



London
Stock Exchange

London Stock Exchange

MIT501 - Guide to Testing Services

Issue 20

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Disclaimer

The London Stock Exchange Group has taken reasonable efforts to ensure that the information contained in this publication is correct at the time of going to press but shall not be liable for decisions made in reliance on it. The London Stock Exchange Group will endeavour to provide notice to customers of changes being made to this document, but this notice cannot always be guaranteed. Therefore, please note that this publication may be updated at any time. The information contained is therefore for guidance only.

1.0 Introduction

The London Stock Exchange provides a range of testing services to customers developing and testing software applications for use on its Millennium Exchange Live Service¹.

1.1 Purpose

The purpose of this document is to provide an overview of the Customer Testing Services available on Millennium Exchange and how to access them.

When read in conjunction with the Millennium Technical Specifications² and the other available testing documentation, it is intended that these documents provide all the necessary information customers require to develop, test and trial their software before connecting to the Live Service.

1.2 Readership

This document is relevant to software developers, system testers and other technical staff who are involved in testing and developing applications for use in the Live Service. It is also relevant to customers who want to use the Customer Development Service (CDS)³ for testing trading strategies or for training purposes.

1.3 Document Series

This document is part of a series of Customer Testing documents that are available to customers. The other documents are:

- MIT 502 Guide to Application Certification
- MIT 503 Certification Report
- GTP005 Testing Services Guide

These documents form part of a series of technical documentation available to customers who are developing software to connect to the Live Services. For reference, the full range of Millennium technical documents are available at the following location: <https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

GTP technical documents are available at <https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>.

¹ The London Stock Exchange Millennium Exchange Live Trading Service is referred to throughout this document as 'The Live Service'.

² The Millennium Technical Specifications includes all protocols including Group Ticker Plant.

³ The London Stock Exchange Millennium Exchange Customer Development Service is referred to throughout this document as 'CDS'.

1.4 Document History

This document has been through the following iterations:

Issue	Date	Description
8.0	23 May 2011	Eighth issue of this document published via the London Stock Exchange's website and distributed to customers.
8.1	4 July 2011	Minor update to previous issue to include Section 11 – Testing Services on Production IP Addresses.
9.0	23 September 2011	Ninth issue of this document published via the London Stock Exchange's website and distributed to customers.
10.0	20 March 2011	Tenth issue of this document published via the London Stock Exchange's website and distributed to customers. Minor revisions to several sections.
10.1	09 August 2012	Minor update to previous issue Section 9.2. Heartbeat Generator and TCP Responder now available on the RNS service.
11	25 October 2012	Minor revisions to several sections. Due to the amount of formatting changes, this version will not have amendments marked with a side bar as described below.
12	1 February 2013	Updated LCON policy
13	15 March 2013	Removed reference to FIX/FAST market data. Added clarification to LCON policy section for NSP clients.
14	15 January 2014	Section 3.4.7 Added references to CDS EDSP Auction schedule.
15	07 July 2014	Section 3.4.4 Added behaviour description of sponsored access enabled native IDs
16	31 October 2014	Amended to reflect rebranding of ITCH to MITCH
17	5 December 2017	Added change for MiFID II:

		<p>4.0 – Added section for production-like CDS environment.</p> <p>5.1 – Updated LSE Certification policy</p> <p>5.2 – Added section on Algorithm conformance</p>
18	1 July 2019	<p>Document updated to reflect the changes following the introduction of new internal processes to update the CDS environment</p> <p>2.0 - Removed reference to HVS and test after normal market hours</p> <p>3.2 - Removed reference to extended hours</p> <p>3.3 – Clarify that the clearing configuration on CDS may be different than production. Removed reference to instrument synchronisation with production.</p> <p>3.4 – Removed reference to the Closing Price Crossing session.</p> <p>3.4.6 – Removed the Post Close Cross section</p> <p>3.4.7 – Now section 3.4.6. The EDSP auctions now follow the production schedule</p> <p>3.5 – Removed the extended trading hours segments. Added Periodic Auction Call to the SETS schedule.</p> <p>4.0 – Added information related to reference data for Legacy CDS</p> <p>10 – Section removed as participant test weekends are no longer available</p>
19	5 July 2019	As per service announcement 001/05072019, the MITCH market data service will be decommissioned on CDS effective Monday 22 July 2019
20	17 June 2020	<p>Removed reference to MITCH market data service</p> <p>Updated links</p> <p>Amended SETS Start of Trading</p> <p>Amended timings for ODTT & TEST segments</p>

Within this document, where amendments have been made to the previous issue, these changes will be identified by highlighting the changes in Red.

1.5 Contacts

Please contact your Technical Account Manager if you have any questions about the Testing services outlined in this document. If you are unsure who your Technical Account Manager is please use the details below:

- Telephone: +44 (0)20 7797 3939
- Email: londontam@lseg.com

2.0 Service Overview

The London Stock Exchange offers a wide range of testing services. Customers can use the testing services to:

- Test the functional interface between their software applications and the London Stock Exchange Millennium Gateways.
- Certify their software applications for use on the Live Service
- Test trading strategies against a simulation of the Live Service
- Provide market participants with a safe training environment away from the Live Service
- Test their application's ability to recover from service disruptions

All of the above service offerings are available on the Millennium Exchange CDS which is described in the next section.

3.0 Customer Development Service

3.1 Service Description

The CDS provides a fully functioning live simulation of the Live Service against which our customers can develop, test, and run their Trading and Information applications.

The CDS also provides model-based testing scenarios to help customers with their development efforts.

3.2 Access to the Customer Development Service

To access the CDS customers will be required to complete a CDS Order Form and send their requirements to their Technical Account Manager or the Technical Account Management team. Customers will then be sent full details of their CDS technical configuration. Amendments can be requested through the London Stock Exchange's Technical Account Management team.

The Millennium Exchange IP address information is provided in the MIT1001 Connectivity Guide at the link below: <https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

CDS sessions can be pre-booked and allowed access to the service for a full trading day. For those customers that test regularly or appreciate the convenience of uninterrupted access, a Continuous Access Service is offered as a cost effective and efficient means of testing.

The CDS Order Form and Price List can be found on the London Stock Exchange website at: <https://www.lseg.com/areas-expertise/technology/market-connectivity/customer-certification-and-testing-services>

3.3 Live Simulation Service

The Live simulation service replicates the full market structure of the Live Service, including all segments, sectors and trading sessions. Market maker registrations, participant details, and clearing configuration, may vary from the Live Service.

All Trading Services available on the Live Service are replicated on the CDS. The full range of Trading Services are detailed on the London Stock Exchange Website at

<https://www.londonstockexchange.com/trade/equity-trading>

Market hours are the same as the live service.

3.4 Model Based Testing

The CDS environment has been enhanced to model specific scenarios on a more frequent basis than customers will encounter on the Live Service, such as service disruptions. Other scenarios are added from time to time to support the introduction of new functionality. Customers can use these scenarios to assist with their testing and development. This section describes the modifications.

3.4.1 GTP Forced Failure

For GTP details, please refer to GTP005 – Testing Guide available at <https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>.

3.4.2 Trading Gateway Failover and Recovery

In order to support customers with their disaster recovery testing, every Friday, between 15:00 and 15:45, the following components will be failed in turn, in sequence:

- Primary FIX Trading Gateways
- Primary FIX Post Trade Gateways
- Primary FIX Drop Copy Gateways
- Selected Native Trading Gateways

Customers connected to a Primary Gateway during these times can detect the disconnection and re-connect to their designated secondary gateway. Technical information regarding failover and recovery is provided in MIT601 – Guide to Disaster Recovery.

Customers will remain connected to the Secondary Gateway for the remainder of the day.

3.4.3 Service Interruption on the Native Interface Recovery Channel

In order for customers to test receipt of the System Status message, a service interruption will be simulated for one minute, every hour, on the hour from 08:00 - 16:00 for every trading day.

In case of Service Interruption on the Native Gateway Recovery Service a new 'System Status' message will be sent to all logged in clients to indicate the unavailability and subsequent availability of the partition.

Clients submitting a new "Missed Message Request" during that time will receive a 'Missed Message Request Ack' with 'ResponseType' = 3 (service unavailable) from the Native Gateway.

3.4.4 Service Interruption during Own Order Book Download on the Drop Copy Service

In order to support customer testing of the unsolicited Execution Report, a service interruption will be simulated for one minute, every hour on the hour from 08:00 - 16:00 and for every trading day. Customers will receive an unsolicited Execution Report if the Drop Copy gateway was servicing their Order Mass Status Request during the interruption.

Sponsored access enabled Native ID's will be logged out from the Native Real Time channel, even if order cache instances of other partitions are up and running. The string "System unavailable (to sponsored users)" will be sent as the reason in the log out message.

Any new logins will be rejected via a logon response message with the reject code 9905 (System unavailable (to sponsored users)) until the order cache instances of that partition are up. This lasts for approximately 1 minute in simulation after which, sponsored access enabled Native ID's can reconnect.

3.4.5 EDSP Auctions

FTSE 100 and FTSE 250 expiry auctions will now follow the production schedule.

Index	Day of Expiry	Auction Call
FTSE 100	3rd Friday of month	Five minute call at 10:10 UK time
FTSE 250	3rd Friday Mar, Jun, Sep, Dec	Five minute call at 10:10 UK time

3.5 Service Hours

The service hours for the CDS match those on the Live Service, with identical trading session timings. These are detailed in the Millennium Exchange Business Parameters document available on the London Stock Exchange website at:

<https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

The Service hours for the SETS service is shown below for reference.

Time (GMT)	Description
05:05-07:50	Start of Trading

07:50-08:00	Open Auction Call
08:00-12:00	Continuous Trading
12:00-12:02	Periodic Auction Call
12:02-16:30	Continuous Trading
16:30-16.35	Closing Auction Call
(After Closing Auction)	Closing Price Publication (CPP)
(After CPP)	Closing Price Crossing (CPX)
(After CPX)	Post Close Session

3.6 Maintenance Days

On occasion the Exchange will have to close the CDS to perform upgrades or maintenance activities. Customers will be informed of maintenance days and early CDS closures via Service Announcements. To register, please follow the instruction available at <https://www.londonstockexchange.com/products-and-services/technical-library/service-announcements/service-announcements.htm>. Furthermore, customers should also note that on occasions where the CDS environment has to be shut down and restarted, message sequence numbers may be reset for both Trading interfaces and Market Data interfaces. The Logon Reply message may contain the message sequence number of '1'.

3.7 Reference Data

An FTP & SFTP flat file-based Reference Data download service has been introduced as part of Millennium Exchange. All customers will also be required to test against this service prior to go-live. Further information is available in MIT401 – Guide to Reference Data Services.

3.8 End to End Testing

Trades executed on the CDS may be sent to a clearing house, but this will need to be pre-arranged well in advance. Please liaise with your Technical Account Manager for more information.

4.0 Production-Like CDS Environment

London Stock Exchange has introduced a production-like CDS environment (Legacy CDS). The production-like CDS environment will be continuously aligned with the live service in terms of software version and reference data (instrument, participants, etc.). Instrument reference data will be updated on a weekly basis. Customers should download the production reference data files on Monday morning to be used with Legacy CDS for that week.

All Trading Services available on the Live Service will be replicated on the production-like CDS environment.

5.0 Conformance Testing

5.1 Application Conformance Testing

Before connecting to the Live Service, customers are required to certify that their software applications fully conform to the London Stock Exchange's Millennium Technical Specifications. Customers should use the CDS to complete the certification test.

Customers are required to recertify their software in accordance with the London Stock Exchange Certification policy:

- whenever the customer modifies the software in any way that directly impact a London Stock Exchange interface;
- the exchange venue upgrades its production environment to a later version of software;
- the customer is requested to re-certify their application by the relevant venue.

Full details of the certification process are available in the following documents:

- **MIT502** - Guide to Application Certification
- **MIT503** - Certification Report

5.2 Algorithm Conformance Testing

From 3 January 2018, London Stock Exchange will require firms to self-certify that all algorithms used on London Stock Exchange have been tested. In accordance with the revised MiFID II release of the London Stock Exchange rulebook, any Order message specifying the use of an algorithm as the decision maker for that order by way of a short code will be taken as confirmation from a Member that the algorithm has been adequately tested. Member Firms will be required to populate the long code associated with the short code, complete with a description of the testing undertaken, in the Member Portal by the end of the next trading day. Firms may, but are not required to, use the London Stock Exchange CDS environment to self-certify their algorithms. London Stock Exchange will not perform conformance testing of client algorithms.

6.0 Sponsored Access Test Service

Sponsored Access Customers have additional mandatory testing requirements for Sponsored Users (Native Gateway) and Sponsoring Firms (Drop Copy Gateway).

Sponsored Users and Sponsoring Firms will need to ensure they are using certified software on the Native Gateway for Order Entry (Sponsored User) and the Drop Copy Gateway (Sponsoring Firm). Both User and Firm will need to demonstrate they tested the functions associated with a Daily Life Cycle (DLC) of the service on the CDS environment prior to go-live on production. The DLC test is conducted with the Sponsoring Firm, the Sponsored User and a member of the Market Access team.

Full details of the testing services and requirements can be found in the document MIT 701 – Guide to Sponsored Access. The document can be found at the following link:

<https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

7.0 Group Ticker Plant Testing Service

The London Stock Exchange Group launched the Group Ticker Plant (GTP) which is designed to revolutionise the real-time market data services, delivering ultra-low latency feeds through new technologies and facilitating the launch of new products and services.

The London Stock Exchange has also provided a testing service in the CDS environment. The testing service will allow customers the ability to interact with the GTP multicast data prior to accessing the Live Service environment. Further information on the GTP testing services can be found in the GTP005 – Testing Services Guide found at the below link.

<https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>

8.0 Production Test Instruments Service

The Production Test Instruments (PTIs) test facility allows customers to enter test transactions in live service test segments, using their Production systems.

The following table details the test segments that are available for entering test transactions:

Market Type	Market Segment	Market Sector
Order driven	ODTT	ODTT
Quote driven	TEST	DOTS

By entering a small volume of transactions in PTI instruments on the live service, customers can verify live system configurations without the need to enter “real” transactions. Testing is confined to 39 test securities that are available during the hours below:

ODTT Segment:

05:06 to 07:45 (Continuous Trading)

07:45 to 17:15 (Post Close)

TEST Segment (test securities for SEAQ):

05:06 to 08:00 (Pre-Mandatory)

08:00 to 16:30 (Mandatory)

16:30 to 17:15 (Post-Mandatory)

Customers are allowed to enter all applicable trade reports in those segments. Please note that PTI is not intended for performance testing and must not be used to enter large volumes of transactions.

Full details of the instruments can be found within the daily reference data flat-file available from the FTP/SFTP site.

**As a rule, testing is not permitted in the London Stock Exchange's production environment. This service is available to customers to enter test transactions prior to the start of the trading day*

9.0 Live Connectivity Testing Services

9.1 GTP Production Heartbeat Generator

For details on the GTP Heartbeat Generator, please refer to GTP005 – Testing Guide available at <https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>.

9.2 Millennium Production TCP Responder

The TCP Responder is activated from 18.30-23.00 from Monday to Thursday following the Production service shutdown and will use the existing Production IP addresses. The TCP Responder will also be activated every weekend from Saturday 22:00 to Sunday 22:00.

The TCP Responder responds to customer TCP messages such as Telnet to all Primary and Backup Trading Gateways.

The Millennium Production IP addresses referenced above can be found in the MIT1001 Connectivity guide on the website at the link below:

<https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

9.3 GTP Production TCP Responder

For details on the GTP TCP Responder, please refer to GTP005 – Testing Guide and GTP004 – Parameters Guide for GTP IP information. Both documents can be downloaded from <https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>.

Customers are reminded that the London Stock Exchange may broadcast test data from its Production environment at the weekends which should be discarded and not processed.

Appendix A: CDS Connectivity

1. Connectivity

Physical access to the Millennium Exchange CDS service is available via the following ways:

- Extranex backup circuit
- Exchange Hosting

-
- VPN Developer service
 - Network Service Provider (NSP)
 - Vendor Access Network (VAN)
 - Customer Managed Connectivity (CMC)

2. Trading Gateway Connectivity

The FIX Trading, Post Trade and Drop Copy interfaces have one IP address acting as a Primary and one IP address acting as a Backup. The Backup can only be connected for failover testing between 15:00 and 15:45 on a Friday or if there is a failure of one of the Primary interfaces.

Native Trading customers can choose an IP for their Primary connection and an IP for their Secondary.

3. Market Data Gateway Connectivity

Customers can request to have GTP Market Data channels enabled on their CDS connectivity. All feeds will be disseminated on multicast channels. Additionally, clients can request Replay and Recovery ComplD's in order to test the ability to re-request messages and recover from large-scale data loss. Clients can request ComplD's to connect to relevant Replay and Recovery Services. Each ComplD will be allocated a Primary and Secondary IP.

4. CDS IP Addressing

CDS IP addresses can be found in the MIT1001 Connectivity Guide at the following link:

<https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

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