



US Equities Last Sale Specification

Version 1.2.1

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Contents

1	Introduction	3
1.1	Overview	3
1.2	Data Types	3
2	Protocol	4
2.1	Message Format.....	4
2.2	Sequence Numbers	4
3	Sessions	5
4	Message Types	6
4.1	System Event Message	6
4.2	Last Sale Message.....	6
4.3	Trade Break Message	7
5	References	8
6	Support.....	8

1 Introduction

1.1 Overview

The Cboe Last Sale Feed is a direct data feed product that is the source for real-time, intraday trade data which includes price, volume and time while specifically excluding order information. Routed executions are not reported on the Last Sale Feed.

* The highlighted sections indicate differences between Last Sale and similar protocols used by other Market Centers. Note that Execution Ids are 12 characters base 36 instead of 9 characters base 10.

1.2 Data Types

- **Numeric** fields are a string of ASCII digits, right justified and zero filled on the left.
- **Base 36 Numeric (Execution Id)** fields are base 36 (0-9A-Z) numbers, right justified and zero filled on the left.
- **Alpha** fields are left justified and space padded on the right.
- **Prices** are decimal with 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.
- **Timestamp** fields are whole number milliseconds past midnight Eastern Time, right justified and zero filled on the left, with no decimal point.

2 Protocol

2.1 Message Format

The Last Sale 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 Last Sale 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.

3 Sessions

Cboe's 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

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.
Prices	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
Timestamps	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 Message

Cboe does not send System Event messages.

4.2 Last Sale Message

Last Sale Messages are sent when an order on the Cboe book is executed in whole or in part.

Field Name	Offset	Length	Value	Description
Timestamp	0	8	Numeric	Timestamp
Message Type	8	1	"L"	Last Sale
Executed Shares	9	8	Numeric	Number of shares executed
Stock Symbol	17	8	Alpha	Stock symbol right padded with spaces
Price	25	10	Numeric	The execution price of the order
* Execution Id	35	12	Base 36 Numeric	Cboe generated day-unique execution identifier of this execution. Execution Id is also referenced in the Trade Break Message.

4.3 Trade Break Message

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.

The Trade Break Message has the following format:

Field Name	Offset	Length	Data Type	Description
Timestamp	0	8	Numeric	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.

5 References

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

6 Support

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

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(Version 1.2.1)

Revision History

Document Version	Date	Description
1.0.0	04/06/10	Initial Version 1.0.
1.1.0	09/03/10	Added Trade Break message type.
1.2.0	02/19/16	Bats branding/logo changes.
1.2.1	10/17/17	Cboe branding/logo changes.