on 10/03/14.<br>`Trading Status` of 'H' will be implied at system startup. Spins will include a Trading Status message for every symbol that has not been Halted ('H') since system startup. Effective on BYX, BZX and Options on 10/03/14.<br>Updated Multicast configuration addresses defined throughout Chapter 9 for NY5. |
| 2.30.4 | 08/05/14 | Added references back into this specification for NJ2 multicast addressing for BYX and BZX Exchange (production). |
| 2.30.5 | 08/07/14 | `Spin Response` *Status* of 'O' will continue to be supported. Effective 10/03/14 it will only be sent when the *Sequence* requested is greater than *Sequence* available by the next spin. |
| 2.30.6 | 09/12/14 | Added clarification to symbol distributions to include EDGA and EDGX markets. |
| 2.31.0 | 10/07/14 | Removed references to changes effective 10/3/14.<br>Add clarification to `Spin Response` to allow for zero order count where only messages available are `Trading Status` or `Time` messages. |
| 2.31.1 | 10/27/14 | `Trading Status` of 'S' will be implied at system startup. **Effective 11/10/14 on BATS Options and 11/14/14 on BYX/BZX Exchange.**<br>`Trading Status` messages will be sent in spins for all symbols that are not "S"uspended. **Effective 11/10/14 in BATS Options and effective 11/14/14 in BYX/BZX**. |