AMEX/ARCA OPTIONS GEMS

ONLINE EXTRACT - COMMUNICATION PROTOCOL AND CERTIFICATION TESTING

Once SFTI connectivity is complete, the firm should establish connectivity to the following IPs (as applicable):

- PROD Amex: 159.125.88.229
- PROD Arca: 159.125.88.232
- DR Amex: 162.68.225.8
- DR Arca: 162.68.225.7
- CERT Amex: 162.68.216.50*
- CERT Arca: 162.68.216.50*

*Note that the IP address for GEMS CERT is the same for both Amex and Arca

The ports will be assigned individually for each firm from the following ranges:

- PROD Amex: 6000-6099*
- PROD Arca: 6100-6199*
- CERT Amex: 6200-6299
- CERT Arca: 6300-6399

*Note that the port assignments are the same for Prod and DR

The firm has to provide up to two IPs per connection from which the firm will connect to the Exchange. The IPs will be validated before the Exchange will accept the connection.

TCP/IP INTERFACE

The following is a brief description of the TCP/IP interface:

- Connection: This process is initiated every morning prior to the beginning of the trading session, and is active until the end of the trading day. NYSE starts its application at 08:00 ET, and requires that all clients establish the connection with NYSE no later than 08:30 ET. NYSE prefers to act as a Listener. It also can "connect" to the client's host using an IP address and port number provided by the client. In this instance, if the connection fails on the primary IP address, NYSE attempts to reconnect using a backup address. If the backup fails, the server will attempt to connect to both the primary and backup addresses until the connection is established, or until NYSE staff terminate the application.
- S-message (Start/Set): This is the first message sent by NYSE after the connection has been established. It has the sequence number set to zero at the beginning of each trading day. If the connection is reestablished in the middle of the day, the S-message will have the sequence number set to the sequence number of the last A-message received from the client, and NYSE will continue to send D-messages starting from this sequence number.
- D-messages (Data): When data is available, NYSE sends D-messages, incrementing the sequence number for every new D-message by one.
- I-messages (Idle): If there is no activity to report, NYSE will send the idle record (I–message) every *n* seconds until the data becomes available. The number of seconds *n* depends on the settings (default value is 30 sec.), and may be changed at any time. The sequence number of the I-messages is the same as the sequence number of the last D-message.
- A-messages (Acknowledgement): The client must reply with an A-message to every message accepted from NYSE to confirm that the data was received in expected order. The A-message should have the sequence number of the last D-message received. If the client does not acknowledge the NYSE messages for the *t* number of seconds (timeout period), NYSE will terminate the connection and return to the "listen" or ''try-to-connect" mode. Timeout period *t* depends on the settings (default value is 30 sec.) and may be changed at any time.
- R-message (Reset): The client must maintain its own sequence number of the D-messages received from NYSE. If the sequence number of the received message is not what the client has expected, the client should reply with the R-message specifying the expected sequence number. Upon receiving an R-message, NYSE will send the D-messages from the requested sequence number. For example, if the client receives messages 1, 2, 3, 5, 6… and requests the 4^{th} D-message to be resent, the NYSE will reset the transmission sequence number to 4 and send messages 4, 5, 6… and so on. The client should be able to handle the duplicate messages (5 and 6 in this case).

The Options Online Extract record, which is sent over TCP/IP, has two components:

- Message header (23 bytes)
- Message data (700 bytes)

Field Name	Position	Length	Field Description
Message Type	1-1	1	An alphanumeric field that indicates the type of message. Valid values are: From NYSE to client: S = start & set the sequence message D = data message I = idle message From client to NYSE: A = acknowledgment message R = resend request message
Time Stamp	2-7	6	A numeric field that indicates the time the trade was sent to the client. Format HHMMSS (ET), where: HH = hour sent MM = minute sent SS = second sent
Message Sequence	8-17	10	A numeric field that indicates the sequence number generated by GEMS for every D-message. Should always be set to zero at the beginning of each trading day.
Message Length	18-23	6	A numeric field that indicates how many bytes are in the record. Valid length for S-message, A-message, I-message and R-message is 23 bytes. Valid length for D-message consists of a header portion, which is 23 bytes, plus the data portion, which is 700 bytes.

Certification Test Cases

Test No.	Test case description	Expected result	Result of the test
1.	Test the "clean start" with sequence number = 0; let it run for few minutes	➢ Firm should reply to S- message with A- containing zero sequence; ➢ Check how we exchange I- and A- messages. *(Firm should reply to I-message with A-message containing the last sequence; zero in this case)*	
2	Play 1 record	➢ Firm should receive one D_message ➢ Firm should reply with A-message confirming the sequence received on D-message. ➢ Verify contents of the data (for example: What is issue symbol or Execution-time?	
3	Play 10 records	➢ Firm should receive 10 D-messages; ➢ Firm should send A- message for every D- message confirming the last sequence number received	
4.	Drop connection to check application recovery/failover in general where NYSE sequence = Firm sequence.	➢ Reconnect should happen automatically within 2 min. ➢ Firm should reply to S-message with A-message containing the last sequence number received.	
5.	Simulate the situations with gap in the sequence numbers where NYSE sequence < Firm sequence.	➢ After reconnect firm should request the sequence number that they expect. *(firm should reply to S-message with R-message containing the sequence number they need);* ➢ Check if firm can handle duplicate messages (*if duplicate D-message received: firm should ignore it and reply with an A- message containing the last sequence number received.)*	
6	Simulate the situation with gap in the sequence numbers where NYSE sequence > Firm sequence	➢ After reconnect firm should request the sequence number that they expect. *(Firm should reply to S-message received with an R- to-request the sequence they need);*	

		➢ Check if firm accepts and acknowledge all messages what were re-sent. (*If D-message received with Gap in the sequence: firm should ignore it and replay with an R- message containing the sequence they expect to see next.)*	
7.	Perform load/stress test (play daily data or at least 10000 rows)	➢ Confirm total number of accepted messages	
8.	Discuss with firm: What time they will do clean up; What time they should start the server in the morning and shutdown process; Implementation and fail back procedure if necessary ;	➢ Cleanup data and reset sequence daily around midnight; ➢ Connect to NYSE Euronext at least an hour before trading.	