

Market Maker Direct Specification for Options

For the NYSE Arca
& NYSE Amex Options Exchanges

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Date	Revision	Change Made by:	Synopsis of Change
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04-27-2006	1.11	WDuarte	All messages with an OCC MMID have been changed from 3 to 4 characters. This shifts the alignment of fields following the OCC MMID in most messages. All messages are the same size but the length of the Risk Mitigation Ack message increased by 4 bytes.
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09-19-2006	1.13	CYohn	Added reject codes 25-30
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12-11-2006	1.13b	Michelle Pietras	Clarified takedown message format. Added reject code 32
10-22-2008	3.0	JUy	Order of field structure change for message 'f' and 'C'; increase size of ExecID from 4 bytes binary to 8

Date	Revision	Change Made by:	Synopsis of Change
11-17-2009	3.1	Chris Calcaterra	Added OSI Rollout Update to Series Update Message

Table of Contents

1 Overview	7
NYSE Arca API Certification	7
System Architecture	7
2 OX Overview	9
Market Maker Quoting	9
Hours of Operation	9
Auctions	9
Market Maker ID	9
Symbol Management	10
Risk Mitigation	10
Binary Fields	11
3 Session Management Messages	12
Overview	12
Disconnects	12
Logon Message	12
Logon Reject Message	13
Test Request Message	14
Heartbeat Message	14
Series Request Message	15
Series Update Message	15
4 Application Messages	17
Bulk Quote Message	17
Bulk Quote Acknowledgement Message	17
Bulk Quote Rejection Message	18
Quote Takedown Request Message	19
Quote Takedown Ack Message	19
Risk Mitigation Request Message	20
Risk Mitigation Ack Message	21
Risk Mitigation Alert Message	21
Quote Fill (Execution) Message	22
Bust or Correct Message	23
Appendix: Recovery Example	24
Appendix: Rejection Codes	25

1 Overview

Market Maker Direct is a message-based interface that allows users to make markets on NYSE Arca's Options Exchange System (OX) in assigned series through quote messaging. OX supports two classes of market maker: lead market maker and regular market maker. All market makers are allowed to submit both quotes and orders to OX for option series in their assigned underlying equities (underlyings).

This document is for qualified market makers (MM) associated with firms that hold NYSE Arcasm Options Trading Permit(s) and developers that wish to write applications that can interface with Market Maker Direct (OX MM API).

Market Maker Direct uses fixed length messages and variable length bulk messages over the TCP IP protocol with binary numeric and fixed length ASCII fields. Binary values are in network Endian (Big Endian).

The message set includes two categories:

- Session management messages (Logon, Heartbeat, Test Request)
- Application messages relating to making markets

NYSE Arca API Certification

Certification testing is required and can be arranged through our Client Connectivity Group. This is a 24 hour test system that is driven with canned data outside of normal market hours. Before a subscriber can go live, it is mandatory to complete approved test scripts to become certified for Market Maker Direct.

System Architecture

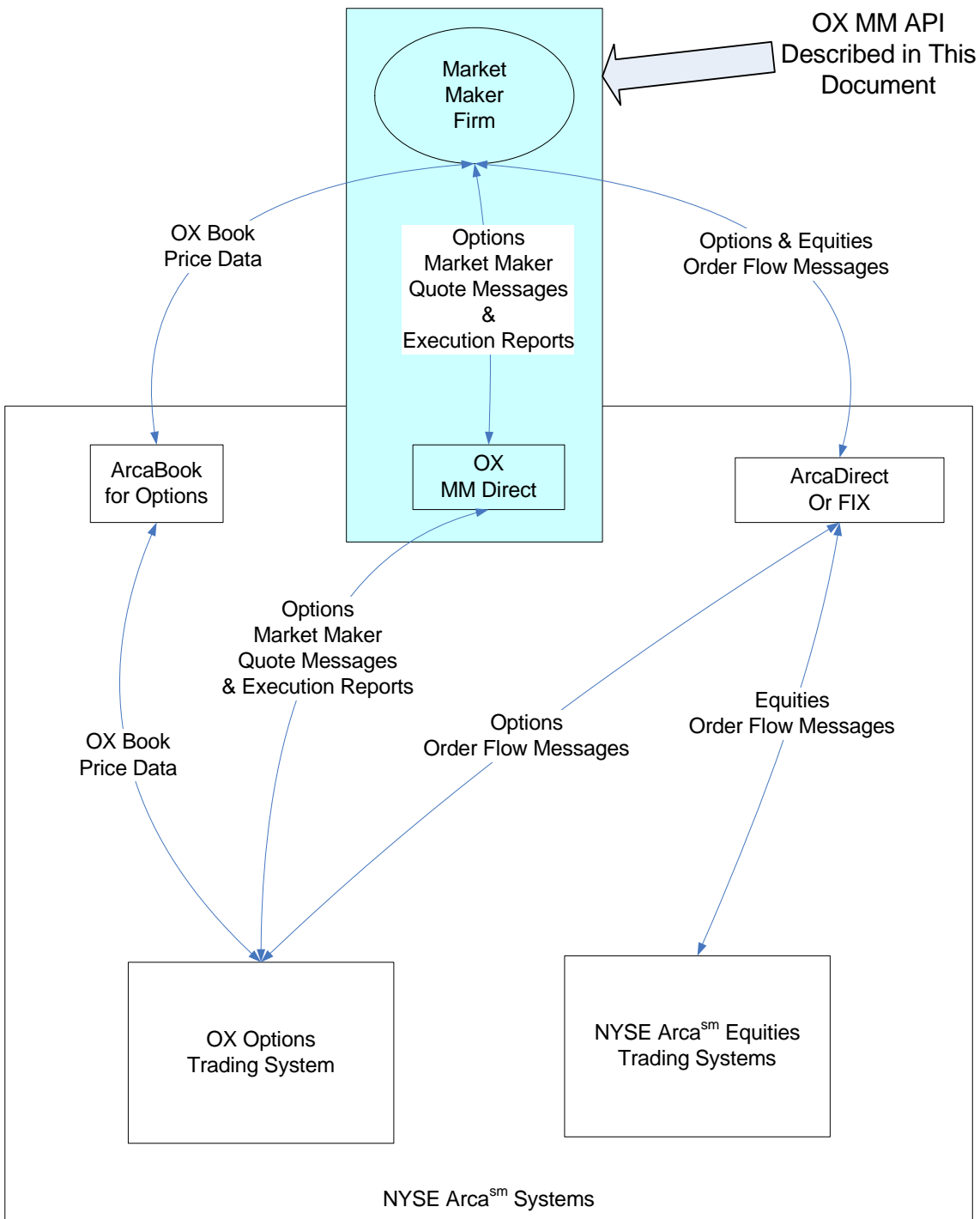
Interaction between market maker firms ("client" in this document) and the OX platform ("server" in this document) consists of three required interfaces:

1. The OX MM API allows quoting on OX, receipt of execution reports against those quotes, and receipt of market-maker-only administrative messages (described in this document).
2. Order flow for Options and/or Equities is supported using either ArcaDirect or the FIX protocol. Specifications for ArcaDirect and FIX can be obtained from <http://www.nyse.com> or from the FIX hotline (see NYSE Arca API Certification).
3. Data feeds for top of book, depth of book and general audience administrative messages, such as trading halts for options and/or equities, are available using the ArcaBook[®] for Options interface (not described in this document).

Each client sends messages to their assigned IP and Port. OX routes the messages to the appropriate trading system.

OX also supports Drop Copy duplicate execution reports to interested parties assigned by market maker firms.

The following diagram illustrates how market makers interact with OX:



Overview of Market Maker Interfaces to NYSE Arcasm

as of 5-05-06

2 OX Overview

Market Maker Quoting

Market makers are required to provide a valid, legal width, two-sided market in their assigned series in support of all OX auctions. Market makers are also required to maintain continuous quotes in these series to the extent required by NYSE Arca options trading rules throughout the core trading session. Quotes are entered in Bulk Quote messages as one side of a market. Quote updates for a series replace the previous quote for the specified side of the market.

Internal Locks or Crosses

Quotes trade immediately with orders or other quotes in OX when executions are possible. OX will **not** prevent market maker quotes from trading with orders or other market maker quotes.

External Locks or Crosses

OX posts and disseminates quotes that lock or cross the quotes of other options exchange markets. Individual market makers are responsible for taking appropriate actions to avoid locking or crossing other options exchange markets as required by the Options Linkage Authority (OLA).

Discretion of Quote Sizes

When trades occur against quotes, OX reduces the size of the quotes involved in the trade. It is the market maker's responsibility to recognize when the quoted size at a price has been depleted and must be re-quoted.

Hours of Operation

Hours of Operation for the NYSE Arca Options Exchange (all times Eastern):

Start of Pre-Open Period – 4:00 AM

Opening Auction – 9:30 AM

Core Trading Session (Equity Options) – 9:30 AM – 4:00 PM

Core Trading Session (ETF Options) – 9:30 AM – 4:15 PM

Hours of Operation are subject to change. Please visit <http://www.nysearca.com> for the most up to date information.

Auctions

OX offers opening and halt auctions for options trading. The Opening Auction occurs after 9:30 AM EST once the first NBBO is received in the related underlying security.

Market makers are required to have a valid, legal width, two-sided quote in their assigned series prior to each auction. These quotes must be entered with the OX MM API and are used to create the opening BBO.

Market makers may also enter orders in their assigned series during pre-open for participation in the opening auction. Market maker orders can be entered either through the ArcaDirect or NYSE Arca FIX APIs.

OX matches crossed quotes and orders on/or within the first disseminated NBBO of a series at the price where the most trade activity will occur.

Market Maker ID

The OCC market maker acronym is used as the market maker identifier on quotes. The client must send this ID on **all** quotes. The max length of the MMID is 4.

Symbol Management

To ensure high throughput and low latency, series for MM quoting are identified using an Index Series Lookup Table. This is an ordered list from 1 to N of all series that OX will be trading this day. A new table is generated every day and disseminated at the start of the day using this API. Intra-day additions of new series are also sent to market makers using this API. Quotes should contain only the series index and not the full signature of the series.

This Index Table can be requested in two ways.

- **Logon Message.** When they log in, clients send a zero (0) in the Last Series Index Number field of the OX Logon Message. Upon receipt, OX sends the entire Index Series Lookup Table in Series Update messages. Clients should save the last index number they have received for this table. This value should be used in any subsequent Logon Messages or Series Request Messages to ensure OX sends only update messages.
- **Series Request Message.** Clients use this message to request any intra-day series additions. This message also uses the last index number mechanism to determine which updates OX should send.

Option symbols are identified for a series index using either the:

- OCC symbol, strike price, expiration date and call/put indicator.
- OPRA symbol.

Risk Mitigation

Activity-based Circuit Breakers

OX has the ability to protect firms actively quoting from excessive executions due to unusually rapid trading activity. OX can immediately pull a market maker's quotes from the market after certain user-defined thresholds of trade activity are reached.

Risk mitigation is accomplished by tracking the number of trades executed in one second for all series associated with one underlying assigned to a market maker. Transaction thresholds can range between 5 and 100 per second. The default threshold is 50 trades per second.

Within this range, MM firms can change assigned thresholds intra-day using the OX MM API. MM firms can set a global threshold and specific thresholds by underlying. For example:

OTP market maker: ABC:

Global Threshold = -50 executions per second

SPY Underlying Threshold = 100 executions per second

IBM Underlying Threshold = 10 executions per second

Threshold checking occurs during auctions as well as core trading sessions.

When risk mitigation is invoked, the firm receives a Risk Mitigation Alert message indicating that the alarm was triggered and they are out of all quotes in the indicated underlying (e.g. IBM). In order to enter the market again, the MM must re-submit a Risk Mitigation Request message for each underlying in which an alarm was triggered.

Market Maker Explicit Quote Withdrawal

Market makers can send a Quote Takedown Request message to pull quotes by series, by underlying, or globally.

Quotes Withdrawn on Session Disconnect

When a client session disconnects (explicitly or inadvertently), a market maker's quotes are cancelled globally. See the [Disconnects](#) section for more information.

Binary Fields

All multiple byte binary fields are signed network Endian (Big Endian) values. One byte numeric fields are unsigned.

Binary Prices

Prices are represented as whole integers in signed binary. **Market maker inbound quote prices are fixed at two decimal places.** Executions of quotes may have more than two decimal places.

For prices where the decimal places are not fixed, the decimal position can be determined by using the Price Scale code, which is supplied in some messages. **The Price Scale code is a character.**

To determine the decimal price, divide the whole integer price by the value that the price scale code represents. For example, the: whole integer price is 1350 and the price scale code is 2. The decimal price is $1350 \div 100 (10^2) = 13.50$.

Table 1 Price Scale Codes

<u>Price Scale Code</u>	<u>Denominator Value</u>	<u>Denominator Value (factor of 10)</u>
"0"	N/A	N/A
"1"	10	$10^1 (10^1)$
"2"	100	$10^2 (10^2)$
"3"	1,000	$10^3 (10^3)$
"4"	10,000	$10^4 (10^4)$

Note: a Price Scale code of **"0"** indicates that the whole integer price in the price field is the actual price and no conversion or division is necessary.

3 Session Management Messages

Overview

A market maker firm initiates a TCP/IP session to the OX MM API Server. Session logon is always initiated by the client connection. Application messages may be exchanged between the client and server after logon is successful.

Messages have a defined number of fixed-length fields, containing both binary and ASCII data. All binary data is sent in network Endian format (Big Endian). Multiple byte binary fields are signed. Single byte binary fields are unsigned.

During periods of inactivity, the server and/or client use the Test Request and Heartbeat messages to ensure the connection is up and functioning properly. The client must be able to respond to Test Request messages from the server by sending a Heartbeat message.

Disconnects

All quotes associated with a client session are automatically pulled from the market when any type of TCP/IP disconnect occurs. A Quote Takedown Ack message is sent to the market maker as soon as possible to notify them that their quotes have been purged from the system. Market makers must send a Risk Mitigation Request to re-enable quoting in an underlying before sending new quotes. OX sends a Risk Mitigation Ack message to indicate that quotes can now be accepted.

This feature is intended to help MM firms in emergency situations. However, firms must not rely upon this automatic cancellation as a normal business practice or to prevent liability of execution. Nor is it a substitute for working with the OX Trade Desk to verify that all quotes are indeed cancelled and that all trades have been properly reported.

To help prevent lost execution messages after a disconnection, execution messages from OX are assigned a message sequence number. When clients connect to OX, the client sends the sequence number of the last execution message processed as part of the Logon message. OX will replay any execution messages the client may have missed.

Client messages and acknowledgements from OX do not use sequence numbers. These messages are not designed to be recovered after a disconnection.

Logon Message

Clients use the Logon message to establish a connection and to identify the last execution message they have processed. The server may accept or reject the client logon. If logon is successful, OX sends a Logon message back to the client. If logon is unsuccessful, OX returns a Logon Reject message.

When the server sends the Logon message back to the client after a successful logon, the "Last Series Index Number Processed" field is filled in with the largest series index number that the server will be sending to a client. The client can use this number as one way to determine when the main series update is complete. However, if a series is loaded intra-day, the client may receive a series index number that is higher than the number given in the logon message.

For the initial connection, clients should set the Last Sequence Number field to zero. A client can also pass '-1' to notify the server not to validate the sequence number. The server will accept the next sequence from the client and then send what it thinks is the next outbound sequence.

Currently, all messages sent by the client to the server are un-recoverable. Clients need not validate the Last Sequence Number field in Logon messages from the server. This field may be used in future releases to allow client messages to be recovered.

Logon Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'L'
Filler	1	Not used	
Message Length	2	Binary	The length of the message
Last Sequence Number Processed	4	Binary	Sequence number of the last response message processed. 0 – Replay everything -1 – Skip validation of this field N – replay from n + 1
Last Series Index Number Processed	4	Binary	Last Series Index number the client processed 0 – Send the whole Index Table -1 – Turn off Series Updates.
Version	2	Binary	The version of MM Direct used in this session: 1 = MM Direct version 1.8 2 = MM Direct version 1.10 3 = MM Direct version 1.13
User Name	5	Alpha/Numeric	Session ID assigned by NYSE Arca
Padding	1		
Total	20		

Logon Reject Message

The server sends a Logon Reject message only when logon validation fails. If logon was successful, the server sends a Logon message back to the client.

The Client Logon Status field indicates the reason (see the [Rejection Code Appendix](#)). The server will close the connection after sending the Logon Reject message. There are times when the client may not receive a response.

Logon Reject Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'l' (lower case L)
Filler	1	Not used	
Message Length	2	Binary	Length of the message
Last Sequence Number Server Received	4	Binary	Reserved for future use
Last Sequence Number Server Sent	4	Binary	Last execution message sequence number the server transmitted. -1 = unknown. This number could not be determined.
Last Series Index Number Server Sent	4	Binary	The last Series Index number sent. -1 = unknown. This number could not be determined.
Client Logon Status	2	Binary	The rejection reason. See the Rejection Code Appendix .

Logon Reject Message	Len	Type	Notes and Values
Text	40		
Pad	2		
Total	60		

Test Request Message

This message is sent by either side of the connection to request the other side to respond with a Heartbeat message, when that side does not receive a message during periods of inactivity. If the other side does not respond to a Test Request message, the application should assume an abnormal situation and terminate the TCP/IP connection.

The server sends a Test Request message only during periods of inactivity after the first heartbeat period (5 seconds). At a minimum, the client must respond to this message with a Heartbeat message. The server will disconnect the client following a subsequent period with no activity.

Test Request Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'1'
Filler	1	Not Used	
Message Length	2	Binary	The message length
Total	4		

Heartbeat Message

The Heartbeat message is used to respond to Test Request messages. It lets the other side know the connection is still good during periods of inactivity. The server heartbeat interval is 5 seconds.

At a minimum a client must be able to receive Test Request messages and respond with Heartbeat messages. During periods of activity the server will not send Test Request or Heartbeat messages and there is no need for the client to send them.

Heartbeat Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'0'
Filler	1	Not Used	
Message Length	2	Binary	The message length
Total	4		

Series Request Message

A market maker can use this message to request the full Index Series Lookup Table with a zero '0' value in the Last index Number field. This can also be used after a reconnection to get updates that might have been missed during disconnects by sending the last index number that the client received. (See also the [Logon Message](#).) Passing a negative one (-1) in the Last Index Number field causes the server to stop sending series updates.

Series Request Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'S'
Filler	1		Pad
Message Length	2	Binary	The length of the message
Last Series Index Number Processed	4	Binary	Last series index number the client has processed: 0 – send the full Index Series Lookup Table -1 – stop sending series updates N – send all series of n+1 or greater
Total	8		

Series Update Message

This message informs the market maker of a new or existing series that can trade on the OX platform. If a client requests the full Index Series Lookup Table (see the [Logon Message](#) and [Series Request Message](#)), each series in the table is sent in a Series Update message.

The server will indicate the series update process is complete by sending a message with the Series Index Number set to (-1). Clients may receive new, unsolicited updates if OX adds a new series intra-day.

Clients may receive new, unsolicited updates if OX adds new series intra-day.

Series Update Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	's'
Filler	1		Pad
Length	2	Binary	Message Length
Series Index Number	4	Binary	Identifying number for this series. 1 – N. There is a special case when this is set to "-1" indicating that the server has no more Series Update Messages to send at this time.
Underlying Quantity	4	Binary	Null (reserved for explicit symbology). The number of shares per option contract for this series
Status	1	Binary	Reserved for future use.
Corporate Action	1	Binary	Null (reserved for explicit symbology). Whether the series has been created because of corporate changes in the underlying stock. 0 = No corporate changes 1 = Created for a corporate action

Series Update Message	Len	Type	Notes and Values
Underlying Symbol	8	ASCII	The underlying stock symbol for this series.
Expiration Date	8	ASCII	In YYYYMMDD format.
Put or Call	1	ASCII	0 = Put 1 = Call
Strike Price	10	ASCII	Strike price for this series.
OCC Root	6	ASCII	The OCC root symbol for the option issue this series belongs to.
OPRA Symbol	8	ASCII	The full OPRA symbol for this series.
Padding	1		
Total	56		

Note:**Changes to Series Update Message (OSI Rollout)**

The OSI symbology change will be rolled out in three phases, each phase is outlined in the table below:

Phase One: (No OCC Symbology) – OPRA is populated with symbol, month code & strike code

Series Fast Index	Series Master Index	311	201	202	541	231	OPRA	OCC
1	478861	AAPL	1	15	20080819	100	QAAIT	QAA

Phase Two: (OCC Symbology with no Consolidation) – OPRA blank, 3-character OCC root preserved

Series Fast Index	Series Master Index	311	201	202	541	231	OPRA	OCC
2	478862	MSFT	1	15	20080819	100		MSQ

Phase Three: (OCC Symbology WITH Consolidation) – OPRA blank, OCC set to explicit

Series Fast Index	Series Master Index	311	201	202	541	231	OPRA	OCC
3	478864	GOOG	1	15	20080819	100		GOOG
4	478865	GOOG	1	15	20080819	100		GOOG1

4 Application Messages

This section describes the API Application messages. Some general points to keep in mind:

- Binary data is in signed network Endian format (Big Endian). Single byte fields are unsigned.
- All Filler and Padding fields will contain null characters.
- ASCII fields should be left justified and null padded.

Bulk Quote Message

This message sends a set of up to 300 quotes to OX. Quotes must be for series belonging to **one** underlying.

Each quote in this message represents one side of the two-sided market. Quote updates for a series replace the previous quote on the specified side of the market. **Quote prices are fixed at a scale of 2 and not variable.**

Bulk Quote Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'M'
Filler	1	Not Used	
Message Length	2	Binary	Length of this message
Bulk Quote ID	4	Binary	A client-assigned ID for this bulk quote message. This ID combined with the series index and side is a unique mapping for individual one-sided quotes.
Number Quote Messages	2	Binary	Count of quotes
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Pad	2		
From 1 to 300 one sided quotes, each consisting of the following fields:			
Series Index	4	Binary	Series Index
Price	4	Binary	Price scale fixed at 2
Volume	2	Binary	0 to 32,767
Side	1	Alpha/Numeric	"1" = Bid "2" = Ask
Pad	1		
End of one-sided quote fields			

Bulk Quote Acknowledgement Message

This message acknowledges a Bulk Quote Message. This message can contain rejection codes for any one-side quotes that failed OX validation. All other one-sided quotes were successfully processed.

Bulk Quote Ack Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'A'
Filler	1	Not Used	
Message Length	2	Binary	The length of this message

Bulk Quote Ack Message	Len	Type	Notes and Values
Bulk Quote Id	4	Binary	Client-assigned ID for the Bulk Quote being acknowledged.
Nack Count	2	Binary	Number of negative acknowledgements. Ranges from 0 to 300
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Pad	2		
From 0 to 300 quote rejections, each consisting of the following fields:			
Series Index	4	Binary	Series Index
Reject	2	Binary	Rejection reason code. See the Rejection Code Appendix .
Side	1	Alpha/Numeric	"1" = Bid "2" = Ask
Pad	1		
End of quote rejection fields			

Bulk Quote Rejection Message

This message rejects an entire Bulk Quote Message and all its one-sided quotes.

Bulk Quote Ack Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'N'
Filler	1	Not Used	
Message Length	2	Binary	The length of this message
Bulk Quote Id	4	Binary	Client-assigned ID for the Bulk Quote being rejected.
Rejection Code	2	Binary	The rejection reason. See the Rejection Code Appendix
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Pad	2		
Total	16		

Quote Takedown Request Message

This message removes quotes from OX. A message can remove all quotes for one series, all series for an underlying symbol, or all quotes for a market maker. This request only applies to quotes sent in the client session for this request.

Once a request is received, all underlying affected by the request will be flagged as out of the market and all quotes after the processing will be rejected until a Risk mitigation request is sent to be placed back into the market.

Quote Takedown Request Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'T'
Filler	1	Not Used	
Message Length	2	Binary	Message length
Series Index	4	Binary	Series to remove quotes from. This is Ignored if Symbol is non NULL ('\0') 0 – Entire Market N – specific series index number
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Underlying Symbol	8	Alpha	If non-NULL then clear all series for the underlying. If NULL ('0') the clear based on the Series Index field. Series Index Number will be identified in message.
Pad	0		
Total	20		

Quote Takedown Ack Message

This message acknowledges all Quote Takedown requests. Market makers may receive unsolicited takedown acknowledgements when the OX system pulls quotes for as a result of disconnects, regulatory action, or risk mitigation.

Market Makers may receive an Ack for every underlying that they have quotes for in OX from one Quote Takedown Request.

Quote Takedown Ack Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	't'
Filler	1	Not Used	
Message Length	2	Binary	Message Length
Series Index	4	Binary	The series that quotes were removed from. This is ignored if Underlying Symbol is non-null ('\0') 0 – Entire Market N – the specific series that had quotes removed
Rejection Code	2	Binary	The rejection reason. See the Rejection Code

Quote Takedown Ack Message	Len	Type	Notes and Values
			Appendix
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Underlying Symbol	8	Alpha	If non-NULL then clear all series for the underlying. If NULL ('\0') the clear based on the Index Number
Pad	2		
Total	24		

Risk Mitigation Request Message

Clients use this message to change the Risk Mitigation parameter(s) or to re-enable an underlying and make it eligible to receive new quotes after any of these events:

- An alert threshold has been triggered
- A user has requested quotes be pulled with a Quote Takedown Request Message
- Quotes are pulled for a client session disconnect.

Risk Mitigation Request Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'X'
Filler	1	Not Used	
Message Length	2	Binary	Message Length
Trade	2	Binary	The number of executions allowed within one second for this underlying. Can range from 5 to 100
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Underlying Symbol	8	Alpha	
Action	1	Binary	0=Update Number of Trades only 1=Update Number of Trades and place Market Maker ID back into the market.
Pad	1		
Total	20		

Risk Mitigation Ack Message

This message acknowledges processing for a Risk Mitigation Request and signals that market makers can begin sending quotes again. The message simply echoes the original Risk Mitigation Request.

Risk Mitigation Ack Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'x'
Filler	1	Not Used	
Message Length	2	Binary	Message Length
Trade	2	Binary	The number of executions allowed within one second for this underlying. Can range from 5 to 100
Rejection Code	2	Binary	The rejection reason. See the Rejection Code Appendix
Market Maker ID	4	Alpha/Numeric	OCC clearing account mnemonic.
Underlying Symbol	8	Alpha	
Action	1	Binary	0=Update Number of Trades only 1=Update Number of Trades and place Market Maker ID back into the market.
Pad	3		
Total	24		

Risk Mitigation Alert Message

OX sends this message to clients when their Risk Mitigation thresholds are breached and Risk Mitigation has been activated.

Risk Mitigation Alert Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'R'
Filler	1	Not Used	
Message Length	2	Binary	Message Length
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Underlying Symbol	8	Alpha/Numeric	
Pad	0		
Total	16		

Quote Fill (Execution) Message

This message informs the market maker there was a fill against their quote. This message contains a sequence number to prevent loss of messages during disconnections.

Clients should record the last sequence number processed from the server. In the event of a disconnect, clients sent the last sequence number processed to the server in the Logon message to have OX replay any missed messages.

The following fields in the Fill message can be used to map back to an original quote.

Quote ID maps to the original Bulk Quote message

Series Index and Side will map to the actual quote within that Bulk Quote message.

The Execution ID is used to identify a unique execution in the OX system per session ID. The Bust or Correct message uses this ID to map to this execution

Quote Fill Message	Len	Type	Notes and Values
Message Type	1	Alpha/Numeric	'f'
Filler	1	Not Used	
Message Length	2	Binary	Message length
Sequence Number	4	Binary	OX sequence number
Transaction Time	4	Binary	Time the message was sent in milliseconds since Midnight.
Series Index	4	Binary	The series for this quote
Execution Id	8	Binary	ARCA issued ID for this execution.
Quote Id	4	Binary	Client-assigned quote ID
Last Contracts	4	Binary	Number of contracts filled
Last Price	4	Binary	Price at which the contracts were filled
Market Maker Id	4	Alpha/Numeric	OCC clearing account mnemonic.
Price Scale	1	Alpha/Numeric	"0" – "4"
Liquidity Indicator	1	Alpha/Numeric	A = added R = removed O = opening auction
Side	1	Alpha/Numeric	"1" = Bid "2" = Ask
Pad	5		
Total	48		

Bust or Correct Message

This message is sent when a trade has been busted or corrected. In all cases the trade desk will have discussed the bust or correction with the MM prior to entry.

The Execution Id can be used to map to the original execution message.

Bust or Correct Message	Len	Type	Notes and Values
Message Type	1	Alpha/numeric	'C'
Filler	1		
Message Length	2	Binary	The length of the message
Sequence Number	4	Binary	ARCA-assigned sequence number
Transaction Time	4	Binary	Time the message was sent in milliseconds since Midnight.
Quote Id	4	Binary	Client-assigned ID of the quote that is being busted or corrected.
Execution Id	8	Binary	ARCA -assigned ID for this execution.
Quantity	4	Binary	Contracts
Price	4	Binary	Corrected price on a correct message
Price Scale	1	Alpha/Numeric	"0" – "4"
Type	1	Numeric	1 = Bust 2 = Correct
Padding	6		Padding
Total	40		

Appendix: Recovery Example

Successful Reconnect Example:

OX has ten executions to send to the client. A disconnect occurs during communication between the server and client and the client only receives four messages.

When the Client reconnects, it sends the number 4 back to the server as the last sequence number processed. The server starts replaying messages with message 5.

Unsuccessful Reconnect Example

OX has ten executions to send to the client. A disconnect occurs during communications between the server and client and the client only receives four messages.

The Client reconnects to the server and passes a last sequence number of 11. In this situation there is something functionally wrong between the sessions.

The Server will send a Logon Reject with a reject code of "Invalid Sequence number" and a Last Sequence Number Sent of 10. OX will close the connection.

The client has two choices to reconnect successfully:

- Logon with a Last Sequence Number Processed of 10.
- Logon with a Last Sequence Number Processed of negative one (-1). This will turn off the sequence number validation check on the server. The client should contact the ARCA connectivity group to determine what else may need to be done.

Appendix: Rejection Codes

Reject number	Name	Description
0	Success	No Reject
1	System Unavailable	The Trading System is unavailable.
2	Crossed NBBO	The quote received crossed the NBBO
3	Invalid Sequence Number	The Last Sequence Number in a Logon message is larger than MM Direct expected. This identifies recoverable responses such as execution reports.
4	Invalid Series Index	The series index number in the message is greater than MM Direct expected.
5	Series Non-Active	Reserved for future use.
6	Series Index Less than zero	The series index value is invalid.
7	Client Session Already Active	The user has attempted to login when an existing client session is still active. Only one client session is supported per user.
8	Client Session Disabled	The user has attempted to reconnect to a disabled client session.
9	Invalid MMID	The market maker ID is invalid.
10	Invalid Series	The Series request is not valid or configured in OX.
11	Invalid Underlying	The underlying for a quote does not match the underlying for this bulk quote message. All quotes in a bulk quote message must be for series belonging to one underlying.
12	Invalid Price	The price is invalid.
13	Invalid Size	The volume is less than zero.
14	Unknown Underlying	The underlying symbol does not match any known underlying.
15	Invalid Market Maker for Underlying	The market maker does not make markets for the underlying for this quote.
16	Invalid Market Maker	The market maker specified is not defined as a market maker.
17	Logon Read Failed	An error occurred reading the Logon message. Since the session name could not be determined, the last sequence number and last series index values in the rejection message are set to -1 (unknown).
18	Not Logon Message	The first message received from a client was not a Logon message. Since the session name could not be determined, the last sequence number and last series index values in the rejection message are set to -1 (unknown).
19	User Name Not Found	The user name from the Logon message is invalid.

Reject number	Name	Description
20	Risk Mitigation Limit Exceeded	The quote was rejected because it caused the market maker to exceed his risk mitigation limit or because he has already exceeded this limit.
21	Invalid quote count	The value in the Number of Quote Messages field in a Bulk Quote message is invalid (0 or negative).
22	Invalid underlying symbol	The message contained an invalid or unknown underlying symbol.
23	Invalid side	The quote contained an invalid value for Side.
24	Invalid price increment	The quote price is invalid. Prices are invalid for options that use nickel/dime price increments if the price is in pennies or if the price is greater than \$3.00 but is not a dime increment.
25	Series is halted	Same as name.
26	MM is not active	Market maker is not set as active for underlying the series belongs to.
27	Duplicate quote id	Two consecutive mass quotes for the same underlying cannot have the same QuoteID.
28	Internal error	There are some internal conditions that prevent the processing of the quote. No details are provided because the reason for the problem maybe unknown.
29	Market is closed	Same as name.
30	The risk mitigation value is greater than 100	Risk mitigation value cannot be greater than 100.
31	Disconnect Takedown	Quote systems not connected.
32	Series Closed	A series is closed