



MIAX Product Feed

MPF Interface Specification

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Table of Contents

1	OVERVIEW	2
1.1	EXCHANGE RELATED INFORMATION	2
1.1.1	Hours of operation for MIAX Options Exchange.....	2
1.1.2	Obtaining more information	3
1.2	TESTING OF MPF SUBSCRIPTION.....	3
1.3	ANSWERS TO FAQs	3
1.4	DATA TYPES.....	3
2	MPF ARCHITECTURE	4
3	SESSION LEVEL PROTOCOL.....	5
3.1	REAL-TIME MPF FEED.....	5
3.2	MPF RETRANSMISSION INTERFACE.....	5
3.2.1	SesM Gap Fill Service	5
3.2.2	Last Value Refresh Service	5
3.2.3	Session Termination.....	6
4	APPLICATION MESSAGE FORMATS.....	7
4.1	MIAX SYSTEM TIME MESSAGE	7
4.2	SYMBOL DEFINITION MESSAGE	7
4.3	INDEX VALUE	8
4.4	SYNTHETIC FUTURE VALUE	8
	APPENDIX A: MIAX MPF SUBSCRIPTION/CONNECTIVITY INFORMATION.....	10
	APPENDIX B: CONTACT LIST.....	11
	APPENDIX C: REVISION HISTORY.....	12

1 Overview

MIAX Product Feed (**MPF**) is a data feed that allows subscribers to receive real-time updates of the following information from the MIAX Options Market

- Values of Indices, Settlements and Synthetic Futures calculated by MIAX.

MPF Features:

MPF messaging and the system architecture are designed for low latency and high throughput messaging. Some of the key features of the interface are:

- MPF uses binary numeric fields and fixed length ASCII fields to utilize bandwidth efficiently and assist in achieving **low latency**.
- Message formats are designed to use **less bandwidth**. MPF disseminates a separate Seconds message instead of sending this with every message
- MPF uses binary message formats and bundles multiple application messages into a single packet in order to facilitate **high throughput**.
- MPF is offered with redundant multicast feeds (A Feed & B Feed) to provide single point of failure hardware and network fault tolerance and to provide an opportunity for recipients to arbitrate the two feeds to auto-fill gaps.
- MPF real-time messages are disseminated over multicast to achieve a fair delivery mechanism.
- MPF requires the use of MIAX proprietary SesM over TCP/IP protocol for retransmission lines in order to provide a **guaranteed delivery** mechanism for gap fills.
- The MPF retransmission service also provides a “Last Value Refresh Service” to facilitate fast intra-day recovery without a full day gap fill.
- MPF notifications provide current **electronic system status** allowing the subscribers to take necessary actions immediately.

This specification is intended to be used by MIAX MPF subscribers only.

1.1 Exchange related information

1.1.1 Hours of operation for MIAX Options Exchange

Please refer to MIAX website at <http://www.MIAXOptions.com> for details about times for each of these events.

Note: Times specified below are in United States Eastern Time zone.

Start of Session: Start of dissemination of messages. After 5:00 a.m.

Trading Session for Equity Options: 9:30 a.m. to 4:00 p.m. (ends at 1:00 p.m. on early closing days).

Trading Session for ETF and Index Options: 9:30 a.m. to 4:15 p.m. (ends at 1:15 p.m. on early closing days).

1.1.2 Obtaining more information

Information such as (but not limited to) membership, rules, data feeds, fees and support can be obtained by sending an email to Trading Operations or by referring to MIAX website at <http://www.MIAXOptions.com>.

1.2 Testing of MPF Subscription

MIAX can provide testing assistance on MIAX testing area for the retransmission interface.

Please contact MIAX Trading Operations to obtain more information about the aforementioned.

1.3 Answers to FAQs

Subscription: Please contact Trading Operations for details about subscribing to MPF.

Symbol management: Subscribers to the data feed will get a list of all Synthetic Future Symbols at the start of every session. If subscribers cannot start listening to the feed in time for the normal symbol broadcast, they can connect to the MPF Retransmission service and request the symbol list.

Retransmission: Gap-fill packets generated as a response to retransmission requests are only disseminated on the retransmission TCP channels and not on the real-time multicast feeds.

Redundant Feeds: In order to achieve higher availability, MIAX offers the real-time MPF feed in two separate redundant and identical feeds named “A Feed” and “B Feed”. Firms are advised to arbitrate between the two feeds in order to mitigate gaps and achieve higher availability. “A Feed” is the primary feed from the primary data center and “B Feed” is the secondary feed from the secondary data center.

Refresh Service: Refresh service is provided only on the retransmission TCP channels and does not affect the real-time MPF feed.

1.4 Data Types

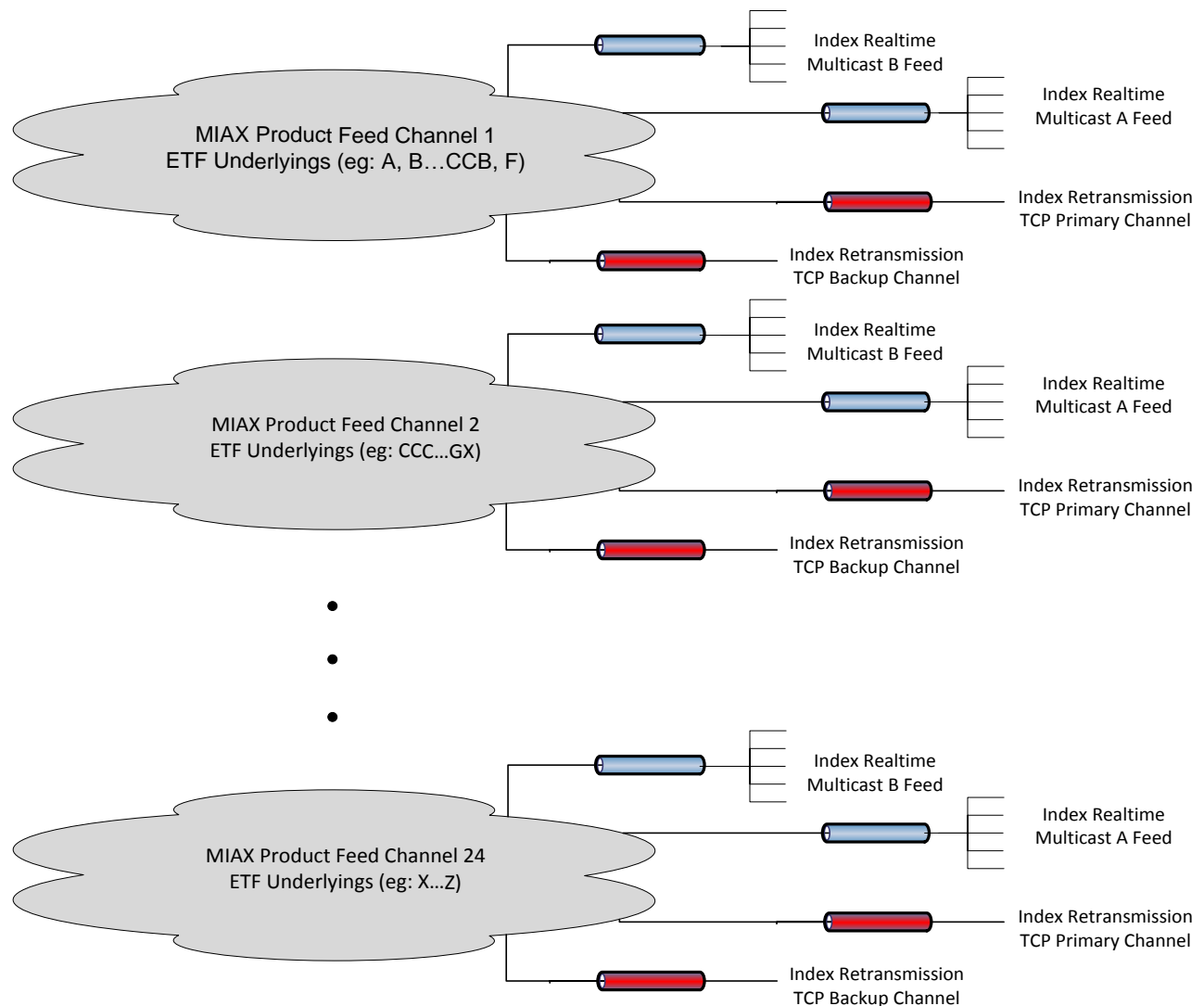
The following table describes the data types used in MPF messaging:

Note: Time fields in all messages are as per timings of United States Eastern Time zone unless specified otherwise.

Data Type	Description
BinaryU	Unsigned, Intel x86 byte-ordered (little-endian), binary encoded numbers
BinaryPrc4U	BinaryU Field with the last 4 (right most) digit places being decimal places
BinaryPrc2U	BinaryU Field with the last 2 (right most) digit places being decimal places
SecTime	BinaryU field that contain transaction time in seconds since Epoch (January 1, 1970, 00:00:00 UTC)
NanoTime	BinaryU field that contain transaction time in nanoseconds since past second
Alphanumeric	Each place can contain characters or numbers. Left justified and space-padded on the right

2 MPF Architecture

MIAX Product Feed Architecture



Highlights:

- Real-time dissemination is separated out on to 24 separate Feed channels.
- A given index will be disseminated over a single Feed channel.
- Each Feed channel sources independently from the other groups and hence has independent sequence numbers.
- All the messages on each feed channel will be published in FIFO sequence.
- High availability is achieved by disseminating identical data on an “A Feed” and “B Feed” for each Feed channel

- Two separate TCP based retransmission channels for each Feed channel supply MPF retransmission via the MPF Retransmission Interface.

3 Session Level Protocol

3.1 Real-time MPF Feed

MPF real-time feed uses MIAX’s proprietary **MACH protocol**. Each MPF Packet may have multiple application messages and each application message is encapsulated in a MACH protocol packet. Hence a single MPF packet may contain 1 or more sequenced MACH protocol packets.

Please refer to MACH document (available at the [MIAX website](#)) for details about MACH protocol. This protocol layer offers low latency application messaging over multicast, sequencing of messages and heartbeats.

3.2 MPF Retransmission Interface

MPF Retransmission Interface uses MIAX’s proprietary **SesM – TCP Session Management Protocol**. Please refer to the latest SesM TCP Session Management document (available at the [MIAX website](#)) for details about SesM session management protocol. This protocol layer offers session management capabilities such as authentication, application messaging over TCP/IP, sequencing of messages, heartbeats and gap fills.

Firms must first use the `Login Request` with a requested sequence number of **zero** to login to the Interface. After receiving a successful `Login Response`, the firm can choose either the SesM Gap Fill Service or Last Value Refresh Service.

3.2.1 SesM Gap Fill Service

Firms can use the **Retransmission Request** session management message, available in the SesM protocol, to request retransmission of a specific range of packets, identified by sequence numbers.

3.2.2 Last Value Refresh Service

3.2.2.1 Request Message to MIAX

Firms can use the **Unsequenced Data Packet**, available in the SesM protocol, to request a last value refresh of various MBBO market data and status information. The Refresh Request has the following format:

Field Name	Length	Data Type	Notes
<i>SesM Packet Length</i>	2	Binary	
<i>SesM Packet Type</i>	1	Alphanumeric	'U' – SesM Unsequenced Packet
Request Type	1	Alphanumeric	"R" – Refresh
Refresh Message Type	1	Alphanumeric	"s" - Symbol Definition Refresh "I" - Index Update Refresh "Z" - Synthetic Future Values Refresh

3.2.2.2 Response Message from MIAX

The Retransmission feed will respond to the Refresh request with a series of SesM-TCP “unsequenced packets” based on the Refresh Message Type. Each response message will have the following format:

Field Name	Length	Data Type	Notes
SesM Packet Length	2	Binary	
SesM Packet Type	1	Alphanumeric	'U' – SesM Unsequenced Packet
Response Type	1	Alphanumeric	“R” – MPF Refresh
Sequence Number	8	BinaryU	Original sequence number from live feed.
Application Message	varies	See section 4	Based on the message type requested.

The first SesM-TCP packet to be received by the firms will be the MIAX System Time Message (See section 4.1). The timestamp (combined with the nanosecond part in the subsequent messages) represents the most recent Matching Engine transaction time. It is **not** the original timestamp from the MACH sequenced messages in the live feed. *The sequence number in the refresh messages may be used to arbitrate with the sequenced packets from live feed (eg: data with higher sequence number from either the refresh or the live feed represents latest information).*

3.2.2.3 End of Refresh Notification from MIAX

When the refresh is complete MIAX will send the following message.

Field Name	Length	Data Type	Notes
SesM Packet Length	2	Binary	
SesM Packet Type	1	Alphanumeric	'U' – SesM Unsequenced Packet
Response Type	1	Alphanumeric	“E” – End of Request.
Refresh Message Type	1	Alphanumeric	from Refresh Request

3.2.3 Session Termination

After satisfying the retransmission request, MPF Retransmission Interface will send a Goodbye Packet and disconnect the TCP connection.

Note: Upon receipt of an unknown, malformed or illegal session message, MIAX will send a SesM “Goodbye Packet” with a human readable reason text string and MIAX will disconnect the line.

4 Application Message Formats

This section consists of format of messages sent over the MPF feed.

The time specified in the *Timestamp* field in all the messages below is the time at which the Matching Engine associated with that underlying group published the message. This is the same timestamp that will get included in the messages transmitted on the retransmission interface.

4.1 MIAX System Time Message

This is the message format that will be used to disseminate the “seconds” part of the timestamp that is applicable to all messages that are sent in the current second.

Field Name	Length	Data Type	Notes
<i>MACH Protocol Data</i>			<i>Refer to MACH Protocol Specification</i>
Message Type	1	Alphanumeric	“1”
Time Stamp	4	SecTime	Seconds part of the time that applies to all messages that gets disseminated until this message gets sent again.

Points to note:

- Note that this message is only sent when there are any application messages that are going to be sent during any second. Firms are advised to not assume that there will be a message for every second of the day.

4.2 Symbol Definition Message

This is the message format that will be used to disseminate all Synthetic Future symbol definitions for the current session.

Field Name	Length	Data Type	Notes
<i>MACH Protocol Data</i>			<i>Refer to MACH Protocol Specification</i>
Message Type	1	Alphanumeric	“s”
Product Add/Update Time	4	NanoTime	Time at which this product is added/updated on MIAX system today.
Synthetic Future Symbol	8	Alphanumeric	Synthetic Future Symbol: The first 3 characters are the base symbol, followed by a single character expiration month code and a single digit expiration year code.
Settlement Date	8	Alphanumeric	Settlement date of the Option associated with the Synthetic Future in YYYYMMDD format
Symbol Status	1	Alphanumeric	Indicates if this Synthetic Future symbol is going to get price updates on MIAX in the current session: “A” = Active Future “I” = Inactive Future

Field Name	Length	Data Type	Notes
Reserved	16	BinaryU	** Reserved for future use **

Points to note:

- Expiration month code: Jan=F, Feb=G, Mar=H, Apr=J, May=K, Jun=M, Jul=N, Aug=Q, Sep=U, Oct=V, Nov=X, Dec=Z.
- Expiration year code: Last digit of the year.
- Entire Symbol list will be disseminated at the start of day.
- Intra-day updates will also be published as they occur.
- In case of an intra-day reconnection, users can request all Symbols from the MPF retransmission line.

4.3 Index Value

This is the message format that will be used to disseminate current index value. The index value may be the index cash value or the index settlement value, as identified by the Index Symbol.

Field Name	Length	Data Type	Notes
<i>MACH Protocol Data</i>			<i>Refer to MACH Protocol Specification</i>
Message Type	1	Alphanumeric	"I"
Index Time	4	NanoTime	Time at which this index value was calculated.
Symbol	5	Alphanumeric	Index or Settlement Symbol
Value	4	BinaryPrc2U	Index or Settlement Value

Points to note:

- The index value is calculated on regular periodic interval (e.g. every 100 milliseconds) as determined by the exchange.
- The Index Value message is published every time a new index value is calculated, regardless if the value changed. (On extremely rare market situations, if the index cannot be calculated, the Index Value message will not be published.)

4.4 Synthetic Future Value

This is the message format that will be used to disseminate current Synthetic Future values. The specific Synthetic Future value is identified by the Synthetic Future Symbol.

Field Name	Length	Data Type	Notes
<i>MACH Protocol Data</i>			<i>Refer to MACH Protocol Specification</i>
Message Type	1	Alphanumeric	"Z"
Future Time	4	NanoTime	Time at which this Synthetic Future value was calculated.
Synthetic Future Symbol	8	Alphanumeric	Synthetic Future Symbol
Value	4	BinaryPrc2U	Synthetic Future Value

Field Name	Length	Data Type	Notes
Reserved	8	BinaryU	** Reserved for future use **

Points to note:

- The Synthetic Future Value is calculated on regular periodic interval (e.g. every 100 milliseconds) as determined by the exchange.
- The Synthetic Future Value message is published every time a new Synthetic Future Value is calculated, regardless if the value changed. On extremely rare market situations, if the Synthetic Future cannot be calculated, the Synthetic Future Value message will not be published.

Appendix A: MIAX MPF Subscription/Connectivity Information

Please visit MIAX website at <http://www.MIAXOptions.com> to obtain the most up-to-date information about the following:

- Real-time Feed multicast groups, ports for A feed and B Feed
- Retransmission IP addresses and ports for primary and backup channels.

Appendix B: Contact List

Please visit MIAX website at <http://www.MIAXOptions.com> to obtain the most up-to-date contact list and other such information.

Appendix C: Revision History

Revision Date	Version	Author	Description
Aug 21, 2018	1.0	David Lehmann	First release.
Feb 20, 2019	1.1	Vinay S. Rao	Added Synthetic Future Symbols message and Synthetic Future Value messages.