



Cboe Europe TRF Binary Order Entry Specification

Version 2.0.23

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1 Introduction

1.1 Overview

This document describes Cboe TRF Binary Order Entry (TRF BOE), the Cboe Europe (hereafter, "Cboe") proprietary order entry protocol.

Where applicable, the terminology used in this document is similar to that used by the FIX protocol to allow those familiar with FIX to more easily understand TRF BOE. This document assumes the reader has basic knowledge of the FIX protocol.

TRF BOE fulfills the following requirements:

- *CPU and memory efficiency.* Message encoding, decoding, and parsing are simpler to code and can be optimized to use less CPU and memory at runtime.
- *Application level simplicity.* State transitions are simple and unambiguous. They are easy to apply to a Participant's representation of an order.
- *Session level simplicity.* The session level protocol (login, sequencing, replay of missed messages, logout) is simple to understand.

Whilst Cboe has strived to preserve feature parity between FIX and TRF BOE where possible, some features may only be available in one protocol or the other.

All binary values are in little Endian (used by Intel x86 processors), and *not* network byte order.

Each message is identified by a unique message type. Not all message types are used in all of the Cboe trading environments globally. A listing of the supported message types is provided in **List of Message Types** (§ 9, p. 62).

All communication is via standard TCP/IP.

1.2 Motivation for Version 2

BOE Version 1 has a number of fixed size parts of messages which, while envisioned to be large enough for future growth, have been unable to accommodate Cboe growth into new service offerings. Version 2 allows greater opportunity for future expansion by eliminating those problems.

Version 2's goals are as follows:

- *Return bitfield expansion.* Messages from Cboe to Participant no longer have a limited number of return bitfields. Participants may ignore newly added fields as before, but there is no longer a fixed limit to the number of possible fields returned.
- *Login message parameter groups.* In Version 2, the LOGIN REQUEST V2 message can have extendable parameter groups sent to modify behavior in a forward compatible manner.
- *Easy extension of messages from Participant to Cboe to support more bitfields.* In Version 1, messages such as NEW ORDER supported a fixed number of bitfields. In Version 2, NEW ORDER V2 requires that the number of entered bitfields be specified. This supports, in a backwards compatible way, addition of new bitfields in the future.
- *Easier addition of new messages.* In Version 1, the return bitfields for *all* messages had to be represented in the LOGIN REQUEST. Addition of messages meant changes to the fundamental structure of the LOGIN REQUEST. In Version 2, repeatable parameter groups are used to specify which bitfields are to be sent for different message type. This allows the LOGIN REQUEST V2 to accommodate new message types without fundamental changes to the message structure.

- *Simplification of documentation.* Cboe has reduced the complexity of this documentation to make TRF BOE easier to understand.

If you are newly developing to the Cboe TRF BOE, you should implement to Version 2 of the specification. Newly added features (e.g., new message fields) *may* be implemented only in Version 2. You may migrate to Version 2 at any point, but you will be *required* to migrate to Version 2 if and when you require use of such features.

To the extent possible, Version 2 has a similar “look and feel” to Version 1. Session-level concepts such as sequencing and heartbeats are identical. Only messages documented in Version 2 are supported on a connection established with a LOGIN REQUEST V2. Data type encoding remains identical. A design goal for the evolution to Version 2 was to make it possible to upgrade Version 1 code to support Version 2 with a minimal amount of development effort.

1.3 Data Types

The following data types are used by TRF BOE. The size of some data types varies by message. All data types have default values of binary zero, in both Participant to Cboe and Cboe to Participant contexts.

- *Binary:* Little Endian byte order, unsigned binary value. The number of bytes used depends on the context.
 - One byte: FE = 254
 - Four bytes: 64 00 00 00 = 100
- *Signed Binary:* Little Endian byte order, signed two’s complement, binary value. The number of bytes used depends on the context.
 - One byte: DF = -33
 - Four bytes: 64 00 00 00 = +100

- *Binary Price*: Little Endian byte order value, signed two's complement, eight bytes in size, with six implied decimal places. So, if the value is 12,340,000, the actual value taking into account implied decimal places is 12.34.

$$- 20\ 4B\ BC\ 00\ 00\ 00\ 00\ 00 = 12,340,000/1000000 = 12.34$$

For negative prices, if the value is -12,340,000, the actual value taking into account implied decimal places is -12.34.

$$- E0\ B4\ 43\ FF\ FF\ FF\ FF\ FF = -12,340,000/1000000 = -12.34$$

- *Short Binary Price*: Little Endian byte order value, signed two's complement, four bytes in size, with six implied decimal places. So, if the value is 1,230,000, the actual value taking into account implied decimal places is 1.23.

$$- E0\ AE\ BB\ 00 = 12,300,000/1000000 = 1.23$$

- *Trade Price*: Little Endian byte order value, eight bytes in size, with seven implied decimal places. So, if the value is 123,400,000, the actual value taking into account implied decimal places is 12.34.

$$- 40\ EF\ 5A\ 07\ 00\ 00\ 00\ 00 = 123,400,000/10000000 = 12.34$$

- *Signed Binary Fee*: Little Endian byte order value, signed two's complement, eight bytes in size, signed, with five implied decimal places. So, the value -123,000 is -1.23 after taking account for the five implied decimal places.

$$- 88\ 1F\ FE\ FF\ FF\ FF\ FF\ FF = -123,000/100000 = -1.23$$

- *Alpha*: Uppercase letters (A-Z) and lowercase letters (a-z) only. ASCII NUL (0x00) filled on the right, if necessary. The number of bytes used depends on the context.

- *Alphanumeric*: Uppercase letters (A-Z), lowercase letters (a-z) and numbers (0-9) only. ASCII NUL (0x00) filled on the right, if necessary.

- *Text*: Printable ASCII characters only. ASCII NUL (0x00) filled on the right, if necessary.

- *DateTime*: 8 bytes. The date and time, in UTC, represented as nanoseconds past the UNIX epoch (00:00:00 UTC on 1 January 1970). The nanoseconds portion is currently ignored and treated as 0 (i.e. the times are only accurate to microseconds) on input, and will always be set to 0 by Cboe in outgoing messages. However, **Cboe may begin populating the nanoseconds portion at any time without warning.**

For example: 1,294,909,373,757,324,000 = 2011-01-13 09:02:53.757324 UTC.

- *Date*: Little Endian byte order, unsigned binary value, 4 bytes in size. The YYYYMMDD expressed as an integer.

1.4 Optional Fields and Bitfields

Some messages such as TRADE CAPTURE REPORT V2 and QUOTE V2 have a number of optional fields. A count and number of bitfields in the message specify which optional fields will be present at the end of the message. If a bit is set, the field will be present. Fields are appended to the end of the message. There is no implicit framing between the optional fields. In order to decode the optional fields, they *must* be appended in a particular order to the end of the message. The fields of the first bitfield are appended first, lowest order bit first. Next, the fields of the next bitfield are appended, lowest order bit first. This continues for all bitfields. While certain *reserved* bits within a defined bitfield are used within another Cboe market and will be ignored, bits that are reserved for future expansion must be set to 0 when noted in the bitfield description.

The size, data type, and values for each field are described in **List of Optional Fields** (§ 7, p. 54).

Note that the set of optional fields returned for each Cboe to Participant message type is determined at session login (using the LOGIN REQUEST V2 message); hence, the exact size and layout of each message received by the client application can be known in advance. Any requested optional field which is irrelevant in a particular context will still be present in the returned message, but with all bytes set to binary zero (0x00).

Each return message from Cboe to Participant indicates the optional fields which are present, even though the Participant indicated during login which optional fields are to be sent. The reason for the inclusion (and duplication) is so that each message can be interpreted on its own, without having to find the corresponding login request or response to know which optional fields are present. So, for example, in a log file, decoding a message requires only that single message.

Example messages are shown with each message type which should help to make this concept clear.

2 Session

2.1 Message Headers

Each message has a ten byte header. The two initial *StartOfMessage* bytes are present to aid in message reassembly for network capture purposes. The *MatchingUnit* field is only populated on sequenced non-session level messages sent from Cboe to the Participant. Messages from Participant to Cboe and all session level messages must always set this value to 0.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	Message type.
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH. For session level traffic, the unit is set to 0. For messages from Participant to Cboe, the unit must be 0.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Messages from Cboe to Participant are sequenced distinctly per matching unit. Messages from Participant to Cboe are sequenced across all matching units with a single sequence stream. Participant can optionally send a 0 sequence number on all messages from Participant to Cboe. Cboe highly recommends Participant to send sequence number on all inbound messages.

2.2 Login, Replay and Sequencing

Session level messages, both inbound (Participant to Cboe) and outbound (Cboe to Participant) are unsequenced. Inbound (Participant to Cboe) application messages are sequenced. Upon reconnection, Cboe informs the Participant of the last processed sequence number; the Participant *may* choose to resend any messages with sequence numbers greater than this value. A gap forward in the Participant's incoming sequence number is permitted at any time and is ignored by Cboe. Gaps backward in sequence number (including the same sequence number used twice) are never permitted and will always result in a LOGOUT message being sent and the connection being dropped.

Most (but not all) outbound (Cboe to Participant) application messages are monotonically sequenced per matching unit. Each message's documentation will indicate whether it is sequenced or unsequenced. While matching units on TRF BOE correspond directly to matching units on Multicast PITCH, sequence numbers do not.

Upon reconnection, a Participant sends the last received sequence number per matching unit in a LOGIN REQUEST V2 message. Cboe will respond with any missed messages. However, when the LOGIN REQUEST V2 *NoUnspecifiedUnitReplay* flag is enabled, Cboe will exclude messages from unspecified matching units during replay. Cboe will send a REPLAY COMPLETE message when replay is finished. If there are no messages to replay,

a REPLAY COMPLETE message will be sent immediately after a LOGIN RESPONSE V2 message. Cboe will reject all orders during replay.

Assuming Participant has requested replay messages using a properly formatted LOGIN REQUEST V2 after a disconnect, any unacknowledged orders remaining with the Participant after the REPLAY COMPLETE message is received should be assumed to be unknown to Cboe.

Unsequenced messages will not be included during replay.

A session is identified by the username and session sub-identifier (both supplied by Cboe). Only one concurrent connection per username and session sub-identifier is permitted.

If a login is rejected, an appropriate LOGIN RESPONSE V2 message will be sent and the connection will be terminated.

2.3 Sequence Reset

A reset sequence operation is not available for Binary Order Entry. However, a Participant can send a LOGIN REQUEST message with *NoUnspecifiedUnitReplay* field enabled, and *NumberOfUnits* field set to zero. Then, upon receiving a LOGIN RESPONSE V2 message from Cboe, the Participant can use the field *LastReceivedSequenceNumber* as the sequence starting point for sending future messages.

2.4 Heartbeats

CLIENT HEARTBEAT messages are sent from Participant to Cboe and SERVER HEARTBEAT messages are sent from Cboe to Participant if no other data has been sent in that direction for one second. Like other session level messages, heartbeats from Cboe to the Participant do *not* increment the sequence number. If Cboe receives no inbound data or heartbeats for five seconds, a LOGOUT message will be sent and the connection will be terminated. **Participants are encouraged to have a one second heartbeat interval and to perform similar connection staleness logic.**

2.5 Logging Out

To gracefully log out of a session, a LOGOUT REQUEST message should be sent by the Participant. Cboe will finish sending any queued data for that port and will then respond with its own LOGOUT message and close the connection. After receipt of a LOGOUT REQUEST message, Cboe will ignore all other inbound (Participant to Cboe) messages except for CLIENT HEARTBEAT.

3 Session Messages

3.1 Participant to Cboe

3.1.1 Login Request V2

A LOGIN REQUEST V2 message must be sent as the first message upon connection.

A number of repeating parameter groups, some of which may be required, are sent at the end of the message. Ordering of parameter groups is not important. New parameter groups may be added in the future with no notice.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x37
<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.
<i>SessionSubID</i>	10	4	Alphanumeric	Session Sub ID supplied by Cboe.
<i>Username</i>	14	4	Alphanumeric	Username supplied by Cboe.
<i>Password</i>	18	10	Alphanumeric	Password supplied by Cboe.
<i>NumberOfParam Groups</i>	28	1	Binary	A number, <i>n</i> (possibly 0), of parameter groups to follow.
<i>ParamGroup₁</i>				First parameter group.
⋮				
<i>ParamGroup_n</i>				Last parameter group.

Unit Sequences Parameter Group

This parameter group includes the last consumed sequence number per matching unit received by the Participant. Cboe uses these sequence numbers to determine what outbound (Cboe to Participant) traffic, if any, was missed by the Participant. If this parameter group is not sent, it's assumed the Participant has not received any messages (e.g., start of day).

The Participant does *not* need to include a sequence number for a unit if they have never received messages from it. For example, if the Participant has received responses from units 1, 3, and 4, the LOGIN REQUEST V2 message need not include unit 2. If the Participant wishes to send a value for unit 2 anyway, 0 would be the only allowed value.

Only one instance of this parameter group may be included.

Field	Offset	Length	Data Type	Description
<i>ParamGroupLength</i>	0	2	Binary	Number of bytes for the parameter group, including this field.
<i>ParamGroupType</i>	2	1	Binary	0x80
<i>NoUnspecified UnitReplay</i>	3	1	Binary	Flag indicating whether to replay missed outgoing (Cboe to Participant) messages for unspecified units. 0x00 = False (Replay Unspecified Units) 0x01 = True (Suppress Unspecified Units Replay)

<i>NumberOfUnits</i>	4	1	Binary	A number, <i>n</i> (possibly 0), of unit/sequence pairs to follow, one per unit from which the Participant has received messages.
<i>UnitNumber₁</i>		1	Binary	A unit number.
<i>UnitSequence₁</i>		4	Binary	Last received sequence number for the unit.
⋮				
<i>UnitNumber_n</i>		1	Binary	A unit number.
<i>UnitSequence_n</i>		4	Binary	Last received sequence number for the unit.

Return Bitfields Parameter Group

This parameter group, which may be repeated, indicates which attributes of a message will be returned by Cboe for the remainder of the session. This allows Participants to tailor the echoed results to the needs of their system without paying for bandwidth or processing they do not need.

Listing of the return bitfields which are permitted per message is contained in **Return Bitfields Per Message** (§ 6, p. 35).

Field	Offset	Length	Data Type	Description
<i>ParamGroupLength</i>	0	2	Binary	Number of bytes for the parameter group, including this field.
<i>ParamGroupType</i>	2	1	Binary	0x81
<i>MessageType</i>	3	1	Binary	Return message type for which the bitfields are being specified (e.g., 0x30 for a TRADE CAPTURE REPORT ACKNOWLEDGMENT V2 message)
<i>NumberOfReturn Bitfields</i>	4	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	5	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.

Example Login Request V2 Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	43 00	67 bytes
<i>MessageType</i>	37	Login Request V2
<i>MatchingUnit</i>	00	Always 0 for inbound messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages
<i>SessionSubID</i>	30 30 30 31	0001
<i>Username</i>	54 45 53 54	TEST
<i>Password</i>	54 45 53 54 49 4E 47 00 00 00	TESTING
<i>NumberOfParam Groups</i>	03	3 parameter groups
<i>ParamGroupLength</i>	14 00	20 bytes for this parameter group
<i>ParamGroupType</i>	80	0x80 = Unit Sequences
<i>NoUnspecified UnitReplay</i>	01	True (replay only specified units)
<i>NumberOfUnits</i>	03	Three unit/sequence pairs to follow;
<i>UnitNumber₁</i>	01	Unit 1
<i>UnitSequence₁</i>	4A BB 01 00	Last received sequence of 113,482
<i>UnitNumber₂</i>	02	Unit 2
<i>UnitSequence₂</i>	00 00 00 00	Last received sequence of 0
<i>UnitNumber₃</i>	04	Unit 4
<i>UnitSequence₃</i>	79 A1 00 00	Last received sequence of 41,337
<i>ParamGroupLength</i>	08 00	8 bytes for this parameter group
<i>ParamGroupType</i>	81	0x81 = Return Bitfields
<i>MessageType</i>	30	0x30 = Trade Capture Report Acknowledgment V2
<i>NumberOfReturn Bitfields</i>	03	3 bitfields to follow
<i>ReturnBitfield₁</i>	00	No bitfields from byte 1
<i>ReturnBitfield₂</i>	41	<i>Symbol, Capacity</i>
<i>ReturnBitfield₃</i>	05	<i>Account, ClearingAccount</i>
<i>ParamGroupLength</i>	0C 00	12 bytes for this parameter group
<i>ParamGroupType</i>	81	0x81 = Return Bitfields
<i>MessageType</i>	32	0x32 = Trade Capture Confirm V2
<i>NumberOfReturn Bitfields</i>	07	7 bitfields to follow
<i>ReturnBitfield₁</i>	00	No bitfields from byte 1
<i>ReturnBitfield₂</i>	41	<i>Symbol, Capacity</i>
<i>ReturnBitfield₃</i>	07	<i>Account, ClearingFirm, ClearingAccount</i>
<i>ReturnBitfield₄</i>	00	No bitfields from byte 4
<i>ReturnBitfield₅</i>	00	No bitfields from byte 5
<i>ReturnBitfield₆</i>	00	No bitfields from byte 6
<i>ReturnBitfield₇</i>	08	<i>Text</i>

3.1.2 Logout Request

To end the session, the Participant should send a LOGOUT REQUEST message. Cboe will finish sending any queued data and finally respond with a LOGOUT message and close the connection.

A Participant may simply close the connection without logging out, but may lose any queued messages by doing so.

LOGOUT REQUEST remains unchanged between Versions 1 and 2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x02
<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.

Example Logout Request Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	08 00	8 bytes
<i>MessageType</i>	02	Logout Request
<i>MatchingUnit</i>	00	Always 0 for inbound messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages

3.1.3 Client Heartbeat

See **Heartbeats** (§ 2.4, p. 9) for more information about heartbeats and the session level protocol.

CLIENT HEARTBEAT remains unchanged between Versions 1 and 2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x03
<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.

Example Client Heartbeat Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	08 00	8 bytes
<i>MessageType</i>	03	Client Heartbeat
<i>MatchingUnit</i>	00	Always 0 for inbound messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages

3.2 Cboe to Participant

3.2.1 Login Response V2

A LOGIN RESPONSE V2 message is sent in response to a LOGIN REQUEST V2 message. On a successful login, the *LoginResponseStatus* will be set to A. On a failed login, *LoginResponseStatus* will be set to a value other than A, and *LoginResponseText* will be set to an appropriate failure description.

Cboe will verify Return Bitfields at login time. If the Return Bitfields in a Return Bitfields Parameter Group are invalid, *LoginResponseStatus* will be set to F, and *LoginResponseText* will include a description of which byte and bit are invalid. This is done to ensure that reserved fields are not used, and only options that apply to the local market are set. See **Return Bitfields Per Message** (§ 6, p. 35) for additional information.

Note that two sets of sequence numbers are available on the LOGIN RESPONSE V2. The set of sequence numbers in the body are the actual Cboe to Participant sequence numbers indicating the highest sequence numbers available per matching unit. If specified during login, the Unit Sequences Parameter Group will also be returned which is an echo of the sequence numbers the Participant presented during login as the highest received. If these are different, it indicates a gap which will be filled by Cboe.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x24
<i>MatchingUnit</i>	5	1	Binary	Always 0 for session level messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.
<i>LoginResponseStatus</i>	10	1	Alphanumeric	Accepted, or the reason for the rejection. A = Login Accepted N = Not authorized (invalid username/password) D = Session is disabled B = Session in use S = Invalid session Q = Sequence ahead in Login message I = Invalid unit given in Login message F = Invalid return bitfield in login message M = Invalid Login Request message structure
<i>LoginResponseText</i>	11	60	Text	Human-readable text with additional information about the reason for rejection. For successful logins, this is empty. ASCII NUL (0x00) filled on the right, if necessary.
<i>NoUnspecifiedUnitReplay</i>	71	1	Binary	Echoed back from the original LOGIN REQUEST V2 message.
<i>LastReceivedSequenceNumber</i>	72	4	Binary	Last inbound (Participant to Cboe) message sequence number processed by Cboe.
<i>NumberOfUnits</i>	76	1	Binary	A number, <i>n</i> , of unit/sequence pairs to follow, one per unit. A pair for every unit will be sent, even if no messages have been sent to this port today. For unsuccessful logins, this will be 0.
<i>UnitNumber₁</i>		1	Binary	A unit number.
<i>UnitSequence₁</i>		4	Binary	Highest available Cboe to Participant sequence number for the unit.
⋮				

<i>UnitNumber_n</i>		1	Binary	A unit number.
<i>UnitSequence_n</i>		4	Binary	Highest available Cboe to Participant sequence number for the unit.
<i>NumberOfParam Groups</i>		1	Binary	Echoed back from the original LOGIN REQUEST V2 message.
<i>ParamGroup₁</i>				Echoed back from the original LOGIN REQUEST V2 message.
⋮				
<i>ParamGroup_n</i>				Echoed back from the original LOGIN REQUEST V2 message.

Example Login Response V2 Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	88 00	136 bytes
<i>MessageType</i>	24	Login Response V2
<i>MatchingUnit</i>	00	Always 0 for session messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages
<i>LoginResponseStatus</i>	41	A = Login Accepted
<i>LoginResponseText</i>	41 63 63 65 70 74 65 64 00	Accepted (padding) (padding) (padding) (padding) (padding)
<i>NoUnspecified</i>	01	True (replay only specified units)
<i>UnitReplay</i>		
<i>Last Received Sequence Number</i>	54 4A 02 00	Last sequence Cboe received of 150,100
<i>NumberOfUnits</i>	04	Four unit/sequence pairs to follow.
<i>UnitNumber₁</i>	01	Unit 1
<i>UnitSequence₁</i>	4A BB 01 00	Actual last sequence of 113,482
<i>UnitNumber₂</i>	02	Unit 2
<i>UnitSequence₂</i>	00 00 00 00	Actual last sequence of 0
<i>UnitNumber₃</i>	03	Unit 3
<i>UnitSequence₃</i>	00 00 00 00	Actual last sequence of 0
<i>UnitNumber₄</i>	04	Unit 4
<i>UnitSequence₄</i>	79 A1 00 00	Actual last sequence of 41,337
<i>NumberOfParam Groups</i>	03	3 parameter groups
<i>ParamGroupLength</i>	14 00	20 bytes for this parameter group
<i>ParamGroupType</i>	80	0x80 = Unit Sequences
<i>NoUnspecified</i>	01	True (replay unspecified units)
<i>UnitReplay</i>		
<i>NumberOfUnits</i>	03	Three unit/sequence pairs to follow
<i>UnitNumber₁</i>	01	Unit 1
<i>UnitSequence₁</i>	4A BB 01 00	Last received sequence of 113,482
<i>UnitNumber₂</i>	02	Unit 2
<i>UnitSequence₂</i>	00 00 00 00	Last received sequence of 0
<i>UnitNumber₃</i>	04	Unit 4
<i>UnitSequence₃</i>	79 A1 00 00	Last received sequence of 41,337
<i>ParamGroupLength</i>	08 00	8 bytes for this parameter group

<i>ParamGroupType</i>	81	0x81 = Return Bitfields
<i>MessageType</i>	30	0x30 = Trade Capture Report Acknowledgment V2
<i>NumberOfReturn</i>	03	3 bitfields to follow
<i>Bitfields</i>		
<i>ReturnBitfield₁</i>	00	No bitfields from byte 1
<i>ReturnBitfield₂</i>	41	<i>Symbol, Capacity</i>
<i>ReturnBitfield₃</i>	05	<i>Account, ClearingAccount</i>
<i>ParamGroupLength</i>	0C 00	12 bytes for this parameter group
<i>ParamGroupType</i>	81	0x81 = Return Bitfields
<i>MessageType</i>	32	0x32 = Trade Capture Confirm V2
<i>NumberOfReturn</i>	07	7 bitfields to follow
<i>Bitfields</i>		
<i>ReturnBitfield₁</i>	00	No bitfields from byte 1
<i>ReturnBitfield₂</i>	41	<i>Symbol, Capacity</i>
<i>ReturnBitfield₃</i>	07	<i>Account, ClearingFirm, ClearingAccount</i>
<i>ReturnBitfield₄</i>	00	No bitfields from byte 4
<i>ReturnBitfield₅</i>	00	No bitfields from byte 5
<i>ReturnBitfield₆</i>	00	No bitfields from byte 6
<i>ReturnBitfield₇</i>	08	<i>Text</i>

3.2.2 Logout

A LOGOUT is usually sent in response to a LOGOUT REQUEST. Any queued data is transmitted, a LOGOUT is sent, and Cboe will close the connection. However, a LOGOUT may also be sent if the Participant violates the protocol specification (e.g., by moving backwards in sequence number).

The LOGOUT contains the last transmitted sequence number for each unit, allowing the Participant to check that their last received sequence number matches.

LOGOUT remains unchanged between Versions 1 and 2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x08
<i>MatchingUnit</i>	5	1	Binary	Always 0 for session level messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.
<i>LogoutReason</i>	10	1	Alphanumeric	The reason why the LOGOUT message was sent. U = User Requested E = End of Day A = Administrative ! = Protocol Violation
<i>LogoutReason</i> <i>Text</i>	11	60	Text	Human-readable text with additional information about the reason for logout. Particularly useful if <i>LogoutReason</i> = ! (Protocol Violation).
<i>LastReceived</i> <i>SequenceNumber</i>	71	4	Binary	Last inbound (Participant to Cboe) message sequence number processed by Cboe.
<i>NumberOfUnits</i>	75	1	Binary	A number, <i>n</i> (possibly 0), of unit/sequence pairs to follow, one per unit from which the client has received messages.

<i>UnitNumber</i> ₁		1	Binary	A unit number.
<i>UnitSequence</i> ₁		4	Binary	Highest available sequence number for the unit.
⋮				
<i>UnitNumber</i> _n		1	Binary	A unit number.
<i>UnitSequence</i> _n		4	Binary	Highest available sequence number for the unit.

Example Logout Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	55 00	85 bytes
<i>MessageType</i>	08	Logout
<i>MatchingUnit</i>	00	Always 0 for session level messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages
<i>LogoutReason</i>	55	U = User Requested
<i>LogoutReason</i>	55 73 65 72 00 00 00 00 00 00	User
<i>Text</i>	00 00	
<i>LastReceived SequenceNumber</i>	54 5A 02 00	Last Cboe received sequence of 150,100
<i>NumberOfUnits</i>	03	Three unit/sequence pairs to follow.
<i>UnitNumber</i> ₁	01	Unit 1
<i>UnitSequence</i> ₁	4A BB 01 00	Last sent sequence of 113,482
<i>UnitNumber</i> ₂	02	Unit 2
<i>UnitSequence</i> ₂	00 00 00 00	Last sent sequence of 0
<i>UnitNumber</i> ₃	04	Unit 4
<i>UnitSequence</i> ₃	79 A1 00 00	Last sent sequence of 41,337

3.2.3 Server Heartbeat

See **Heartbeats** (§ 2.4, p. 9) for more information about heartbeats and the session level protocol.

SERVER HEARTBEAT remains unchanged between Versions 1 and 2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x09
<i>MatchingUnit</i>	5	1	Binary	Always 0 for session level messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.

Example Server Heartbeat Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	08 00	8 bytes
<i>MessageType</i>	09	Server Heartbeat
<i>MatchingUnit</i>	00	Always 0 for session level messages

SequenceNumber 00 00 00 00

Always 0 for session level messages

3.2.4 Replay Complete

See **Login, Replay and Sequencing** (§ 2.2, p. 8) for more information on Login, sequencing and replay.

REPLAY COMPLETE remains unchanged between Versions 1 and 2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x13
<i>MatchingUnit</i>	5	1	Binary	Always 0 for session level messages.
<i>SequenceNumber</i>	6	4	Binary	Always 0 for session level messages.

Example Replay Complete Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes.
<i>MessageLength</i>	08 00	8 bytes
<i>MessageType</i>	13	Replay Complete
<i>MatchingUnit</i>	00	Always 0 for session level messages
<i>SequenceNumber</i>	00 00 00 00	Always 0 for session level messages

4 Application Messages

4.1 Participant to Cboe

4.1.1 Trade Capture Report V2

The TRADE CAPTURE REPORT V2 is used to submit a Trade.

The model supported is as described in the FIX 5.0 (SP2) specification in the Two-Party Reporting workflow diagram of the Trade Capture Reporting section.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x3C
<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message.
<i>TradeReportID</i>	10	20	Text	Corresponds to <i>TradeReportID</i> (571) in Cboe FIX. Day-unique ID chosen by client. Cboe will enforce port level day-uniqueness. 20 characters or less. Characters in ASCII range 33–126 are allowed, except for comma, semi-colon, and pipe. If the <i>TradeReportID</i> matches a live trade report (one that has been acked, but not confirmed or declined), it will be rejected as duplicate.
<i>LastShares</i>	30	4	Binary	Corresponds to <i>LastShares</i> (32) in Cboe FIX. Executed share quantity. If the <i>LargeSize</i> optional field is specified, that value holds precedence over this field.
<i>LastPx</i>	34	8	Trade Price	Corresponds to <i>LastPx</i> (31) in Cboe FIX. Price of this fill. A value of zero or an indicative price may be used if the price is pending, as denoted by <i>PriceFormation</i>
<i>NumberOfTradeCaptureReportBitfields</i>	42	1	Binary	Bitfield identifying bitfields which are set. Field values must be appended to the end of the message.
<i>TradeCaptureReportBitfield₁</i>		1	Binary	Bitfield identifying fields to follow.
⋮				
<i>TradeCaptureReportBitfield_n</i>		1	Binary	Last bitfield.
<i>NoSides</i>		1	Binary	Corresponds to <i>NoSides</i> (552) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 1 or 2.

Repeating Group *TrdCapRptSideGrp* must occur the number of times specified in *NoSides*. Only *Side* and *PartyID* are mandatory. Each field occurs in each group, in order as shown below. Optional fields should occur only if corresponding bits in bitfields are set.

<i>Side</i>	1	Alphanumeric	Corresponds to <i>Side</i> (54) in Cboe FIX. 1 = Buy 2 = Sell 8 = Cross
<i>Capacity</i>	1	Alpha	Corresponds to <i>OrderCapacity</i> (47) in Cboe FIX. (Orders). Corresponds to <i>LastCapacity</i> (29) in Cboe FIX. (Executions). A = Agency (maps to 'AOTC') P = Principal (maps to 'DEAL') R = Riskless Principal (maps to 'MTCH')
<i>PartyID</i>	4	Alpha	Corresponds to <i>PartyID</i> (448) in Cboe FIX. The end-client responsible for the trade. Must be an identifier (4 uppercase letters) known to Cboe.
<i>Account</i>	16	Text	Corresponds to <i>Account</i> (1) in Cboe FIX. Contains the <i>Account</i> specified on this leg on the trade capture, if any. Reflected back on trade capture report confirmations. Allowed characters are alphanumeric and colon.
<i>PartyRole</i>	1	Alphanumeric	Corresponds to <i>PartyRole</i> (452) in Cboe FIX. Contains the <i>PartyRole</i> specified on this leg on the trade capture, if any. Reflected back on trade capture report confirmations. 2 = EnteringFirm (the party reporting the trade)

<i>Optional fields. . .</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block.
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Example Trade Capture Report V2 Message:

Field Name	Hexadecimal	Notes
<i>StartOfMessage</i>	BA BA	Start of message bytes
<i>MessageLength</i>	4D 00	77 bytes
<i>MessageType</i>	3C	Trade Capture Report V2
<i>MatchingUnit</i>	00	Always 0 for inbound messages
<i>SequenceNumber</i>	64 00 00 00	Sequence number 100
<i>TradeReportID</i>	31 34 32 39 30 39 38 34 38 39 35 38 37 33 33 32 00 00 00 00	1429098489587332
<i>LastShares</i>	46 00 00 00	70 shares
<i>LastPx</i>	40 F9 A1 6A 00 00 00 00	1789000000 = 178.9000000
<i>NumberOf</i>	04	4 bitfields to follow
<i>TradeCaptureReport</i>		
<i>Bitfields</i>		
<i>Bitfield₁</i>	01	<i>Symbol</i>
<i>Bitfield₂</i>	B5	<i>Capacity, TransactionCategory,</i> <i>PartyRole, TradeReportTransType, VenueType</i>
<i>Bitfield₃</i>	A2	<i>MatchType, TradePublishIndicator,</i> <i>ExecutionMethod</i>
<i>Bitfield₄</i>	43	<i>TradeReportType, TradeHandlingInstruction,</i> <i>OrderCategory</i>
<i>NoSides</i>	02	2 repeating groups to follow
<i>Side</i>	31	Buy
<i>Capacity</i>	50	Principal
<i>PartyID</i>	54 45 53 54	TEST
<i>PartyRole</i>	31	ExecutingFirm
<i>Side</i>	32	Sell
<i>Capacity</i>	50	Principal
<i>PartyID</i>	54 45 53 54	TEST
<i>PartyRole</i>	31	ExecutingFirm
<i>Symbol</i>	56 4F 44 6C 00 00 00 00	V0D1
<i>TransactionCategory</i>	50	P = Regular Trade
<i>TradeReportTransType</i>	00	0 = New
<i>VenueType</i>	4F	0 = Off Book
<i>MatchType</i>	03	3 = Trade Reporting (On-Exchange)
<i>TradePublishIndicator</i>	01	1 = Publish trade
<i>ExecutionMethod</i>	55	U = Unspecified
<i>TradeReportType</i>	00	0 = Submit
<i>TradeHandlingInstr</i>	01	1 = Two-Party Report
<i>OrderCategory</i>	03	3 = Privately Negotiated Trade

4.1.2 Quote V2

The QUOTE V2 is used to submit a Quote.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x3D

<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message.
<i>QuoteID</i>	10	20	Text	Corresponds to <i>QuoteID</i> (117) in Cboe FIX. Mandatory unique ID chosen by client for a Quote or QuoteCancel. 18 characters or less. Characters in ASCII range 33–126 are allowed, except for comma, semi-colon, and pipe. Please note that the last two bytes are for internal use. Note: Cboe only enforces the uniqueness of QuoteID values among currently live quotes. However, we strongly recommend that you keep your QuoteID values day unique.
<i>NumberOfQuoteBitfields</i>	30	1	Binary	Bitfield identifying bitfields which are set. Field values must be appended to the end of the message.
<i>QuoteBitfield₁</i>	31	1	Binary	Bitfield identifying fields to follow.
⋮				
<i>QuoteBitfield_n</i>		1	Binary	Last bitfield.
<i>Optional fields. . .</i>				

4.1.3 Quote Cancel V2

The QUOTE CANCEL V2 is used to cancel a Quote.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x3E
<i>MatchingUnit</i>	5	1	Binary	Always 0 for inbound (Participant to Cboe) messages.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message.
<i>QuoteID</i>	10	20	Text	Corresponds to <i>QuoteID</i> (117) in Cboe FIX. Mandatory unique ID chosen by client for a Quote or QuoteCancel. 18 characters or less. Characters in ASCII range 33–126 are allowed, except for comma, semi-colon, and pipe. Please note that the last two bytes are for internal use. Note: Cboe only enforces the uniqueness of QuoteID values among currently live quotes. However, we strongly recommend that you keep your QuoteID values day unique.
<i>NumberOfQuoteCancelBitfields</i>	30	1	Binary	Bitfield identifying bitfields which are set. Field values must be appended to the end of the message.
<i>QuoteCancelBitfield₁</i>	31	1	Binary	Bitfield identifying fields to follow.
⋮				
<i>QuoteCancelBitfield_n</i>		1	Binary	Last bitfield.
<i>NoQuoteEntries</i>		1	Binary	Mandatory. Corresponds to <i>NoQuoteEntries-Text</i> (295) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 0 or 1. 0 - Cancel all symbols 1 - Cancel quote for the specified symbol

Repeating Group *QuoteCancelRptGrp* must occur the number of times specified in *NoQuoteEntries*. All fields are optional. Each field occurs in each group, in bitfield order as shown below, if its corresponding bit in the bitfields bit is set.

<i>Symbol</i>	8	Alphanumeric	Corresponds to <i>Symbol</i> (55) in Cboe FIX. Uniform symbology identifier for the instrument.
<i>Currency</i>	3	Alpha	Corresponds to <i>Currency</i> (15) in Cboe FIX. ISO currency. Required if <i>IDSource</i> is set to 4 (ISIN).
<i>IDSource</i>	1	Alphanumeric	Corresponds to <i>IDSource</i> (22) in Cboe FIX. 4 = ISIN 5 = RIC
<i>SecurityID</i>	16	Text	Corresponds to <i>SecurityID</i> (48) in Cboe FIX. ISIN, or RIC if <i>IDSource</i> is set.
<i>SecurityExchange</i>	4	Alphanumeric	Corresponds to <i>SecurityExchange</i> (207) in Cboe FIX. Required if <i>IDSource</i> is set to 4 (ISIN).

<i>Optional fields. . .</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block. If <i>ClearingFirm</i> is not specified, default firm will be used if possible.
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4.2 Cboe to Participant

4.2.1 Trade Capture Report Acknowledgment V2

The TRADE CAPTURE REPORT ACKNOWLEDGMENT V2 is sent by Cboe to acknowledge the receipt of a TRADE CAPTURE REPORT V2. It is a technical-level ack. The Trade is not considered to have fully succeeded until a TRADE CAPTURE CONFIRM V2 is sent.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x30
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.
<i>TransactionTime</i>	10	8	DateTime	The time the event occurred in the Cboe matching engine (not the time the message was sent).
<i>TradeReportID</i>	18	20	Text	Corresponds to <i>TradeReportID</i> (571) in Cboe FIX. Contains the <i>TradeReportID</i> (571) of the original trade capture report to which this message relates
<i>ReservedInternal</i>	38	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturnBitfields</i>	39	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	40	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>NoSides</i>		1	Binary	Corresponds to <i>NoSides</i> (552) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 1 or 2.

Repeating Group *TrdCapAckSideGrp* must occur the number of times specified in *NoSides*. All fields are optional. Each field occurs in each group, in bitfield order as shown below, if its corresponding bit in the bitfields bit is set.

<i>Side</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Capacity</i>	1	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Account</i>	16	Text	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>PartyID</i>	4	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>PartyRole</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.

<i>Optional fields...</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block.
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4.2.2 Trade Capture Report Reject V2

The TRADE CAPTURE REPORT REJECT V2 is sent by Cboe in response to a TRADE CAPTURE REPORT V2. TRADE CAPTURE REPORT REJECT V2 messages are unsequenced.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x31
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.
<i>TransactionTime</i>	10	8	DateTime	The time the event occurred in the Cboe matching engine (not the time the message was sent).
<i>TradeReportID</i>	18	20	Text	Corresponds to <i>TradeReportID</i> (571) in Cboe FIX. Contains the <i>TradeReportID</i> (571) of the original trade capture report to which this message relates
<i>Reason</i>	38	1	Text	Reason for a TRADE CAPTURE REPORT reject or decline. See Reason Codes (§ 8, p. 61) for a list of possible reasons.
<i>Text</i>	39	60	Text	Human readable text with more information about the reject reason.
<i>ReservedInternal</i>	99	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturnBitfields</i>	100	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	101	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>NoSides</i>		1	Binary	Corresponds to <i>NoSides</i> (552) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 1 or 2.

Repeating Group *TrdCapAckSideGrp* must occur the number of times specified in *NoSides*. All fields are optional. Each field occurs in each group, in bitfield order as shown below, if its corresponding bit in the bitfields bit is set.

<i>Side</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Capacity</i>	1	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Account</i>	16	Text	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>PartyID</i>	4	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>PartyRole</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.

<i>Optional fields...</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block.
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4.2.3 Trade Capture Confirm V2

The TRADE CAPTURE CONFIRM V2 is sent from Cboe to the participant in order to confirm that a TRADE CAPTURE REPORT V2 has been fully processed. It is a business-level confirmation as distinct from the technology level acknowledgment sent as a TRADE CAPTURE REPORT ACKNOWLEDGMENT V2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x32
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.
<i>TransactionTime</i>	10	8	DateTime	The time the event occurred in the Cboe matching engine (not the time the message was sent).
<i>TradeReportID</i>	18	20	Text	Corresponds to <i>TradeReportID</i> (571) in Cboe FIX. Unique identifier for the trade report confirm as provided by Cboe
<i>TradeReportRefID</i>	38	20	Text	Corresponds to <i>TradeReportRefID</i> (572) in Cboe FIX. Contains the <i>TradeReportID</i> (571) of the original trade capture report to which this message relates

<i>TradeID</i>	58	8	Binary	Corresponds to <i>TradeID</i> (1003) in FIX. An ID allocated by Cboe in response to a trade capture report, identifying a particular trade. These are present in the PITCH Off-Book Trade messages, and are guaranteed unique for a minimum of 7 calendar days from the original report.
<i>LastShares</i>	66	4	Binary	Corresponds to <i>LastShares</i> (32) in Cboe FIX. Executed share quantity. If the <i>LargeSize</i> optional field is specified, that value holds precedence over this field.
<i>LastPx</i>	70	8	Trade Price	Corresponds to <i>LastPx</i> (31) in Cboe FIX. Price of this fill. A value of zero or an indicative price may be used if the price is pending, as denoted by <i>PriceFormation</i>
<i>ContraBroker</i>	78	4	Alphanumeric	Corresponds to <i>ContraBroker</i> (375) in Cboe FIX. Indicates the market of execution. ¹
<i>ReservedInternal</i>	82	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturnBitfields</i>	83	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	84	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>NoSides</i>		1	Binary	Corresponds to <i>NoSides</i> (552) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 1 or 2.

Repeating Group *TrdCapAckSideGrp* must occur the number of times specified in *NoSides*. All fields are optional. Each field occurs in each group, in bitfield order as shown below, if its corresponding bit in the bitfields bit is set.

<i>Side</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Capacity</i>	1	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Account</i>	16	Text	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>PartyID</i>	4	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>Central Counterparty</i>	1	Alpha	The CCP handling the trade N = None
<i>PartyRole</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.
<i>FeeCode</i>	2	Alphanumeric	Indicates fee associated with an execution. Fee codes are published in the pricing schedule. New fee codes may be sent with little to no notice. Participants are encouraged to code their systems to accept unknown fee codes.

¹for historical reasons a local execution for an order entered into the BXE book is identified with a value of BATS

<i>Optional fields...</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block.
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4.2.4 Trade Capture Report Decline V2

The TRADE CAPTURE DECLINE V2 is sent from Cboe to the participant in order to decline a TRADE CAPTURE REPORT V2. It is a business-level reject as distinct from the technology level acknowledgment sent as a TRADE CAPTURE REPORT ACKNOWLEDGMENT V2.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x33
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.
<i>TransactionTime</i>	10	8	DateTime	The time the event occurred in the Cboe matching engine (not the time the message was sent).
<i>TradeReportID</i>	18	20	Text	Corresponds to <i>TradeReportID</i> (571) in Cboe FIX. Unique identifier for the trade report confirm as provided by Cboe
<i>TradeReportRefID</i>	38	20	Text	Corresponds to <i>TradeReportRefID</i> (572) in Cboe FIX. Contains the <i>TradeReportID</i> (571) of the original trade capture report to which this message relates
<i>TradeID</i>	58	8	Binary	Corresponds to <i>TradeID</i> (1003) in FIX. An ID allocated by Cboe in response to a trade capture report, identifying a particular trade. These are present in the PITCH Off-Book Trade messages, and are guaranteed unique for a minimum of 7 calendar days from the original report.
<i>LastShares</i>	66	4	Binary	Corresponds to <i>LastShares</i> (32) in Cboe FIX. Executed share quantity. If the <i>LargeSize</i> optional field is specified, that value holds precedence over this field.
<i>LastPx</i>	70	8	Trade Price	Corresponds to <i>LastPx</i> (31) in Cboe FIX. Price of this fill. A value of zero or an indicative price may be used if the price is pending, as denoted by <i>PriceFormation</i>

<i>ContraBroker</i>	78	4	Alphanumeric	Corresponds to <i>ContraBroker</i> (375) in Cboe FIX. Indicates the market of execution. ²
<i>Reason</i>	82	1	Text	Reason for a TRADE CAPTURE REPORT reject or decline. See Reason Codes (§ 8, p. 61) for a list of possible reasons.
<i>Text</i>	83	60	Text	Human readable text with more information about the reject reason.
<i>ReservedInternal</i>	143	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturnBitfields</i>	144	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	145	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>NoSides</i>		1	Binary	Corresponds to <i>NoSides</i> (552) in Cboe FIX. Indicates the number of repeating groups to follow. Currently, can be 1 or 2.
Repeating Group <i>TrdCapAckSideGrp</i> must occur the number of times specified in <i>NoSides</i> . All fields are optional. Each field occurs in each group, in bitfield order as shown below, if its corresponding bit in the bitfields bit is set.				
<i>Side</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.	
<i>Capacity</i>	1	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.	
<i>Account</i>	16	Text	Echoed back from the original TRADE CAPTURE REPORT V2 message.	
<i>PartyID</i>	4	Alpha	Echoed back from the original TRADE CAPTURE REPORT V2 message.	
<i>PartyRole</i>	1	Alphanumeric	Echoed back from the original TRADE CAPTURE REPORT V2 message.	
<i>Optional fields. . .</i>				Optional fields as set in the bitmap. Note, optional fields that occur in the repeating groups appear above, repeating per group, not within this block.

4.2.5 Quote Status V2

The QUOTE STATUS V2 is sent by Cboe in response to a QUOTE V2 or QUOTECANCEL V2. QUOTE STATUS V2 messages are sequenced.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.

²for historical reasons a local execution for an order entered into the BXE book is identified with a value of BATS

<i>MessageType</i>	4	1	Binary	0x3F
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.
<i>QuoteID</i>	10	20	Text	Corresponds to <i>QuoteID</i> (117) in Cboe FIX. Mandatory unique ID chosen by client for a Quote or QuoteCancel. 18 characters or less. Characters in ASCII range 33–126 are allowed, except for comma, semicolon, and pipe. Please note that the last two bytes are for internal use. Note: Cboe only enforces the uniqueness of QuoteID values among currently live quotes. However, we strongly recommend that you keep your QuoteID values day unique.
<i>Status</i>	30	1	Alphanumeric	Indicates the acceptance or otherwise of a Quote or QuoteCancel message. 0 = Accepted in response to a QUOTE message 1 = Cancelled in response to a QUOTECANCEL message
<i>ReservedInternal</i>	31	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturnBitfields</i>	32	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	33	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>Optional fields. . .</i>				

4.2.6 Quote Reject V2

The QUOTE REJECT V2 is sent by Cboe in response to a QUOTE V2 or QUOTECANCEL V2. QUOTE REJECT V2 messages are unsequenced.

Field	Offset	Length	Data Type	Description
<i>StartOfMessage</i>	0	2	Binary	Must be 0xBA 0xBA.
<i>MessageLength</i>	2	2	Binary	Number of bytes for the message, including this field but not including the two bytes for the <i>StartOfMessage</i> field.
<i>MessageType</i>	4	1	Binary	0x40
<i>MatchingUnit</i>	5	1	Binary	The matching unit which created this message. Matching units in TRF BOE correspond to matching units on Multicast PITCH.
<i>SequenceNumber</i>	6	4	Binary	The sequence number for this message. Distinct per matching unit.

<i>QuoteID</i>	10	20	Text	<p>Corresponds to <i>QuoteID</i> (117) in Cboe FIX.</p> <p>Mandatory unique ID chosen by client for a Quote or QuoteCancel.</p> <p>18 characters or less. Characters in ASCII range 33–126 are allowed, except for comma, semi-colon, and pipe.</p> <p>Please note that the last two bytes are for internal use.</p> <p>Note: Cboe only enforces the uniqueness of QuoteID values among currently live quotes. However, we strongly recommend that you keep your QuoteID values day unique.</p>
<i>Reason</i>	30	1	Text	<p>Reason for a QUOTE reject.</p> <p>A = Admin Y = Symbol Not Supported Z = Unforeseen Reason</p>
<i>Text</i>	31	60	Text	Human readable text with more information about the reject reason.
<i>ReservedInternal</i>	91	1	Binary	Reserved for Cboe internal use.
<i>NumberOfReturn Bitfields</i>	92	1	Binary	Number of bitfields to follow.
<i>ReturnBitfield₁</i>	93	1	Binary	Bitfield identifying fields to return.
⋮				
<i>ReturnBitfield_n</i>		1	Binary	Last bitfield.
<i>Optional fields...</i>				

5 Input Bitfields Per Message

Legend:

- Indicates that the field can be requested for a message
- Indicates that the field cannot be requested for a message

5.1 Trade Capture Report V2

Byte	Bit	Field	
1	1	<i>Symbol</i>	•
	2	<i>Reserved</i>	–
	4	<i>Currency</i>	•
	8	<i>IDSource</i>	•
	16	<i>SecurityID</i>	•
	32	<i>Security Exchange</i>	•
	64	<i>ExecInst</i>	–
	128	<i>Reserved</i>	–
2	1	<i>Capacity</i>	•
	2	<i>Account</i>	•
	4	<i>TransactionCategory</i>	•
	8	<i>TradeTime</i>	•
	16	<i>PartyRole</i>	•
	32	<i>TradeReport Trans Type</i>	•
	64	<i>TradeID</i>	•
	128	<i>Venue Type</i>	•
3	1	<i>TradingSessionSubId</i>	•
	2	<i>Match Type</i>	•
	4	<i>TrdSub Type</i>	•
	8	<i>Secondary Trd Type</i>	•
	16	<i>TradePriceCondition</i>	•
	32	<i>TradePublishIndicator</i>	•
	64	<i>LargeSize</i>	•
	128	<i>ExecutionMethod</i>	•
4	1	<i>TradeReport Type</i>	–
	2	<i>TradeHandlingInstruction</i>	–
	4	<i>TradeLinkID</i>	–
	8	<i>TradeReportRefID</i>	–
	16	<i>GrossTradeAmt</i>	•
	32	<i>Tolerance</i>	–
	64	<i>OrderCategory</i>	•
	128	<i>SettlementPrice</i>	–
5	1	<i>SettlementDate</i>	–
	2	<i>PriceFormation</i>	•
	4	<i>AlgorithmicIndicator</i>	•
	8	<i>WaiverType</i>	•
	16	<i>DeferralReason</i>	•
	32	<i>SettlementCurrency</i>	–
	64	<i>SettlementLocation</i>	–
	32	<i>Reserved</i>	–
	64	<i>Reserved</i>	–
	128	<i>Reserved</i>	–

5.2 Quote V2

Byte	Bit	Field	
1	1	<i>Symbol</i>	•
	2	<i>Currency</i>	•
	4	<i>IDSource</i>	•
	8	<i>SecurityID</i>	•
	16	<i>SecurityExchange</i>	•
	32	<i>Bid</i>	•
	64	<i>Offer</i>	•
	128	<i>ClearingFirm</i>	•

5.3 Quote Cancel V2

Byte	Bit	Field	
1	1	<i>Symbol</i>	•
	2	<i>Currency</i>	•
	4	<i>IDSource</i>	•
	8	<i>SecurityID</i>	•
	16	<i>SecurityExchange</i>	•
	32	<i>ClearingFirm</i>	•
	64	<i>Reserved</i>	–
	128	<i>Reserved</i>	–

6 Return Bitfields Per Message

Legend:

- Indicates that the field can be requested for a message
- Indicates that the field cannot be requested for a message

6.1 Trade Capture Report Acknowledgment V2

Byte	Bit	Field	
1	1	<i>Side</i>	•
	2	<i>PegDifference</i>	–
	4	<i>Price</i>	–
	8	<i>ExecInst</i>	–
	16	<i>OrdType</i>	–
	32	<i>TimelnForce</i>	–
	64	<i>MinQty</i>	–
	128	<i>MaxRemovePct</i>	–
2	1	<i>Symbol</i>	•
	2	<i>SymbolSfx</i>	–
	4	<i>Currency</i>	•
	8	<i>IdSource</i>	•
	16	<i>SecurityId</i>	•
	32	<i>SecurityExchange</i>	•
	64	<i>Capacity</i>	•
	128	<i>(Reserved)</i>	–
3	1	<i>Account</i>	•
	2	<i>ClearingFirm</i>	•
	4	<i>ClearingAccount</i>	–
	8	<i>DisplayIndicator</i>	–
	16	<i>MaxFloor</i>	–
	32	<i>DiscretionAmount</i>	–
	64	<i>OrderQty</i>	•
	128	<i>PreventParticipantMatch</i>	–
4	1	<i>MaturityDate</i>	–
	2	<i>StrikePrice</i>	–
	4	<i>PutOrCall</i>	–
	8	<i>OpenClose</i>	–
	16	<i>CIOrdIdBatch</i>	–
	32	<i>CorrectedSize</i>	–
	64	<i>PartyID</i>	•
	128	<i>AccessFee</i>	–
5	1	<i>OrigCIOrdId</i>	–
	2	<i>LeavesQty</i>	–
	4	<i>LastShares</i>	–
	8	<i>LastPrice</i>	–
	16	<i>DisplayPrice</i>	–
	32	<i>WorkingPrice</i>	–
	64	<i>BaseliquidityIndicator</i>	–
	128	<i>ExpireTime</i>	–
6	1	<i>SecondaryOrderId</i>	–
	2	<i>CCP</i>	–
	4	<i>ContraCapacity</i>	–
	8	<i>AttributedQuote</i>	–
	16	<i>ExtExecInst</i>	–
	32	<i>BulkOrderIds</i>	–
	64	<i>BulkRejectReasons</i>	–
	128	<i>PartyRole</i>	•

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	●
	4	<i>TradePublishIndReturn</i>	–
	8	<i>Text</i>	–
	16	<i>Bid</i>	–
	32	<i>Offer</i>	–
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	–
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	●
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	●
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	●
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	●
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	●
	32	<i>DeferralReason</i>	●
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	-
	2	<i>DayOrderQty</i>	-
	4	<i>DayCumQty</i>	-
	8	<i>AvgPx</i>	-
	16	<i>DayAvgPx</i>	-
	32	<i>PendingStatus</i>	-
	64	<i>DrillThruProtection</i>	-
	128	<i>MultilegReportingType</i>	-
14	1	<i>LegCFIcode</i>	-
	2	<i>LegMaturityDate</i>	-
	4	<i>LegStrikePrice</i>	-
	8	<i>QuoteRoomID</i>	-
	16	<i>SecondaryExeclD</i>	-
	32	<i>UserRequestID</i>	-
	64	<i>Username</i>	-
	128	<i>UserStatus</i>	-
15	1	<i>TradeReportingIndicator</i>	-
	2	<i>(Reserved)</i>	-
	4	<i>(Reserved)</i>	-
	8	<i>(Reserved)</i>	-
	16	<i>TradePublishInd</i>	-
	32	<i>ReportTime</i>	-
	64	<i>(Reserved)</i>	-
	128	<i>(Reserved)</i>	-

6.2 Trade Capture Report Reject V2

Byte	Bit	Field	
1	1	<i>Side</i>	•
	2	<i>PegDifference</i>	–
	4	<i>Price</i>	–
	8	<i>ExecInst</i>	–
	16	<i>OrdType</i>	–
	32	<i>TimelnForce</i>	–
	64	<i>MinQty</i>	–
	128	<i>MaxRemovePct</i>	–
2	1	<i>Symbol</i>	•
	2	<i>SymbolSfx</i>	–
	4	<i>Currency</i>	•
	8	<i>IdSource</i>	•
	16	<i>SecurityId</i>	•
	32	<i>SecurityExchange</i>	•
	64	<i>Capacity</i>	•
	128	<i>(Reserved)</i>	–
3	1	<i>Account</i>	•
	2	<i>ClearingFirm</i>	•
	4	<i>ClearingAccount</i>	–
	8	<i>DisplayIndicator</i>	–
	16	<i>MaxFloor</i>	–
	32	<i>DiscretionAmount</i>	–
	64	<i>OrderQty</i>	•
	128	<i>PreventParticipantMatch</i>	–
4	1	<i>MaturityDate</i>	–
	2	<i>StrikePrice</i>	–
	4	<i>PutOrCall</i>	–
	8	<i>OpenClose</i>	–
	16	<i>CIOrdIdBatch</i>	–
	32	<i>CorrectedSize</i>	–
	64	<i>PartyID</i>	•
	128	<i>AccessFee</i>	–
5	1	<i>OrigCIOrdId</i>	–
	2	<i>LeavesQty</i>	–
	4	<i>LastShares</i>	–
	8	<i>LastPrice</i>	–
	16	<i>DisplayPrice</i>	–
	32	<i>WorkingPrice</i>	–
	64	<i>BaseliquidityIndicator</i>	–
	128	<i>ExpireTime</i>	–
6	1	<i>SecondaryOrderId</i>	–
	2	<i>CCP</i>	–
	4	<i>ContraCapacity</i>	–
	8	<i>AttributedQuote</i>	–
	16	<i>ExtExecInst</i>	–
	32	<i>BulkOrderIds</i>	–
	64	<i>BulkRejectReasons</i>	–
	128	<i>PartyRole</i>	•

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	●
	4	<i>TradePublishIndReturn</i>	●
	8	<i>Text</i>	–
	16	<i>Bid</i>	–
	32	<i>Offer</i>	–
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	–
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	–
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	–
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	●
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	●
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	●
	32	<i>DeferralReason</i>	●
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	–
	2	<i>DayOrderQty</i>	–
	4	<i>DayCumQty</i>	–
	8	<i>AvgPx</i>	–
	16	<i>DayAvgPx</i>	–
	32	<i>PendingStatus</i>	–
	64	<i>DrillThruProtection</i>	–
	128	<i>MultilegReportingType</i>	–
14	1	<i>LegCFIcode</i>	–
	2	<i>LegMaturityDate</i>	–
	4	<i>LegStrikePrice</i>	–
	8	<i>QuoteRoomID</i>	–
	16	<i>SecondaryExeclD</i>	–
	32	<i>UserRequestID</i>	–
	64	<i>Username</i>	–
	128	<i>UserStatus</i>	–
15	1	<i>TradeReportingIndicator</i>	–
	2	<i>(Reserved)</i>	–
	4	<i>(Reserved)</i>	–
	8	<i>(Reserved)</i>	–
	16	<i>TradePublishInd</i>	–
	32	<i>ReportTime</i>	–
	64	<i>(Reserved)</i>	–
	128	<i>(Reserved)</i>	–

6.3 Trade Capture Confirm V2

Byte	Bit	Field	
1	1	<i>Side</i>	•
	2	<i>PegDifference</i>	–
	4	<i>Price</i>	–
	8	<i>ExecInst</i>	–
	16	<i>OrdType</i>	–
	32	<i>TimelnForce</i>	–
	64	<i>MinQty</i>	–
	128	<i>MaxRemovePct</i>	–
2	1	<i>Symbol</i>	•
	2	<i>SymbolSfx</i>	–
	4	<i>Currency</i>	•
	8	<i>IdSource</i>	•
	16	<i>SecurityId</i>	•
	32	<i>SecurityExchange</i>	•
	64	<i>Capacity</i>	•
	128	<i>(Reserved)</i>	–
3	1	<i>Account</i>	•
	2	<i>ClearingFirm</i>	•
	4	<i>ClearingAccount</i>	–
	8	<i>DisplayIndicator</i>	–
	16	<i>MaxFloor</i>	–
	32	<i>DiscretionAmount</i>	–
	64	<i>OrderQty</i>	•
	128	<i>PreventParticipantMatch</i>	–
4	1	<i>MaturityDate</i>	–
	2	<i>StrikePrice</i>	–
	4	<i>PutOrCall</i>	–
	8	<i>OpenClose</i>	–
	16	<i>CIOrdIdBatch</i>	–
	32	<i>CorrectedSize</i>	–
	64	<i>PartyID</i>	•
	128	<i>AccessFee</i>	–
5	1	<i>OrigCIOrdId</i>	–
	2	<i>LeavesQty</i>	–
	4	<i>LastShares</i>	–
	8	<i>LastPrice</i>	–
	16	<i>DisplayPrice</i>	–
	32	<i>WorkingPrice</i>	–
	64	<i>BaseLiquidityIndicator</i>	–
	128	<i>ExpireTime</i>	–
6	1	<i>SecondaryOrderId</i>	–
	2	<i>CCP</i>	–
	4	<i>ContraCapacity</i>	–
	8	<i>AttributedQuote</i>	–
	16	<i>ExtExecInst</i>	–
	32	<i>BulkOrderIds</i>	–
	64	<i>BulkRejectReasons</i>	–
	128	<i>PartyRole</i>	•

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	•
	4	<i>TradePublishIndReturn</i>	•
	8	<i>Text</i>	•
	16	<i>Bid</i>	–
	32	<i>Offer</i>	–
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	•
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	–
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	•
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	•
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	•
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	•
	32	<i>DeferralReason</i>	•
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	-
	2	<i>DayOrderQty</i>	-
	4	<i>DayCumQty</i>	-
	8	<i>AvgPx</i>	-
	16	<i>DayAvgPx</i>	-
	32	<i>PendingStatus</i>	-
	64	<i>DrillThruProtection</i>	-
	128	<i>MultilegReportingType</i>	-
14	1	<i>LegCFIcode</i>	-
	2	<i>LegMaturityDate</i>	-
	4	<i>LegStrikePrice</i>	-
	8	<i>QuoteRoomID</i>	-
	16	<i>SecondaryExeclD</i>	-
	32	<i>UserRequestID</i>	-
	64	<i>Username</i>	-
	128	<i>UserStatus</i>	-
15	1	<i>TradeReportingIndicator</i>	-
	2	<i>(Reserved)</i>	-
	4	<i>(Reserved)</i>	-
	8	<i>(Reserved)</i>	-
	16	<i>TradePublishInd</i>	●
	32	<i>ReportTime</i>	●
	64	<i>(Reserved)</i>	-
	128	<i>(Reserved)</i>	-

6.4 Trade Capture Report Decline V2

Byte	Bit	Field	
1	1	Side	•
	2	PegDifference	–
	4	Price	–
	8	ExecInst	–
	16	OrdType	–
	32	TimelnForce	–
	64	MinQty	–
	128	MaxRemovePct	–
2	1	Symbol	•
	2	SymbolSfx	–
	4	Currency	•
	8	IdSource	•
	16	SecurityId	•
	32	SecurityExchange	•
	64	Capacity	•
	128	(Reserved)	–
3	1	Account	•
	2	ClearingFirm	•
	4	ClearingAccount	–
	8	DisplayIndicator	–
	16	MaxFloor	–
	32	DiscretionAmount	–
	64	OrderQty	•
	128	PreventParticipantMatch	–
4	1	MaturityDate	–
	2	StrikePrice	–
	4	PutOrCall	–
	8	OpenClose	–
	16	CIOrdIdBatch	–
	32	CorrectedSize	–
	64	PartyID	•
	128	AccessFee	–
5	1	OrigCIOrdId	–
	2	LeavesQty	–
	4	LastShares	–
	8	LastPrice	–
	16	DisplayPrice	–
	32	WorkingPrice	–
	64	BaseliquidityIndicator	–
	128	ExpireTime	–
6	1	SecondaryOrderId	–
	2	CCP	–
	4	ContraCapacity	–
	8	AttributedQuote	–
	16	ExtExecInst	–
	32	BulkOrderIds	–
	64	BulkRejectReasons	–
	128	PartyRole	•

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	•
	4	<i>TradePublishIndReturn</i>	•
	8	<i>Text</i>	–
	16	<i>Bid</i>	–
	32	<i>Offer</i>	–
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	–
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	–
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	–
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	•
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	•
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	•
	32	<i>DeferralReason</i>	•
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	-
	2	<i>DayOrderQty</i>	-
	4	<i>DayCumQty</i>	-
	8	<i>AvgPx</i>	-
	16	<i>DayAvgPx</i>	-
	32	<i>PendingStatus</i>	-
	64	<i>DrillThruProtection</i>	-
	128	<i>MultilegReportingType</i>	-
14	1	<i>LegCFIcode</i>	-
	2	<i>LegMaturityDate</i>	-
	4	<i>LegStrikePrice</i>	-
	8	<i>QuoteRoomID</i>	-
	16	<i>SecondaryExecID</i>	-
	32	<i>UserRequestID</i>	-
	64	<i>Username</i>	-
	128	<i>UserStatus</i>	-
15	1	<i>TradeReportingIndicator</i>	-
	2	<i>(Reserved)</i>	-
	4	<i>(Reserved)</i>	-
	8	<i>(Reserved)</i>	-
	16	<i>TradePublishInd</i>	-
	32	<i>ReportTime</i>	-
	64	<i>(Reserved)</i>	-
	128	<i>(Reserved)</i>	-

6.5 Quote Status V2

Byte	Bit	Field	
1	1	Side	–
	2	PegDifference	–
	4	Price	–
	8	Execlnst	–
	16	OrdType	–
	32	TimelnForce	–
	64	MinQty	–
	128	MaxRemovePct	–
2	1	Symbol	•
	2	SymbolSfx	–
	4	Currency	•
	8	IdSource	•
	16	SecurityId	•
	32	SecurityExchange	•
	64	Capacity	•
	128	(Reserved)	–
3	1	Account	–
	2	ClearingFirm	•
	4	ClearingAccount	–
	8	DisplayIndicator	–
	16	MaxFloor	–
	32	DiscretionAmount	–
	64	OrderQty	–
	128	PreventParticipantMatch	–
4	1	MaturityDate	–
	2	StrikePrice	–
	4	PutOrCall	–
	8	OpenClose	–
	16	CIOrdIdBatch	–
	32	CorrectedSize	–
	64	PartyID	–
	128	AccessFee	–
5	1	OrigCIOrdId	–
	2	LeavesQty	–
	4	LastShares	–
	8	LastPrice	–
	16	DisplayPrice	–
	32	WorkingPrice	–
	64	BaseliquidityIndicator	–
	128	ExpireTime	–
6	1	SecondaryOrderId	–
	2	CCP	–
	4	ContraCapacity	–
	8	AttributedQuote	–
	16	ExtExeclnst	–
	32	BulkOrderIds	–
	64	BulkRejectReasons	–
	128	PartyRole	–

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	–
	4	<i>TradePublishIndReturn</i>	–
	8	<i>Text</i>	–
	16	<i>Bid</i>	•
	32	<i>Offer</i>	•
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	–
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	–
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	–
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	–
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	–
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	–
	32	<i>DeferralReason</i>	–
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	–
	2	<i>DayOrderQty</i>	–
	4	<i>DayCumQty</i>	–
	8	<i>AvgPx</i>	–
	16	<i>DayAvgPx</i>	–
	32	<i>PendingStatus</i>	–
	64	<i>DrillThruProtection</i>	–
	128	<i>MultilegReportingType</i>	–
14	1	<i>LegCFIcode</i>	–
	2	<i>LegMaturityDate</i>	–
	4	<i>LegStrikePrice</i>	–
	8	<i>QuoteRoomID</i>	–
	16	<i>SecondaryExeclD</i>	–
	32	<i>UserRequestID</i>	–
	64	<i>Username</i>	–
	128	<i>UserStatus</i>	–
15	1	<i>TradeReportingIndicator</i>	–
	2	<i>(Reserved)</i>	–
	4	<i>(Reserved)</i>	–
	8	<i>(Reserved)</i>	–
	16	<i>TradePublishInd</i>	–
	32	<i>ReportTime</i>	–
	64	<i>(Reserved)</i>	–
	128	<i>(Reserved)</i>	–

6.6 Quote Reject V2

Byte	Bit	Field	
1	1	<i>Side</i>	–
	2	<i>PegDifference</i>	–
	4	<i>Price</i>	–
	8	<i>ExecInst</i>	–
	16	<i>OrdType</i>	–
	32	<i>TimelnForce</i>	–
	64	<i>MinQty</i>	–
	128	<i>MaxRemovePct</i>	–
2	1	<i>Symbol</i>	•
	2	<i>SymbolSfx</i>	–
	4	<i>Currency</i>	•
	8	<i>IdSource</i>	•
	16	<i>SecurityId</i>	•
	32	<i>SecurityExchange</i>	•
	64	<i>Capacity</i>	•
	128	<i>(Reserved)</i>	–
3	1	<i>Account</i>	–
	2	<i>ClearingFirm</i>	•
	4	<i>ClearingAccount</i>	–
	8	<i>DisplayIndicator</i>	–
	16	<i>MaxFloor</i>	–
	32	<i>DiscretionAmount</i>	–
	64	<i>OrderQty</i>	–
	128	<i>PreventParticipantMatch</i>	–
4	1	<i>MaturityDate</i>	–
	2	<i>StrikePrice</i>	–
	4	<i>PutOrCall</i>	–
	8	<i>OpenClose</i>	–
	16	<i>CIOrdIdBatch</i>	–
	32	<i>CorrectedSize</i>	–
	64	<i>PartyID</i>	–
	128	<i>AccessFee</i>	–
5	1	<i>OrigCIOrdId</i>	–
	2	<i>LeavesQty</i>	–
	4	<i>LastShares</i>	–
	8	<i>LastPrice</i>	–
	16	<i>DisplayPrice</i>	–
	32	<i>WorkingPrice</i>	–
	64	<i>BaseLiquidityIndicator</i>	–
	128	<i>ExpireTime</i>	–
6	1	<i>SecondaryOrderId</i>	–
	2	<i>CCP</i>	–
	4	<i>ContraCapacity</i>	–
	8	<i>AttributedQuote</i>	–
	16	<i>ExtExecInst</i>	–
	32	<i>BulkOrderIds</i>	–
	64	<i>BulkRejectReasons</i>	–
	128	<i>PartyRole</i>	–

continued...

Byte	Bit	Field	
7	1	<i>SubLiquidityIndicator</i>	–
	2	<i>TradeReportTypeReturn</i>	–
	4	<i>TradePublishIndReturn</i>	–
	8	<i>Text</i>	–
	16	<i>Bid</i>	•
	32	<i>Offer</i>	•
	64	<i>LargeSize</i>	–
	128	<i>LastMkt</i>	–
8	1	<i>FeeCode</i>	–
	2	<i>EchoText</i>	–
	4	<i>StopPx</i>	–
	8	<i>RoutingInst</i>	–
	16	<i>RoutStrategy</i>	–
	32	<i>RouteDeliveryMethod</i>	–
	64	<i>ExDestination</i>	–
	128	<i>TradeReportRefID</i>	–
9	1	<i>MarketingFeeCode</i>	–
	2	<i>TargetPartyID</i>	–
	4	<i>AuctionId</i>	–
	8	<i>OrderCategory</i>	–
	16	<i>LiquidityProvision</i>	–
	32	<i>CmtaNumber</i>	–
	64	<i>CrossType</i>	–
	128	<i>CrossPrioritization</i>	–
10	1	<i>CrossId</i>	–
	2	<i>AllocQty</i>	–
	4	<i>GiveUpFirmID</i>	–
	8	<i>RoutingFirmID</i>	–
	16	<i>WaiverType</i>	–
	32	<i>CrossExclusionIndicator</i>	–
	64	<i>PriceFormation</i>	–
	128	<i>ClientQualifiedRole</i>	–
11	1	<i>ClientID</i>	–
	2	<i>InvestorID</i>	–
	4	<i>ExecutorID</i>	–
	8	<i>OrderOrigination</i>	–
	16	<i>AlgorithmicIndicator</i>	–
	32	<i>DeferralReason</i>	–
	64	<i>InvestorQualifiedRole</i>	–
	128	<i>ExecutorQualifiedRole</i>	–
12	1	<i>CtiCode</i>	–
	2	<i>ManualOrderIndicator</i>	–
	4	<i>OperatorId</i>	–
	8	<i>TradeDate</i>	–
	16	<i>VariancePrice</i>	–
	32	<i>VarianceSize</i>	–
	64	<i>OrigSymbolID</i>	–
	128	<i>OrigTASPrice</i>	–

continued...

Byte	Bit	Field	
13	1	<i>CumQty</i>	-
	2	<i>DayOrderQty</i>	-
	4	<i>DayCumQty</i>	-
	8	<i>AvgPx</i>	-
	16	<i>DayAvgPx</i>	-
	32	<i>PendingStatus</i>	-
	64	<i>DrillThruProtection</i>	-
	128	<i>MultilegReportingType</i>	-
14	1	<i>LegCFIcode</i>	-
	2	<i>LegMaturityDate</i>	-
	4	<i>LegStrikePrice</i>	-
	8	<i>QuoteRoomID</i>	-
	16	<i>SecondaryExeclD</i>	-
	32	<i>UserRequestID</i>	-
	64	<i>Username</i>	-
	128	<i>UserStatus</i>	-
15	1	<i>TradeReportingIndicator</i>	-
	2	<i>(Reserved)</i>	-
	4	<i>(Reserved)</i>	-
	8	<i>(Reserved)</i>	-
	16	<i>TradePublishInd</i>	-
	32	<i>ReportTime</i>	-
	64	<i>(Reserved)</i>	-
	128	<i>(Reserved)</i>	-

7 List of Optional Fields

The following are descriptions of optional fields which may be sent or received.

Field	Length	Data Type	Description
<i>Account</i>	16	Text	Corresponds to <i>Account</i> (1) in Cboe FIX. Reflected back on execution reports associated with this order. May be made available in the Participant's clearing file. Allowed characters are alphanumeric and colon.
<i>Algorithmic Indicator</i>	1	Text	This corresponds to <i>AlgorithmicTradeIndicator</i> (2667) in Cboe FIX. Indicates the Trade Capture Report was placed as a result of an investment firm engaging in algorithmic trading. N = No algorithm was involved (default). Y = Algorithm was involved (ALGO).
<i>BidPx</i>	8	Binary Price	Corresponds to <i>BidPx</i> (132) in FIX. Specifies the bid quote price. If omitted, indicates the bid quote is not to be changed, and <i>BidSize</i> must also be omitted. If <i>BidPx</i> = 0, indicates the bid quote is to be cancelled, and <i>BidSize</i> = 0 must also be present
<i>BidSize</i>	4	Binary	Corresponds to <i>BidSize</i> (132) in FIX. The quantity of the bid quote. Must be zero when cancelling a quote.
<i>CancelOrig OnReject</i>	1	Alpha	Corresponds to <i>CancelOrigOnReject</i> (9619) in Cboe FIX. Indicates handling of original order on failure to modify. N = Leave original order alone. Y = Cancel original order if modification fails.
<i>Capacity</i>	1	Alpha	Corresponds to <i>OrderCapacity</i> (47) in Cboe FIX. (Orders). Corresponds to <i>LastCapacity</i> (29) in Cboe FIX. (Executions). A = Agency (maps to 'AOTC') P = Principal (maps to 'DEAL') R = Riskless Principal (maps to 'MTCH')
<i>Central Counterparty</i>	1	Alpha	The CCP handling the trade N = None
<i>ClearingFirm</i>	4	Alpha	Corresponds to <i>OnBehalfOfComplID</i> (115) and <i>ClearingFirm</i> (439) in Cboe FIX. Firm that will clear the trade. If empty (all binary zero), a default will be used (only permitted on non-service bureau accounts).
<i>CorrectedSize</i>	4	Binary	Corresponds to <i>CorrectedSize</i> (6655) in Cboe FIX. Number of shares after trade adjustment.
<i>Currency</i>	3	Alpha	Corresponds to <i>Currency</i> (15) in Cboe FIX. ISO currency. Required if <i>IDSource</i> is set to 4 (ISIN).

<i>DeferralReason</i>	1	Alphanumeric	<p>Corresponds to <i>TrdRegPublicationReasons</i> (8013) in FIX and is used to indicate the deferral reason used for the reported trade. The following values are valid:</p> <ul style="list-style-type: none"> - = No Deferral Reason 6 = Deferral for Large In Scale (LRGS) 7 = Deferral for Illiquid Instrument (for RTS2 only) (ILQD) 8 = Deferral for Size Specific (for RTS2 only) (SIZE) C = Deferral for Illiquid Instrument (for RTS2 only) (ILQD) AND Deferral for Large In Scale (LRGS) D = Deferral for Illiquid Instrument (for RTS2 only) (ILQD) AND Deferral for Size Specific (for RTS2 only) (SIZE) <p>Each Deferral Reason is represented by a distinct value that can be requested individually. Deferrals that can be applied together are represented by values that indicates the deferrals being set together. Based upon what is requested, the system calculates which of these are valid. The business confirmation contains the deferral(s) that have been applied.</p>
<i>ExecInst</i>	1	Text	<p>Corresponds to <i>ExecInst</i> (18) in Cboe FIX.</p> <ul style="list-style-type: none"> P = Market Peg (peg buy to PBBO offer, peg sell to PBBO bid) R = Primary Peg (peg buy to PBBO bid, peg sell to PBBO offer) M = Midpoint (peg to PBBO midpoint) L = Alternate Midpoint (less aggressive of midpoint and 1 tick inside PBBO) <p>for Periodic Auction Orders:³</p> <ul style="list-style-type: none"> M = Midpoint (peg to Cboe EBBO midpoint) G = Guarded Midpoint (peg to Cboe EBBO midpoint but suspend order if primary market quote becomes one-sided or disappears) <p>ASCII NUL (0x00) = no special handling</p> <p>Default = ASCII NUL (0x00)</p>
<i>ExecutionMethod</i>	1	Alpha	<p>Corresponds to <i>ExecutionMethod</i> (2405) in FIX.</p> <p>Optional. Is used by the participant to indicate the method by which the trade was executed. This field corresponds to the proposed MMT Level 3.7 (Offbook Automated Liquidity Indicator). The following values are valid:</p> <ul style="list-style-type: none"> A = Automated M = Manual U = Unspecified (default)
<i>ExpireTime</i>	8	DateTime	<p>Corresponds to <i>ExpireTime</i> (126) in FIX.</p> <p>Required for <i>TimInForce</i> = 6 orders, specifies the date-time (in UTC) that the order expires.</p>

³RoutingInst=BP

<i>GrossTradeAmt</i>	8	Binary Price	Total amount traded, expressed in units of currency. A value of zero or an indicative price may be used if the price is pending, as denoted by <i>PriceFormation</i>
<i>IDSource</i>	1	Alphanumeric	Corresponds to <i>IDSource</i> (22) in Cboe FIX. 4 = ISIN 5 = RIC
<i>LargeSize</i>	8	Binary	Number of shares relevant for the trade. Used when size exceeds the capabilities of 32-bit. System limit is 99,999,999,999.
<i>LastMkt</i>	4	Alphanumeric	Corresponds to <i>LastMkt</i> (30) in Cboe FIX. Segment MIC of this fill.
<i>LastPx</i>	8	Binary Price	Corresponds to <i>LastPx</i> (31) in Cboe FIX. Price of this fill. A value of zero or an indicative price may be used if the price is pending, as denoted by <i>PriceFormation</i>
<i>LastShares</i>	4	Binary	Corresponds to <i>LastShares</i> (32) in Cboe FIX. Executed share quantity. If the <i>LargeSize</i> optional field is specified, that value holds precedence over this field.
<i>MatchType</i>	1	Binary	Corresponds to <i>MatchType</i> (574) in FIX. The following values are valid: 1 = Trade Reporting (Off-Exchange) 3 = Trade Reporting (On-Exchange) 9 = Trade Reporting (Systematic Internalizer)
<i>OfferPx</i>	8	Binary Price	Corresponds to <i>OfferPx</i> (133) in FIX. Specifies the offer quote price. If omitted, indicates the offer quote is not to be changed, and <i>OfferSize</i> must also be omitted. If <i>OfferPx</i> = 0, indicates the offer quote is to be cancelled, and <i>OfferSize</i> = 0 must also be present.
<i>OfferSize</i>	4	Binary	Corresponds to <i>OfferSize</i> (132) in FIX. The quantity of the offer quote. Must be zero when cancelling a quote.
<i>OrderCategory</i>	1	Binary	Optional. This field corresponds to the MMT Level 3.2 field 'Negotiated Transaction Indicator', and is used by the participant to indicate that the trade made use of the Negotiated Transaction MiFID waiver. 0 = Not a Negotiated Trade 3 = Privately Negotiated Trade On return fields, this field indicates whether Cboe deems the trade as utilising the Negotiated Transaction waiver under MiFID.

<i>PriceFormation</i>	1	Alphanumeric	Optional. Indicates the price formation attribute of the trade, and corresponds to MMT v3 Level 3.8 Not specified or P = Plain-Vanilla Trade J = Trade Not Contributing to the Price Discovery Process (TNCP) N = Price is Pending (PNDG)
<i>Price</i>	8	Binary Price	Corresponds to <i>Price</i> (44) in Cboe FIX. Limit price. Six implied decimal places.
<i>ReportTime</i>	8	DateTime	Corresponds to <i>RptTime</i> (7570) in FIX. Optional. Indicates the time at which a deferred trade report will be automatically published.
<i>RptTime</i>	8	DateTime	DEPRECATED. Corresponds to <i>RptTime</i> (7570) in FIX. Optional. Indicates the time at which a deferred trade report will be automatically published.
<i>SecondaryOrderID</i>	8	Binary	Corresponds to <i>SecondaryOrderID</i> (198) in Cboe FIX. Denotes an alternative <i>OrderID</i> which is present on Cboe market data feeds (for example, to hide that a reserve (iceberg) order has reloaded). Or, <i>OrderID</i> of the contra side of a prevented match.
<i>Side</i>	1	Alphanumeric	Corresponds to <i>Side</i> (54) in Cboe FIX. 1 = Buy 2 = Sell 8 = Cross
<i>SecondaryTrdType</i>	1	Binary	Corresponds to <i>SecondaryTrdType</i> (855) in FIX. The following values are valid: 64 = Benchmark Trade
<i>SecurityExchange</i>	4	Alphanumeric	Corresponds to <i>SecurityExchange</i> (207) in Cboe FIX. Required if <i>IDSOURCE</i> is set to 4 (ISIN).
<i>SecurityID</i>	16	Text	Corresponds to <i>SecurityID</i> (48) in Cboe FIX. ISIN, or RIC if <i>IDSOURCE</i> is set.
<i>SettlementCurrency</i>	3	Alpha	Currency in which the trade should settle. Must be USD or EUR. If used, settlement price must be specified.
<i>SettlementDate</i>	8	DateTime	Used to specify the date on which the trade is desired to settle. Note, the actual settlement date may be varied by the central counterparties (CCPs) due to operational requirements (eg. for symbols in a conditional trading status). May only be specified on a new trade report.
<i>SettlementLocation</i>	2	Alpha	Location at which the trade should settle. Must be EB (Euro-clear Bank)
<i>SettlementPrice</i>	8	Trade Price	Price at which the trade should settle at. If specified, any risk controls will be applied against this price.

<i>Symbol</i>	8	Alphanumeric	Corresponds to <i>Symbol</i> (55) in Cboe FIX. Uniform symbology identifier for the instrument.
<i>Text</i>	60	Text	Used to provide additional textual information, e.g. a warning.
<i>TimeInForce</i>	1	Alphanumeric	Corresponds to <i>TimeInForce</i> (59) in FIX. 0 = Day 1 = GTC (allowed, but treated as Day) 2 = At The Open 3 = IOC (Portion not filled immediately is cancelled. Market orders are implicitly IOC.) 6 = GTD (expires at earlier of specified <i>ExpireTime</i> or end of day) 7 = At The Close 8 = Good For Auction (only valid if <i>RoutingInst</i> =BP)
<i>TradeID</i>	8	Binary	Corresponds to <i>TradeID</i> (1003) in FIX. Optional. Is used by the participant to specify the previously reported trade that the report sent refers to.
<i>TradePriceCondition</i>	1	Binary	Corresponds to <i>TradePriceCondition</i> (1390) in FIX. The following values are valid: 0 = Cum Dividend (deprecated) 2 = Ex Dividend (deprecated) 13 = Special Dividend (SDIV)
<i>TradePublishIndicator</i>	1	Binary	DEPRECATED. Corresponds to <i>TradePublishIndicator</i> (1390) in FIX. Optional. Is used by the participant to request that the publication be delayed. The following values are valid: 0 = Do not publish 1 = Publish trade 2 = Deferred publication
<i>TradePublishInd</i>	1	Binary	Corresponds to <i>TradePublishIndicator</i> (1390) in FIX. Optional. Is used by the participant to request that the publication be delayed. The following values are valid: 0 = Do not publish 1 = Publish trade 2 = Deferred publication
<i>TradeReportTransType</i>	1	Binary	Corresponds to <i>TradeReportTransType</i> (487) in FIX. Optional. Specifies the transaction type of the report sent via Trade Capture Report. The following values are valid: 0 = New 1 = Cancel 2 = Replace 3 = Release

<i>TradeReport Type</i>	1	Binary	This field controls pending state of the trade report. 0 = (Submit) for all new trade reports 6 = (Trade Report Cancel) to cancel any acknowledged, but not confirmed trade reports entered where <i>TradeHandlingInstruction</i> = 2
<i>TradeReport TypeReturn</i>	2	Binary	When requested, both <i>TradeReportTransType</i> and <i>TradeReportType</i> will be returned.
<i>TradeTime</i>	8	DateTime	Corresponds to <i>TransactTime</i> (60) and <i>TradeDate</i> (75) in FIX. Optional, for new trade reports. Cancel/amend/releases require the original time of the trade. Specifies the date and time at which the trade was arranged. This field defaults to the time at which the message is received, when defaulting is allowed.
<i>TradingSession SubId</i>	1	Binary	Corresponds to <i>TradingSessionSubId</i> (625) in FIX. The following values are valid: 2 = Scheduled Opening Auction 4 = Scheduled Closing Auction 6 = Scheduled Intraday Auction 8 = Unspecified Auction 9 = Unscheduled Auction 3 = Continuous Trading 5 = Post Trading 10 = Out of Main Session Trading
<i>Transaction Category</i>	1	Alphanumeric	Corresponds to <i>TrdType</i> (828) in FIX. Also corresponds to <i>Transaction Category</i> in MMT. Optional. Specifies the type or category of the trade being reported in a Trade Capture Report. At this time, only the following values are valid: P = Regular Trade (aka Plain-Vanilla Trade) D = Dark Trade R = Trade With Price Improvement (RPRI)
<i>TrdSubType</i>	1	Binary	Corresponds to <i>TrdSubType</i> (829) in FIX. Optional. The following values are valid: 37 = Agency Cross trade

<i>VenueType</i>	1	Alphanumeric	<p>Corresponds to <i>VenueType</i> (1430) in FIX. The following values are valid:</p> <ul style="list-style-type: none"> O = Off Book B = Central Limit Order Book Q = Quote Driven Market D = Dark Order Book A = Periodic Auction N = Request For Quotes H = Hybrid Market
<i>WaiverType</i>	1	Alphanumeric	<p>Corresponds to <i>TrdRegPublicationReasons</i> (8013) in FIX and is used to indicate the waiver used for the reported trade. The following values are valid:</p> <ul style="list-style-type: none"> - = No Waiver Type 3 = Reference Price (Dark Book) (for MTF only) (RFPT) 4 = Pre-Trade Transparency Waiver for Illiquid Instrument (for SI only) (ILQD) 5 = Pre-Trade Transparency Waiver for Above Standard Market Size (for SI only) (SIZE) B = Pre-Trade Transparency Waiver for Illiquid Instrument (for SI only) (ILQD) AND Pre-Trade Transparency Waiver for Above Standard Market Size (for SI only) (SIZE) <p>Each Pre-Trade Transparency Waiver is represented by a distinct value that can be requested individually. Waivers that can be applied together are represented by a value that indicates both waivers being set together. Based upon what is requested, the system calculates which of these are valid. The business confirmation contains the waiver(s) that have been applied.</p>

8 Reason Codes

The following is a list of all reason codes used. These reason codes are used in a variety of contexts (order cancellations, order rejections, modify rejections, etc.). All reasons are not valid in all contexts. Cboe may add additional reason codes without notice. Members must gracefully ignore unknown values.

- A = Admin
- D = Duplicate Identifier (e.g., *TradeReportID*)
- Y = Symbol Not Supported
- Z = Unforeseen Reason
- m = Market Access Risk Limit Exceeded

9 List of Message Types

9.1 Participant to Cboe

Message Name	Level	Type	Sequenced
Login Request V2	Session	0x37	No
Logout Request	Session	0x02	No
Client Heartbeat	Session	0x03	No
Trade Capture Report V2	Application	0x3C	Yes
Quote V2	Application	0x3D	Yes
Quote Cancel V2	Application	0x3E	Yes

9.2 Cboe to Participant

Message Name	Level	Type	Sequenced
Login Response V2	Session	0x24	No
Logout	Session	0x08	No
Server Heartbeat	Session	0x09	No
Replay Complete	Session	0x13	No
Trade Capture Report Accept V2	Application	0x30	Yes
Trade Capture Report Reject V2	Application	0x31	No
Trade Capture Report Confirm V2	Application	0x32	Yes
Trade Capture Report Decline V2	Application	0x33	Yes
Quote Status V2	Application	0x3F	Yes
Quote Reject V2	Application	0x40	Yes

10 Port Attributes

The table below lists BOE port attributes that are configurable on the port or firm level. Changes to these attributes can be made by contacting the Cboe Trade Desk.

Attribute	Default	Description
Allowed Clearing Executing Firm ID(s)	No MPIDs	Executing Firm ID(s) allowed for quoting on the port.
Allowed Trade Reporting Firm ID(s)	No MPIDs	Executing Firm ID(s) allowed for trade reporting on the port.
Cancel on Disconnect	Option 1	Cboe offers two options for cancelling orders as a result of a session disconnect: <ol style="list-style-type: none"> 1. Cancel all open orders (continuous book and on-open, on-close and periodic auction orders). 2. Do not cancel any open orders.
Send Trade Breaks [^]	No	Enables sending of TRADE CANCEL OR CORRECT V2 messages.
Reject Orders on DROP Port Disconnect	No	Allows Participant/Sponsoring Firms to associate DROP port(s) to order entry port(s). If all associated DROP ports experience disconnection, new orders will be rejected until at least one DROP port session has been reestablished.
Reject Orders on DROP Port Disconnect	30 seconds	Only applicable if "Reject Orders on DROP Port Disconnect" has been enabled. When the last associated DROP port has disconnected, begin rejecting orders on the associated order entry port(s) if a DROP session has not been reestablished within this timeout. Minimum value allowed is 0 seconds.
Cancel Open Orders on DROP Port Disconnect	No	Only applicable if "Reject Orders on DROP Port Disconnect" has been enabled. When the last associated DROP port has disconnected, cancel all associated open orders.

[†]Port attribute can be overridden on an order-by-order basis.

[^]Requires certification.

11 Support

Please email questions or comments regarding this specification to tradedeskeurope@cboe.com.

Revision History

November 15, 2018	Version 2.0.23 Update <i>TradeReportID</i> (571) description.
September 28, 2018	Version 2.0.22 Cboe will enforce port level day-uniqueness for <i>TradeReportID</i> .
July 24, 2018	Version 2.0.21 Added description for <i>TradeReportReturn</i> in ROB7.
May 09, 2018	Version 2.0.20 Added <i>TradePublishInd</i> and <i>ReportTime</i> to ROB15. These should be used instead of the now deprecated <i>TradePublishIndReturn</i> from ROB7.
April 30, 2018	Version 2.0.19 Updated return bitfields.
February 5, 2018	Version 2.0.18 Removed <i>ExecInst</i> from the list of supported fields.
July 19, 2017	Version 2.0.17 MMT v3.04 support for Q4 2017 release.
July 10, 2017	Version 2.0.16 Added <i>FeeCode</i> to repeating group on TRADE CAPTURE CONFIRM V2 messages.
June 2, 2017	Version 2.0.15 Clarified <i>TransactionCategory=R</i> maps to MMT v3 'RPRI' on market data.
May 24, 2017	Version 2.0.14 Corrected description for <i>PriceFormation</i> . Driving MMT v3 'NPFT' on market data not a valid option off-exchange.
March 2, 2017	Version 2.0.13 Add new field type <i>Date</i>
February 9, 2017	Version 2.0.12 Review feedback for MMT v3
February 1, 2017	Version 2.0.11 Support for MMT v3
December 9, 2016	Version 2.0.10 Update fields on QUOTE STATUS V2 and QUOTE REJECT V2
August 4, 2016	Version 2.0.9 Update field length for <i>GrossTradeAmt</i>
June 15, 2016	Version 2.0.8 Fix typo regarding size of <i>PartyRole</i> field, plus its omission from return <i>TradeCapture</i> messages
February 19, 2016	Version 2.0.7 Updated for new branding.
January 8, 2016	Version 2.0.6 Added <i>Order Category</i> optional return bitfield.
December 1, 2015	Version 2.0.5 For TRADE CAPTURE REPORT V2, clarified that <i>TradeTime</i> is only optional for new trades.
June 13, 2015	Version 2.0.4 Added 5th input bitfield for TRADE CAPTURE REPORT V2.
May 28, 2015	Version 2.0.3 Added an example for TRADE CAPTURE REPORT V2 and clarified description of <i>TrdCapRptSideGrp</i> .
March 13, 2015	Version 2.0.2 Added <i>TradeReportRefID</i> to ROB8.
March 12, 2015	Version 2.0.1 Added detail on fields in TCRB4.

February 10, 2015

Version 2.0
First Version 2 release.
