OPENBOOK AGGREGATED CLIENT SPECIFICATION

NYSE AMERICAN OPENBOOK AGGREGATED
NYSE OPENBOOK AGGREGATED

Version	Date
2.1d	February 22, 2024

PREFACE

DOCUMENT HISTORY

VERSION	DATE	CHANGE DESCRIPTION
1.0	4/19/10	Initial version
1.0b	6/23/2010	▪ Removed Firm index mapping messages. ▪ Added "LastSeqNum" field to the Refresh Header message ▪ Corrected Bloomberg code field sizes on the Symbol Index mapping message
1.2	12/15/2010	▪ Removed Order ID description ▪ Removed Time Reference description ▪ Removed control message types not used on this feed ▪ Corrected update message example on 2.1.6 ▪ Added Symbol Index Mapping FTP file
1.2a	08/12/2011	Updated artwork and minor edits throughout
1.3	05/30/2012	Changed name to NYSE MKT throughout
	09/03/2012	Minor correction made to Date column for previous entry.
1.3a	10/15/2015	Updated the location of Symbol Index File Mapping
2.1	3/29/2017	Bumped version num to 2.1 to conform to Pillar migration Removed all information that is now in the Common Client Specification Updated with references to NYSE American
2.1a	6/26/2017	Symbol Index message (type 3) conforms to the Common Client Spec Exceptions to the Common Client Spec (no coding changes needed): ▪ Refresh Headers are 12 bytes in length ▪ Refresh Response message has a non-standard structure, defined here
2.1b	01/28/2022	Include a new security/trading status of 'B' to indicate that the Exchanges' gateways are accepting orders.
2.1c	03/21/2022	Updated with NYSE logo and re-branding. No content changes.
2.1d	02/22/2024	Added 6 (Suspended) as a valid value in Trading Status field of Message Type 230 and Message Type 231

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:

- IGN connectivity
- NYSE Symbology Specification

CONTACT INFORMATION

NYSE Group Service Desk

- Telephone: +1 212 383 3640 (International)
- Connectivity@nyse.com

FURTHER INFORMATION

For additional product information please visit, our NYSE Real Time Market Data pages

- For updated capacity figures, visit: https://www.nyse.com/publicdocs/data/NYSE_Market_Data_Capacity.pdf
- For details of IP addresses, download our IP Addresses spreadsheet

Contents

1. OPENBOOK AGGREGATED - VERSION 2.1

1.1 CHANGES IN THE FEED

For the most part, this version of the OpenBook Aggregated Client Specification consists of document changes: improved organization and streamlining to align better with other Pillar datafeed specifications.

1.2 CHANGES TO THE DOCUMENT

Although OpenBook Aggregated is in XDP format, many sections of previous spec versions contained information that is already available in the XDP Common Client Specification. In this version, all material in that is available in the Common Client Specification has been removed.

With this version and going forward, this specification depends on the Common Client Specification like other XDP specifications do.

OpenBook Aggregated has a few features that differ from the standards in the Common Client Specification. These are explained below:

1.3 EXCEPTIONS TO THE PILLAR COMMON CLIENT SPECIFICATION

1.3.1 Length of Refresh Header (message type 35)

Refresh Headers in packets published over the Aggregated refresh channels use the format shown in the Common Client Specification, except that only the first 12 bytes are published. Neither the full 16 byte structure nor the shortened 8 byte format is ever used in publishing refreshes for Aggregated.

1.3.2 Format of Request Response messages (message type 11)

Request Response messages from the Aggregated Request Server differ in format from that shown in the Common Client Specification. The Aggregated format follows.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 21 Bytes
Msg Type	2	2	Binary	This field identifies the type of message 11 – Request Response message
RequestSeqNum	4	4	Binary	The sequence number of the request message sent by the client. This can be used by the client to couple this response with the original request message.
SourceID	8	10	ASCII	The ID of the client making the request. This field is up to 9 characters, null terminated.
ProductID	18	1	Binary	The unique ID of the feed for which the request was made (listed in the feed's client specification).
ChannelID	19	1	Binary	The ID of the multicast channel for which the request was made.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Status	20	1	ASCII	The reason why the request was rejected. Values: • 0 – Message was accepted • 1 – Rejected due to an Invalid Source ID • 2 – Rejected due to invalid sequence range • 3 – Rejected due to maximum sequence range • 4 – Rejected due to maximum request in a day • 5 – Rejected due to maximum number of refresh requests in a day • 6 – Rejected. Requested SeqNum is too old. Use refresh to recover current state if necessary. • 7 – Rejected due to an Invalid Channel ID • 8 – Rejected due to an Invalid Product ID • 9 – Rejected due to: 1) Invalid MsgType, or 2) Mismatch between MsgType and MsgSize

2. OPENBOOK AGGREGATED FEED INFORMATION

OpenBook Aggregated provides a once-a-second snapshot of the Exchange's limit-order book for all traded securities. OpenBook Aggregated lets traders see aggregate limit-order volume at every bid and offer price.

2.1 PRODUCT IDS

EXCHANGE	PRODUCTID	DESCRIPTION
NYSE	1	NYSE OpenBook Aggregated
American	50	NYSE American OpenBook Aggregated

3. ORDERBOOK SNAPSHOT/REFRESH MESSAGE - MSG TYPE 110

A Snapshot Update message provides the full depth of book for the symbol.

A Snapshot message 110 message is sent as a result of one of the following events:

- Start of day
- Refresh Request (broadcast only over refresh multicast group)
- System Restart

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message. NYSE – 49 Bytes NYSE American – 49 Bytes
Msg Type	2	2	Binary	This field identifies the type of message • 110 – Snapshot Message
SourceTime	4	4	Binary	This field specifies the time when the msg was generated in the order book. The number represents the number of seconds in UTC time (EPOCH)
SourceTimeNS	8	4	Binary	This field represents the nanosecond portion within the second in UTC time (EPOCH)
SymbolIndex	12	4	Binary	This field identifies the numerical representation of the symbol. See Symbol Mapping
Ultra LastSeqNum	16	4	Binary	To ease recovery of OpenBook Ultra customers, This field contains the last sequence number of the last message sent out of the OpenBook Ultra feed.
Symbol	20	11	ASCII String	This field contains the full symbol in NYSE Symbology. A sequence of characters representing the symbol, padded with NULLs. For more information, see *NYSE Symbology*
PriceScaleCode	31	1	Binary	Price scale for price conversion of the symbol. See Price Formats.
TradingStatus	32	1	ASCII	This field indicates the market condition of the security. Valid Values: • 'P' – Pre-Opening • 'B' - Begin Accepting Orders

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				• 'E' – Early Session • 'O' – Core Session • 'L' – Late Session • 'C' – Closed • 'H' – Halted • '6' - Suspended
RemainingCount	33	2	Binary	Number of updates remaining in the event.
MPV	35	2	Binary	This field contains the minimum price variation
UpdateCount	37	1	Binary	Number of updates. Indicates number of times the following group of fields (Price, Volume, Side, NumOrders) will be repeated in the message. Default value is 1
>Price	38	4	Binary	This field contains the price point. See Price Formats. Use the Price scale from the symbol mapping index.
>Volume	42	4	Binary	This field contains the total interest quantity in shares at a price point
>Side	46	1	ASCII	This field indicates the side of the order • 'B' – Buy • 'S' – Sell
>NumOrders	47	2	Binary	This field contains the number of orders at the current price point

3.1 MESSAGE PROCESSING

A snapshot will be sent starting at a pre-defined time such as the start of day to provide details of any orders such as GTC orders (Good Til Cancelled), and exceptionally following an intraday service restart.

The following notes provide general guidelines for processing snapshot Messages. The client should not ascribe any importance to the order in which they are presented.

- Snapshot update Messages that span multiple packets must be processed as one complete message.
- For Snapshot update Messages that span multiple packets, if a packet is lost, then the whole message should be considered lost.
- Snapshot update messages contain all active price points regardless of prior period activity.

4. ORDERBOOK DELTA UPDATE MESSAGE - MSG TYPE 111

A Delta Update message provides information about price updates for symbol.

A Delta Update 111 message is sent as a result of one of the following events:

- New order
- New cancel
- New execution

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message. NYSE– 35 Bytes NYSE MKT – 35 Bytes
Msg Type	2	2	Binary	This field identifies the type of message 111 – Event Update Message
SourceTime	4	4	Binary	This field specifies the time when the msg was generated in the order book. The number represents the number of seconds in UTC time (EPOCH)
SourceTimeNS	8	4	Binary	This field represents the nanosecond portion within the second in UTC time (EPOCH)
SymbolIndex	12	4	Binary	This field identifies the numerical representation of the symbol. See Symbol Mapping
Ultra LastSeqNum	16	4	Binary	To ease recovery of OpenBook Ultra customers, This field contains the last sequence number of the last message sent out of the OpenBook Ultra feed.
TradingStatus	20	1	ASCII	This field indicates the market condition of the security. Valid Values: • ‘P’ – Pre-Opening • ‘B’ - Begin Accepting Orders • ‘E’ – Early Session • ‘O’ – Core Session • ‘L’ – Late Session • ‘C’ – Closed • ‘H’ – Halted • ‘6’ - Suspended
RemainingCount	21	2	Binary	Number of updates remaining in the event.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
UpdateCount	23	1	Binary	Number of updates. Indicates number of times the following group of fields (Price, Volume, Side, and NumOrders) will be repeated in the message. Default value is 1
>Price	24	4	Binary	This field contains the price point. See Price Format. Use the Price scale from the symbol mapping index.
>Volume	28	4	Binary	This field contains the total interest quantity in shares at a price point
>Side	32	1	ASCII	This field indicates the side of the order. Valid Values: • 'B' – Buy • 'S' – Sell
>NumOrders	33	2	Binary	This field contains the number of orders at the current price point

4.1 MESSAGE PROCESSING

The following notes provide general guidelines for processing Delta Update Messages. The client should not ascribe any importance to the order in which they are presented.

Delta Update Messages that span multiple packets must be processed as one complete message.

For Delta Update Messages that span multiple packets, if a packet is lost, then the whole message should be considered lost.

All price points containing a zero (0) quantity should be removed as an active price point.

If no changes have occurred for a given symbol (e.g., an inactive stock) since the last publication, no Delta Update Message is generated.

APPENDIX A: SCENARIOS

A.1 SCENARIO 1 – SINGLE PRICE POINT UPDATE FOR THE SAME SYMBOL

New events:

A 100 share Buy Order entered at $49.99 for stock ABC at 9:30:00am.

Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	500	49.99		
1	300	49.98		
3	600	49.97		

New State of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	1
2	600	49.99		
1	300	49.98		
3	600	49.97		

OpenBook Update Message

FIELD	OFFSETS	SIZE (BYTES)	FORMAT	VALUE
Msg Size	0	2	Binary	35
Msg Type	2	2	Binary	111
SourceTime	4	4	Binary	1259832600
SourceTimeNS	8	4	Binary	0
SymbolIndex	12	4	Binary	24005
Ultra LastSeqNum	16	4	Binary	40000
TradingStatus	20	1	ASCII	O
RemainingCount	21	2	Binary	0
UpdateCount	23	1	Binary	1
Price	24	4	Binary	4999
Volume	28	4	Binary	600
Side	32	1	ASCII	B
NumOrders	33	2	Binary	2

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A.2 SCENARIO 2 – MULTIPLE PRICE POINT UPDATES FOR THE SAME SYMBOL

New events:

A 100 share Buy Order entered at $49.99 for stock ABC at 9:30:00am.

A 400 share Sell Order entered at $50.00 for stock ABC at 9:30:00am.

Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	500	49.99		
1	300	49.98		
3	600	49.97		

New state of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	700	2
2	600	49.99		
1	300	49.98		
3	600	49.97		

OpenBook Update Message

FIELD	OFFSETS	SIZE (BYTES)	FORMAT	VALUE
Msg Size	0	2	Binary	46
Msg Type	2	2	Binary	111
SourceTime	4	4	Binary	1259832600
SourceTimeNS	8	4	Binary	0
SymbolIndex	12	4	Binary	24005
Ultra LastSeqNum	16	4	Binary	40000
TradingStatus	20	1	ASCII	O
RemainingCount	21	2	Binary	0
UpdateCount	23	1	Binary	2
Price	24	4	Binary	4999
Volume	28	4	Binary	600
Side	32	1	ASCII	B
NumOrders	33	2	Binary	2
Price	35	4	Binary	5000
Volume	39	4	Binary	700
Side	43	1	ASCII	S
NumOrders	44	2	Binary	2

A.3 SCENARIO 3 – SINGLE PRICE POINT UPDATES FOR THE DIFFERENT SYMBOLS

New events:

100 share Buy Order entered at $49.99 for stock ABC.

400 share Sell Order entered at $30.00 for stock XYZ.

ABC - Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	500	49.99		
1	300	49.98		
3	600	49.97		

ABC - New state of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	2
2	600	49.99		
1	300	49.98		
3	600	49.97		

XYZ - Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		30.02	900	3
		30.01	600	2
		30.00	800	4
1	100	29.99		
1	200	29.98		
3	300	29.97		

XYZ - New state of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		30.02	900	3
		30.01	600	2
		30.00	1200	5
1	100	29.99		
1	200	29.98		
3	300	29.97		

OpenBook Update Message

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE
Msg Size	0	2	Binary	35
Msg Type	2	2	Binary	111
SourceTime	4	4	Binary	1259832600
SourceTimeNS	8	4	Binary	0
SymbolIndex	12	4	Binary	24005

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE
Ultra LastSeqNum	16	4	Binary	40000
TradingStatus	20	1	ASCII	O
RemainingCount	21	2	Binary	0
UpdateCount	23	1	Binary	1
Price	24	4	Binary	4999
Volume	28	4	Binary	600
Side	32	1	ASCII	B
NumOrders	33	2	Binary	2
Msg Size	35	2	Binary	35
Msg Type	37	2	Binary	111
SourceTime	39	4	Binary	1259832600
SourceTimeNS	43	4	Binary	0
SymbolIndex	47	4	Binary	18006
Ultra LastSeqNum	51	4	Binary	28569
TradingStatus	55	1	ASCII	O
RemainingCount	56	2	Binary	0
UpdateCount	58	1	Binary	1
Price	59	4	Binary	3000
Volume	63	4	Binary	1200
Side	67	1	ASCII	S
NumOrders	68	2	Binary	5

A.4 SCENARIO 4 – MULTIPLE PRICE POINT UPDATES FOR THE DIFFERENT SYMBOLS

New events:

100 share Buy Order entered at $49.99 for stock ABC.
200 share Buy Order entered at $49.98 for stock ABC.
400 share Sell Order entered at $30.00 for stock XYZ.
100 share Sell Order entered at $30.02 for stock XYZ.

ABC - Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	500	49.99		
1	300	49.98		
3	600	49.97		

ABC - New state of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		50.02	400	4
		50.01	200	1
		50.00	300	2
2	600	49.99		
2	500	49.98		
3	600	49.97		

XYZ - Existing Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		30.02	900	3
		30.01	600	2
		30.00	800	4
1	100	29.99		
1	200	29.98		
3	300	29.97		

XYZ - New state of the Book

#ORDERS	BUY	PRICE POINT	SELL	#ORDERS
		30.02	1000	4
		30.01	600	2
		30.00	1200	5
1	100	29.99		
1	200	29.98		
3	300	29.97		

OpenBook Update Message

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE
Msg Size	0	2	Binary	46
Msg Type	2	2	Binary	111
SourceTime	4	4	Binary	1259832600
SourceTimeNS	8	4	Binary	0

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE
SymbolIndex	12	4	Binary	24005
Ultra LastSeqNum	16	4	Binary	40000
TradingStatus	20	1	ASCII	O
RemainingCount	21	2	Binary	0
UpdateCount	23	1	Binary	2
Price	24	4	Binary	4999
Volume	28	4	Binary	600
Side	32	1	ASCII	B
NumOrders	33	2	Binary	2
Price	35	4	Binary	4998
Volume	39	4	Binary	500
Side	43	1	ASCII	B
NumOrders	44	2	Binary	2
Msg Size	46	2	Binary	46
Msg Type	48	2	Binary	111
SourceTime	50	4	Binary	1259832600
SourceTimeNS	54	4	Binary	0
SymbolIndex	58	4	Binary	18006
Ultra LastSeqNum	62	4	Binary	28569
TradingStatus	66	1	ASCII	O
RemainingCount	67	2	Binary	0
UpdateCount	69	1	Binary	2
Price	70	4	Binary	3000
Volume	74	4	Binary	1200
Side	78	1	ASCII	S
NumOrders	79	2	Binary	5
Price	81	4	Binary	3002
Volume	85	4	Binary	1000
Side	89	1	ASCII	S
NumOrders	90	2	Binary	4

A.5 SCENARIO 5 – PRICE POINT DELETE

New events:

A 500 share execution at $49.99 for stock ABC at 9:30:00am.

Existing Book

#orders	Buy	Price Point	Sell	#orders
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	500	49.99		
1	300	49.98		
3	600	49.97		

New state of the Book

#orders	Buy	Price Point	Sell	#orders
		50.02	400	4
		50.01	200	1
		50.00	300	1
1	300	49.98		
3	600	49.97		

OpenBook Update Message

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE
Msg Size	0	2	Binary	35
Msg Type	2	2	Binary	111
SourceTime	4	4	Binary	1259832600
SourceTimeNS	8	4	Binary	0
SymbolIndex	12	4	Binary	24005
Ultra LastSeqNum	16	4	Binary	40000
TradingStatus	20	1	ASCII	O
RemainingCount	21	2	Binary	0
UpdateCount	23	1	Binary	1
Price	24	4	Binary	4999
Volume	28	4	Binary	0
Side	32	1	ASCII	B
NumOrders	33	2	Binary	0