



US Equities
TCP Depth of Book
(PITCH)
Specification

Version 1.15.2

October 11, 2019

Contents

1	Introduction	3
1.1	Overview	3
1.2	Definitions and Acronyms	3
1.3	Document Format	3
2	Protocol	4
2.1	Message Format	4
2.2	Sequence Numbers	4
2.3	Order IDs/Execution IDs	4
3	Sessions	5
4	Message Types	6
4.1	System Event	6
4.2	Symbol Clear	6
4.3	Add Order	7
4.4	Order Modification	9
4.4.1	Order Executed	9
4.4.2	Order Cancel	10
4.5	Trade	10
4.6	Trade Break	12
4.7	Trading Status	13
4.8	Auction Update	14
4.9	Auction Summary	15
4.10	Retail Price Improvement (BYX Exchange Only)	16
5	Order Representation	17
5.1	Hidden Orders	17
5.2	Reserve Orders	17
5.3	OrderID Obfuscation Opt-out	17
6	References	18
6.1	Symbology	18
7	Support	19

1 Introduction

1.1 Overview

This document describes the Cboe TCP PITCH protocol. The intended audience of this document is software developers of Cboe members who would like to use the TCP PITCH protocol to receive real-time full depth of book quotations and execution information direct from Cboe via a TCP/IP connection.

Note that this specification will be the standard TCP PITCH specification to be used for Cboe BYX Exchange, BZX Exchange, EDGA Exchange and EDGX Exchange platforms within the NY5 data center.

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

All visible orders and executions are reflected via the PITCH feed. Each PITCH message reflects the addition, deletion, or execution of an order in the system. All orders and executions are anonymous, and do not contain the member identity.

Cboe Auction Update and Auction Summary messages are available in support of the Cboe Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the [Cboe US Equities Auction Process](#) specification for more information on Cboe Auctions.

1.2 Definitions and Acronyms

Term or Abbreviation	Description
FIX	An industry-standard messaging standard for the electronic communication of trade-related messages.
PITCH	A Cboe-specific protocol used for receiving real-time full depth of book quotations and execution information.
SIP	Securities Information Processor, a centralized processor for data consolidation and dissemination.

1.3 Document Format

The highlighted sections indicate differences between PITCH and similar protocols used by other Market Centers.

2 Protocol

2.1 Message Format

The PITCH data feed is comprised of a series of fixed-length sequenced messages. The length of each message is dependent upon the message type. Each message is made up of non-control ASCII bytes.

2.2 Sequence Numbers

The messages that make up the PITCH protocol are delivered using SOUP 2.0, which handles sequencing and delivery integrity. Cboe implementation of SOUP 2.0 is the same as other Market Centers.

2.3 Order IDs/Execution IDs

Note that Order IDs and Execution IDs are 12 characters base 36. The 1st character of an Execution ID may be used to differentiate between internal matched trades, internal auction fills, and routed trades as follows:

- 0 (zero) = Cboe Internal Match
- C = Auction Fill
- M = Cboe Market Close Trade (**effective TBD**)
- R = Routed Trade

3 Sessions

Cboe implementation of SOUP 2.0 is the same as other Market Centers. This includes the implementation of session events such as login requests, client/server heartbeats, and logout requests.

4 Message Types

Each PITCH message type reflects the addition, deletion, or execution of an order in the system.

The fields within each message type have a corresponding data type. The various data types are defined in the following table.

Data Type	Description
Alpha	A string of ASCII letters (A-Z) left justified and space padded on the right.
Base 36 Numeric	A string of ASCII numbers and letters (0-9A-Z), representing base 36 digits, right justified and zero filled on the left. Typically used for Order IDs and Execution IDs. Note that these fields are longer than on some other Market Centers.
Numeric	A string of ASCII numbers (0-9), right justified and zero filled on the left.
Price	A string of ASCII numbers (0-9) consisting of 6 whole number digits followed by 4 decimal digits. The whole number portion is zero filled on the left; the decimal portion is zero filled on the right. The decimal point is implied by position and does not explicitly appear in the field
Printable ASCII	A string of printable ASCII values in the range of 0x20 – 0x7e.
Timestamp	A string of numbers (0-9) representing whole number milliseconds past midnight Eastern Time, right justified and zero filled on the left, with no decimal point.

4.1 System Event

Unlike other Market Centers, Cboe does not send System Event messages.

4.2 Symbol Clear

The `Symbol Clear` message instructs feed recipients to clear all orders for the Cboe book in the specified symbol. 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.

Symbol Clear				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	TimeStamp
Message Type	8	1	“s”	Symbol Clear Message
Stock Symbol	9	8	Printable ASCII	Stock symbol right padded with spaces.

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

4.3 Add Order

An `Add Order` message represents a newly accepted visible order on the Cboe book. It includes a day-specific Order ID assigned by Cboe to the order. The `Display` field is used to reflect whether or not the order can be considered a protected quote and thus reportable to the SIP.

NOTE: If an order's Price or Display values change within the Cboe matching engine, a `Cancel Order` Message will be immediately followed by a new `Add Order` message with the same Order ID as the original order. An order that changes its Display value from "N" to "Y" will not lose its priority.

The `Add Order` message has the following formats:

Add Order (short)				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"A"	Add Order message (short)
* Order ID	9	12	Base 36 Numeric	Day-specific identifier assigned to this order
Side Indicator	21	1	Alpha	"B" = Buy Order "S" = Sell Order
Shares	22	6	Numeric	Number of shares being added to the book (may be less than the number of shares entered).
Stock Symbol	28	6	Printable ASCII	Stock symbol right padded with spaces.
Price	34	10	Price	The limit order price
Display	44	1	Alpha	"Y" = The order is aggregated in the Cboe SIP quote.

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

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

Add Order (long)				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"d"	Add Order message (long)
* Order ID	9	12	Base 36 Numeric	Day-specific identifier assigned to this order
Side Indicator	21	1	Alpha	"B" = Buy Order "S" = Sell Order
Shares	22	6	Numeric	Number of shares being added to the book (may be less than the number of shares entered).
Stock Symbol	28	8	Printable ASCII	Stock symbol right padded with spaces.
Price	36	10	Price	The limit order price
Display	46	1	Alpha	"Y" = The order is aggregated in the Cboe SIP quote.
ParticipantID	47	4	Alpha	<i>Optionally specified.</i> If specified, MPID or "RTAL" for retail specified orders (equities) of firm attributed to this quote. Space filled otherwise.
CustomerIndicator Effective 11/1/19	51	1	Alphanumeric	(EDGX Only) , space filled on other Cboe Equities Exchanges. "R" = Retail

4.4 Order Modification

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. Order Modification messages always reduce the remaining shares in the referenced open order by the number of shares indicated. When the remaining shares for 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 Cboe book is executed in whole or in part. The execution price equals the limit order price found in the original `Add Order` message.

Order Executed				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"E"	<code>Order Executed</code> message
* Order ID	9	12	Base 36 Numeric	Order ID of a previously sent <code>Add Order</code> Message that was executed.
Executed Shares	21	6	Numeric	Number of shares executed
* Execution ID	27	12	Base 36 Numeric	Cboe generated day-unique execution identifier of this execution. Execution ID is also referenced in the <code>Trade Break</code> Message.

4.4.2 Order Cancel

Order Cancel messages are sent when a visible order on the Cboe book is canceled in whole or in part.

Order Cancel				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"X"	Order Cancel message
* Order ID	9	12	Base 36 Numeric	Order ID of a previously sent Add Order Message that has been reduced or cancelled
Canceled Shares	21	6	Numeric	Number of shares canceled

4.5 Trade

The Trade message provides information about executions of non-displayed orders or shares on the Cboe book and routed orders. Trade messages are necessary to calculate Cboe execution based data. Trade messages do not alter the book and can be ignored if you are just building a book.

No Add Order message is sent for non-displayed and routed orders, and thus, no modify order messages may be sent when non-displayed 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 orders may be executed in parts. A complete view of all Cboe executions can be built by combining all Order Executed messages and Trade messages.

The OrderID of a non-displayed 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 OrderIDs.

Trade (short)				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"P"	Trade message (short)
* Order ID	9	12	Base 36 Numeric	Obfuscated Order ID or Order ID of the executed order

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

Side Indicator	21	1	Alpha	Always "B" = Buy Order regardless of side of resting order
Shares	22	6	Numeric	Incremental Number of shares executed
Stock Symbol	28	6	Printable ASCII	Stock symbol right padded with spaces.
Price	34	10	Price	The execution price of the order
* Execution ID	44	12	Base 36 Numeric	Cboe generated day-unique execution identifier of this trade. Execution ID is also referenced in the Trade Break message.

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

Trade (long)				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"r"	Trade message (long)
* Order ID	9	12	Base 36 Numeric	Obfuscated Order ID or Order ID of the executed order.
Side Indicator	21	1	Alpha	Always "B" = Buy Order regardless of side of resting order
Shares	22	6	Numeric	Incremental Number of shares executed
Stock Symbol	28	8	Printable ASCII	Stock symbol right padded with spaces.
Price	36	10	Price	The execution price of the order
* Execution ID	46	12	Base 36 Numeric	Cboe generated day-unique execution identifier of this trade. Execution ID is also referenced in the Trade Break message.

4.6 Trade Break

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

Trade Break				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"B"	Trade Break message
* Execution ID	9	12	Base 36 Numeric	Cboe execution identifier of the execution that was broken. Execution ID refers to previously sent Order Execution or Trade message.

4.7 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. In addition, Cboe will send a `Trading Status` message for all securities that are “Halted” or have a price test in effect before the start of trading hours.

`Trading Status` of ‘S’ will be implied at system startup. ‘T’ will be sent as securities are available for trading. ‘A’ will be distributed when orders can be accepted for queuing in preparation for the market open.

Trade Status				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	“H”	<code>Trading Status</code> message
Stock Symbol	9	8	Printable ASCII	Stock symbol right padded with spaces.
Halt Status	17	1	Alpha	“A” = Accepting Orders for Queuing “H” = Halted “Q” = Quote-Only (Cboe Listings) “S” = Exchange Specific Suspension “T” = Trading
Reg SHO Action	18	1	Numeric	“0” = No price test in effect “1” = Reg SHO price test restriction in effect
Reserved1	19	1	Alpha	Reserved
Reserved2	20	1	Alpha	Reserved

4.8 Auction Update

Auction Update messages are used to disseminate Cboe price and size information during auctions for Cboe 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.

Cboe Auction Update messages support the Cboe Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the [Cboe US Equities Auction Process](#) specification for more information on Cboe Auctions.

Auction Update				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	"1"	Auction Update message
Stock Symbol	9	8	Printable ASCII	Stock symbol right padded with spaces.
Auction Type	17	1	Alpha	O = Opening Auction C = Closing Auction H = Halt Auction I = IPO Auction M = Cboe Market Close (effective TBD)
Reference Price	18	10	Price	BBO Collared auction price (see Auction Process Spec).
Buy Shares	28	10	Numeric	Number of shares on buy side at the <i>Reference Price</i> . Shares matched for Cboe Market Close (effective TBD).
Sell Shares	38	10	Numeric	Number of shares on sell side at the <i>Reference Price</i> . Shares matched for Cboe Market Close (effective TBD).
Indicative Price	48	10	Price	Price at which the auction book and the continuous book would match.

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

Auction Only Price	58	10	Price	Price at which the auction book would match using only Eligible Auction Orders (see Auction Process Spec).
--------------------	----	----	-------	--

4.9 Auction Summary

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

Cboe Auction Summary messages support the Cboe Opening, Closing, Halt and IPO Auctions on the BZX Exchange. Refer to the [Cboe US Equities Auction Process](#) specification for more information on Cboe Auctions.

Auction Summary				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	Timestamp
Message Type	8	1	“J”	Auction Summary message
Stock Symbol	9	8	Printable ASCII	Stock symbol right padded with spaces.
Auction Type	17	1	Alpha	O = Opening Auction C = Closing Auction H = Halt Auction I = IPO Auction M = Cboe Market Close (effective TBD)
Price	18	10	Price	Auction price. Price of the CMC match (effective TBD).
Shares	28	10	Numeric	Cumulative number of shares executed during the auction. Shares executed in the CMC match (TBD).

4.10 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.

Retail Price Improvement				
Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Timestamp	TimeStamp
Message Type	8	1	"R"	Retail Price Improvement message
Stock Symbol	9	8	Printable ASCII	Symbol
Retail Price Improvement	17	1	Alpha	"B" = Buy Side RPI "S" = Sell Side RPI "A" = Buy & Sell RPI "N" = No RPI

5 Order Representation

5.1 Hidden Orders

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

5.2 Reserve Orders

To better protect reserve orders, Cboe 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 `Order Executed` message 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 (P or r)` 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 Cboe 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 (A or d)` 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 section 5.1 and 5.2 may opt-out at the port level, via request to the Cboe Trade Desk. An opt-out will impact all `Trade` messages (P or r) generated from non-displayed liquidity on a given order.

6 References

6.1 Symbology

For more information on Cboe Symbology, please refer to the [Cboe Symbology](#) Reference document.

7 Support

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

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

Revision History

Document Version	Date	Description
1.0.0	11/25/05	Initial Version.
1.1.0	01/09/06	Removed System Event Messages.
1.1.1	08/21/06	Added “Symbology” Section.
1.1.2	06/18/07	Added FAST PITCH link.
1.1.3	06/18/08	Corrected Bats suffix for Convertible called.
1.2.0	10/06/08	Revised wording to reflect transition to Bats Exchange.
1.2.1	12/03/08	Moved Symbology reference to a separate document.
1.3.0	05/27/09	Changed the use of the Display field on Add Order messages.
1.4.0	08/11/09	Removed BOLT references.
1.4.1	08/26/09	Removed SRO quoting reference
1.5.0	11/09/09	Reformatted document based Bats Protocol Specification Template. Updated Side indicator of Trade message to always be set to ‘B’.
1.5.1	12/14/09	Added logic for decoding internal matched vs. routed trades via Execution ID.
1.5.2	12/16/09	Minor updates for clarity.
1.6.0	01/12/10	Long form created for Add Order and Trade messages.
1.6.1	04/06/10	Implemented support for 8 character symbology.
1.6.2	06/09/10	Obfuscate Trade message Order ID by default
1.7.0	08/16/10	Added “Order Representation” Section. Described OrderID obfuscation logic for reserve and hidden orders.
1.8.0	09/03/10	Added Trading Status message definition.
1.8.1	11/09/10	Clarified Modify Order messages were a category of messages and not a specific message type.
1.9.0	05/09/11	Added Auction Update message. <i>Effective Date 10/7/11.</i> Added Quote-Only option to the Halt Status field of the Trading Status message. Removed FAST PITCH reference.
1.9.1	06/06/11	Various changes based on feedback and internal discussions.
1.9.2	06/27/11	Minor formatting update.

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

1.9.3	06/30/11	Converted <code>Auction Update</code> message buy/sell shares from 6 to 10 byte fields.
1.10.0	09/09/11	Added <code>Auction Summary</code> message. <i>Effective date 10/7/11.</i> The first character of Execution IDs will use “C” for Auction Fills. <i>Effective date 10/7/11.</i>
1.11.0	03/07/12	Added 4 byte MPID to the <code>Add Order (long)</code> message. <i>Effective date 5/7/12.</i>
1.12.0	09/14/12	Added <code>Symbol Clear</code> message. <i>Effective date 02/15/13.</i> Added <code>Retail Price Improvement</code> message support for the BYX Exchange. <i>Effective date 11/05/12 (test symbols) and 01/11/13 (other defined symbols).</i>
1.12.1	11/09/12	Correction made to message type for <code>Symbol Clear</code> message which becomes available effective 01/18/13. Message type updated from “u” to “s”.
1.12.2	12/06/12	<code>Symbol Clear</code> message updated to reflect Stock Symbol length of 8.
1.12.3	01/10/14	Corrected minor typographical errors in <code>Order Executed</code> and <code>Auction Summary</code> sections.
1.12.4	04/04/14	Updated Overview section to confirm this specification will be used for EDGA/EDGX in NY5. Added Printable ASCII data type and corrected <code>Symbol</code> data type definitions to reflect the same. Bats will begin sending Halt Status = “T” for symbols available for trading at the 8AM ET pre-market session open, effective 10/03/14. <code>Add Order Expanded ParticipantID</code> may indicate “RTL” for retail specified orders in equities.
1.12.5	06/05/14	<code>Add Order Expanded ParticipantID</code> messages indicating retail specified orders in equities changed from “RTL” to “RTAL”, effective 10/03/14.
1.12.6	08/01/14	<code>Trading Status</code> of ‘H’ will be implied at system startup effective 10/03/14. <code>Trading Status</code> of ‘A’ will be distributed when orders can be accepted for queuing in preparation for the market open effective date 11/14/14. <code>Trading Status</code> of ‘S’ will be used to indicate an Exchange specific suspension in trading effective 10/03/14.
1.12.7	10/27/14	<code>Trading Status</code> of ‘S’ will be implied at system startup effective 11/14/14.
1.13.0	01/25/15	Specification title change.

Cboe US Equities
TCP Depth of Book (PITCH) Specification (Version 1.15.2)

1.13.1	02/05/15	Replaced the “Numeric” data type definition with “Timestamp” for Timestamp fields to more accurately describe the data type. No change in functionality.
1.13.2	07/14/15	Changed name of “Prices” data type to “Price”. Replaced the “Numeric” data type definition with “Price” for Price fields to more accurately describe data type. No change in functionality.
1.14.0	02/19/16	Bats branding/logo changes.
1.14.1	10/17/17	Cboe branding/logo changes.
1.15.0	07/10/18	Added support for Cboe Market Close (CMC) in Auction Update and Auction Summary messages effective TBD . Execution IDs that start with ‘M’ are Cboe Market Close trades.
1.15.1	04/30/19	Added <i>Customer Indicator</i> field with new value of 'R' to the Add Order (long) message to indicate a Retail Order on EDGX Equities (effective 07/01/19).
1.15.2	10/11/19	Updated <i>Customer Indicator</i> field with new value of 'R' to the Add Order (long) message to indicate a Retail Order on EDGX Equities only effective 11/1/19 .