# Cboe Options Introduces New Message in Flight Behavior

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## Overview

**Applicable Cboe Exchanges:** BZX Options, EDGX Options, Cboe Options, C2 Options

**Effective April 28, 2023** on the EDGX Options Exchange ("EDGX"), **effective May 12, 2023** on the C2 Options Exchange ("C2"), and **effective May 29, 2023** on the Cboe Options Exchange ("C1"), Cboe will introduce changes to message in flight settings. The changes include a reduction in the number of messages in flight to a single matching engine as well as a new limit on the total number of unacknowledged messages for each FIX or BOE order entry session.

As previously announced, these changes have already been implemented on the Cboe BZX Options Exchange ("BZX").

## Technical Details

### Current Order Handler Behavior

Cboe's FIX and BOE order handlers read TCP data from members. The order handler validates and translates these bytes from FIX or BOE into internal Cboe format to send to the matching engines. The internal protocol has a limited send window facing each matching engine. When there are more than 512 unacknowledged messages, the FIX or BOE order handler will stop sending messages to that matching engine while continuing to read TCP data from the member.

When members collectively outpace the matching engine's ability to process data, a potentially large queue of messages builds up at the matching engine and within individual order handlers.

### New Order Handler Behavior

The number of messages in flight between an order handler and a matching engine will be reduced from 512 to 128. In addition, when the total number of unacknowledged messages exceeds 1,024, the FIX/BOE order handler will stop reading from the member-facing TCP socket. This will cause the order handler to stop removing bytes from the TCP receive buffer and will prevent the member from sending more TCP data once the member's own configured send buffer is full.

When the total number of unacknowledged messages falls below 960, then the reading of the member facing TCP socket will be resumed.

For message in flight counting purposes, the following logic will be used:

- A new order message will count as one message;
- A new complex order with up to 100 legs will count as one message;
- A new order cross or new complex order cross auction message with one agency side and up to 10 contra parties will count as one message;
- A quote update with up to 20 individual quote sides will count as one message.
- In contrast, a single TCP segment sent by a member containing two quote update messages, each with five quote sides, will count as two messages.

## Futures Changes to Message Limits

Cboe may update either the message in flight or the total number of unacknowledged messages settings with notice. Changes to reduce either limit will be made only with two weeks' notice. Cboe reserves the ability to increase either limit immediately with notice.

## Testing Opportunities

The new message in flight and total number of unacknowledged message settings is currently available in all Cboe Options certification environments.

Please note that in order to facilitate customer testing, the allowed number of messages in flight and the total number of unacknowledged messages will be set to a much lower rate in certification than in production. The certification settings will allow 2 messages in flight and a total of 5 unacknowledged messages.

## Additional Information

For more information, please refer to the following technical specifications:

- Cboe Options FIX Specification
- Cboe Options BOE Specification

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