SMP ISO – Messaging Service for Proprietary Networks for ISO 20022 messages

Technical Specifications & FIX Catalog

DI-GMAD | JUN-2017

Version 1.6

Contents

1. Differences SMP / SMPISO

Functionality	SMP	SMP ISO
MsgType	UPRQ UPRP	n
ClOrdID	Identifier of message entered by participant. Format: XXXXXXXXAAAAMMDDSSSSSSS. Total of **23** positions, where: XXXXXXXX – institution's Code in the BVMF; YYYYMMDD – current date; SSSSSSS-sequential.	Unique identifier of the message given by the participant. Total of **35** positions. This handle is formed by: • the first 8 positions is the participant code. If the participant ID number is less than 8 digits, leading zeros must be completed. eg: **00123456** • followed the year, month and day. eg: **20111228** • and another is incremental number one of 19 positions. If the incremental number is less than 19 digits, leading zeros must be completed. eg: **0000000000000007890** This field has be same value from BizMsgIdr tag
Error message	GEN0004	tsmt.016.001.03 – ErrorReportV03
XMLContent	TGP Catalog	ISO 20022 Catalog

2. Preface

2.1. Introduction

BM&FBOVESPA provides a communication interface for post-trade systems using the Financial Information eXchange (FIX) Protocol. FIX is used as the means of communication, while business data continue to be encapsulated in the XML format established by the TGP catalog.

FIX is a set of technical specifications for the electronic communication of trade-related messages. It is an open standard maintained by the members of FIX Protocol Ltd. (http://www.fixprotocol.org/).

This document describes BM&FBOVESPA's implementation of FIX for post-trade messaging over dedicated private networks and is intended for use by third parties who need systems connectivity via a FIX interface. Readers are assumed to have basic knowledge of how the FIX Protocol works.

2.2. Abbreviations

Abbreviation	Meaning
FIX	Financial Information eXchange Protocol
IP	Internet Protocol
SSL	Secure Sockets Layer (secure link – padlock symbol in browser)
TCP	Transmission Control Protocol (transport layer of TCP/IP)
SMPISO	Messaging System for Proprietary Networks (ISO 20022)
RCCF	Financial Community Communications Network (Rede de Comunicação da Comunidade Financeira – BM&FBOVESPA)
RCB	BM&FBOVESPA Communications Network (Rede de Comunicação BM&FBOVESPA)
VPN	Virtual private network

3. Network Connection to SMPISO

BM&FBOVESPA offers network connectivity via:

- RCCF
- VPN (internet)

These options are explained below.

3.1. Physical connection/connection via link

3.1.1. RCCF/RCB

RCCF and RCB are networks that connect all brokerage houses to BM&FBOVESPA, as well as some dealers and other customers who opt to use them. They enable specific service level agreements (SLAs) and contingency functionalities. They are typically used to receive market data feed and trade-related messages.

3.1.2. VPN

Customers can also connect to BM&FBOVESPA via the internet using a VPN tunnel. This is a way to reduce cost, but enables neither contingency nor SLAs. BM&FBOVESPA supports VPNs via both software and hardware. This type of connection can be used in the certification process, even where connectivity in the production environment is via RCCF or RCB.

3.2. Data encryption

BM&FBOVESPA does not support built-in FIX encryption. Connections are secured by lower layers and by means of physical isolation for dedicated links.

3.3. Throttle mechanism

The throttle mechanism controls the flow of messages at the session level and is designed to regulate the number of messages sent to BM&FBOVESPA in order to optimize system performance.

The throttle is set at a specified number of messages per second. If the limit is exceeded, excess messages can be queued or rejected.

Two parameters must therefore be set: an upper limit for the number of messages per second to be processed by the gateway; and whether messages that exceed that limit are rejected or sent to the queue for processing in the next period.

If a message exceeds the upper limit, it may be rejected or sent to the queue. If it is rejected, the following error message is sent: "Message rejected by business rule" with BusinessRejectReason = "Throttle limit exceeded". The customer's system can associate the error message with the original message by checking the contents of field 45 (RefSeqNum). This field contains the sequence number of the rejected message (field 34).

If the parameter set is non-rejection, the throttle mechanism holds excess messages until the second ends, in which case there may be a slight delay in receiving a response.

Assuming a limit of 50 messages per second, the first one-second period begins when the FIX gateway receives the first message, and if more than 50 messages are sent before the next second begins, they are either rejected or sent to the queue.

4. Counterparty Identification

4.1. FIX CompID

FIX connections are established on the basis of the "CompID" tag, which identifies the counterparty for the connection at the session level. CompID conveys no trader or broker information and are used only at the FIX session level, as per the following specification:

	Sender CompID	OnBehalfOf CompID	Target CompID	DeliverTo CompID
A sends directly to B	A		B	
B sends directly to A	B		A	

4.2. FIX CompID assignment

BM&FBOVESPA assigns a FIX CompID to each counterparty when the connection is made. Codes vary according to category (bank, broker, vendor etc).

5. Certification

Before connecting to BM&FBOVESPA, counterparties must complete the certification process according to the activity to be performed. If you wish to begin certification with BM&FBOVESPA, please email bvmfsolution@bvmf.com.br.

5.1. Network configuration certification

Network configuration is provided by means of a FIX certification communication port. The physical link used for certification must be different from the production link because an application is being certified. A customer's application that operates via RCCF or a dedicated link in the production environment can therefore be certified via a VPN connection over the internet.

6. SMPISO Fault Tolerance

Customers who connect to BM&FBOVESPA's post-trading communications system benefit from fault tolerance assured by distributed data centers and compartmentalized services.

6.1. Distributed data centers

BM&FBOVESPA has two data centers located at geographically remote sites, assuring complete fault tolerance in the event of physical occurrences. These data centers are called CT1 and CT2. If CT1 is affected by a problem that prevents it from operating, the appropriate applications are redirected to CT2

6.2. Compartmentalized services

All components of BM&FBOVESPA's post-trading communications system are bundled into clusters, which are redirected to the backup device or facility in the event of a hardware failure. These clusters have an active-passive configuration so that the backup component is inactive whenever the primary component is active but automatically takes control in the event of a failure.

Redirection of components by BM&FBOVESPA should be transparent to customers using these connections.

However, if a FIX communications port is redirected, the customer using the connect will be affected. FIX communications ports operate as a cluster in CT1, mirrored by an identical cluster in CT2 (totaling four instances). When a port in the primary data center (CT1) fails, the backup port restores the connection. FIX sequence numbers are shared by FIX communications ports in the same cluster, so that if a customer's connection is redirected to two ports in the same data center the customer receives a Logout message from BM&FBOVESPA, followed immediately by a Logon message. The sequence numbers are identical in both connections, so the need for resynchronization will be minimal.

In the event of a major failure requiring redirection to CT2, the expected inbound and outbound sequence numbers on the BM&FBOVESPA side will be set to one.

7. Standard Header & Trailer

7.1. Standard header

All messages in both directions must start with the standard FIX header.

Field	Name	Required	Format	Comments
8	BeginString	Y	String	Identifies start of new message and version of FIX Protocol: FIX.4.4
9	BodyLength	Y	Int	Message size. Not encrypted. Must always be second field of message.
35	MsgType	Y	String	Message type. Not encrypted. Must always be third field of message.
34	MsgSeqNum	Y	Int	Message sequence number.
43	PossDupFlag	N	Boolean	Indicates possible message retransmission with same sequence number.
49	SenderCompID	Y	String	Assigned value identifying message sender: contact BM&FBOVESPA for assignment of appropriate SenderCompID (Section 3.2).
56	TargetCompID	Y	String	Assigned value identifying message recipient: contact BM&FBOVESPA for assignment of appropriate TargetCompID (Section 3.2).
115	OnBehalfOfCompID	N	String	Assigned value used to identify customer's brokerage firm (if any) originating message delivered by BM&FBOVESPA or customer's trading partner (if any) for message received by BM&FBOVESPA.
128	DeliverToCompID	N	String	Assigned value used to identify customer's trading partner (if any) for message by BM&FBOVESPA or customer's brokerage firm (if any) for message received by BM&FBOVESPA.
52	SendingTime	Y	UTCTimestamp	Time of message transmission expressed in UTC (Universal Time Coordinated).
97	PossResend	N	Boolean	

7.2. Standard trailer

All messages in both directions must end with the standard FIX trailer.

Field	Name	Required	Format	Comments
10	CheckSum	Y	Int	Not encrypted. Must always be last field of message.

8. Summary of Messages

8.1. Summary of session messages

The following table summarizes the session messages supported by BM&FBOVESPA:

Message	Type of FIX message	Transmitted by BM&FBOVESPA	Received by BM&FBOVESPA
Logon	A	X	X
Heartbeat	0	X	X
Test Request	1	x	X
Resend Request	2	x	X
Reject	3	X	X
Sequence Reset	4	X	X
Logout	5	X	X

8.2. Summary of application messages

The following table summarizes the application messages supported by BM&FBOVESPA:

Message	Type of FIX message	Transmitted by BM&FBOVESPA	Received by BM&FBOVESPA
XML MESSAGE	n~~N~~	X	X

Any messages not supported by BM&FBOVESPA will be rejected with a BusinessMessageReject message, in which BusinessRejectReason (380) = 3 (unsupported message type).

9. Session messages

This section describes in detail the session management messages used by BM&FBOVESPA.

9.1. Logon (message type = A)

The type A logon message authenticates a user establishing a connection to a remote system. It must be the first message sent by the application requesting the start of a FIX session.

N.B. Customers can change their password (tag 95) by sending tag 925 with new password.

Field	Name	Required	Format	Comments
[Standard message header]				
98	EncryptedMethod	Y	Int	Must always be 0.
108	HeartBtInt	Y	Int	Recommended heartbeat interval = 30 seconds.
141	ResetSeqNumFlag	N	Boolean	Reset message sequence numbers.
789	NextExpectedMsgSeqNum	N	Int	Next expected sequence number to be received.
464	TestMessageIndicator	N	Boolean	Indicates test or production connection.
95	RawDataLength	N	Length	Number of bytes in raw data field.
96	RawData	N	Data	Required when message contains authentication data (password).
553	UserName	N	String	CAU's service username. Required when message connection.
[Standard message trailer]				

IMPORTANT: BM&FBOVESPA strongly advises customers not to reset logon sequence numbers (tag 141=Y). In the event of a disconnect, resetting sequence numbers is likely to result in loss of messages transmitted by the session while disconnected.

9.2. Heartbeat (message type = 0)

The Heartbeat (0) monitors the status of the communication link and identifies when the last of a string of messages was not received.

Field	Name	Required	Format	Comments
[Standard message header]				
112	TestReqID	N	String	Required when heartbeat is result of test request message.
[Standard message trailer]				

9.3. Test Request (message type = 1)

The Test Request message (1) forces a heartbeat from the counterparty, checking sequence numbers or verifying communication line status. The opposite application will respond to the Test Request with a Heartbeat (0) reflecting the TestReqID field (112) contained in the request.

Field	Name	Required	Format	Comments
[Standard message header]				
112	TestReqID	Y	String	Required ID for testing. Field included in Test Request message to be returned by resulting heartbeat.
[Standard message trailer]				

9.4. Resend Request (message type = 2)

A Resend Request is sent by the receiving application to initiate the retransmission of messages. This function is utilized in three situations: if a sequence number gap is detected, if the receiving application loses a message or as part of the initialization process.

Field	Name	Required	Format	Comments
[Standard message header]				
7	BeginSeqNo	Y	Int	Message sequence number of first message in range to be resent.
16	EndSeqNo	Y	Int	Message sequence number of last message in range to be resent. If request is for a single message BeginSeqNo = EndSeqNo. If request is for all messages subsequent to a particular message, EndSeqNo = "0" (representing infinity).
[Standard message trailer]				

9.5. Reject (message type = 3)

The Reject message (3) must be issued when a message is received but cannot be properly processed due to a session-level rule violation.

Field	Name	Required	Format	Comments
[Standard message header]				
45	RefSeqNum	Y	Int	Message sequence number of rejected message referenced.
371	RefTagID	N	Int	Tag number of FIX field referenced.
372	RefMsgType	N	String	Type of FIX message referenced.
373	SessionRejectReason	Y	Int	Code identifying reason for session-level message rejection. Values accepted: 0 = invalid tag number 1 = required tag missing 2 = tag not defined for this message type 3 = undefined tag 4 = tag specified without a value 5 = value is incorrect (out of range) for this tag 6 = incorrect data format for value 9 = CompID problem 10 = SendingTime accuracy problem 11 = invalid message type 13 = tag appears more than once 14 = tag specified out of required order 15 = repeating group fields out of order 16 = incorrect NumInGroup count for repeating group 17 = non-numerical data value includes field delimiter (SOH delimiter) 99 = other
58	Text	N	String	Message explaining reason for rejection whenever possible.
[Standard message trailer]				

9.6. Sequence reset (message type = 4)

There are two modes of Sequence Reset message (4): Gap Fill and Reset.

Gap Fill mode is used in response to a Resend Request (2) when one or more messages must be skipped.

Reset mode involves specifying an arbitrarily higher new sequence number to be expected by the receiver of the Sequence Reset message (4) and is used to reestablish a FIX session after an unrecoverable application failure.

Field	Name	Required	Format	Comments
[Standard message header]				
123	GapFillFlag	N	Boolean	Indicates that Sequence Reset message is replacing administrative or application messages which will not be resent. Values accepted: Y = Gap Fill message, MsgSeqNum valid N = Sequence Reset, ignore MsgSeqNum
36	NewSeqNo	Y	Int	New sequence number.
[Standard message trailer]				

9.7. Logout (message type = 5)

The logout message (5) initiates or confirms the termination of a FIX session. Disconnection without the exchange of logout messages should be interpreted as an abnormal condition.

Field	Name	Required	Format	Comments
[Standard message header]				
58	Text	N	String	Message explaining reason for logout (if any).
[Standard message trailer]				

10. Post-Trade Messaging

10.1. Session times

FIX session will be available:

- Monday to Friday from 05:00am to 11:59pm and from 00:00 to 01:00am (Brazil-Brasília time)
- Saturday from 00:00 to 01:00am (Brazil-Brasília time)

The FIX session sequence reset **should** occur every day at **05:55am UTC.** The sequence number to inbound and outbound (*NextInboundSeq* and *NextOutboundSeq*) of FIX messages should be set to value 1.

P.S.: If the sequence number has not been restarted at the time quoted above, there will be message retransmission.

10.2. Application messages (message type = n)

10.2.1. Request message

Used by an institution to request processing from BM&FBOVESPA.

Field	Name	Required	Format	Comments
[Standard message header]				
11	ClOrdID	Y	String	Unique identifier of the message given by the participant. Total of **35** positions. This handle is formed by: • the first 8 positions is the participant code. If the participant ID number is less than 8 digits, leading zeros must be completed. eg: **00123456** • followed the year, month and day. eg: **20111228** • and another is incremental number one of 19 positions. If the incremental number is less than 19 digits, leading zeros must be completed. eg: **0000000000000007890** This field has be same value from **BizMsgIdr** tag
60	TransactTime	Y	UTCTimestamp	Time when message was generated, expressed in UTC.

453	NoPartyIDs		Y	NumInGroup	Repeating group below should contain unique combinations of PartyID, PartyIDSource and PartyRole. Value accepted: 1.
447	>>	PartyIDSource	Y	Char	Identifies class or source of PartyID (448) value. Value accepted: D = proprietary/ individual code.
448	>>	PartyID	Y	String	Identifies participant (participant number).
452	>>	PartyRole	Y	Int	Identifies type or function of PartyID (448) specified. Values accepted: 7 = broker.
20002	XMLContentLen		Y	Int	Size of XML message contained in XMLContent field
20001	XMLContent		S	String	XML message from ISO 20022 catalog to receiving system.
9225	MessageID		S	String	Identifies message to receiving system. eg: bvmf.001.01
[Standard message trailer]					

10.2.2. Response message

Used by BM&FBOVESPA to transmit a notification to a participant.

Field	Name	Required	Format	Comments
[Standard message header]				
11	ClOrdID	Y	String	Unique identifier of the message given by the participant. Total of **35** positions. This handle is formed by: •BV + system identification. If the incremental number is less than 6 digits, leading zeros must be completed. In the example 336 is the SINCAD system (Registration of Participants and Accounts) eg: **BV000336** • followed the year, month and day. eg: **20111228** • Number of system instance. eg: **1308** • and another is a number of 15 positions. If the incremental number is less than 15 digits, leading zeros must be completed. eg: **000000000007899**

				This field has be same value from **BizMsgIdr** tag
60	TransactTime	Y	UTCTimestamp	Time when message was generated, expressed in UTC.
453	NoPartyIDs	Y	NumInGroup	Repeating group below should contain unique combinations of PartyID, PartyIDSource and PartyRole. Value accepted: 1.
447	>> PartyIDSource	Y	Char	Identifies class or source of PartyID (448) value. Value accepted: D = proprietary/ individual code.
448	>> PartyID	Y	String	Identifies participant (participant number).
452	>> PartyRole	Y	Int	Identifies type or function of PartyID (448) specified. Values accepted: 7 = broker.
20002	XMLContentLen	Y	Int	Size of XML message contained in XMLContent field
20001	XMLContent	Y	String	XML message from ISO 20022 catalog to receiving system.
9225	MessageID	Y	String	Identifies message to receiving system. eg: bvmf.002.01
[Standard message trailer]				

10.2.3. Response and notification messages

Response messages are transmitted in the same FIX session as the respective request message. Notification messages are sent by BM&FBOVESPA in the primary FIX sessions. An institution's primary FIX session is the session whose name ends with **0**.

10.2.4. Error messages and Connectivity

The error message (tsmt.016.001.03 – ErrorReportV03) will be available in the same FIX session where the original message was sent with error.
The connectivity message response (tsmt.001.001.03 - Acknowledgment) will be available in the same FIX session where the connectivity test request message (tsmt.038.001.03 - StatusReportRequest) was sent.

10.2.5. Proxy

Proxies are not allowed in post-trade messaging via the FIX Protocol. Instead, one or more FIX sessions must be used for each institution. Thus each institution has FIX sessions and is allowed only to transmit and receive its own messages during these sessions.

10.2.6. ISO 20022

All messages exchanged via FIX protocol (XML Content) must be "enveloped" in the PayloadBVMF tag. The message will be:

```
<PayloadBVMF>
        <AppHdr>
              ↕
        </AppHdr>
        <Document>
              ↕
        </Document>
</PayloadBVMF>
```

11. Contacts

Suggestions, complaints and questions should be sent to SSP – Post-Trading Support on +55 (11) 2565.5000, option 3 or ssp@bvmf.com.br.

12. Change log

Date	Version	Description	Author
Aug 22, 2012	1.0	Creation of document	FM
Aug 27, 2012	1.1	Revision	MK
Feb 28, 2013	1.2	Change format to ClOrdID field	MK
Nov 29, 2013	1.3	Supplementary information from ClOrdID field	MK
Oct 18, 2016	1.4	CAS's username change to CAU. Correction of contacts.	MK
Nov 21, 2016	1.5	Removed the 20003 (ResponseID) field from the FIX response message. Adjust in the text of observation in item 9.1 Connection. Modification of the item: 10.1 Hours of sessions. Changed item 10.2.3. Response and Notification Messages. Inclusion of the connectivity message.	RB
13/06/17	1.6	Page 13 item 10.1 changed- reset session time. Old: 05:50am UTC New: 05:55am UTC	LFC