CTA SIP Functional Differences - Current Platform vs Pillar Platform

Outbound Protocol Differences:

	CTA SIP Behavior - Current Platform	CTA SIP Behavior - Pillar Platform
Output Protocol - Version	• Output blocks are published with Block Header Version 0 (zero) on the Block Header	• Output blocks are published with Block Header Version 2 (two) on the Block Header
Output Protocol - Block Sequence Numbers	• The Sequence Number field of the Block Header is incremented per block irrespective of the number of messages in the block. Data recipients request retransmissions based on Block sequence number. A Retransmitted block matches the original block data and SIP Block Timestamp contains the original time of the Block that was transmitted. • Once the Block Sequence Number reaches a value of 999,999,999, it rolls over and the subsequent block is published with a Sequence Number of 1	• The Sequence Number field of the Block Header indicates the sequence number of the first message in the block. If there is more than one message contained in a block, any messages following the first message are implicitly numbered sequentially. Data recipients need to request retransmissions based on message sequence number. The retransmission blocks can be packed differently than the original blocks and would have SIP Block Timestamp of the first message in the retransmitted block. • The Block Sequence Number rolls over when the u32 maximum limit is reached (4,294,967,295)

	CTA SIP Behavior - Current Platform	CTA SIP Behavior - Pillar Platform
Output Protocol - Multicast Setup	• For each unique NMS message, there are two redundant multicast data streams. To leverage the redundancy, it is suggested that recipients read from the redundant data feeds • Retransmitted data is published via a single multicast data stream	• Recipients must subscribe to both A and B Multicast channels like any standard multicast data product instead of just one channel, so that if there is any issue with one feed, recipients are able to receive data from the other. • Retransmitted data is published via two distinct multicast data streams for redundancy
Output Protocol - Start of Day	• Start of Day (Category C Type A) message is published three times, starting at 3:30 AM, with a quiescent period of one minute following each of the three transmissions	• Start of Day (Category C Type A) message is published only once at 1:30 AM
Output Protocol - End of Day	• End of Day (Category C Type Z) message is published three times with a quiescent period of one minute following each of the three transmissions • The End of Day message contains a Block Sequence Number one greater than the highest Block Sequence Number previously transmitted	• End of Day (Category C Type Z) message is published only once • The End of Day message contain Block Sequence Number of Zero
Output Protocol - Test Cycles	• Test Cycle Data is published every day between 2:00 - 2:45 am prior to the publication of Start of Day message at 3:30 am. Test Cycle is preceded by Start of Test Cycle (Category C Type M) and followed by End of Test Cycle (Category C Type N) messages	• Test Cycle schedule prior to Start of Day and associated Start of Test Cycle (Category C Type M) and End of Test Cycle (Category C Type N) messages are eliminated on Pillar SIP. Test data publication starts after the Start of Day message and continues throughout the day over Production multicast feeds. Test data is published only for Test Symbols.

	CTA SIP Behavior - Current Platform	CTA SIP Behavior - Pillar Platform
Output Protocol - Time Beacon	• Selected nodes that source multicast data within the IP Multicast distribution network generate a single Time Beacon packet every six seconds	• Time Beacon message is not published
Closing Quotes	• CQS publishes Closing Quotes on behalf of Participants upon reaching the closing time configured for each participant, or, upon receipt of the End of Participating Quoting (EOPQ) message from the participants	• Closing Quotes are not published systematically. Participants may choose to submit Closing Quotes which are then published on the multicast lines
Message Routing	• Market Status Messages - 'Approximate Adjusted Volume Market Center (Category M Type N)' and 'Approximate Trades and Total Dollar Value (Category M Type O)' are distributed only over Network 'A' L1 and Network 'B' L1 lines for respective network	• Market Status Messages - 'Approximate Adjusted Volume Market Center (Category M Type N)' and 'Approximate Trades and Total Dollar Value (Category M Type O)' are distributed over all lines for their respective Network
Administrative Unformatted Message	• Administrative Unformatted (Category A Type H) message is supported on output lines. Any Administrative Unformatted messages submitted by participants are published on the output lines. Also, SIP generated Administrative Unformatted messages are published to provide system information	• Administrative Unformatted (Category A Type H) message is not supported
Line Integrity	• Line Integrity (Category C Type T) message is transmitted over the multicast lines at intervals of sixty seconds to verify continued integrity of multicast transmission • Line Integrity message transmission stops once End of Day (Category C Type Z) message is published	• Line Integrity (Category C Type T) message is transmitted over the multicast lines at intervals of ten seconds to verify continued integrity of multicast transmission • Line Integrity message transmission continues after non-sequenced End of Day (Category C Type Z) message is published, as long as system is up

	CTA SIP Behavior - Current Platform	CTA SIP Behavior - Pillar Platform
Timestamp 1	• For any messages generated by SIP, e.g., Messages generated on behalf of a Participant, Price Band messages and Market Status messages, the Timestamp 1 field is set to zero	• For any messages generated by SIP, e.g., Messages generated on behalf of a Participant, Price Band messages and Market Status messages, the Timestamp 1 field is set to current system time
Trade Publication during Regulatory Halt	• During a primary market regulatory halt, no Trade is published from the Primary Participant, while trades from a non-primary Participant are published with appropriate 'Held Trade Indicator' after the close of the primary market Note - As of May 11, 2020, behavior for trades received during halts has been applied in CTA SIP current platform to match the behavior expected in Pillar platform. As such, this difference is no longer applicable starting May 11, 2020.	• During a primary market regulatory halt, Trades from both the Primary and any non-primary Participant are published real time without any 'Held Trade Indicator' code. These trades are included in the Last, High and Low calculation as per the Sale Condition.

Note: For Outbound Data Publication from the SIP to Recipients during Parallel Phase:

- New Multicast IP Addresses associated with the CTA SIP Pillar system will be provided
- Data will be published simultaneously via existing Multicast IP Addresses for the current CTA SIP system and via a subset of new Multicast IP Addresses for Pillar SIP system. Data Recipients shall subscribe to both sets of Multicast IP Addresses
- Upon cutover, data publication will cease over current Multicast IP Addresses and only the data via the Pillar SIP system will be published over the new Multicast IP Addresses

Document Version History:

Date	Document Version #	Change Summary
June 10, 2020	1.6	• Retrofitted publication time difference in Output Protocol for Start of Day Message Publication Time (note - requirement published in Output Specifications as of March 27) • Clarified behavior difference for Test Data publication • Added difference for Line Integrity transmission (note - requirement published in Output Specifications as of February 25)
February 20, 2020	1.5	• Updated difference for redundant retransmission data stream
February 10, 2020	1.4	• Updated difference for 'Trade Publication during Regulatory Halt'
February 5, 2020	1.3	• Updated difference for 'Output Protocol - End of Day' • Updated Output Protocol version to 2 • Added difference for Timestamp 1 for SIP generated messages
January 24, 2020	1.2	• Added difference for 'Output Protocol - Version' • Added differences for Line Integrity • Updated Block Sequence Number value for CTA SIP • Updated SIP Block Timestamp for retransmitted blocks
December 9, 2019	1.1	• Initial version of the document