

Final as approved by the Operating Committee on 5/22/19

Emergency Procedures

Any terms used in these procedures shall have the meaning ascribed to them in the Consolidated Tape Association Plan (“CTA Plan”) and Consolidated Quotation Plan (“CQ Plan”, together with CTA Plan, “Plan”).

Pursuant to Section VIII of the CTA Plan and Section XI of the CQ Plan, the Operating Committee sets forth the following procedures (“Emergency Procedures”) to address market failures, outages, system problems and other crisis situations impacting the operations and dissemination of information by the Processor pursuant to the Plan.

Activation

The Processor shall activate these Emergency Procedures consistent with the Incident Management Process (set forth below) upon the following:

- The Processor has determined that it has ceased (or anticipates being unable) to provide updated and accurate quote or trading information;
- The Processor has determined that latency for quote or trade information exceeds the thresholds set forth below in the Incident Management Process, as measured between the time the data is received by the Processor and the time the Processor disseminates the data;
- The Processor has been advised by a Participant or a data recipient that circumstances that could be considered Extraordinary Market Activity may have occurred or are occurring;
- The Processor believes, or is advised that activity at one or more Participants may be having a material impact on data disseminated by the Processor or that a Participant has called, or plans to call, an Operational Halt with respect to one or more Eligible Securities due to reasons that could impact the operations of the Processor or other Participants; or
- The Processor or a Participant requests that the Operating Committee be convened to consider an urgent matter impacting Participants or the Plan as may otherwise be determined necessary.

Emergency Procedures Call

Upon activation of these Emergency Procedures, the Processor shall coordinate a conference call (“Emergency Procedures Call”) by promptly notifying each member of the Operating Committee and its participants (in any event within five minutes after activation of the Emergency Procedures) with a time and dial-in information. The Processor shall notify the Participants by sending an email to the designated representatives of the Operating Committee. Should email be unavailable, the Processor will attempt to notify the designated representatives of the Operating Committee by phone. The Emergency Procedures Call shall remain open until the Operating Committee agrees that an ongoing conference call is no longer needed.

Notification to Industry

If the Emergency Procedures are activated, the Processor shall endeavor, consistent with the Incident Management Process and after the Processor has a reasonable basis to conclude that a systems disruption has occurred, to promptly disseminate to (i) any person that subscribes to the Processor's public notices; and (ii) data recipients directly connected to the Processor (collectively, "recipients"), which shall also be posted to the Plan's website, a notice that includes one of the following scripts:

Issue:

- <system name> is experiencing a processing problem as of <time>. Further information to follow.

Issue continues:

- <system name> continues to experience a processing problem. Further information to follow.

Issue resolved:

- <system name> experienced a processing problem [which resulted in a {disruption OR missing OR incorrect data} from HH:MM:ss to HH:MM:ss]. *[If the issue resulted in missing or incorrect data, provide information to clarify the behavior recipients would have or will continue to witness as a result.]* [This issue was a result of a hardware failure OR software defect {if known, if not known provide this information in a subsequent update}]. The issue [was resolved as of <time> OR will be resolved effective <date/time>].

or

Issue continues:

- <system name> is failing over to the secondary data center as of <time>. Further information to follow.

Issue resolved:

- Due to a [hardware failure OR software defect OR data center issue], <system name> services were failed over to the secondary data center as of <time>. <system name> will run out of the secondary data center for the remainder of the day.

Once the issue is resolved, an email will be provided to the recipients using one of the templates noted above.

Within the next business day after the issue has been resolved, the Processor will conduct a post mortem call open to representatives of the participants, SEC, and advisory committee. In addition, if the Processor determines that a system disruption or a system compliance event has occurred under Regulation SCI, any resultant Form SCI filings by the Processor will also be made available to the participants and the advisory committee.

Regulatory Halt Determinations

The Primary Listing Market is the only party that may declare a Regulatory Halt, including a SIP Halt, in its listed securities consistent with its rules. To assist the Primary Listing Market in making its determination of whether to declare a SIP Halt, the Processor and the Operating Committee shall use the Emergency Procedures Call to provide the Primary Listing Market with information so that the Primary Listing Market may consider the totality of information available concerning the severity of the issue, its likely duration, its potential impact on members and the public interest.

The Processor shall endeavor to provide the following information during the Emergency Procedures Call:

- The scope of the issue and the approximate time that the issue began;
- What steps are being taken to resolve the issue;
- If the issue cannot be resolved within the primary data center, notification of when failover to the secondary data center would begin or began;
- If a determination is made to failover to the secondary data center, whether the Processor meets the time frames for the failover to the secondary data center, consistent with the Incident Management Process. The Processor will advise whether it is unable to complete the failover to the secondary data center within the prescribed time, and if not, whether there is a projected time frame when such failover would be completed.
 - As provided for in the Incident Management Process, once a determination has been made to failover to the secondary data center, the Processor shall endeavor to complete the failover within 10 minutes.
 - As further provided for in the Incident Management Process, SIP material latency refers to sustained latency of 100 milliseconds or greater for 10 minutes caused by a technical issue at the Processor.
- If the Processor fails over to the secondary data center, information, as may be available, regarding when the Processor will resume processing from the primary data center.

Incident Management Process

The Processor has the authority to act pursuant to the following Incident Management Process, including taking specified actions without input from Participants.

Production Issues Outside of Regular Market Hours (generally 4:00:00 to 08:59 and 16:30:01 to 20:30:00)

Scenario	Action
System Startup and Shutdown issues	<ul style="list-style-type: none"> • The Processor resolves the issue. • Email sent to Participants notifying them of the issue and that it has been resolved and there is no longer an impact or interruption of service.
Application and/or Infrastructure issues	<ul style="list-style-type: none"> • The Processor resolves the issue. • Email sent to Participants notifying them of the issue and that it has been resolved and there is no longer an impact or interruption of service.
Application issue of a new release that includes format changes for Participants and/or data recipients, that are not backward compatible	<ul style="list-style-type: none"> • Possible actions to be included in the Change Request and discussed on the Go No/Go call. • Email sent to Participants notifying them of the issue and action. • Action dependent on scope of format changes. <ul style="list-style-type: none"> ○ If possible keep secondary data center on current production version. <ul style="list-style-type: none"> ▪ Processor may determine to failover to secondary data center (“DR Process”). ▪ If Processor invokes DR Process, email sent to Participants notifying them of initiation of DR Process. ○ If format changes require both primary and secondary data centers to be upgraded then invoke tested release fallback procedures on the primary system. <ul style="list-style-type: none"> ▪ Email sent to Participants notifying them of the fallback. ○ Fix issue and move forward.

Production Issues During Regular Market Hours (09:00 to 16:30)

Scenario	Action
Catastrophic issues requiring failover to secondary data center	<ul style="list-style-type: none"> • The Processor invokes DR Process based on issue and timing to resolve. • Processor opens Emergency Procedures Call. <ul style="list-style-type: none"> ○ Processor does not need to open Emergency Procedures Call before invoking DR Process. • Processor provides notice to public of initiation of DR Process. • Once a determination is made to invoke DR Process, the Processor shall endeavor to complete the failover within 10 minutes.
Loss of primary instance in primary Data Center - running on secondary only and primary cannot be restarted.	<ul style="list-style-type: none"> • Notify the Participants of the issue. • Email sent to Participants notifying them of the loss of a server and running without a backup, no market impact or interruption of service.
Loss of primary instance in primary Data Center – running on secondary and loss of secondary instance.	<ul style="list-style-type: none"> • Processor invokes DR Process based on issue and timing to resolve. • Processor opens Emergency Procedures Call with Participants. <ul style="list-style-type: none"> ○ Processor does not need to open Emergency Procedures Call before invoking DR Process. • Processor provides notice to public of initiation of DR Process. • Once a determination is made to invoke DR Process, the Processor shall endeavor to complete the failover within 10 minutes.
Loss of primary instance and restart primary	<ul style="list-style-type: none"> • No Participant notification.
Loss of primary components (excluding critical processing components) - no impact Participant quoting/trading	<ul style="list-style-type: none"> • Email sent to Participants notifying them of the loss of a server and running without a backup, no market impact or interruption of service.

<p>Application issue of a new release that includes format changes for Participants and / or data recipients.</p>	<ul style="list-style-type: none"> • Release contains format changes and is not forward / backward compatible. • Possible actions to be included in the Change Request and discussed on the Go No/Go call. • Notify the Participants and / or data recipients of the issue and action. • Action dependent on scope of format changes. • If possible keep secondary data center on current production version. • Invoke DR Process. • Processor opens Emergency Procedures Call with Participants. • Once a determination is made to invoke DR Process, the Processor shall endeavor to complete the failover within 10 minutes. • If format changes require both primary and secondary data center to be upgraded then invoke tested release fallback procedures. • Inform Participants before starting fallback procedures within the primary data center. • Fix issue and move forward. • During the Emergency Procedures call, provide frequent periodic updates to keep Participants informed and ETA when system will be available.
<p>Participant behavior that could adversely impact the system. Examples include but are not limited to:</p> <ul style="list-style-type: none"> - Single Participant sending abnormal load (“x” times normal traffic) - Single Participant sending bad symbols and causing issues to multiple Front End Processor - Single Participant sending bad data which is being processed/disseminated and causing issues to data recipients 	<ul style="list-style-type: none"> • Reach out to Participant to resolve the issue/stop own lines, if not then Processor take action. • Processor will issue command to “Disconnect” the offending port(s) • Notify the Participant that their ports were stopped • Coordinate the reconnect with Participant • Confirm connection functionality/stability with Participant

Latency Issues During Market Hours (09:00 to 16:30)

Scenarios	Action
Sustained latency of 100 milliseconds or greater for 10 minutes caused by a technical issue.	<ul style="list-style-type: none">• Processor to initiate Emergency Procedures Call and Notify the Participants and / or data recipients of the issue and action.• Processor invokes DR Process based on issue and timing to resolve.
Sustained latency of 100 milliseconds or greater for 10 minutes not the result of a technical issue, e.g., some type of news.	<ul style="list-style-type: none">• Email sent to Participants notifying them of the latency.
Sustained latency of 100 milliseconds or greater for 15 minutes not the result of a technical issue, e.g., some type of news.	<ul style="list-style-type: none">• Processor to initiate Emergency Procedures Call.