NYSE PILLAR DEPTH FEED - CLIENT SPECIFICATION

NYSE

NYSE American

NYSE National

NYSE Arca

NYSE Texas

Version	Date
1.4	May 17, 2025

PREFACE

DOCUMENT HISTORY

VERSION NO.	DATE	CHANGE DESCRIPTION
1.0	5/13/2024	Initial spec publication for NYSE Pillar Depth Feed
1.1	7/25/2024	Added Appendix C: Scenarios Updated section 1.3.2 Control Message Types and section 1.3 to account for new feed start time of 2:00am ET
1.2	11/15/2024	Replace Regulatory Imbalance language with Significant Imbalance language throughout document and imbalance message (msg type 105) structure. Remove significant imbalance indicator from imbalance message (msg type 105) and replace with reserved field Corrected length of update count field in Delta Message (msg type 115)
1.3	3/28/2025	Rebranded NYSE Chicago to NYSE Texas
1.4	5/17/2025	Updated Appendix A: Information on Auctions to reflect NYSE Texas auctions

REFERENCE MATERIAL

The following lists the associated documents, which either should be read in conjunction with this document or which provide other relevant information for the user:

- Common Client Specification
- ICE Global Network
- NYSE Symbology
- IP Addresses

CONTACT INFORMATION

Service Desk

- Telephone: +1 212 896-2830
- Email: support@nyse.com

FURTHER INFORMATION

For additional information about the product, visit the NYSE Pillar Depth Product Page.

For updated capacity figures, visit the Market Data capacity page.

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1. NYSE Pillar Depth Feed

1.1 OVERVIEW

The NYSE Pillar Depth Feed is a frequency-based market data product that provides a consolidated view of the ten best bid and ten best offer price points across NYSE Group's combined limit order books for all securities traded on the NYSE Group equities markets (NYSE, NYSE American, NYSE Arca, NYSE Texas, and NYSE National). The NYSE Pillar Depth Feed also includes imbalance data from each of NYSE Group's listing venues as well as security status updates (e.g., session transitions and trading halts).

See the BQT Common Client Specification for details on Time Reference and Symbol Index Mapping messages, and Order ID and Price field formats.

1.2 CONTROL MESSAGE TYPES USED IN THE FEED

See the BQT Common Client Specification for details on all control messages.

MSG TYPE	DESCRIPTION	PUBLISHER CHANNELS	REQUEST CHANNEL	REFRESH CHANNELS
1	Sequence Number Reset	x		x
3	Symbol Index Mapping	x		x
10	Retransmission Request		client	
11	Request Response		server	
12	Heartbeat Response		client	
13	Symbol Index Mapping Request		client	
15	Refresh Request		client	
31	Message Unavailable		server	
32	Symbol Clear	x		
34	Security Status Message	x		x
35	Refresh Header Message			x

1.3 MESSAGE PUBLICATION TIMES

Scheduled trading session times on normal and early-close days for all NYSE markets can be found here.

1.3.1 NYSE Pillar Depth Feed Message Types and Hours

Hours are for guidelines use only (e.g. publication times for NYSE Tape A are not exactly at 4:00pm ET, rather when the stock is closed).

MSG TYPE	DESCRIPTION	HOURS
115	Delta Message	**Markets may be included in delta messages during the following hours:** **NYSE Arca** 4:00am – 8:00pm **NYSE American** 7:00am – 8:00pm **NYSE Texas** 7:00am – 8:00pm **NYSE National** 7:00am – 8:00pm **NYSE Tape A** ~9:30am – 4:00pm **NYSE Tape B & C** 7:00am – 4:00pm
105	Imbalance Message	**See Appendix A**

1.3.2 Control Message Types

The initial publication of messages occurs shortly after feed start time. For the exact timing on each market, refer to the Common Client Specification, section "Proprietary Data - Production Hours."

2. Delta Message – Msg Type 115

The Delta Message is published each time there is a change to the aggregate limit-order book quantity across the ten best price points on the buy and/or sell side for NYSE Group. If no changes occurred for a given symbol since the last publication, no Delta Message is generated. If the volume field for a particular market ID at a particular price is updated to zero (0), the quantity should be removed as an active price point for that particular Market ID. For more information regarding how price points may be zeroed out in bulk, see the UpdateCount and Market ID fields.

Delta Messages that span multiple packets must be processed as one complete message. If a Delta message spans multiple packets and one of the packets is lost, the whole message should be considered lost.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: Varied based on repeating/sub-repeating groups contained in the message
Msg Type	2	2	Binary	The type of message: 115– Delta Message
SourceTime	4	4	Binary	The time when this msg was generated in the order book, in secs since 1/1/1970 00:00:00 UTC
SourceTimeNS	8	4	Binary	The nanosecond offset from the Source Time
SymbolIndex	12	4	Binary	The ID of the symbol in the Symbol Index msg
SymbolSeqNum	16	4	Binary	The sequence number of this message in the set of all messages for this symbol
UpdateCount	20	1	Binary	Indicates the number of times* the following group fields will be repeated in the message: • Price • Side • Participants *If this field is zero (0), all price points should be considered zero for this symbol and no repeating group information will follow.
The fields below marked with “>” represent a specific price point and can repeat in a message				
>Price	0	4	Binary	The order price. Use with the Price Scale from the symbol-mapping index.
>Side	4	1	ASCII	The side of the book (Buy/Sell). Valid values: • ‘B’ – Buy • ‘S’ – Sell

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
>Participants	5	1	Binary	Indicates the number of times the following fields will be repeated for a given price/side grouping: • Market ID • Number of Orders • Volume This field will be set to 0 when a price level is zeroed out for all exchanges and sub-repeating group fields will not be provided
The fields below marked with “>>” represent exchange specific information at a price point and can repeat in a message				
>>Market ID	0	2	Binary	Value values: 1- NYSE 3- NYSE Arca 9- NYSE American 10- NYSE National 11- NYSE Texas
>>Number of Orders	2	2	Binary	Number of orders at a price point for the specified exchange
>>Volume	4	4	Binary	Total interest quantity in shares at a price point for the specified exchange

3. Imbalance Message – Msg Type 105

Imbalance messages are published once a second during auctions to update price and volume information. If there is no change to the calculated fields, no message will be generated. See Information on Auctions for details on the auction process in the NYSE, Arca and American markets.

FIELD NAME	OFFSET	SIZE	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 73 bytes
Msg Type	2	2	Binary	This field identifies the type of message. 105 – Imbalance Message
SourceTime	4	4	Binary	The time when this msg was generated in the order book, in secs since 1/1/1970 00:00:00 UTC
SourceTimeNS	8	4	Binary	The nanosecond offset from the Source Time
SymbolIndex	12	4	Binary	The ID of the symbol in the Symbol Index msg
SymbolSeqNum	16	4	Binary	The sequence number of this message in the set of all messages for this symbol
ReferencePrice	20	4	Binary	The Reference Price is the notional likely price of the auction trade. See Information on Auctions for details. For non-NYSE markets, the Reference Price is used to calculate the Indicative Match Price.
PairedQty	24	4	Binary	For non-NYSE markets, the number of shares paired off at the Indicative Match Price. For NYSE, the number of shares paired off at the Reference Price.
TotalImbalanceQty	28	4	Binary	For non-NYSE markets, the total imbalance quantity at the Indicative Match Price. For NYSE, the total imbalance quantity at the Reference Price. When Auction Type=P (NYSE only), this field will be set to the Extreme Order Imbalance quantity.
MarketImbalanceQty	32	4	Binary	The total market order imbalance quantity at the Indicative Match Price. For NYSE, unused and defaulted to 0.
AuctionTime	36	2	Binary	Projected Auction Time (hhmm)

FIELD NAME	OFFSET	SIZE	FORMAT	DESCRIPTION
AuctionType	38	1	ASCII	• 'O' – Early Opening Auction (non-NYSE only) • 'M' – Core Opening Auction • 'H' – Reopening Auction (Halt resume) • 'C' – Closing Auction • 'P' – Extreme Closing Imbalance (NYSE only) • 'R' – Significant Closing Imbalance (NYSE only)
ImbalanceSide	39	1	ASCII	The side of the TotalImbalanceQty • 'B' – Buy side • 'S' – Sell side • ' ' - (space or 0x20) – No imbalance
ContinuousBook ClearingPrice	40	4	Binary	For non-NYSE markets, the price at which all interest on the book can trade, including auction and imbalance offset interest, and disregarding auction collars. For NYSE, the price closest to the reference price where the imbalance is 0. For signifcant imbalances, or if a continuous book clearing price is not reached, this field is defaulted to 0.
AuctionInterest ClearingPrice	44	4	Binary	For non-NYSE markets, the price at which all eligible auction-only interest would trade, subject to auction collars. For the NYSE closing auction only, the price closest to the reference price where the imbalance of closing-only interest is 0. If a closing-only clearing price is not reached, this field is defaulted to 0.
SSRFilingPrice	48	4	Binary	For non-NYSE markets, not supported and defaulted to 0. For NYSE non-Significant imbalances, if a Sell Short Restriction is in effect, the price at which Sell Short interest will be filed.
IndicativeMatchPrice	52	4	Binary	For non-NYSE markets, the price at which the highest number of shares would trade, subject to auction collars. It includes the non-displayed quantity of Reserve Orders. See Information on Auctions for details. For NYSE, set to 0.

FIELD NAME	OFFSET	SIZE	FORMAT	DESCRIPTION
UpperCollar	56	4	Binary	If the IndicativeMatchPrice is not strictly between the UpperCollar and the LowerCollar, special auction rules apply. See Rule 7.35 for details For NYSE, set to 0
LowerCollar	60	4	Binary	If the IndicativeMatchPrice is not strictly between the UpperCollar and the LowerCollar, special auction rules apply. See Rule 7.35 for details. For NYSE, set to 0
AuctionStatus	64	1	Binary	Indicates whether the auction will run • 0 - Will run as always for Open and Close • 1 - Will run, interest exists inside or at the collars or is fully paired off • 2 – Will not run because there is an imbalance through the collars • 3 – Will not run, will transition to the Closing Auction instead
FreezeStatus	65	1	Binary	Freeze status is the Imbalance Freeze status - MOC/LOC orders are accepted on the side opposite to the Significant imbalance. • 0 - Imbalance freeze not in effect • 1 - Imbalance freeze is in effect NYSE market has an imbalance freeze for the closing. Arca market has imbalance freeze for opening and re-opening.
NumExtensions	66	1	Binary	Number of times the halt period has been extended For NYSE, set to 0.
Unpaired Qty	67	4	Binary	For NYSE only, during the Closing Auction, the number of unpaired shares priced at or better than the Reference Price. For non-NYSE markets, 0.
Unpaired Side	71	1	ASCII	For NYSE only, the side of the Unpaired Qty • ‘B’ - buy side • ‘S’ - sell side • ‘ ’ - (space or 0x20) - not applicable

FIELD NAME	OFFSET	SIZE	FORMAT	DESCRIPTION
Reserved	72	1	ASCII	Reserved for future use

APPENDIX A: Information on Auctions

1.1 NYSE AUCTIONS

The NYSE market conducts auctions for NYSE-listed (Tape A) symbols only.

As a part of the auction process, Imbalance messages are published every second if there is any change from the previous second.

Note: During an auction, in calculating the imbalance at a price point on the book, NYSE considers the following to be an imbalance:

- market orders
- interest whose price is better than the book price point

AUCTION TYPE	DESCRIPTION
Opening Auction (M) **and** **Re-Opening Auction (H)**	**Interest Included** ▪ All electronic interest eligible to trade in the opening auction ▪ DMM interest as needed to offset the imbalance **Order Cancellation** ▪ Orders can be cancelled at any time up to the conclusion of the auction **Reference Price Calculation** The Reference Price is ▪ The consolidated last sale* if no Mandatory Indication has been published ▪ The consolidated last sale* if it is within the indication range ▪ The indication low price if it is higher than the consolidated last sale* ▪ The indication high price it is lower than the consolidated last sale* * If there's no consolidated last sale price, the previous close price is used

Closing Auction (C)	**Interest Included**
	▪ For Paired Quantity, Unpaired Quantity, and Total Imbalance Quantity:
	  ○ MOC and LOC orders
	  ○ Imbalance offset orders
	  ○ Closing D orders
	▪ For Continuous Book Clearing Price:
	  ○ All electronic interest eligible to trade in the closing auction
	  ○ DMM interest as needed to offset the imbalance
	▪ For Auction Interest Clearing Price:
	  ○ MOC and LOC orders
	  ○ Imbalance offset orders
	
	Order Cancellation

AUCTION TYPE	DESCRIPTION
	▪ Orders can be cancelled any time during the auction period, except for MOC, LOC and Imbalance offset orders, which can be cancelled only up to 10 minutes before the scheduled closing time. **Reference Price Calculation** The Reference Price is ▪ The NYSE last sale if it is at or within the NYSE best quote ▪ The NYSE best bid if the NYSE best bid is higher than the NYSE last sale ▪ The NYSE best offer if the NYSE best offer is lower than the NYSE last sale
Significant Imbalance Closing Auction (R)	**Interest Included** ▪ MOC and LOC orders **Reference Price Calculation** ▪ The NYSE last sale if it is at or within the NYSE best quote* ▪ The NYSE best bid if the NYSE best bid is higher than the NYSE last sale* ▪ The NYSE best offer if the NYSE best offer is lower than the NYSE last sale* * If there’s no NYSE last sale price, the NYSE previous close price is used
Extreme Imbalance Closing Auction (P)	**Interest Included** ▪ All electronic interest eligible to trade in the closing auction **Reference Price Calculation** ▪ The Reference Price is the NYSE last sale* * If there’s no NYSE last sale price, the NYSE previous close price is used

1.2 NYSE ARCA,NYSE AMERICAN, AND NYSE TEXAS AUCTIONS

Three single-price auctions are conducted during the day: the Early Opening Auction, the Core Opening Auction and the Closing Auction. As a part of the auction process, Imbalance messages are published every second if there is any change from the previous second.

This description covers normal cases. For full detail on exception cases, see Rule 7.35.

Indicative Match Price Details

- The Indicative Match Price is the price that maximizes executable volume of auction-eligible shares, subject to Auction Collars.
- It includes the non-displayed quantity of Reserve Orders.
- If two or more prices maximize executable volume equally, in an effort to maintain continuity, the Indicative Match Price is whichever price is closest to the Reference Price.
- The final auction execution price is the Indicative Match Price at auction time.

Note: During an auction, in calculating the imbalance at a price point on the book, NYSE Arca, American, and Texas consider the following to be an imbalance:

- Market orders
- Any interest whose price is at or better than the book price point

Imbalance Calculation

AUCTION TYPE	DESCRIPTION
Early Opening Auction (O)	**Interest Included** 1. Limit Orders designated for the Early Trading Session. 2. During the last minute before the Early Opening Auction time, the non-displayed quantity of Reserve Orders designated for the Early Open Auction is included in the Matched Volume and Total Imbalance Volume. **Order Cancellation** Orders can be cancelled at any time up to the conclusion of the auction. **Reference Price** ▪ The Reference Price is normally the listing market's previous Official Closing Price. See Rule 7.35 for full detail. Unexecuted session 1 eligible orders become eligible for the Early Session immediately upon conclusion of the Early Opening Auction.
Core Opening Auction (M) **and** **Re-Opening Auction (H)**	**Interest Included** 1. Limit, Market, MOO, LOO and Primary Peg orders 2. During the last 5 seconds before the Core Opening Auction time, the non-displayed quantity of Reserve Orders is included in the Matched Volume and Total Imbalance Volume. **Order Cancellation**

AUCTION TYPE	DESCRIPTION
	Orders can be cancelled any time during the auction, except for MOO and LOO orders which can be cancelled only up to 1 minute before the conclusion of the auction. **Reference Price** The Reference Price is normally the midpoint of the NBBO. See Rule 7.35 for full detail.
Closing Auction (C)	**Interest Included** 1. Limit, Market, MOC, LOC and Primary Peg orders 2. During the last minute before the Closing Auction time for Arca or Texas (last ten minutes before Closing Auction Time for American), the non-displayed quantity of Reserve Orders is included in the Matched Volume and Total Imbalance Volume. **Reference Price** ▪ The Reference Price is normally the Consolidated Tape last sale. If the price closest to the Reference Price would trade through the exchange book, the indicative match price will be the best price available where no trade through occurs. See Rule 7.35 for full detail.

1.3 IMBALANCE MESSAGE PUBLICATION TIMES

Three single-price auctions are conducted during the day: the Early Opening Auction, the Core Opening Auction and the Closing Auction. As a part of the auction process, Imbalance messages are published every second if there is any change from the previous second.

The initial publication of messages occurs shortly after feed start time. For the exact timing on each market, refer to the Common Client Specification, section "Proprietary Data - Production Hours."Scheduled trading session hours on normal and early-close days for all NYSE markets can be found here.

Regularly scheduled auctions occur at the following times. Trading halts and re-opens can occur anytime during any session. Trading halts can last from one session into the next.

During auction periods, Imbalance messages are published every second if there is any change from the last publication.

All times are US Eastern Time

DESCRIPTION	MARKET	NORMAL AUCTION PERIOD
Early Opening Auction	Arca	3:30am - 4:00am ET
	American Texas	6:30am - 7:00am ET
Core Opening Auction	Arca American Texas	8:00am - 9:30am ET
	NYSE	8:00am ET - the stock opens
Closing Auction	Arca American Texas	3:00pm - 4:00pm ET
	NYSE	3:50pm ET - the stock closes

On early closing days for ARCA, American, and Texas, the Closing auction runs from 12:00pm to 1:00pm. For NYSE, the closing auction runs from 12:50 until the stock closes.

APPENDIX B: Product IDs

Refresh and Retransmission Request messages must specify a Product ID. The correct product ID for the NYSE Pillar Depth Feed:

EXCHANGE	PRODUCT ID	DESCRIPTION
NYSE Group	27	Depth/Imbalance Data

APPENDIX C: Scenarios

Below examples show only two markets for simplicity though same can be extended to 5 markets (NYSE, Arca, Texas, American, National). The input to Pillar Depth is NYSE AggLite for each of the 5 underlying equities markets.

Assumptions (applied on a per side basis):

- Pillar Depth feed is 1 second output feed
- UpdateCount = Number of price levels with updates
- Pillar Depth publishes only delta updates which occurred during the last second
- Maximum number of price levels is 10
- Minimum number of participants at any top 10 price level is 1
- Maximum number of participants at any top 10 price level is 5
- If numParticipants is 0 on a price level, it means the price level has been deleted from top 10
- Delta Message contains 0 or more active price levels followed by 0 or more deleted price levels (as appropriate)
- The max price levels in a Delta Message can be 40 (10 new buy, 10 new sell, 10 deleted buy, 10 deleted sell)
- The price values are shown in decimals just for illustration (they are unsigned 32 types)

A packet containing Delta Messages will have max. possible size = 1073 bytes.

The worst-case scenario is when all top 10 buy/sell levels are replaced by new top levels.

$$\boldsymbol{TotalMsgSize} = Message\ FixedPortion + Size\ of\ All\ price\ points$$

(Note: the UpdateCount field provides number of price points)

$$\boldsymbol{Size\ of\ each\ price\ point} = sizeof(price\ point\ Fixed\ Portion) + numParticipants * sizeof(Participant)$$

1.1 Scenario 1 - Following is the new state of the Book in the last second. Pillar Depth Delta Message will contain 2 price points with 2 participants each.

ARCA				
#Orders	Buy	Price	Sell	#Orders
		32.33	200	2
3	300	32.00		

NYSE				
#Orders	Buy	Price	Sell	#Orders
		32.33	220	2
3	320	32.00		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	61
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	2
PricePoint1		price	uint32_t	4	32.00
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	3
		Volume	uint32_t	4	300
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	3
		Volume	uint32_t	4	320
PricePoint2		price	uint32_t	4	32.33
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	220

1.2 Scenario 2 - In Arca, 300 share execution @32. No change in NYSE.

ARCA				
#Orders	Buy	Price	Sell	#Orders
		32.33	200	2
~~3~~	~~300~~	~~32.00~~		

NYSE (current book state)				
#Orders	Buy	Price	Sell	#Orders
		32.33	220	2
3	320	32.00		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	31
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	1
PricePoint1		price	uint32_t	4	32.00
		side	char	1	B
		numParticipants	uint8_t	1	1
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	0
		Volume	uint32_t	4	0

1.3 Scenario 3 - In NYSE, 320 share execution @32. No change in ARCA. This will result in removing price point @32.

ARCA (current book state)				
#Orders	Buy	Price	Sell	#Orders
		32.33	200	2

NYSE (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.33	220	2
~~3~~	~~320~~	~~32.00~~		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output

Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	23
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	1
PricePoint1		price	uint32_t	4	32.00
		side	char	1	B
		numParticipants	uint8_t	1	0

1.4 Scenario 4 - A bunch of new orders added in ARCA at various price levels. A bunch of new orders added in NYSE at various price levels. This will result in adding new price levels.

ARCA (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.37	100	1
		32.36	200	2
		32.35	100	1
		32.34	200	2
		32.33	200	2
		32.32	100	1
		32.31	200	2
		32.30	100	1
2	200	31.99		
1	100	31.98		
3	300	31.97		
1	100	31.96		
2	200	31.95		

NYSE (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.37	200	2
		32.36	100	1
		32.35	200	2
		32.34	200	2
		32.33	220	2
		32.32	200	2
		32.31	100	1
		32.30	200	2

1	100	31.99		
2	200	31.98		
1	100	31.97		
3	300	31.96		
2	200	31.95		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	281
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	12
PricePoint1		price	uint32_t	4	31.99
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
PricePoint2		price	uint32_t	4	31.98
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint3		price	uint32_t	4	31.97
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	3
		Volume	uint32_t	4	300

	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
PricePoint4		price	uint32_t	4	31.96
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	3
		Volume	uint32_t	4	300
PricePoint5		price	uint32_t	4	31.95
		side	char	1	B
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint6		price	uint32_t	4	32.30
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint7		price	uint32_t	4	32.31
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
PricePoint8		price	uint32_t	4	32.32
		side	char	1	S

		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint9		price	uint32_t	4	32.34
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint10		price	uint32_t	4	32.35
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint11		price	uint32_t	4	32.36
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
	participant2	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
PricePoint12		price	uint32_t	4	32.37
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant2	mkt id	uint16_t	2	1

		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200

1.5 Scenario 5 - ARCA added 3 sell side orders. No change in NYSE. The new price level 32.41 is at 11th position, so it will not be published.

ARCA (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.41	200	2
		32.39	100	1
		32.38	200	2
		32.37	100	1
		32.36	200	2
		32.35	100	1
		32.34	200	2
		32.33	200	2
		32.32	100	1
		32.31	200	2
		32.30	100	1
2	200	31.99		
1	100	31.98		
3	300	31.97		
1	100	31.96		
2	200	31.95		

NYSE (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.37	200	2
		32.36	100	1
		32.35	200	2
		32.34	200	2
		32.33	220	3
		32.32	200	2
		32.31	100	1
		32.30	200	2
1	100	31.99		
2	200	31.98		
1	100	31.97		
3	300	31.96		
2	200	31.95		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	45
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	2
PricePoint1		price	uint32_t	4	32.38
		side	char	1	S
		numParticipants	uint8_t	1	1
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint2		price	uint32_t	4	32.39
		side	char	1	S
		numParticipants	uint8_t	1	1
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100

1.6 Scenario 6 - Both ARCA and NYSE executed their corresponding shares @32.30. Price level 32.30 is removed. This event will be published. Price level 32.41 which was at 11th position before this event, moves up in top 10, so it will be published.

ARCA (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.41	200	2
		32.39	100	1
		32.38	200	2
		32.37	100	1
		32.36	200	2
		32.35	100	1
		32.34	200	2
		32.33	200	2
		32.32	100	1
		32.31	200	2
		~~32.30~~	~~100~~	~~1~~

2	200	31.99		
1	100	31.98		
3	300	31.97		
1	100	31.96		
2	200	31.95		

NYSE (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.37	200	2
		32.36	100	1
		32.35	200	2
		32.34	200	2
		32.33	220	3
		32.32	200	2
		32.31	100	1
		~~32.30~~	~~200~~	~~2~~
1	100	31.99		
2	200	31.98		
1	100	31.97		
3	300	31.96		
2	200	31.95		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	37
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	2
PricePoint1		price	uint32_t	4	23.41
		side	char	1	S
		numParticipants	uint8_t	1	1
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	2
		Volume	uint32_t	4	200
PricePoint2		price	uint32_t	4	32.30
		side	char	1	S
		numParticipants	uint8_t	1	0

1.7 Scenario 7 - Both ARCA and NYSE entered order sell @32.40. This order creates a new price level in top 10. Price level 32.41 which was at 10th position before this event, moves out of top 10, so it will be deleted.

ARCA (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.41	200	2
		32.40	100	1
		32.39	100	1
		32.38	200	2
		32.37	100	1
		32.36	200	2
		32.35	100	1
		32.34	200	2
		32.33	200	2
		32.32	100	1
		32.31	200	2
2	200	31.99		
1	100	31.98		
3	300	31.97		
1	100	31.96		
2	200	31.95		

NYSE (new book state)				
#Orders	Buy	Price	Sell	#Orders
		32.40	400	4
		32.37	200	2
		32.36	100	1
		32.35	200	2
		32.34	200	2
		32.33	220	3
		32.32	200	2
		32.31	100	1
1	100	31.99		
2	200	31.98		
1	100	31.97		
3	300	31.96		
2	200	31.95		

Delta Message will be as follows:

		Field	Type	Bytes	Sample Output
Packet Header		PktHeader		16	
Fixed Portion Of Message		MsgType	uint16_t	2	115
		MsgSize	uint16_t	2	45
		sourceTime	uint32_t	4	1234
		sourceTimeNS	uint32_t	4	5678
		symbolIndex	uint32_t	4	1
		updateCount	uint8_t	1	2
PricePoint1		price	uint32_t	4	32.40
		side	char	1	S
		numParticipants	uint8_t	1	2
	participant1	mkt id	uint16_t	2	3
		numOrders	uint16_t	2	1
		Volume	uint32_t	4	100
	participant1	mkt id	uint16_t	2	1
		numOrders	uint16_t	2	4
		Volume	uint32_t	4	400
PricePoint2		price	uint32_t	4	32.41
		side	char	1	S
		numParticipants	uint8_t	1	0