

ISE T7 Release 5.0

**Simulation Guide for Members of
the Irish Stock Exchange**

Release Date: 3rd April 2017

Abstract

This document is a guide for the project coordinators and testers in ISE member firms and service providers who are responsible for coordinating the migration to T7 Release 5.0. It provides information to enable member firms' participation in the ISE T7 Release 5.0 Integrated Simulation environment.

We recommend that this document is distributed as soon as possible within the members' project teams to all those involved.

ISE T7 Release 5.0 will be implemented on Monday, 17th July 2017.

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1 Introduction

The ISE is migrating the ISE Xetra trading platform to the next generation T7 trading platform as part of T7 Release 5.0. The migration to T7 represents the next stage in our successful strategic technology partnership with DB, and will ensure that the ISE continues to enhance its trading architecture for the benefit of members by providing access to a new, world class platform.

ISE T7 will be launched on Monday, 17th July 2017.

A two-phase simulation approach has been defined to support member firms with their migration activities.

The initial phase of the simulation commenced with the start of T7 Release 5.0 Cloud Simulation on 6th March 2017. The second phase of the simulation will commence with the launch of the T7 Release 5.0 Integrated Simulation environment on 18th April 2017.

T7 Integrated Simulation allows members to become familiar with the new Trader and Admin GUIs, as well as the new technical interfaces. As a production-like system, members will be able to test all ISE T7 functionality. In addition, it will provide access to the other downstream functions currently available in the Xetra simulation environment, including the CCP.

1.1 Document Structure

This document has the following structure:

Chapter 1 – Introduction

This chapter provides an overview of T7 Release 5.0 simulation, including the objectives of the simulation phase, the details of the daily timetable and simulation calendar, and general information about the participating systems.

Chapter 2 – Member Activities

The member required activities, and those recommended for simulation execution are explained.

Chapter 3 – Helpdesks

Contact numbers and availability times of the relevant contact departments are listed.

Chapter 4 – Simulation Setup and Execution

All relevant information for simulation setup and execution on the ISE T7 Integrated Simulation environment is summarised in this chapter.

Chapter 5 – Focus Days

This chapter provides a description of all the focus days planned for ISE T7 Release 5.0 Integrated Simulation.

Chapter 6 - Appendix

Available XML and text reports are listed, with documentation references provided.

1.2 Simulation Scope

The T7 Release 5.0 Integrated Simulation environment will offer the full suite of technical interfaces and functionality in order to enable members to perform comprehensive testing of their trading applications before going live in production.

To further support the members with their testing, several dedicated focus days are offered during the simulation phase to enable members to become more accustomed to the features of T7. On those days, which are marked in the simulation calendar, special testing scenarios will be provided.

A description of the ISE T7 functionality and technical infrastructure has been provided in the T7 Release 5.0 - Preliminary Release Notes for ISE T7. This document, as well as the Interface Specifications and User Manuals, are also available on the ISE's website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

1.3 Objectives of the Simulation

The purpose of the T7 Release 5.0 Integrated Simulation environment is to provide an opportunity for ISE member firms and service providers to become familiar with the migration steps to the T7 architecture, and the enhanced functionality and technical infrastructure in preparation for production.

The key objectives are:

Early issue identification

By providing a production-like setup and by participating early and frequently in the simulation phase, possible issues can be detected and corrected in advance of production.

Risk minimisation

Production-like back-end and front-end conversion processes will be simulated, and members will be given the opportunity to test the migration strategy and gather experience in installation procedures.

Focusing on new functionality

By granting access to the new functionality through simulation, members are supported in practicing the skills required to handle the new and enhanced functionality.

1.4 Timeline

The key dates for the migration of ISE Xetra to ISE T7, Release 5.0 are as follows:

Date	Milestone
1 st March 2017	Simulation session ordering and GUI key upload available via the Xetra Member Section.
18 th April 2017	T7 Release 5.0 is available for connectivity testing.
24 th April 2017	Record date for member and trader data migration. Any changes made to member or trader accounts in ISE Xetra simulation after this date will not be migrated to ISE T7 simulation and will have to be completed again by the member in ISE T7 simulation.
2 nd May 2017	Upload of instrument, member and session data
3 rd May 2017	ISE member and trader accounts are available, enabling members to verify the results of the trader migration. ISE member sessions will also be available for connectivity testing.
9 th May 2017	Activation of ISE instrument data based on the ISE Xetra simulation system.
10 th May 2017	All ISE Xetra instruments are available with full trading functionality.

Table 1: Key dates for ISE T7 simulation rollout

The following diagram outlines the various milestones during the preparation and launch of the T7 Integrated Simulation environment. This timeline allows detailed production-like preparation and user entitlement maintenance leading to full trading functionality for ISE T7 from 10th May 2017 onwards:

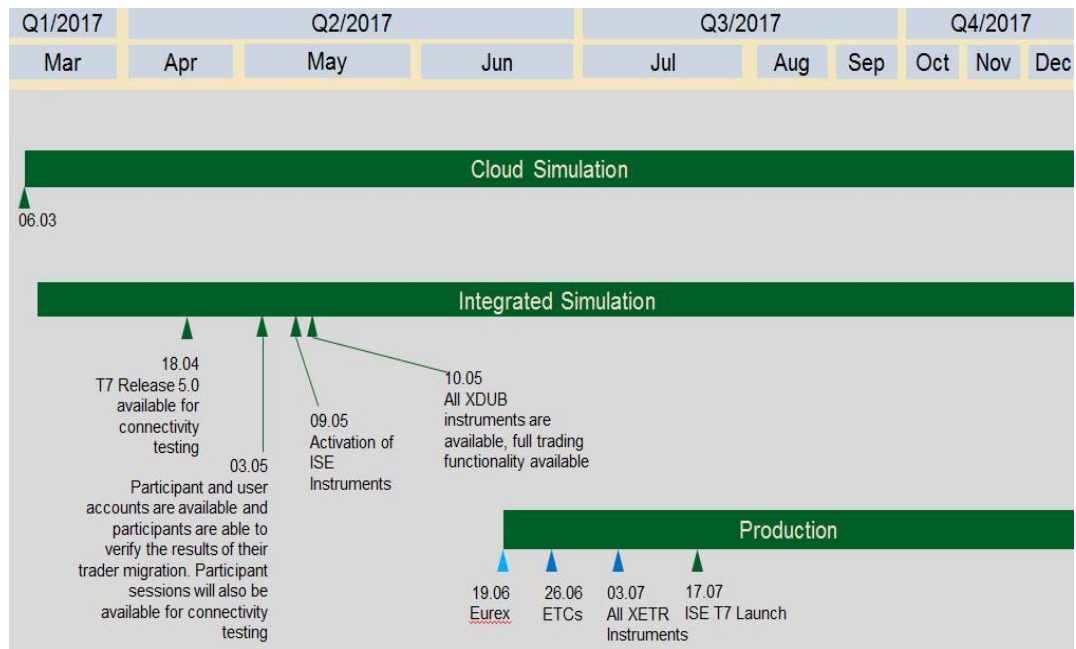
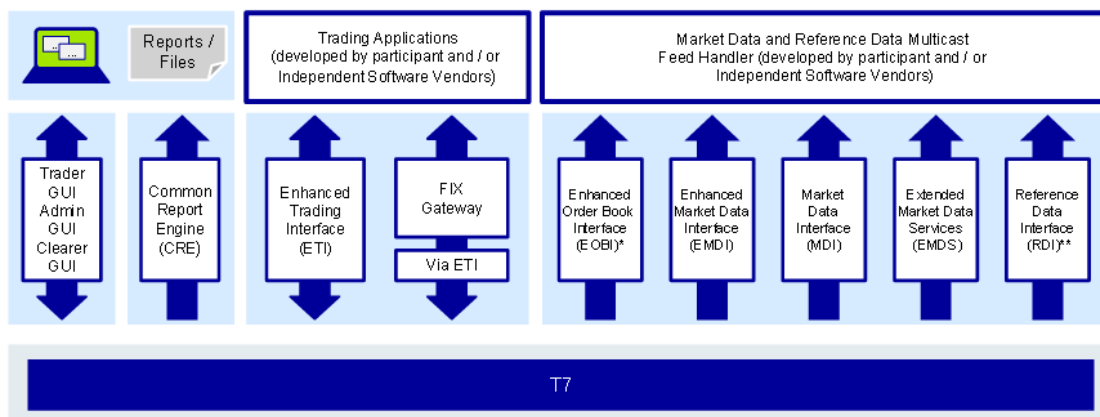


Figure 1: T7 Release 5.0 - Introduction schedule for ISE T7

1.5 Simulation System Components

The following table gives an overview of the simulation systems components for T7 Release 5.0:



*available in co-locations only

**In addition to the multicast based solution there will also be a file based solution for reference data via the Common Report Engine (CRE) and an internet download

Table 2: Overview of the T7 Release 5.0 simulation systems

1.6 Participating Systems

The following table gives an overview of the other related systems participating in T7 Release 5.0 simulation:

System	Short Description	Participating dates
ISE CCP	The CCP will run on the CCP simulation environment.	Dates to be confirmed
CEF	Real Time Data Feed, used for Block-trade delay and data dissemination (e.g. trade prices). CEF will run on the CEF simulation environment between Deutsche Börse and Market Data Vendors.	29.05 – 14.07
ISE T7	Trading system of ISE	18.04 – 14.07
Common Report Engine	Service which allows the centralised provision of reports.	10.05 – 14.07

Table 3: Overview of the related participating simulation systems

1.7 Simulation Calendar

The ISE T7 Simulation Calendar can be downloaded from the ISE website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

The calendar also includes the dates of the focus days which are described in chapter 5.

The business days in T7 simulation always correspond to the trading days which have an end-of-day batch. During Integrated Simulation, two batches per week will be provided as standard. This will allow batch days to alternate with online days on which the simulation environment remains open for 24 hours. To also enable the system to operate under production-like conditions or for special test scenarios, certain weeks will have three batch days. Additionally the simulation environment is accessible on weekends to give members the opportunity to test long-lasting and complex simulation scenarios outside of common working hours.

On batch days, the simulation will close earlier than production in order to avoid any influences on end-of-day processing operations in production. Post-trading in simulation is scheduled for 14:45 – 15:00 (Irish time).

1.8 Daily Timetable for Simulation

Simulation days will be either batch days or non-batch days (online days). After batch processing, the next online day starts at 09:00 (Irish time). On batch days, online processing ends at 15:00 (Irish time). On online days the system is permanently up and running.

The following table shows an overview of the batch day schedule:

Phase	ISE T7
Pre-Trading*	9:00 – 9:15
Opening Auction*	9:15 – 9:30
Main-Trading	9:30 – 14:30
Closing Auction	14:30 – 14:45
Post-Trading	14:45 – 15:00
Ready for Batch	~15:00
Report Distribution	21:45 – 05:00

* In case the day before was a Batch Day.

Table 4: Timetable for ISE T7 Release 5.0 batch days

1.9 T7 Cloud Simulation

Since 6th March 2017 access has been available to the T7 Cloud Simulation environment. T7 Cloud Simulation provides early access to the T7 Release 5.0 software, providing additional preparation time for software developers prototyping for the T7 interfaces. The T7 Release 5.0 Cloud Simulation is available 24/7 via Internet and is also available via the N7 network leased lines, providing full market control and on-demand access to the T7 interfaces RDI, ETI, EMDI, MDI, EOBI and the FIX gateway. T7 Cloud Simulation offers members the opportunity to test their T7 interfaces without any unintended interaction with other trading members or vendors. Therefore each member can create test scenarios based on their own needs or those of its customers.

For a detailed overview of the T7 Cloud Simulation features, benefits and connection options, please refer to the information provided on the Xetra website www.xetra.com under the following link:

Technology > T7 Trading Architecture > Cloud Simulation

Firms interested in participating in Cloud Simulation will need to sign the “T7 Cloud Simulation Agreement” with Deutsche Börse which can also be found under the aforementioned link.

2 Member Activities

2.1 Simulation Preparation

We strongly urge all members to use the entire simulation period in order to become fully familiar with the T7 features and new interfaces, in preparation for the migration to ISE T7 Release 5.0. All members should use this time to develop and adapt their in-house applications to the T7 interfaces (ETI, T7 FIX Gateway, MDI, EMDI, EOBI, RDI and EMDS) specifications.

In order to participate in T7 Release 5.0 simulation, specific member tasks have to be completed. These are detailed in the ISE T7 simulation preparation check list available on the ISEs website, www.ise.ie, under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

In addition, the following activities have to be completed by members in order to successfully participate in Release 5.0 Integrated Simulation:

- User IDs and passwords will be migrated and then set to expire. Therefore all passwords must be changed immediately after the first login to T7. (Any difficulties experienced with this should be raised directly with DBAG Clearing Data Control, please see chapter 3 for contact details). A connection to the Admin GUI / Trader GUI is required for password maintenance and therefore must be established.

The user password requirements for T7 are:

- minimum of 8 and a maximum of 16 characters
- valid characters: [a-z, A-Z, 0-9] and special characters: ['+', '-', '@', '!', '_', '\$', '%', '&', '/', '=', '*', '#']
- minimum 1 uppercase letter and minimum 1 lowercase letter
- minimum 1 special character
- maximum number of repeated characters allowed is 6
- a password history is maintained to prevent the last 10 passwords from being re-used.
- Resources for participation in simulation have been identified and confirmed.
- Member internal issue management processes and arrangements have been established.
- Broadcast streams, if required, have been subscribed to.
- Clearing members have ensured the participation of their non-clearing members in order to test specific clearing and settlement scenarios.
- Connectivity and sessions (FIX and/or ETI sessions) for T7 have been ordered via the Member Section.
- GUI certificates to the member portal have been uploaded for internet connectivity.
- Multicast addresses and gateways have been configured in members' in-house firewalls for receiving the broadcast streams.
- Access to the Common Report Engine has been subscribed to and established.

It is important to note that the multicast addresses for accessing the ISE T7 partition are different to the multicast addresses for accessing the T7 Frankfurt partition. These are detailed in the Network Access Manual available on the ISE's website.

2.2 Simulation Execution

Simulation is the final opportunity to attain functional and technical readiness for the migration of ISE Xetra to the T7 trading platform. Members are free to choose their own focus for the simulation period, however they are encouraged to simulate the processes necessary for their firm's individual situation, and to acquire the knowledge and competence in working with the new functionality to be prepared for a seamless start into production.

Members can generally participate in the simulation at any time, once the technical connection and login tests have been executed successfully.

The ISE does not specify members' tests, however support will be available and focus days will be provided in relation to certain technical and functional specifications (see chapter 5). Members are strongly encouraged to participate in these.

Members should be aware that as with production, the activity load in the simulation environment is managed with thresholds set on the maximum number of orders / trades that can be entered. In case a threshold is breached, orders / trades may be deleted or a member's access may be restricted.

If a member believes that they may breach one of the thresholds, they should contact the Group Client Key Account Manager team in Deutsche Börse for support (for contact details see chapter 3).

3 Simulation Support by DBAG

Dedicated support for members is facilitated by the ISE and by the relevant Deutsche Börse helpdesks.

Functional Helpdesk XETR

Monday – Friday: 07.00 – 17.00 (Irish time)

Tel: +49 (69) 211 - 1 14 00

Fax: +49 (69) 211 - 1 14 01

E-mail: xetrahelpdesk@deutsche-boerse.com

Clearing Data Control

Monday – Friday: 07.00 – 19.00 (Irish time)

Tel: +49 (69) 211 - 1 24 53

Fax: +49 (69) 211 - 1 44 20

E-mail: clearingdata@deutsche-boerse.com

Group Client Key Account Manager

Monday – Friday: 08.00 – 17.00 (Irish time)

Tel: +49 (69) 211 – 1 16 40

Fax: +49 (69) 211 – 1 16 41

E-mail: memberservices@deutsche-boerse.com

Customer Technical Support

Monday – Friday: 07.00 – 17.00 (Irish time)

Please use your individual VIP Number

E-mail: CTS@deutsche-boerse.com

ISE Traded Markets Infrastructure

Monday – Friday: 09.00 – 17.30 (Irish time)

Tel: +353 1 6174 200

Fax: +353 1 6795 432

E-mail: isextra@ise.ie

4 Simulation Setup and Execution

4.1 Simulation Member Data Setup

In order to minimise the effort for firms, member and trader data, including passwords, will be migrated from the ISE Xetra simulation environment to the ISE T7 Release 5.0 Integrated Simulation environment.

T7 generally distinguishes trading and clearing business units per member firm. While all trading relevant rights can be assigned to trading business units, the clearing business unit is restricted to back office activities only. Viewing of trades of all related non-clearing members is available for clearing business units, but no trading activity will be enabled.

Migration of Member IDs

For every active ISE Xetra member ID, at least one business unit will be generated in ISE T7 depending on the member's activity in the ISE Xetra environment.

- For every trading member which is a non-clearing member, a trading business unit will be setup with a business unit ID which will be the same as their current ISE Xetra member ID.
- For members which are providing only clearing (and settlement services), a clearing business unit will be setup with a business unit ID created from their ISE Xetra member ID with "CL" added at the end.
- For every member that is both a trading member and a clearing member, both a trading business unit and a clearing business unit will be assigned.

The existing clearing relationship between a trading member and its clearing member will also be migrated to ISE T7. This also applies to the assignment of instrument groups.

The authorisation concept in T7 is slightly different than in Xetra since it is not based on single rights but on the combination of rights into roles which are then assigned to the business unit (by Deutsche Börse in consultation with the ISE).

The available predefined roles are assigned automatically with the migration to trading and clearing business units based on the authorisation available in the current ISE Xetra environment. For example,

- "Cash Trader" role will be assigned to every trading business unit for which the Resource Access Level (RAL) 7 "Enter Order" is assigned to the respective member in ISE Xetra;
- "Cash Market Maker" will be derived from RAL 11 "Enter Quote".

User Roles

The same approach will also be applied at the user level. For example, for trading business units, a user will get the role Cash Market Maker assigned in ISE T7 if RAL 11 "Enter Quote" was assigned in ISE Xetra, while the Cash Service Administrator role in T7 will be assigned if the user was allowed to "Add Users" by RAL 3 in ISE Xetra.

For T7 roles for which no equivalent RAL exists, the role will not be assigned automatically but can be allocated by the Service Administrator to the user at a later time. These roles are “Emergency Trading Stop”, “Trade Enrichment Rule” and “Trade Enrichment Rule View”.

For clearing only members, which will receive only a clearing business unit, the Cash Service Administrator role is derived from RAL 3 “Add User”. The CM Backoffice View role will be given to all users since having the possibility to view the trades of all assigned non-clearing members is the main purpose of the clearing business unit.

Within the business unit, a Service Administrator can set up different kinds of users and group them into user groups. For each user, there is a choice of three levels with regards to their order maintenance rights, i.e.:

- **Traders** are allowed to maintain their own orders only.
- **Head traders** can maintain their own orders and orders of all users within their group.
- **Supervisors** can maintain orders of all traders of the trading business unit.

Within a trading business unit all users having the “Senior” flag in ISE Xetra will be setup as “Head Traders”. Other users will be migrated to the “Trader” level. No user will receive the “Supervisor” level automatically but this can be assigned later, if required, by the Service Administrator of the business unit.

For clearing business units on the other hand all users that are migrated or set up will automatically get the “Supervisor” level since they always act for the whole member.

In the Xetra environment the RALs can be assigned independent of the instrument groups in which the user should be active. In T7 on the other hand roles always need to be assigned to users together with a Product Assignment Group in which the user should be able to do something. Hence, the combination of what a user can do and in which instruments becomes more flexible.

Migration Approach

While in the Xetra environment all users are set up under one member ID, in T7 it is possible for two business units to be assigned to a single member firm, therefore the following rule applies for the migration:

- For members set up as either a trading or a clearing member, i.e. where only one business unit needs to be setup, all users in scope of the migration will be automatically migrated to the respective business unit.
- In case both business units need to be set up for a member, all users in scope will be migrated to the trading business unit only. For the clearing business unit, the only user that will be set up is the system generated user “CLGSPV” which is the Service Administrator role. This will be setup automatically for all clearing business units, and will have the Cash Service Administrator role and the CM Backoffice View role assigned automatically. The password will be provided by DBAG.

To migrate the member and user data to T7 for both production and simulation some input files need to be prepared. This will be done by extracting the data from the relevant ISE Xetra environment a few days before the migration.

For simulation, the data valid as of end-of-business on 24th April 2017 in the ISE Xetra permanent simulation environment will be used. The members and users will be available in the ISE T7 Integrated Simulation environment commencing 2nd May 2017. Any change to user data in ISE Xetra simulation done after the 24th April cannot be considered for the migration and has to be executed again by the member after the migration in the T7 system.

For the migration, every user which has logged in since the introduction of Xetra Release 12.0 in 2011 will be migrated to T7 automatically.

The available trading accounts or trading capacities in T7 are Agency (A), Proprietary (P) and Market Making (M). The trading accounts currently assigned to a user in ISE Xetra will be mapped to the respective trading capacity in T7 (with the Designated Sponsor (D) account mapped to the Market Making (M) account).

The Maximum Order Value from the ISE Xetra environment will also be migrated for each user as it is currently set. The only exception is that values higher than the possible maximum value in T7, which is 9,999,999,999.99999999, will be set to the T7 maximum automatically.

Further details will be included in the document "Member and User Maintenance Manual".

4.2 Instrument Migration and Activation

From 3rd May 2017 complete reference data for all ISE instruments will be available in the ISE T7 simulation environment. These instruments will be activated and available for trading from 10th May.²

Until the instruments become active in the T7 Release 5.0 Integrated Simulation environment, the field Market Segment Status (Tag 2542) in the Reference Data Interface (RDI), Reference Data File (RDF) on the Common Report Engine (CRE) will have the value "10 (Published)" for all instruments, indicating that the data is published but the instrument is not activated for trading. From 10th May, the field will have the value "1 (Active)" for all ISE instruments in T7 simulation.

In ISE Xetra these instruments will remain active, however all order book trading RALs will be disabled and in the end of day processing in ISE Xetra on 9th May, all open orders will be deleted by a special processing, if they are not deleted anyway e.g. due to expiry or corporate action. All deletions done in the ISE Xetra system as a result of the migration will have time stamp 23:59:58 and the deletion reason suspend in the order confirmation and in report TC540.

All ISE instruments available for trading in the ISE T7 simulation environment will be contained in the product assignment group **ISE1**.

¹ The document will be published in April 2017 on the ISE website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership > Trading System > T7 Documents

² These instruments will also remain available in ISE Xetra simulation for those members that wish to continue to simulate the off order book trade reporting facility.

4.3 Supported Simulation Instruments

Liquidity (bid/ask prices) will be provided on each trading day throughout ISE T7 Release 5.0 simulation in the following products:

- Instrument for which ISE will provide buy orders to test the Iceberg Order:
IE00B59HWB19
- Script support for liquidity / provision of market depth for EMDI, MDI and ETI:
IE00BDC5DG00, IE0004906560, IE00B1HDWM43

The following instruments will also be used for certain focus days:

IE0000020408, IE0000669501, IE00B1WV4493, IE00BXC8D038, IE00BJMZDW83

Further details are in chapter 5 and also the simulation calendar.

4.4 Instruments for CCP End-to-End Testing

It will also be possible to carry out full end-to-end testing with the CCP and CREST. Details of this will be provided in advance of Integrated Simulation availability.

4.5 Reports

Reports will be provided after every batch day. T7 report distribution will be done exclusively via the Common Report Engine for both production and simulation. Therefore all members require a setup on the Common Report Engine in order to receive the reports. This can be done via the DBAG member portal. Details on accessing the Common Report Engine are described in the Common Report Engine User Guide available from the ISE.

The distribution of (new) reports via the Common Report Engine will start with ISE T7 simulation on 10th May.

4.6 Reference Data Simulation

Customers will receive the instrument reference data in simulation via:

- **Reference Data Interface (RDI)**
- **Common Report Engine (CRE)**
- **Xetra public reference data**

As of 21st April, 2017 a sample file for members will be available on the Xetra website www.xetra.com under the following path:

Technology > T7 trading architecture > T7 System documentation > Simulation

As of 5th May, 2017 the Xetra public reference data file will be generated with every batch run and be transferred to the public Xetra website under the above path.

Further details regarding Reference Data can be found in the document “Xetra Instrument Reference Data Guide”, which will also be available via the above path in mid-April.

5 Focus Days

Focus days are provided to support members' testing and experience of the new interfaces and functionality. The schedule for all focus days is included in the simulation calendar.

In this chapter, all focus days that will be offered for the ISE T7 Integrated Simulation environment are described. Please note: no focus days are provided in T7 Cloud Simulation.

Technical Focus Days: Triggered by DBAG

- Fix Gateway Failover
- Matching Engine Failover and Failure, EOBI Failure
- Market Data Services Failure
- ETI Session to Gateway Re-assignment
- Matching Engine Processing Delay
- GUI (forced user log out)

Functional Focus Days

- Corporate Actions
- Product Halt
- Instrument Suspend
- Volatility Interruption

Functional Focus Days: Executed by ISE T7 Members

- Instrument / product state changes
- Quote Handling
- Self-Match Prevention
- Risk Controls view

5.1 Technical Focus Days: Triggered by DBAG

5.1.1 Focus Day 1: FIX Gateway Failover

In case of a FIX Gateway Application Failover, all FIX sessions connected to that FIX Gateway will be disconnected and the corresponding port will be closed. Members should then activate the connection to the secondary FIX Gateway.

The first FIX session logon to the secondary FIX Gateway may take some seconds. Therefore if a connection or a session logon fails or is not responded to immediately, a second attempt should only be made after a few seconds have passed (30 seconds recommended).

Schedule:

- 14:00 (Irish time): Application Failover FIX Gateway
(IP address: 90.152.253.42 becomes unavailable)
- 14:15 (Irish time): Restart of FIX Gateway
(IP address: 90.152.253.42 available again)
- 14:30 (Irish time): Application Failover FIX Gateway
(IP address: 90.153.253.42 becomes unavailable)

- 14:45 (Irish time): Restart of FIX Gateway
(IP address: 90.153.253.42 available again)

These tests are recommended for all ISE T7 members (Members/Vendors) using the T7 FIX Interface.

In the event of a FIX Gateway failure, active FIX sessions will be disconnected. FIX sessions may be resumed for the same SenderCompID (49) on the secondary FIX Gateway, using the secondary IP address and port number.

Recovery notes: In the event that the disconnection was due to an outage on the FIX Gateway side, members should consider the following recovery mechanisms:

- After reconnection of the FIX session, the FIX Gateway may receive a sequence number higher than the one expected and sends a Resend Request (2) message to the member.

The members should resend all potentially missed messages with PossDupFlag (43) ="Y", to indicate that a message may have been previously transmitted with the same MsgSeqNum (34). Please note: No Gap Fill messages should be sent by the members during the resend series for application messages. Application messages should always be re-transmitted since the T7 FIX Gateway requires all missing application messages for the purpose of reconciliation with the T7 trading system fall-back. If a member sends Gap Fill messages during the resend series for application messages, the related orders might not be accessible any more via the FIX Gateway and related order specific information will not be forwarded to the FIX session.

5.1.2 Focus Day 2: Matching Engine Failover and Failure, EOBI Failure

The T7 simulation system runs on separate partitions. Every process in the partition has a standby partner process that can take over in case the primary process fails. During simulation a failover and a failure of a matching engine will be simulated.

Matching Engine Failover

As a precondition, members are advised to enter non-persistent orders and quotes in the simulation environment before the matching engine failover takes place.

In this test scenario the existing matcher processes in the partition will be terminated and the standby partner process will take over. Shortly after the takeover, members will receive a 'Market Reset Event' message, stating the technical problem and including the message key which is the last reproducible order message.

As a result of the failover, the products from the failed partition will still be tradable. A Market Reset Event message will be triggered. Non-persistent orders and quotes which were inserted earlier will be deleted after the restore of the order book.

There is a "failover time parameter" defined per product. If the failover happens in between that timeframe or the product did NOT have a continuous trading status prior to the corruption,

the product will change to product state “halt”, after the failover is finished. Afterwards an order book replay will be sent including the persistent orders which were recoverable. Members with low frequency sessions will receive an extra end of replay message on a product level. Members with high frequency sessions will only receive the previously mentioned Market Reset Event Message. Hence, there are no extra deletion messages.

The Matching Engine failover automatically triggers an EOBI failure.

Matching Engine Failure

For the execution of a matching engine failure both matcher processes will be crashed for the partition in simulation. The test case will have an impact on all products available on this partition. As long as the partition is not available, i.e. not restarted by the DBAG, members will neither be able to receive public market data for products linked to that partition, nor will they be able to enter orders.

A Market Reset Event message will be sent out to members, when the matching engine has been restarted. Additionally the market data service will still be available but will send only unchanged data to members.

The Matching Engine failure also automatically triggers an EOBI failure.

T7 Enhanced Order Book Interface (EOBI) Failure

Prior to the focus day, members should check in advance whether they are able to receive market data from EOBI i.e. they should try to send some orders in the instruments available in simulation (Product Assignment Group ISE1). Public market data information from T7 EOBI will be provided in packages/UDP datagrams marked with a *MarketSegmentID*, i.e. product identifier; *PartitionID*; *AppSeqNum* (continuous numbering format); Packages are sent over redundant multicast address and port combinations. Each package is uniquely identified by its *MarketSegmentID* and *AppSeqNum* combination. In addition to the packet sequence numbering, individual messages are sequenced by *MsgSeqNum* which is continuous per *MarketSegmentID*. In case of an EOBI failure, both the *AppSeqNum* and the *MsgSeqNum* for a specific *MarketSegmentID* will restart from 1.

An EOBI failure is triggered together with a matching engine failover or failure. Member applications should notice this, whenever an *AppSeqNum* is received which is smaller than one which has already been received for a specific *MarketSegmentID* and multicast address:port combination. Whenever a member application detects a restart of the *MsgSeqNum* as well, it must rebuild all order books for this *MarketSegmentID* again from the T7 EOBI snapshot channel.

All non-persistent orders entered prior to the failover will be deleted. The receiving application needs to invalidate its view of the order book and refresh, once an explicit message has been received containing new information.

- ➔ Matching Engine and EOBI Failover / Failure scenario will be offered between 14:00-15:00 (Irish time).

5.1.3 Focus Day 3: Market Data Services Failure

Prior to the focus day members should check whether they receive market data from T7, i.e. they should try to send some orders in products which are available in simulation. Market data information will be provided in packages marked with a *SenderCompID*; *PartitionID*; *PacketSeqNum* (continuous numbering format); the *MessageSeqNum* (continuous per *SenderCompID* multicast address and port combination) and a *MarketSegmentID*. The *SenderCompID* always remains constant for a product during the whole business day, if there is no failover.

When the market data failure is initiated, a crash will be simulated within the partition for market data services. During that time members can try to insert new orders and quotes for that product. As a result they will receive a message that the associated partition is not available. As long as the partition is not available, i.e. not restarted by DBAG, members will neither be able to receive market data for products linked to that partition, nor be able to enter orders. In this test scenario both partitions in simulation will be affected and therefore the test will refer to all products which are available at that time in the simulation environment.

Members can identify this failover scenario by comparing the *SenderCompID* value with the previous value. A new *SenderCompID*, which is available in the packet header and in each data message for incremental and snapshots, indicates the partition failure. Additionally the *PacketSeqNum* will be reset to 1.

Once this condition is observed, it can be assumed that a failover scenario took place and the rebuild of the order book can be started. All non-persistent orders entered prior to the failover will be deleted. The receiving application needs to invalidate its view of the order book until an explicit message has been received containing new information.

- The Market Data Services Failure scenario will be offered between 14:00-15:00 (Irish time).

5.1.4 Focus Day 4: ETI Session to Gateway Re-assignment

Members interact with the trading gateways by means of high frequency or low frequency sessions. The primary and secondary gateway, to which a session is assigned, is contained in the response to the gateway request message which is issued as the first step in the connection process. Under normal circumstances the assignment of the session to a trading gateway will not change on a day-to-day basis. However, either as a result of hardware failure or due to the re-assignment of sessions for load balancing purposes, the session to gateway assignment can and will change.

Members must not only ensure that their applications support the automatic gateway re-assignment but also that their application can handle a logon to the primary or secondary gateway should one of the logins fail. Hardcoding of gateway assignments may lead to the inability to connect to the trading gateways.

To assist members in preparing for the ETI session to gateway re-assignment and to ensure that trading applications are able to handle the scenario once it occurs, focus days will be offered whereby the session to gateway assignment will be changed for all sessions. There will be two focus days for this scenario with both focus days taking place in the same week.

In the end-of-day processing on the first day where the focus day is specified, all session to gateway mappings will be deleted. Once the simulation environment becomes available again after the end-of-day processing, the assignment of the sessions to the trading gateways will be performed on a “round robin” principle and there will be no way to ascertain which gateway will be assigned in advance. Applications will be required to process the response from the gateway request message to find out which trading gateways can be used for a particular session.

A list of all the possible trading gateways together with their IP addresses is listed in the document “Exchange and Settlement Network Access” which is available on the ISEs website, www.ise.ie, under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

In the end-of-day processing on the following batch day, the original session to gateway mappings will be restored.

- ➔ The ETI to Gateway Session Re-assignment scenario will be offered over a time spanning two batch days with part one deleting all existing mapping and part two restoring the original session to gateway mappings.

5.1.5 Focus Day 5: Matching Engine Processing Delay

This focus day scenario is provided to assist members in testing the very rare event where massive processing delays occur on a partition. In this scenario the following events will be triggered:

- All non-persistent orders and quotes will be deleted for the affected product(s)
- Product-specific DeleteAllOrderQuoteEventBroadcast messages will be sent to all ETI sessions with MassActionReason set to (111) Product_temporarily_not_tradable.
- OrderMassActionReport (UBZ) messages will be sent to all FIX sessions.
- For a minimum time period of 10 seconds or until the slow processing is resolved, all transactions except order deletions will be rejected with SessionRejectReason set to (102) Service_Temporarily_Not_Available and VarText 'TRANSACTION REJECTED DUE TO SLOW PARTITION'
- In the event that a product is temporarily not tradable, members will be informed when the matching engine will accept transactions again by a TradingSessionStatus message (MsgType (tag 35) = “h”) specifying TradSesEvent (tag 1368) = 105 (“Service Resumed”).

Please Note: Members will still be able to send deletion requests for any persistent orders which they would like to remove.

This focus day will be provided in the product IE00BJMZDW83 only.

Members are requested to check that their applications can correctly handle order / quote deletions and transaction rejections due to the slow partition state.

5.1.6 Focus Day 6: GUI (forced user log out)

The GUI Focus Day scenario is provided to make members aware of the effects of a full GUI environment restart. Following this event, a full restart of the GUI environment in simulation will be performed. On the day where the focus day is scheduled, members will be encouraged to suspend orders so that the effect on suspended orders caused by a GUI restart can be observed. Suspended orders will all be deleted, and the rest of the order book will be unchanged after a restart.

- ➔ The GUI (forced user log out) focus day scenario will be offered between 14:00-14:30 (Irish time).

5.2 Functional Focus Days

5.2.1 Corporate Actions

DBAG will trigger a corporate action in IE00B1WV4493. The approach will be as follows:

One business day prior to the focus day, DBAG will maintain the Cum-indicator, the Ex date and the dividend amount for the respective instrument. On the focus day, members will see the Cum-Indicator. Members then should have open orders in POSTR. These orders will be deleted during the following batch run. Furthermore, the deletion messages including the order deletion reasons will be sent. On the next business day, (Ex-day) the members will see the Ex indicator and the reference price reduced accordingly by the dividend amount.

The deletion messages including the order deletion reasons will be sent out during the batch run on the respective focus days.

5.2.2 Product Halt

A product halt will be carried out in simulation on a predefined focus day for IE00BXC8D038. This test will be done on an intraday basis between 13:00 and 13:30 (Irish time).

Test scenario and expected result:

Prior to the planned product halt, members are recommended to enter non-persistent and persistent orders and quotes in the affected product. As a result, this product will not be tradable between the given times in the ISE T7 simulation environment. In this scenario all non-persistent orders and quotes will be deleted after the market reset and members must then re-enter them. Persistent orders for the affected product will stay in the system. Additionally the following message will be triggered:

10308 - (ETI: Mass Cancellation Event aka DeleteAllOrderQuoteEventBroadcast aka BC CleanupOQ)

OrderMassActionReport (UBZ) messages will be sent to all FIX sessions.

5.2.3 Instrument Suspend

In order to reflect a product halt in T7, one Instrument Suspend will be carried out on a predefined focus day. This test will be done on an intraday basis between 13:00 and 13:30 (Irish time) in product IE0000020408.

Test scenario and expected result:

Prior to the planned Instrument Suspend members are recommended to enter non-persistent and persistent orders and quotes in the affected product. As a result this product will not be tradable between the given times in the ISE T7 simulation environment. In this scenario all orders (persistent and all non-persistent) and all quotes will be deleted after the market reset and members must re-enter them. Persistent orders for the affected product will stay in the system. Additionally the following message will be triggered:

10308 - (ETI: Mass Cancellation Event aka DeleteAllOrderQuoteEventBroadcast aka BC CleanupOQ)

5.2.4 Volatility Interruption

The volatility interruption mechanism on ISE T7 will operate in functionally the same way as it does currently on ISE Xetra. In summary, during continuous trading and auction call phases, the potential trade price is validated against the fixed and floating volatility boundaries. If a potential trade price lies outside the fixed or floating volatility boundaries then a volatility interruption is triggered and the volatility indicator is published. Please note that in auction call phases, the volatility interruption is only triggered at the end of an auction call phase.

If, at the end of a volatility interruption, the potential price lies outside the extended range, which is broader than the floating price range, the volatility interruption will be extended until it is terminated manually. This extension of the volatility auction call phase will be marked with a special indicator. This indicator is published to inform the market about an extended volatility interruption.

For this focus day the volatility interruption will be triggered between 13:30 and 14:00 (Irish time) and the extended volatility interruption between 14:00 and 14:30 (Irish time) in IE0000669501.

Test scenario and expected result

- I. Prior to the planned volatility interruption, members are recommended to enter persistent and non-persistent orders in the respective product. As a result of this test scenario all persistent and non-persistent orders are still in the book after the volatility interruption started.
- II. During the freeze of an extended volatility interruption, the instrument's trading phase does not allow deletion of orders. In such a situation the respective orders cannot be

deleted directly but the deletion is pending until the respective phase gets released. DBAG Market Operation will execute a Mass Delete. Within the mass cancellation message the member is informed about all orders with “Pending Deletion” by enumeration of the system order numbers. When the Extended Vola Freeze is resolved an order marked for pending deletion might get executed or (the remaining quantity) is deleted before the next incoming order book transaction is processed. For this final deletion a single order message is formatted.

5.3 Functional Focus Days: Executed by Members

The ISE also recommends that members carry out the following focus days themselves.

5.3.1 Instrument / Product State changes

T7 applies trading states at both a product level and at an instrument level. Instruments of the same product can be in different instrument states. Product states apply to all instruments of a product. For ISE T7, there will be a 1:1 mapping between instruments and products.

While product states give structure to the trading day and control general access to the system, instrument states control order/quote maintenance, execution and availability of market information. The introduction of instrument states permits greater flexibility with auctions.

5.3.2 Quote Handling

This scenario describes the most important features related to quote handling, e.g. ‘mass quote’ functionality allowing members to enter, modify and delete multiple quotes of a session simultaneously.

Quotes per business unit:

Quotes belong to the session on which they are entered. It is possible to have multiple sessions for one business unit and each session can have different quotes in the same instrument.

Mass quote entry:

In this scenario it is possible for the trader to enter, modify and delete multiple quotes of a session simultaneously. This function is different from the “delete all quotes” feature, which deletes all quotes in one session.

Quote check:

A newly inserted or amended quote which fails the price reasonability or extended price range validation results in a complete deletion of the quote.

Automatic deletion:

In this scenario it can be tested that quotes are automatically deleted when the instrument status changes to “closed” or “restricted”.

Quote activation / inactivation:

Quotes of a given session or product (and instrument type) can be set to active/inactive. Inactive quotes will be hidden from trading and will not participate in matching. Furthermore they will not be visible in the order book depth. Traders can continue to add, modify and cancel individual quotes. The inserted status for quotes is always persisted for the current business day. At the start of the new business day all newly entered quotes will be reset via default to status active.

During the time of a session inactivation any new quotes which are inserted for the session become automatically inactive. When reactivating the quotes they get a new matching time priority.

5.3.3 Self-Match Prevention

Self-match prevention is an optional functionality that allows a business unit to prevent that certain own orders of the same instrument match against each other.

SMP is offered via all trading interfaces (ETI, FIX Gateway) including the Trader GUI. It is supported for all order types (except iceberg orders and orders with order validity "FOK") and quotes.

On the focus day "Self Match Prevention", members are requested to test the new functionality by entering orders, which are executable against each other with the same numeric SMP-ID. The SMP-ID will be checked on a business unit level. Its setup and usage lies within a business unit's responsibility.

In report TC 812 "Daily Prevented Self-Matches" members can see all order deletions, cancellations, and modifications due to self-match prevention.

5.3.4 Risk Controls view

The Risk Controls View comprises of two different functions:

- the Panic Cancel actions, which results in the deletion of orders and/or quotes
- the Stop/Release actions, which will not only delete orders and quotes but will prevent a single or group of traders/machines from further entry of quotes and orders.

More information is available in the "T7 Trader, Admin and Clearing GUI Manual" available on the ISE's website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

6 Appendix

6.1 XML and Text Reports

All reports provided by T7 Release 5.0 for members, together with their frequency of creation, and whether they are available as text reports can be found in the document “XML Reports - Reference Manual”. The document can be found on the ISE website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

Reports are provided only on batch days.

6.2 Related Documentation

All T7 Release 5.0 documentation for ISE T7 members is available on the ISE website www.ise.ie under the following path:

Products & Services > Trading Members > Equity Trading Membership >
Trading System > T7 Documents

6.3 List of Terms and Abbreviations

ETI	Enhanced Trading Interface
MDI	Market Data Interface
EMDI	Enhanced Market Data Interface
EOBI	Enhanced Order Book Interface
EMDS	Extended Market Data Service
RDI	Reference Data Interface
CRE	Common Report Engine
DBAG	Deutsche Börse AG

Table 5: List of abbreviated terms