Cboe Options Technology Integration Feature Pack 7 – Global Trading Hours ("GTH") and Opening Process

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Overview

Cboe Global Markets will introduce new Global Trading Hours (GTH) sessions for Dow Jones Industrial Average Index ("DJX") options on the C2 Options ("C2") Exchange effective **June 17, 2019** and for Mini-SPX Index ("XSP") options on the EDGX Options ("EDGX") Exchange effective **June 24, 2019**, both dates *subject to regulatory review*. Additionally, a new opening process, along with supporting order entry and market data changes, will be introduced for all products on C2 and EDGX. Finally, a restriction on Reserve Orders for Cboe proprietary classes will be implemented. These new features and enhancements are in preparation for migration of Cboe Options Exchange ("C1") to Bats technology and are *subject to regulatory review*.

Addition of GTH for DJX Options on C2 and XSP Options on EDGX

On the noted effective dates, C2 will expand trading hours for DJX to include GTH and EDGX will expand trading hours for options on XSP to include GTH.

Trading Hours

- ➢ Global Trading Hours (C2 and EDGX Options): Monday through Friday from 8:30 a.m. ET to 9:15 a.m. ET.
- ➢ Regular Trading Hours: Monday through Friday from 9:30 a.m. ET to 4:15 p.m. ET except for expiring series in XSP which will close at 4:00 PM ET.
- ➢ Orders still live in GTH at the end of the session will join the RTH queuing book in time priority.

Opening Process Updates on C2 and EDGX

On the effective date, a Volume Maximizing Imbalance Minimizing ("VMIM")-based price-forming opening process for multilist and proprietary index options will be introduced on C2 and EDGX for both GTH and RTH openings. VMIM Algorithm details can be found in the US Options Opening Process specification.

The opening price for a series, as well as prices disseminated in `Options Auction Update` messages during the Queuing Period, are computed using the VMIM algorithm. The VMIM selects the single clearing price that maximizes the number of contracts matched while minimizing the absolute imbalance.

Depth of book (PITCH) and top of book (TOP) data will be disseminated for limit orders and quotes queued for either the GTH or RTH opening. In addition, the new `Options Auction Update` message will be sent to provide information about each symbol's GTH or RTH opening during the pre-open queuing period.

The Queuing Period start times by option class category are detailed in the table below.

Option Class Category	Queuing Period Start Time	Start of Auction Update Dissemination	PITCH/TOP Dissemination Times
Multilist	7:30 a.m. ET	8:30 a.m. ET	7:30 a.m. ET
Non GTH-Enabled Proprietary (i.e. RUT/RUTW)	7:30 a.m. ET	8:30 a.m. ET	7:30 a.m. ET
GTH-Enabled Proprietary (i.e. DJX on C2 and XSP on EDGX)	GTH: 7:30 a.m. ET RTH: 7:30 a.m. ET	GTH: 7:30 a.m. ET RTH: 8:30 a.m. ET	GTH: 7:30 a.m. ET RTH: 9:15 a.m. ET

Maximum Width Checks and Opening Collars

A Maximum Composite Width ("MCW") check will be applied to all option class category openings on C2 and EDGX. MCW checks prevent a given series from opening if the best available Composite Market ("CM") for the series is too wide.

The CM bid is the greater of the local Appointed Market Maker quote Best Bid and the Away Best Bid ("ABB"), where an ABB is present.

The CM Offer is the lower of the local Appointed Market Maker quote Best Offer and the Away Best Offer ("ABO") where an ABO is present.

If the CM is wider than the MCW, a series will still open as long as both of the following two conditions exist:

1. There are no quotes/orders that lock or cross with each other; and
2. There are no non-Market-Maker quotes/orders that are inside the CM.

An Opening Collar Width (OCW) check will be applied to ensure that the Opening Price falls within a reasonable price range which, for Multilist options, incorporates the Away Market Best Bid and Offer ("ABBO"). The collar is the midpoint of the CM plus/minus half of the OCW, with a zero floor. Opening trades occur at a VMIM price within the prevailing Opening Collar.

The table below defines the MCW and OCW as a function of the CM bid.

Composite Market (CM) Bid	Max Composite Width	Opening Collar Width
0.00 – 1.99	0.50	0.50
2.00 – 5.00	0.80	0.80
5.01 – 10.00	1.00	1.00
10.01 – 20.00	2.00	2.00
20.01 – 50.00	3.00	3.00
50.01 – 100.00	5.00	5.00
100.01 – 200.00	8.00	8.00
>= 200.01	12.00	12.00

Opening Triggers

For each option class category, Opening Triggers are used to transition from a queuing status to an Opening Rotation status. All series will follow the progression below.

TradingStatus = Q (Queuing) → *TradingStatus* = R (Opening Rotation) → *TradingStatus* = T (Trading)

Trading state "R" indicates that the Opening Trigger has been received and the system is attempting to open the series. The table below describes the Opening Triggers for each option class.

Option Class Category	Opening Trigger
Multilist	RTH: Observation of first print in the underlying from any exchange after 9:30 a.m.ET. Print is not restricted to the primary exchange for the underlying.
Non GTH-Enabled Proprietary	RTH: Observation of the first underlying index value after 9:30 a.m.ET
GTH-Enabled Proprietary	GTH: Time-based RTH: Observation of the first underlying index value after 9:30 a.m.ET

Order Entry Updates

On the effective date, the following FIX and BOE order entry changes will be made.

New SessionEligibility Field

The *SessionEligibility* (FIX Tag 22017) field will be added to C2 and EDGX FIX and BOE order entry protocols. Possible values for this field will be "R" = Regular Trading Hours only and "A" = Order participates in both GTH and RTH sessions.

Market Data Updates

On the effective date, the following market data messages will begin disseminating values in support of the opening process changes.

Trading Status Message

C1 Feature Pack 4 added the additional *GTH Trading Status* field, and this field will be utilized with the new opening process in Feature Pack 7 to indicate the state of the GTH opening process for DJX and XSP options on C2 and EDGX. In addition, the field value of "R = Opening Rotation" will be sent for both the *Trading Status* and *GTH Trading Status* fields to indicate that the Opening Trigger has been received for either the GTH or RTH opening. Once the opening is complete, a value of "T = Trading" will be sent to indicate that a series is open.

Options Auction Update Message

This new message type will be disseminated on TOP, PITCH, and Auction data feeds to provide information regarding expected opening price, size, and imbalances for each symbol's GTH or RTH opening. `Options Auction Update` messages are sent every five seconds during an opening period provided that one

of the field values has changed. When no values have changed, a message is sent once every 60 seconds. The table below presents the fields of the Auction Update message.

Field	Description
Auction-Only Price	Uncollared VMIM price computed on the queuing book only.
Reference Price	Collared VMIM price computed on the queuing book only.
Indicative Price	Collared VMIM price computed on the combined queuing book and the GTH book. For classes that do not include a GTH session and for classes that include a GTH session which has closed i.e. at 9:15am ET, the indicative and reference prices are identical.
Buy Contracts	Total Buy contracts at the market and at the Indicative Price and above.
Sell Contracts	Total Sell contracts at the market and at the Indicative Price and below.
Opening Condition	Indication of the state of the opening process. "Would open" indicates that MCW checks and collars will not prevent opening. "Need quote to Open" indicates that the MCW check failed and the opening will not occur until the relevant market width narrows.

Auction Summary Message

This new message type will be sent at the conclusion of a successful series opening on TOP, PITCH, and Auction data feeds with summary trade information. The fields include the *Auction Type*, *Price*, and contracts executed in the related Opening.

Transaction Begin and Transaction End Messages

The `Transaction Begin` message indicates that any subsequent messages, up to the accompanying `Transaction End` message, are all part of the same transaction block. These messages will be disseminated on the Multicast PITCH and Complex Multicast PITCH feeds. `Transaction Begin` and `Transaction End` messages will be sent when an opening is completed for a series so that a feed handler can postpone publishing a quote update until the end of a transaction block.

Width Update Message

Values will be disseminated, by underlying, for the `Width Update` message on the PITCH, TOP, and Auction feeds. This message is used to communicate an opening quote width multiplier. This is sent at the beginning of the day and in the event that baseline MCW and OCW values are modified from their original state.

Risk Management Limits for GTH Trading Session and Opening Process

The ability to set GTH-specific risk management limits will be added for DJX on C2 and XSP on EDGX. By default, all of the existing risk management rules that are specified for a given EFID or risk root will also be applied during GTH trading. A firm may also upload rules that will apply only to the GTH session provided that the firm already has rules specified for that risk root or EFID. A risk trip in the GTH session will cause all orders to be cancelled (including those queued for the RTH open).

The cutoff for adding, modifying, or deleting GTH rules via the Customer Web Portal or Secure Web API will be 8:00 a.m. ET on EDGX and C2.

See the US Options Risk Management Specification for more detail on configuring risk limits for the GTH trading session.

GTH Risk Examples

GTH Risk Example 1:

EFID1 has an existing rate_count rule on C2 that limits the number of executions to 10 per 1000 milliseconds for DJX. If no changes are made, this same rule will also be applied to GTH trading for DJX.

GTH Risk Example 2:

EFID1 has an existing rate_count rule on C2 that limits the number of executions to 10 per 1000 milliseconds for DJX.

An additional rate_count rule may be added for GTH trading that limits the number of executions to 5 per 1000 milliseconds for DJX.

GTH Risk Example 3:

EFID2 has no existing risk rules for DJX.

EFID2 will be rejected if it tries to upload a rule for GTH trading for DJX. A default rule that applies to both sessions must be added first.

Risk Management During the Opening Process

Risk management limits will be applied during the new Opening Process, but will only trip at the end of the opening of a given series.

Opening Process Risk Example 1:

EFID1 has an absolute volume limit in SPY of 100 contracts.

After the opening of 10 different series in SPY the firm has executed 95 contracts of volume.

The opening of the next SPY series causes the firm to execute two SPY orders for 10 contracts each.

Risk is not tripped in the middle of that series opening, so the firm executes both orders for a grand total of 115 SPY contracts. This exceeds the 100 contract limit.

Risk is tripped immediately after the opening of the series is complete and all remaining SPY orders for EFID1 are cancelled before the next SPY series is opened.

Reserve Order Restrictions

On the effective date, orders with a *MaxFloor* value greater than 0 will be rejected for Cboe proprietary classes (e.g., DJX, RUT, SPX, XSP, and VIX).

Rollout Schedule

Please refer to the schedule below for the dates the new functionalities will be available for testing in the certification environments, as well as the dates index options will be available in production.

Milestone	Target Availability Date
DJX Options (C2) and XSP Options (EDGX) available for GTH and new opening process testing in C2 and EDGX certification environments.	05/03/19
Production Launch of DJX trading during GTH and new opening process (*C2*).	06/17/19

Production Launch of XSP trading during GTH and new opening process (*EDGX Options*).	06/24/19

Additional Information

More information can be found within the following technical specifications:

- ➢ US Options Opening Process
- ➢ US Options FIX Specification
- ➢ US Options BOE Specification
- ➢ US Equities/Options Multicast PITCH Specification
- ➢ US Options Multicast TOP
- ➢ US Options Auction Feed
- ➢ US Options Complex Multicast PITCH Specification
- ➢ US Options Risk Management Specification
- ➢ US Secure Web API

Please contact the Cboe Trade Desk for support or with any questions. Additionally, you may refer to the C1 integration website for more details at http://batsintegration.cboe.com.

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Cboe Trade Desk
913.815.7001
tradedesk@cboe.com