SIAC   Securities Industry Automation Corporation
11 Wall Street, New York, NY 10005

July 5, 2022

TO: OPRA and OPRA Global Trading Hours (GTH) Multicast Data Subscribers

SUBJECT: OPRA and GTH Failover to Secondary Data Center Testing: **Saturday, July 23, 2022, Reminder**

Failover Testing

As previously [announced](#), SIAC will conduct OPRA and GTH failover testing to the secondary data center, as well as Market-Wide Circuit Breaker (MWCB) Breach Level 1 and 2 (7% breach and 13% breach) testing with the OPRA exchanges on **Saturday, July 23, 2022, from 8:30 am - 11:00 am ET**. In addition, OPRA GTH will also conduct failover testing to the secondary data center, **from 7:30 am - 9:15 am ET**.

All OPRA and GTH Multicast Data Subscribers are invited to participate in these tests to validate expected processing within your systems.

2022 SIP Failover/MWCB Saturday Testing Schedule
- Sat 7/23/22: SIP Failover / MWCB Level 1/2 Test #2
- Sat 9/10/22: MWCB Level 1/2/3 Test
- Sat 12/3/22: SIP Failover / MWCB Level 1/2 Test #3

Failover Test Details

The GTH failover to the secondary data center can occur at any time during the 7:55 am - 8:15am ET time window, with the OPRA failover occurring at any time during the 10:00 am - 11:00 am ET time window, to simulate an unexpected real-time event requiring a failover. Participating exchanges will continue to generate test data, which will be disseminated over the production multicast lines sourced from the secondary data center.

Upon failover to the secondary data center OPRA and GTH Data Subscribers will see:

OPRA and GTH Failover Messaging Description
Category H, Type K - Reset Block Sequence Number Control messages to '1' (10x)
Category H, Type P - Disaster Recovery Data Center Activation Control messages
Zero quotes for all securities
OPRA trades and quotes after failover from participating Exchanges

Test Registration

Each OPRA and GTH Data Subscriber participating in the test should register at **CTA-OPRA-Support@siac.com** . Test plans are below.

Data Subscribers who receive OPRA and GTH from connectivity service providers other than ICE Global Network (IGN) or the NMS Network must contact their connectivity service providers to coordinate testing.

Documentation

Please reference the latest OPRA and GTH Output Multicast Specifications which may be obtained from **www.opraplan.com**.

OPRA and GTH Notifications

To automatically receive these notifications and OPRA and GTH system alerts, you are required to subscribe at: https://www.opraplan.com/contact-us

OPRA Global Trading Hours (GTH) Server Failure/Data Center Failover Test Plan
Test Date & Time: July 23, 2022, 7:30 AM to 9:15 AM ET (Approximate)

#	Time	Test Category	Action By	Test Description	Expected Results
				Hourly Test Script	
Friday, July 22					
1	7:45:00 PM - 8:30:00 PM	SOD	OPRA	OPRA Global Trading Hours (GTH) to trigger Start of Day message	
2	7:45:00 PM - 7:30:00 AM	Participant Connectivity/Input	CBOE	CBOE to establish connectivity for OPRA GTH Input lines	CBOE establish connections
				CBOE to start submitting Quote and Trade data	Quotes and trades accepted and disseminated via the multicast output lines
Saturday, July 23					
3	7:30:00 - 7:45:00 AM	Output Publication Primary Process Failure	OPRA	OPRA GTH to simulate Primary Output Publication process failure. Data Publication to switch to backup process	-- Subscribers may see a momentary outage in data flow on the output lines -- Subscriber can request retransmission for any gaps
4	7:45:00 - 7:55:00 AM	Single Participant Line Disconnect	OPRA	OPRA GTH to simulate primary input line failure of a subset of OPRA input lines for CBOE	CBOE will see primary input lines disconnected
			CBOE	For the affected lines, CBOE to reconnect to OPRA GTH on their backup lines and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R). CBOE to start submitting Quote and Trade data	-- OPRA GTH to accept input connections and respond with Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S) -- Quotes and trades accepted and disseminated on the output lines
5	7:55:00 - 8:15:00 AM	Site failover from Primary Data Center to Disaster Recovery Data Center	OPRA	OPRA GTH to simulate Production site failure	-- Disconnection of all Input and Retransmission lines to OPRA GTH -- Disruption in output multicast data dissemination for all lines
				OPRA GTH to failover to DR site and publish following messages: 1) Reset Block Sequence Number (Category H Type K) for each OPRA output line to reset the sequence number to 1 2) Disaster Recovery Data Center Activation (Category H Type P) message 3) Zero Quotes (Quote messages with Zero Price and Size) on behalf of CBOE across all symbols	-- Subscribers to receive and process sequence reset message (Category H / Type K) disseminated from the DR site -- Subscribers to receive the Disaster Recovery Site Activation Control Message (Category H, Type P) over the multicast lines -- Subscribers to receive the zero quotes disseminated upon failover Note: To request retransmission for any range of messages disseminated after the sequence reset to 1, Data Subscriber would be required to apply the offset up to 4,294,967,295 in the message sequence number
				OPRA GTH to enable input lines and Retransmission lines of the DR site	DR Input IP/Ports available to establish connections
			CBOE	CBOE to reconnect to input IP/ports on OPRA GTH DR site and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R).	OPRA GTH to accept input connections and respond with Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S)
				CBOE to start submitting Options data from the latest Sequence Numbers	-- Subscribers to accept Quotes and trades disseminated on the output lines. -- Subscribers can request Retransmission for any gaps via the retransmission lines on the DR site.
6	8:30:00 - 9:15:00 AM	Network Failure	OPRA	OPRA GTH to simulate Network Failure scenarios which may result in - - Failure of a subset of OPRA GTH Input lines for CBOE - Momentary disruption in output multicast data dissemination	-- CBOE may see Primary input lines disconnected -- Subscribers may see a momentary outage in data flow on the output lines and can request retransmission for the gap
			CBOE	In case of a line disconnection, CBOE to reconnect to OPRA GTH and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R)	OPRA GTH to accept input connections and respond with latest sequence number via Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S) Messages
				CBOE to start submitting Quote and Trade data	Quotes and trades accepted and disseminated on the output lines
7	9:15:00 AM			End of test	

OPRA Server Failure/Data Center Failover Test Plan
Test Date & Time: July 23, 2022, 8:30 AM to 11:00 AM ET (Approximate)

				Hourly Test Script	
#	Time	Test Category	Action By	Test Description	Expected Results
1	1:30:00 AM	SOD	OPRA	OPRA to trigger Start of Day message	
2	1:30:00 -9:30:00 AM	Participant Connectivity/Input	Participants	Participants to establish connectivity for OPRA Input lines	Participants establish connections
				Participants to start submitting Quote and Trade data	Quotes and trades accepted and disseminated via the multicast output lines
3	8:30:00 - 9:15:00 AM	Network Failure	OPRA	OPRA to simulate Network Failure scenarios which may result in - - Failure of a subset of OPRA Input lines for participants - Momentary disruption in output multicast data dissemination	-- Some Participant may see Primary input lines disconnected -- Subscribers may see a momentary outage in data flow on the output lines and can request retransmission for the gap
			Participants	In case of a line disconnection, Participants to reconnect to OPRA and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R)	OPRA to accept input connections and respond with latest sequence number via Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S) Messages
				Participants to start submitting Quote and Trade data via their Primary connections	Quotes and trades accepted and disseminated on the output lines
4	9:15:00 AM	Output Publication Primary Process Failure	OPRA	OPRA to simulate Primary Output Publication process failure. Data Publication to switch to backup process	-- Subscribers may see a momentary outage in data flow on the output lines -- Subscriber can request retransmission for any gaps
5	9:30:00 AM	Market Open	OPRA	Market Open	
6	9:30 - 10:00 AM	Single Participant Line Disconnect	OPRA	OPRA to simulate primary input line failure of a subset of OPRA input lines for each Participant	Participants will see primary input lines disconnected
			Participants	For the affected lines, Participants to reconnect to OPRA on their backup lines and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R). Participants to start submitting Quote and Trade data	-- OPRA to accept input connections and respond with Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S) -- Quotes and trades accepted and disseminated on the output lines
7	10:00 - 11:00 AM	Site failover from Primary Data Center to Disaster Recovery Data Center	OPRA	OPRA to simulate Production site failure	-- Disconnection of all OPRA Input and Retransmission lines for all Participants and Data Subscribers -- Disruption in output multicast data dissemination for all lines
				OPRA to failover to DR site and publish following messages: 1) Reset Block Sequence Number (Category H Type K) for each OPRA output line to reset the sequence number to 1 2) Disaster Recovery Data Center Activation (Category H Type P) message 3) Zero Quotes (Quote messages with Zero Price and Size) on behalf of all participants across all symbols	-- Subscribers to receive and process sequence reset message (Category H / Type K) disseminated from the DR site -- Subscribers to receive the Disaster Recovery Site Activation Control Message (Category H, Type P) over the multicast lines -- Subscribers to receive the zero quotes disseminated upon failover Note: To request retransmission for any range of messages disseminated after the sequence reset to 1, Data Subscriber would be required to apply the offset up to 4,294,967,295 in the message sequence number
				OPRA to enable input lines and Retransmission lines of the DR site	DR Input IP/Ports available to establish connections
			Participants	Participants to reconnect to input IP/ports on OPRA DR site and establish sequence numbers by sending Block Sequence Number Status Inquiry Request (Category N / Type L) and Message Count Status Inquiry Request (Category N / Type R).	OPRA to accept input connections and respond with Block Sequence Response (Category N / Type M) and Message Count Status Response (Category N / Type S)
				Participants to start submitting Options data from the latest Sequence Numbers	-- Subscribers to accept Quotes and trades disseminated on the output lines. -- Subscribers can request Retransmission for any gaps via the retransmission lines on the DR site.
8	11:00:00 AM			End of test	