

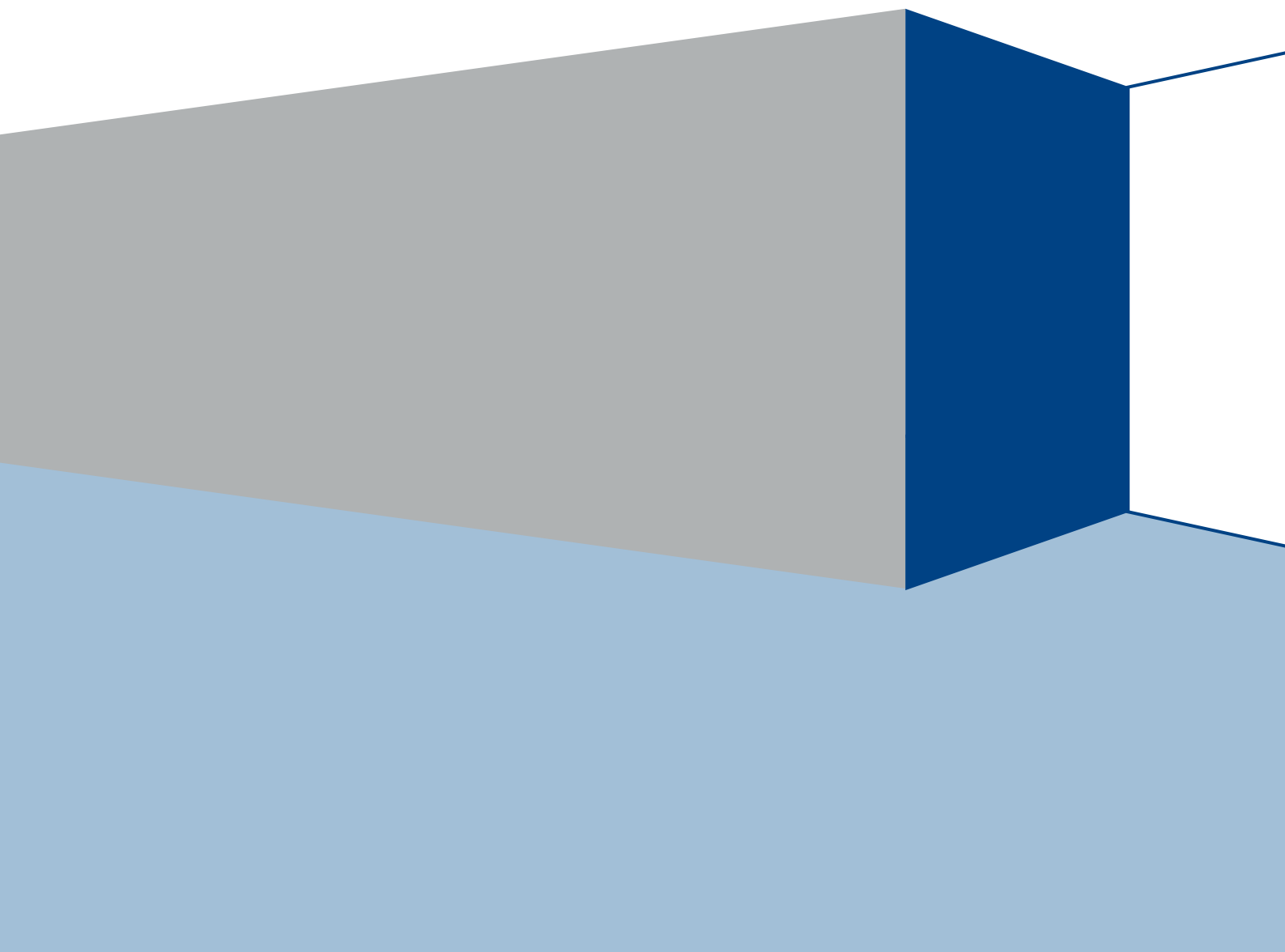


London
Stock Exchange Group

MIT702 – BIT – MILLENNIUM EXCHANGE

Connectivity Specification Main Markets

Issue 1.4 · March 2017



1	Introduction	4
1.1	Purpose.....	4
1.2	Readership.....	4
1.3	Document series	4
1.4	Document history	5
1.5	Enquiries	6
2	Connectivity.....	7
2.1	Production IP addresses and ports	7
2.1.1	Normal Hours	7
2.2	Connection configuration	14
2.3	FIX Session.....	15
2.3.1	FIX failover and recovery	15
2.4	Native Session	19
2.4.1	Failover and recovery.....	19
2.5	FTP Reference Data	21
2.6	MITCH Session	22
2.6.1	Real-Time Channel	22
2.6.2	Replay Channel.....	23
2.6.3	Recovery Channel.....	23
2.6.4	Failure and Recovery	23
2.7	Recipient Failures	24
2.8	Connectivity test.....	24

Disclaimer

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1 Introduction

Following the acquisition of MillenniumIT, the Borsa Italiana is embarking on a programme of change that will see BIT Cash Markets migrate from the current TradElect and Affari trading platforms to Millennium Exchange – the multi-asset class, ultra-low latency platform of MillenniumIT.

The first phase of this transition will be the migration of the TAH market and in a second phase all the other BIT Cash Markets (MTA, MIV, AIM Italy, MAC, ETFplus, MOT, ExtraMOT, SeDeX).

It is anticipated that this will require participants to make a number of technical changes to their existing trading systems.

1.1 Purpose

The purpose of this document is to provide a technical description about the connectivity to BIT Cash Markets (MTA, MIV, AIM Italy, MAC, ETFplus, MOT, ExtraMOT, SeDeX) on the Millennium Exchange platform.

1.2 Readership

This document outlines how to connect to the MIT Trading System.

When read in conjunction with the other Millennium Exchange guides, it is intended that these documents provide all of the details directly connected Borsa Italiana customers require to develop to the new services.

1.3 Document series

This document is part of series of documents providing a holistic view of full trading and information services available from Borsa Italiana post the migration to Millennium Exchange.

The current series of documents are set out below:

Trading

- MIT201 BIT – Guide to New Trading System
- MIT202 BIT – FIX Trading Gateway (FIX 5.0)
- MIT203 BIT – Native Trading Gateway Specification
- MIT204 BIT – Post Trade Gateway (FIX 5.0) Specification
- MIT205 BIT – Drop Copy Gateway (FIX 5.0) Specification

Market Data

- MIT301 BIT – Guide to Market Data Services
- MIT303 BIT – MITCH Specification
- MIT305 BIT – Markets Reference Data
- MIT306 BIT – MOT / EuroMOT Instrument Currency

Connectivity

- MIT701 BIT – Connectivity Specifications TAH
- **MIT702 BIT – Connectivity Specifications Main (this document)**

This series principally covers non-regulatory information and does not override or supersede the Rules of Borsa Italiana.

The latest version of this document series can be found at the following links:

Italian Version:

<http://www.borsaitaliana.it/borsaitaliana/intermediari/gestione-mercati/migrazionemillenniumit-mit/millenniumitmigration.htm>

English Version:

<http://www.borsaitaliana.it/borsaitaliana/intermediari/gestione-mercati/migrazionemillenniumit-mit/millenniumitmigration.en.htm>

1.4 Document history

This document has been through the follow iterations:

Issue	Date	Description
1.0	May 2012	First issue of this document published via the Borsa Italiana's website and distributed to customers.
1.1	November 2013	MITCH source multicast IP addresses amended
1.2	October 2014	Updated version of this document published via the Borsa Italiana's website and distributed to customers. Changes are applied in the following sections: 1.3, 2.3.1
1.3	January 2015	Updated version of this document published via the Borsa Italiana's website and distributed to customers. Changes are applied in the following sections: 2.3.1

1.4	March 2017	Added paragraph 2.8 – tcp responder and heartbeat generator service availability
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In subsequent issues, where amendments have been made to the previous version, these changes will be identified using a series of side bars as illustrated opposite.

1.5 Enquiries

Please contact either Client Technology Services or your Technical Account Manager if you have any functional questions about the Millennium Exchange services outlined in this document. Client Technology Services (ITA) can be contacted at:

- Telephone: +39 0272426409 - 348 – 606 – 647
- Service Desk Free Toll Number: 00800 26772000
- Email: MIT-migration@borsaitaliana.it ; clients-services@borsaitaliana.it

2 Connectivity

2.1 Production IP addresses and ports

The IP addresses and ports are listed in the following sections.

2.1.1 Normal Hours

Primary Data Centre

Exchange Gateway (Trading) Services		
Service	Customer Information	
	Exchange IP Address	TCP Port
Fix Trading GW 01 - Channel 1	194.169.10.1	57251
Fix Trading GW 01 - Channel 1 Alternate	194.169.10.2	57251
Fix Trading GW 01 - Channel 2	194.169.10.1	57252
Fix Trading GW 01 Channel 2 - Alternate	194.169.10.2	57252
Native Trading 01	194.169.10.48	57201
Native Trading 02	194.169.10.48	57203
Native Trading 03	194.169.10.48	57205
Native Trading 04	194.169.10.48	57207
Native Trading 05	194.169.10.48	57209
Native Trading 06	194.169.10.49	57211
Native Trading 07	194.169.10.49	57213
Native Trading 08	194.169.10.49	57215
Native Trading 09	194.169.10.49	57217
Native Trading 10	194.169.10.49	57219
Native Trading 11	194.169.10.50	57221
Native Trading 12	194.169.10.50	57223
Native Trading 13	194.169.10.50	57225
Native Trading 14	194.169.10.50	57227
Native Trading 15	194.169.10.50	57229
Native Trading 01 Recovery	194.169.10.48	57202
Native Trading 02 Recovery	194.169.10.48	57204
Native Trading 03 Recovery	194.169.10.48	57206
Native Trading 04 Recovery	194.169.10.48	57208
Native Trading 05 Recovery	194.169.10.48	57210
Native Trading 06 Recovery	194.169.10.49	57212
Native Trading 07 Recovery	194.169.10.49	57214

Native Trading 08 Recovery	194.169.10.49	57216
Native Trading 09 Recovery	194.169.10.49	57218
Native Trading 10 Recovery	194.169.10.49	57220
Native Trading 11 Recovery	194.169.10.50	57222
Native Trading 12 Recovery	194.169.10.50	57224
Native Trading 13 Recovery	194.169.10.50	57226
Native Trading 14 Recovery	194.169.10.50	57228
Native Trading 15 Recovery	194.169.10.50	57230
Post Trade Router 01 - Channel 1	194.169.10.16	57400
Post Trade Router 01 - Channel 1 Alternate	194.169.10.17	57400
Post Trade Router 01 - Channel 2	194.169.10.16	57401
Post Trade Router 01 -Channel 2 Alternate	194.169.10.17	57401
Drop Copy 01 - Channel 1	194.169.10.32	57500
Drop Copy 01 - Channel 1 Alternate	194.169.10.33	57500
Drop Copy 01 - Channel 2	194.169.10.32	57501
Drop Copy 01 - Channel 2 Alternate	194.169.10.33	57501
BTT FTP 1	81.174.64.61	21 (FTP)
BTT FTP 2	81.174.64.62	21 (FTP)

MTA-A (Primary)	
Multicast address A: 224.4.2.192	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63401
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64401

MTA-B (Primary)	
Multicast address A: 224.4.2.193	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63402
Recovery Service (Active)	

LSEG VIP IP	External TCP Port
194.169.10.73	64402

ETF-A (Primary)	
Multicast address A: 224.4.2.194	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63403
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64403

ETF-B (Primary)	
Multicast address A: 224.4.2.195	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63404
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64404

MOT (Primary)	
Multicast address A: 224.4.2.196	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63405
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64405

SEDEX (Primary)	
Multicast address A: 224.4.2.197	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63406
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64406

Admin Channel (Primary)	
Multicast address A: 224.4.2.198	
Multicast Source IP Address	Service Port (UDP)
194.169.10.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	63407
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.10.73	64407

Secondary Data Centre

Exchange Gateway (Trading) Services		
Service	Customer Information	
	Exchange IP Address	TCP Port
Fix Trading GW 02 - Channel 1	194.169.12.1	57251
Fix Trading GW 02 - Channel 1 Alternate	194.169.12.2	57251
Fix Trading GW 02 - Channel 2	194.169.12.1	57252
Fix Trading GW 02 Channel 2 - Alternate	194.169.12.2	57252
Native Trading 16	194.169.12.48	57201
Native Trading 17	194.169.12.48	57203
Native Trading 18	194.169.12.48	57205
Native Trading 19	194.169.12.48	57207
Native Trading 20	194.169.12.48	57209
Native Trading 21	194.169.12.49	57211
Native Trading 22	194.169.12.49	57213
Native Trading 23	194.169.12.49	57215
Native Trading 24	194.169.12.49	57217
Native Trading 25	194.169.12.49	57219
Native Trading 26	194.169.12.50	57221
Native Trading 27	194.169.12.50	57223
Native Trading 28	194.169.12.50	57225
Native Trading 29	194.169.12.50	57227
Native Trading 30	194.169.12.50	57229
Native Trading 16 Recovery	194.169.12.48	57202
Native Trading 17 Recovery	194.169.12.48	57204
Native Trading 18 Recovery	194.169.12.48	57206
Native Trading 19 Recovery	194.169.12.48	57208
Native Trading 20 Recovery	194.169.12.48	57210
Native Trading 21 Recovery	194.169.12.49	57212
Native Trading 22 Recovery	194.169.12.49	57214
Native Trading 23 Recovery	194.169.12.49	57216
Native Trading 24 Recovery	194.169.12.49	57218
Native Trading 25 Recovery	194.169.12.49	57220
Native Trading 26 Recovery	194.169.12.50	57222
Native Trading 27 Recovery	194.169.12.50	57224
Native Trading 28 Recovery	194.169.12.50	57226
Native Trading 29 Recovery	194.169.12.50	57228
Native Trading 30 Recovery	194.169.12.50	57230
Post Trade Router 02 - Channel 1	194.169.12.16	57400

Post Trade Router 02 - Channel 1 Alternate	194.169.12.17	57400
Post Trade Router 02 - Channel 2	194.169.12.16	57401
Post Trade Router 02 -Channel 2 Alternate	194.169.12.17	57401
Drop Copy 02 - Channel 1	194.169.12.32	57500
Drop Copy 02 - Channel 1 Alternate	194.169.12.33	57500
Drop Copy 02 - Channel 2	194.169.12.32	57501
Drop Copy 02 - Channel 2 Alternate	194.169.12.33	57501
BTT FTP 1	81.174.64.61	21 (FTP)
BTT FTP 2	81.174.64.62	21 (FTP)

MTA-A (Replica)	
Multicast address B: 224.4.3.192	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63401
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64401

MTA-B (Replica)	
Multicast address B: 224.4.3.193	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63402
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64402

ETF-A (Replica)	
Multicast address B: 224.4.3.194	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63403
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64403

ETF-B (Replica)	
Multicast address B: 224.4.3.195	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63404
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64404

MOT (Replica)	
Multicast address B: 224.4.3.196	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63405
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64405

SEDEX (Replica)	
Multicast address B: 224.4.3.197	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63406
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64406

Admin Channel (Replica)	
Multicast address B: 224.4.3.198	
Multicast Source IP Address	Service Port (UDP)
194.169.12.65	60200
Replay Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	63407
Recovery Service (Active)	
LSEG VIP IP	External TCP Port
194.169.12.73	64407

2.2 Connection configuration

A member firm connection will be configured by the Exchange to connect to a specific IP address and port of the primary data centre.

In case of unavailability, customer should try connection to another specific address associated to the CompID. This address could be in the primary or in the secondary data centre.

For the purpose of redundancy, the service supports the configuration of multiple connections to send the same information on the activity of the selected firms/trader groups.

2.3 FIX Session

The interface is a point-to-point service based on the technology and industry standards TCP/IP, FIXT and FIX. The session and application event models and messages are based on versions 1.1 and 5.0 (Service Pack 2) of the FIXT and FIX protocols respectively.

2.3.1 FIX failover and recovery

The MIT Trading system has been designed with fault tolerance and disaster recovery technology that ensures that trading should continue in the unlikely event of a process or gateway outage.

For load balance purposes, customer will be split in two different groups connecting two different combination of IP address and port. These information will be provided to customers along with each ComplID.

Considering customers split in group A and group B, where group A is required to connect to

Fix Trading GW 01 - Channel 1 → 194.169.10.1 port 57251

and group B is required to connect to

Fix Trading GW 01 - Channel 2 → 194.169.10.1 port 57252

If group ComplIDs in group A lost connection with the gateway, they need to try connection on the alternate channel

Fix Trading GW 01 - Channel 1 Alternate → 194.169.10.2 port 57251

If group ComplIDs in group B lost connection with the gateway, they need to try connection on the alternate channel

Fix Trading GW 01 - Channel 2 Alternate → 194.169.10.2 port 57252

In this case it is important to note that the system will increment the server side outbound sequence number (i.e. Client's inbound sequence) by 5000.

Since the client needs to comply with FIX Session rules, the client should submit a Resend Request after receiving a response to the login request. This would result in syncing the inbound sequence number on client side.

In this scenario, the client might receive duplicate messages (i.e. messages the client has already received before the Fail-over - low probability). All these duplicate messages will have PossResend(97) field set to "Y".

It is expected for the client to perform a check for duplicate messages with PossResend(97) set "Y". Therefore if the client had already received Acknowledgements for messages with those Client Order IDs, client should ignore these Rejects.

The client might receive Business Rejects with reject reason 'Application not Available' for requests that were submitted during a failover (low probability). It should be noted that these requests have not been accepted by the System and Client should decide on whether to re-submit them or not.

If also alternate channels are not working, customers are required to connect to the Secondary Data Centre again using two different addresses/ports between group A and B.

In this case the server side inbound and outbound sequence numbers are reset and therefore the sequence number sent out by client should also be reset.

Group A

Fix Trading GW 02 - Channel 1 → 194.169.12.1 port 57251

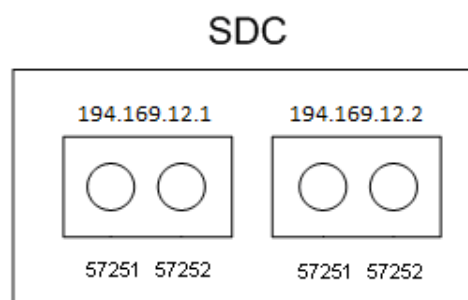
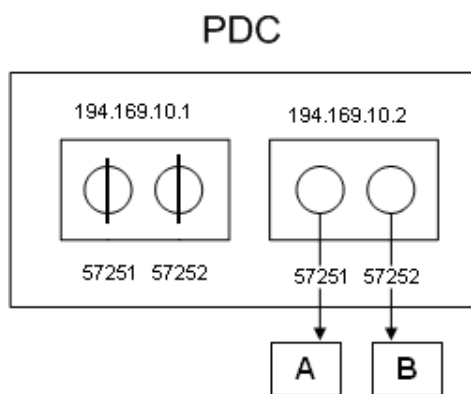
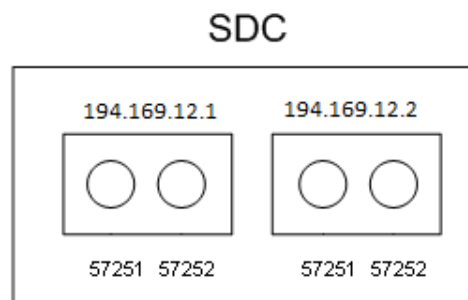
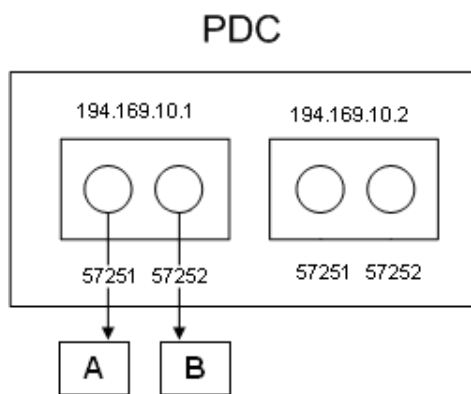
Group B

Fix Trading GW 02 - Channel 2 → 194.169.12.1 port 57252

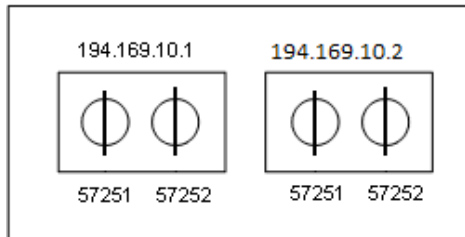
This behavior should be implemented for connections to

- FIX Trading Gateway
- Drop Copy Gateway
- Post Trade Gateway

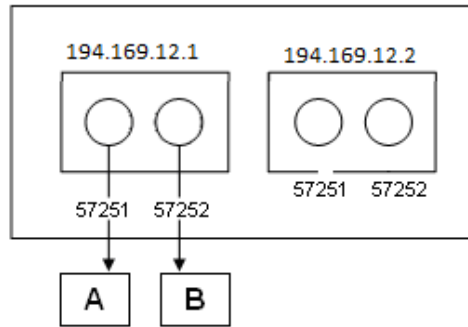
Please find below a simple diagram about the sequence.



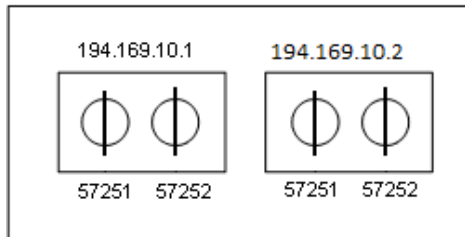
PDC



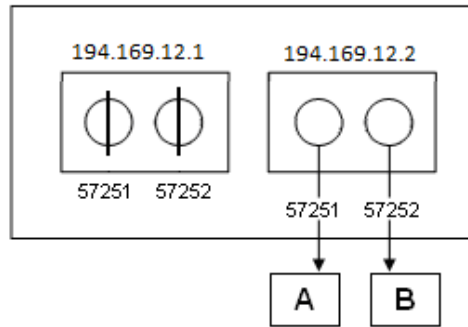
SDC



PDC



SDC



2.4 Native Session

Customers will be split on all the 15 gateway in order to achieve a balanced configuration.

The User will be confirmed with each client before communications can begin through the Native Trading Gateway. A single client may have multiple connections to the server (i.e. a user can maintain multiple sessions if he has multiple UserIDs).

Each client will use the assigned IP address and port to establish a TCP/IP session with the server. The client will initiate a session at the start of each trading day by sending the Logon message.

2.4.1 Failover and recovery

The system has been designed with fault tolerance and disaster recovery technology that ensures that trading should continue in the unlikely event of a process or site outage.

On unexpected disconnection from the primary gateway a client should try to reconnect three times to the primary gateway with a time out value of three seconds on each connection before attempting to connect to the secondary gateway – and this should then be retried a further 3 times. After six failed connection attempts (3 on each gateway) the client should contact the Exchange for guidance.

A CompID for MTA market could be configured to send orders only on

Native Trading 01 → 194.169.10.48 port 57201

If the CompID lost the connection to the gateway it is required to connect to

Native Trading 16 → 194.169.12.48 port 57201

This is valid for each Native trading gateway.

In the table below it's possible to check the gateway on which customers could be configured and the related gateway to use in case of connection lost

Native Trading 01 --> Native Trading 16
Native Trading 02 --> Native Trading 17
Native Trading 03 --> Native Trading 18
Native Trading 04 --> Native Trading 19
Native Trading 05 --> Native Trading 20
Native Trading 06 --> Native Trading 21
Native Trading 07 --> Native Trading 22
Native Trading 08 --> Native Trading 23
Native Trading 09 --> Native Trading 24
Native Trading 10 --> Native Trading 25
Native Trading 11 --> Native Trading 26
Native Trading 12 --> Native Trading 27
Native Trading 13 --> Native Trading 28
Native Trading 14 --> Native Trading 29
Native Trading 15 --> Native Trading 30

Native Recovery gateways will behave in the same way.

Native Trading 01 Recovery --> Native Trading 16 Recovery
Native Trading 02 Recovery --> Native Trading 17 Recovery
Native Trading 03 Recovery --> Native Trading 18 Recovery
Native Trading 04 Recovery --> Native Trading 19 Recovery
Native Trading 05 Recovery --> Native Trading 20 Recovery
Native Trading 06 Recovery --> Native Trading 21 Recovery
Native Trading 07 Recovery --> Native Trading 22 Recovery
Native Trading 08 Recovery --> Native Trading 23 Recovery
Native Trading 09 Recovery --> Native Trading 24 Recovery
Native Trading 10 Recovery --> Native Trading 25 Recovery
Native Trading 11 Recovery --> Native Trading 26 Recovery
Native Trading 12 Recovery --> Native Trading 27 Recovery
Native Trading 13 Recovery --> Native Trading 28 Recovery
Native Trading 14 Recovery --> Native Trading 29 Recovery
Native Trading 15 Recovery --> Native Trading 30 Recovery

Please note that a CompID configured to trade using Native Trading 01 should use Native Trading 01 Recovery as recovery channel.

2.5 FTP Reference Data

MIT 305 and 306

Reference data will be available in PRODUCTION environment for all customers upon ftp connection to the server

- PDC:

- 81.174.64.61

- 81.174.64.62

- SDC:

- 81.174.64.189

Standard username and password available for the connection are

User: trm2USER

Pw: F1les4You

2.6 MITCH Session

The market data feed is load balanced by market data group.

While each group will contain multiple instruments, each instrument is assigned to just one market data group. Although the group an instrument is assigned to may change from interday, it will not change intraday.

Each market data group is disseminated on a dedicated multicast market data channel.

Two TCP recovery channels are available per market data group: Replay and Recovery.

While a recipient may connect to the Replay channel to recover from a small data loss, it should use the Recovery channel after a large data loss (i.e. late joiner or major outage).

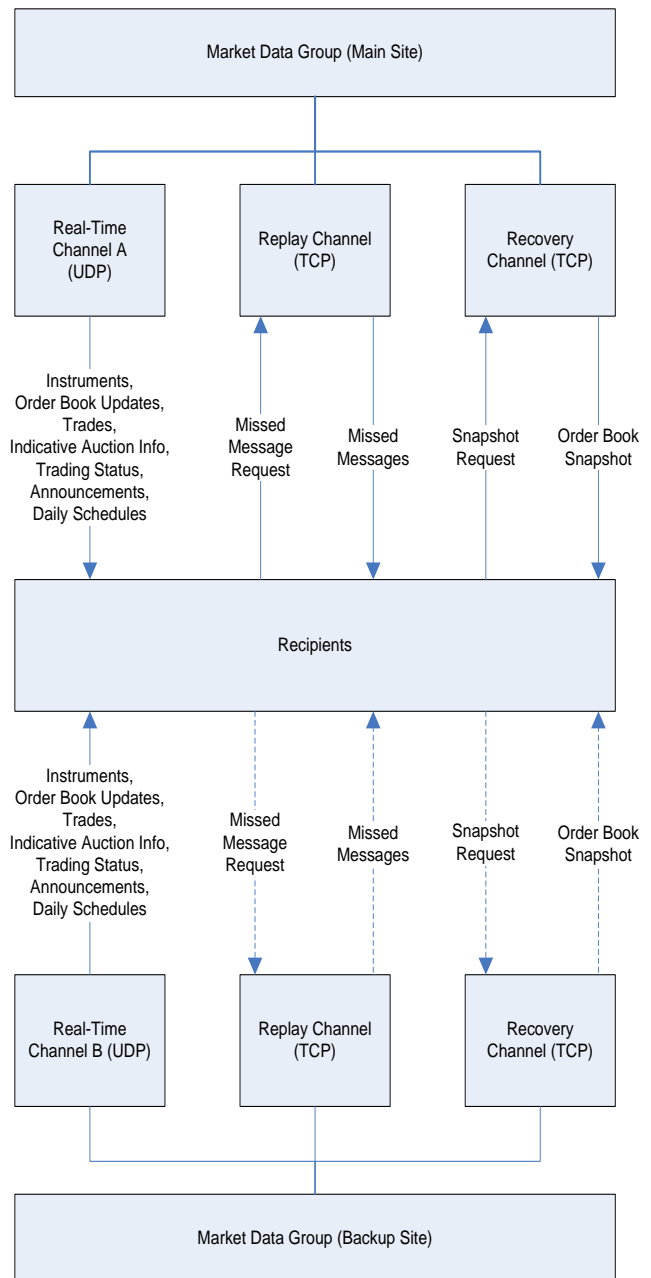
2.6.1 Real-Time Channel

The Real-Time channel is the primary means of disseminating market data. Real-time updates to instruments and all market data supported by the feed are available on this multicast channel.

The list of active instruments in the market data group is broadcast at the start of the trading day. The details of instruments created during trading hours as well as updates of the trading status of instruments are also disseminated.

Real-time updates to order books and indicative auction information are published along with the details of each trade. The official opening and closing price of each instrument as well as previous day's closing price will also be disseminated on this channel. The initial static and dynamic reference prices as well as updates to static reference price will also be disseminated.

MITCH will also broadcast any announcements made by Market Supervision and any changes to an instrument's trading schedule. Each application message includes a



sequence number which is incremented by one for every message disseminated on the Real-Time channel within a particular market data group. The sequence numbers of each is reset to 1 at the start of each day.

During periods of inactivity the market data channel will broadcast a Heartbeat message. Heartbeat messages maintain will be sent at constant intervals and exercise communication between a client application and Millennium Exchange.

Recipients have access to two identically sequenced Real-Time feeds: one from the Primary site (Primary Feed) and one routed via the Secondary site (Secondary Feed) Recipients may process both feeds and arbitrate between them to minimise the probability of a data loss. The secondary feed will be subject to additional minimal latency as it is routed via the Secondary Data Centre.

2.6.2 Replay Channel

The TCP Replay channel permits recipients to request the retransmission of a limited number of messages already published on the Real-Time channel. This channel may be used by recipients to recover from a small data loss.

The Replay channel supports the retransmission of the last messages published on the Real-Time channel. The channel does not support the retransmission of messages published on the Recovery channel or from previous trading days.

During normal service the replay service will only be available on the Primary feed. The Secondary feed replay service is only available in the event of a failure of the Primary feed.

2.6.3 Recovery Channel

The TCP Recovery channel permits recipients to request a snapshot of the order book for any active instrument in the market data group. This channel may be used by recipients to recover from a large-scale data loss.

While a Recovery channel is available from the Secondary feed, it will only be activated in the unlikely event of a Primary feed failure.

2.6.4 Failure and Recovery

Borsa Italiana will provide full component resiliency at the Primary data centre. For all TCP/IP connections clients will be given IP addresses for the Primary/feed and for the Secondary/feed.

On unexpected disconnection from the Production feed gateway a client should try to reconnect 3 times to the primary gateway with a time out value of three seconds on each connection before attempting to connect to the Production Site secondary feed gateway. Upon successful connection to the Secondary feed gateway, clients should treat this gateway as master. Clients should continue to do this until a time when the Secondary feed gateway becomes unavailable. If this gateway becomes unavailable, clients should attempt to reconnect to the Primary feed gateway. Should this also be unavailable, clients should contact the Exchange for guidance.

Clients should use the Production Site pair until directed that a site failover has been invoked – this will be clearly communicated to clients. Following this site failover, the Secondary site pair of gateways should be used as above; clients should connect using the same IP addresses as employed at the Primary Site.

2.7 Recipient Failures

Recipients have access to two identically sequenced multicast feeds: Primary feed and Secondary feed. Recipients may process both feeds and arbitrate between them to minimise the probability of a data loss.

If a gap in sequence numbers is detected on the multicast channel, the recipient should assume that some or all of the order books maintained on its systems are incorrect and initiate one of the recovery processes outlined below.

2.8 Connectivity test

In order to facilitate connectivity tests a tcp responder and heartbeat generator service is available on Millennium IT platform out of market hours.

The connectivity service (response to TCP telnet and multicast heartbeats generators) is available for BIT Main markets:

- Every day of the week (week end included) between 8.30 pm CET and 11 pm CET
- From 8.30 pm CET on Saturday to 11 pm CET on Sunday

All the Multicast Groups for Main Market are available (both A and B feed).

All the TPC gateway for Main Market are available (both PDC and SDC).

Please note that **login will not be available (only telnet)**.



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