

T7 Release 5.0

Final Release Notes for ISE T7

9th May 2017

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1. Definitions and Abbreviations

The following are the definitions and abbreviations used in this ISE version of the release notes:

BU	Business Unit
CRE	Common Report Engine
EMDI	Enhanced Market Data Interface
EMDS	Extended Market Data Service
EOBI	Enhanced Order Book Interface
ETI	Enhanced Trading Interface
FIX	Financial Information eXchange (Protocol)
ISE	Irish Stock Exchange plc
ISE T7	The future electronic trading system of the ISE, to be introduced on 17 th July 2017
ISE Xetra	The existing electronic trading system of the ISE
MDI	Market Data Interface
RDF	Reference Data File
RDI	Reference Data Interface
T7	Cash and Derivatives trading system developed by Deutsche Börse Group
Xetra (system)	Existing Xetra trading system of Deutsche Börse
Xetra (trading venue)	Trading venue with Market Identifier Code "XETR" (Deutsche Börse)

2. Introduction

To improve and extend its exchange infrastructure, Deutsche Börse is planning to migrate its cash market trading (Xetra) to the T7 architecture which is already used by the derivatives markets (Eurex, EEX). Step 1 of the migration will be executed with the introduction of T7 Release 5.0 in June/July 2017.

The ISE is also migrating the ISE Xetra trading platform to the T7 trading architecture as part of Release 5.0.

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

The table below provides an overview of the general introduction schedule of Release 5.0, with further details on the migration schedule for the ISE market:

Exchange	Task	Start Date	End Date
All	Release 5.0 technical installation in Production	16.06.2017	17.06.2017
Xetra Frankfurt	Start trading in ETCs	26.06.2017	26.06.2017
Xetra Frankfurt	Start trading full instrument scope	03.07.2017	03.07.2017
ISE	Load ISE Member Data & Specific Reference Data	07.07.2017	08.07.2017
ISE	Load ISE Product, Instrument & ISE Member Session Data	10.07.2017	10.07.2017
ISE	Connection Test & User Maintenance	11.07.2017	14.07.2017
ISE	Launch of ISE T7	17.07.2017	17.07.2017

Table 1: ISE T7 Release 5.0 introduction schedule

ISE members will have the opportunity to perform comprehensive testing of their trading applications before going live. For the migration to ISE T7 the simulation will be provided in two phases as for the Xetra Frankfurt market. The first phase started on 6th March 2017 with the Cloud Simulation. The Cloud Simulation provides the opportunity to test the T7 member interfaces without any unintended interaction of other members or vendors. Test scenarios can be created based on the needs of the members. In addition scenarios that are provided from Deutsche Börse can be used for the tests. As of 18th April 2017, the second phase began in an integrated environment, which allows members to test the whole process chain. The rollout plan for the T7 integrated simulation environment will follow the same approach as the rollout plan for production, with the following key milestones for the launch of the ISE T7 Integrated Simulation Environment:

Date	Milestone
01.03.2017	Simulation session ordering and GUI key upload available via the Xetra Member Section.
18.04.2017	T7 Release 5.0 is available for connectivity testing.
26.04.2017	Availability of ETC instruments in Xetra Frankfurt T7 simulation.
28.04.2017	Availability of all Xetra Frankfurt instruments in Xetra T7 simulation.
05.05.2017	ISE member and trader accounts are available, enabling members to verify the results of the trader migration. Technical connectivity to the GUIs is possible.
09.05.2017	Activation of ISE instrument data based on the ISE Xetra simulation system.
10.05.2017	All ISE Xetra instruments are available with full trading functionality.

Table 2: ISE T7 Release 5.0 simulation rollout plan

2.1 Migration Strategy for ISE Xetra for Release 5.0

With Release 5.0, the ISE will migrate the order book to the T7 environment. The Off Order Book trade reporting facility will remain on ISE Xetra for a period of months and will be migrated to a new MiFID II compliant trade reporting system, 'ISE OBOE', on 4th December 2017.

Therefore from 17th July 2017 order book trading in ISE equities and ETFs will take place on the ISE T7 order book, while Off Order Book trade reporting in those securities will remain on ISE Xetra until migrated to the new trade reporting system.

To enable as smooth a transition as possible, all data necessary to enable order book trading will be migrated from the ISE Xetra system to ISE T7 in advance. As outlined in Table 2 above, ISE instrument reference data will be migrated on 10th July 2017. Therefore as of this date, all ISE Xetra instruments will be available in both the reference data of ISE T7 and also the trading system ISE Xetra. On ISE T7 these instruments can be identified in the T7 reference data interfaces RDF, RDI and the ASCII file. For member firms, there will be no change in the trading behaviour of those instruments on the system.

The current trading day schedule will remain, although some of the trading phases like start of trading, auctions, etc. may have different names.

Product Assignment Groups in T7 will replace the concept of instrument groups in the trading system Xetra for the purpose of trader assignment. Each instrument group available at the time of the migration in ISE Xetra will be reflected by one Product Assignment Group with the same name and instrument content.

Member and user IDs will be migrated with analogous access rights, settings and instrument assignments as they are setup in ISE Xetra at end of day on 23rd June 2017.

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 ('Trading BU') 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 ('Clearing BU') 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.

For more details on the concept of participants, business units and users, please refer to chapter 3.2.

The T7 business unit and user roles as well as settings are derived from the RALs (Resource Access Levels) and settings of the members and users in the ISE Xetra trading system according to the following rules:

Business Unit	
ISE T7 Role/Setting	ISE Xetra RAL/Setting
Cash Service Administrator	No particular RAL required. (This will always be assigned in T7)
Emergency Trading Stop	No particular RAL required. (This will always be assigned in T7 to Trading BU)
Trade Enrichment Rule	No particular RAL required. (This will always be assigned in T7 to Trading BU)
Trade Enrichment Rule View	No particular RAL required. (This will always be assigned in T7 to Trading BU)
CM Backoffice View	No particular RAL required. (This will always be assigned in T7 to Clearing BU)
Cash Trader	RAL (7) Enter Order
Cash Market Maker	RAL (11) Enter Quote
Trading View	No particular RAL required. (This will always be assigned in T7 to Trading BU)
Cash User Data View	No particular RAL required. (This will always be assigned in T7)
Emergency Mass Deletion	No particular RAL required. (This will always be assigned in T7 to Trading BU)
SMP Prevention¹	Self Match Prevention not enabled

Table 3: Role/setting mapping from trading system ISE Xetra to ISE T7 for Business Units

User	
T7 Role/Setting	Xetra RAL/Setting
Cash Service Administrator	RAL (3) Add User
Cash Trader	RAL (7) Enter Order
Cash Market Maker	RAL (11) Enter Quote
Trading View	RAL (20) Inquire Trade and without RAL (7) Enter Order
Cash User Data View	RAL (1) Inquire User List and without RAL (3) Add User
Emergency Mass Deletion	RAL (29) Delete All Orders and Quotes
CM Backoffice View	No particular RAL required. (This will always be assigned in T7 to Clearing BU)

Table 4: Role/setting mapping from trading system ISE Xetra to ISE T7 for User

¹ The role "SMP Prevention" disables the possibility to use Self Match Prevention which is usually enabled for all business units. The role can be assigned and hence SMP switched off for members on request.

Users which have not logged in and have not changed their password since the introduction of Xetra Release 12.0 in 2011 will not be migrated at all.

For users which will be migrated from ISE Xetra to ISE T7, their passwords will be migrated as well for the first login but set to be expired i.e. users need to change their password during the first login. In this context it is highly recommended to all users, including technical users and order routing machines, to change the initial password prior to the first trading day. The change of passwords can only be performed via the GUI.

Senior traders will be migrated to be “Head Traders” in ISE T7 while Non-Senior traders will be setup as “Traders” in ISE T7. More information on user levels can be found in chapter 3.2.3.

Trading accounts “Agent”, “Proprietary” and “Designated Sponsor” will be migrated as well and assigned as Trading Capacities “Agent”, “Proprietary” and “Market Maker”. The Maximum Order Value and the Default Settlement Information setup for a user will be migrated to ISE T7 analogously while Maximum Order Values higher than 9,999,999,999.99999999 will be capped to this value.

Session IDs will neither be migrated to ISE T7 nor can they be used to login into the trading systems ISE Xetra and ISE T7 in parallel. In order to connect to the ISE T7 system, it will be necessary for participants to order new ISE T7-specific sessions for the interfaces. This applies to the Enhanced Trading Interface as well as FIX Gateway. Details regarding the session concept and session types can be found in chapter 4.1.1. Sessions can already be ordered for Simulation and from 8th May 2017 sessions can also be ordered for Production.

Orders available in the ISE Xetra trading system with validity equal to or longer than 17th July 2017 will not be transferred to the ISE T7 system. These orders will be deleted during their last batch run in ISE Xetra with deletion reason “suspend” and a deletion time stamp “23:59:58”. Members can therefore easily identify these orders and re-enter them into the ISE T7 system.

As stated above, the Off Order Book Trade Reporting facility will not be migrated to ISE T7 and will instead remain on ISE Xetra for a period of approximately four months until it is migrated to the new ISE OBOE system. Further information is available on the ISE’s website, www.ise.ie. The existing MiFID I Post-trade Transparency Service will also remain available on ISE Xetra for a period of months following the migration of the order book.

2.2 Further reading

The documents relevant for ISE T7 Release 5.0 are scheduled to be published in accordance with Table 5 below. Preliminary versions (identified by ◆) have been published in **December 2016**. Prior to the start of simulation, simulation versions (identified by □) were provided in **February, March and April 2017**. Final versions (identified by ●) are being distributed from **March** through to **June 2017**, prior to Production Launch.

All relevant Release 5.0 documents are available on the ISE website:

www.ise.ie/Products-Services/Trading-Members/Equity-Trading-Membership/

Please note that the publication dates in Table 5 are subject to change.

2.3 Contacts

For any questions you may have on the migration of ISE Xetra to T7, please contact the Traded Markets Infrastructure team at the ISE by e-mail to isexetra@ise.ie. Alternatively, please contact your Xetra Technical Key Account Manager using your VIP number or via e-mail to cts@xetra.com.

T7 Release 5.0	Q3 2016			Q4 2016			Q1 2017			Q2 2017			Q3
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Release Notes													
ISE T7 announcement	△												
T7 Release 5.0, Release Notes						◇				●			
Simulation													
Participant Simulation Guide									●				
Cloud Simulation commences								△					
Permanent Simulation commences										△			
Overview and Functionality													
T7 Functional and Interface Overview										●			
T7 Functional Reference										●			
T7 Security Administration Manual										●			
Participant and User Maintenance Manual										●			
ISE T7 Market Model										●			
GUI Solutions													
Trader and Admin GUI – Manual										□	●		
T7 Trader and Admin GUI - Installation Manual										□	●		
Trading Interfaces													
Enhanced Trading Interface - An Introduction			●										
FIX Gateway - An Introduction			●										
T7 Enhanced Trading Interface – Manual incl. Repository and Header files						◇		□			●		
T7 Enhanced Trading Interface – XML Representation						◇		□			●		
T7 FIX Gateway - FIX 4.2 and 4.4 Manual incl. Fiximate and Repository						◇		□			●		
Market and Reference Data Interfaces													
Enhanced Market Data Feed Interface, Market Data Feed Interface, Reference Data Interface – An Introduction			●										
T7 Market-, Enhanced Order Book- and Reference Data Interfaces, Manual incl. Fast Message Template and Repository						◇		□			●		
Reference Data File – FIXML Schema Files						◇		□			●		
Instrument Reference Data Guide										●			
T7 Extended Market Data Services – Manual incl. Fast Message Template and Underlying Ticker Data						◇		□			●		
T7 Multicast-Addresses									●				
Reports													
XML Reports - Reference Manual						◇		□			●		
Common Report Engine User Guide										●			
Network Access													
Exchange and Settlement Network Access												●	
Connectivity Pricing													
Information on Connectivity Pricing Concept		●											
Go-live													
ISE T7 Production launch													△
◇ preliminary versions													
□ simulation versions													
● final versions													
△ information release													

Table 5: Communication Calendar ISE T7 Release 5.0

3. Functional Aspects of the Cash Market Migration

This chapter outlines the general functional concepts on instruments, members (participants) and users as well as how trading is organised on the T7 trading platform.

Only functional concepts relevant to ISE T7 are included in this document.

3.1 Instrument Concept

Generally in T7 each market has the following structure: “Product Assignment Groups”, “Products” and “Instruments”.

Instruments are the tradeable entities, i.e. an order always refers to buying or selling a specified quantity of a certain instrument.

Instruments of the same type can be grouped together to form Products. However, every tradeable instrument must belong to a product.

Instruments of the same product are traded in the same way, i.e. trading parameters and trading schedules are defined for products rather than for individual instruments.

The product itself is always associated to a product assignment group which is used for entitlement.

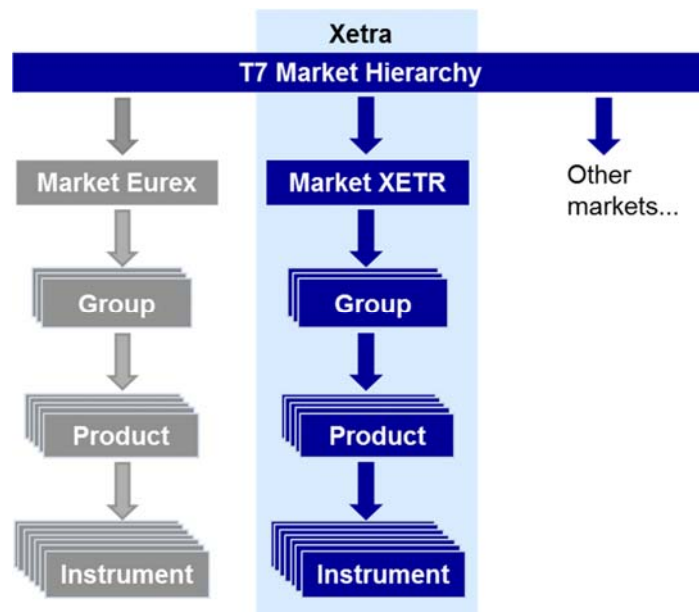


Figure 1: Market Structure on T7

With the Release 5.0 migration, ISE T7 will follow the general T7 concept of products and instruments with a 1:1 relation of product to instrument.

The assignment of product to product assignment group will correspond to the existing allocation of instrument to instrument group on ISE Xetra.

3.2 Participant & User Concept

The member structure in T7 consists of three different levels: the participant which represents the legal entity that is the member firm, the business unit which always belongs to a participant, and finally the user, always belonging to a dedicated business unit. Technically the session also needs to be considered here. The session also belongs to the business unit but has no hierarchical relation to the user.

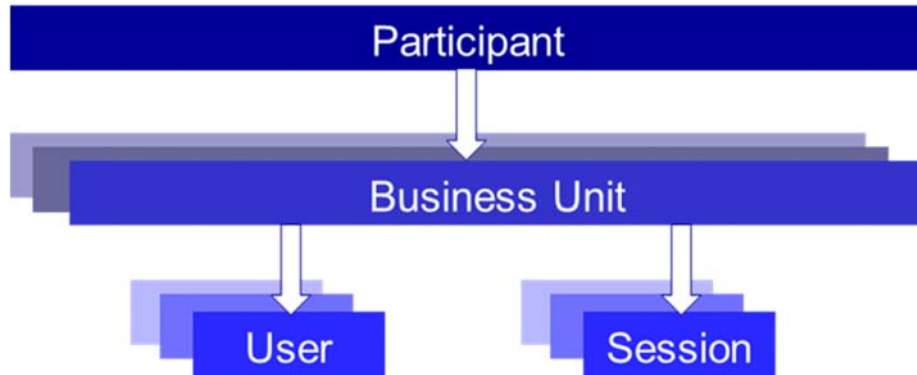


Figure 2: Participant hierarchy in T7

More details are provided in the “Participant and User Maintenance Manual”.

3.2.1 Participant

The Participant is the highest level entity in the member structure of T7. It is the member firm.

3.2.2 Business Unit

Within a participant different units may exist that act independently from each other. These are so called Business Units (BU).

- *Trading Business Unit*
A trading BU is necessary in order to participate in trading and will be available for every trading member firm. Necessary rights for trading will be assigned by the ISE.
- *Clearing Business Unit*
A Clearing Member has a specific Clearing BU that receives trade confirmations for the trades of its own trading BUs, as well as for the trades of the trading BUs of related NCMs.

By default, trading members will only get a trading BU while clearing members will only get a clearing BU. Members who provide trading as well as clearing services will get both a trading BU and a clearing BU.

A business unit is represented by a business unit name which will be mapped from the member ID in the ISE Xetra system, e.g. ABCDB in case of a trading business unit. For clearing business units “CL” is appended to this ID, i.e. to ABCDBCL to be able to distinguish both IDs easily.

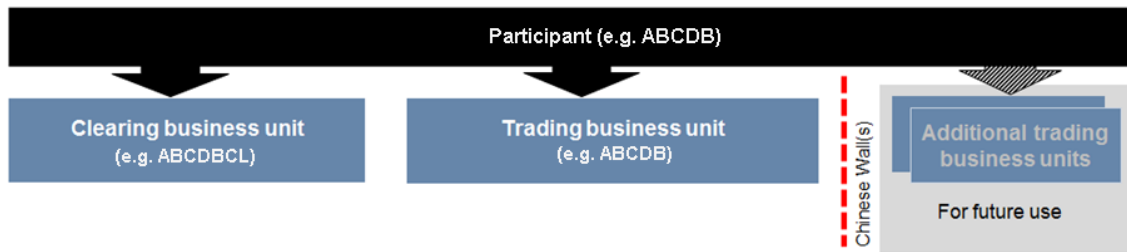


Figure 3: Business Units in T7

3.2.3 Users

Users are always assigned to a BU. Users can be created and assigned to the trading or the clearing BU. However it is not possible to assign the same user to multiple business units. Since trading and clearing business units generally fulfil different tasks the entitlements will also differ.

Users in trading BUs can be grouped to user groups in order to reflect different departments or trading desks. The system supports a hierarchy of three user levels within a user group: Trader, head trader and supervisor. The user levels for trading users define a clear context for order maintenance:

- Trader
Users can maintain own orders only.
- Head Trader
Users can maintain own orders as well as orders of all other traders within the same user group.
- Supervisor
Users can maintain own orders as well as orders of all other traders in all user groups.²

Single on-behalf transactions are supported for standard orders only while mass deletion also includes lean orders.

Since clearing BUs are not able to trade, the user group functionality is irrelevant in terms of order maintenance. However, users will need to be assigned to a user group upon creation.

3.2.4 Password Rules

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.

User passwords do not automatically expire. Users are able to change their passwords themselves. Passwords can only be changed using the GUI. Passwords generated during setup of new users and passwords generated during password reset by a Service Administrator will automatically expire after

² Only users of Clearing Business Units will be setup as "Supervisor". No user of a Trading Business Unit will get this user level assigned automatically.

first login. The user is then forced to create a new password. Participants are responsible for the regular refresh of user passwords, according to their own security guidelines.

3.2.5 Sessions

Sessions are permanently registered connection channels to ISE T7. A session is set up for and belongs to exactly one BU. In order to send requests to the trading system, a user must use a session that is connected to ISE T7 and that belongs to the same BU as the user. Besides that there is no further relationship between users and sessions, i.e. a user does not belong to a specific session and a session does not belong to a specific user.

The session concept provides different session types matching the different needs of members. Members migrating to the T7 platform will have to order new sessions for the Enhanced Trading Interface as well as for the FIX Gateway. For more details regarding the session types, please check chapter 4.1.1.

3.2.6 Entitlement

Entitlements in T7 consist of a concept of roles in combination with product assignment groups. T7 includes a set of pre-defined user roles, configured and maintained by the ISE. User roles offer participants a simplified approach to administration: sets of resources (e.g. enter order request) are combined to define a logical user role (e.g. Cash Trader). The roles are assigned to the business units by the ISE. From here, the participant can circulate the entitlement to his users. The roles which can be assigned to a user are always a subset of the roles of the business unit. The user maintenance can be done by a user having the Cash Service Administrator role assigned. The roles available in ISE T7 that can be assigned to users of trading or clearing business units are:

Name	Description
Cash Service Administrator	The Cash Service Administrator is allowed to set up new users, maintain their entitlement as well as delete users. This role is relevant for the trading as well as for the clearing business unit.
Cash Trader	The Cash Trader role allows the user to participate in trading, e.g. to enter orders. This role is relevant for the trading business unit only.
Cash Market Maker	The Cash Market Maker role allows the user to enter and maintain quotes. This role is relevant for the trading business unit only.
Cash User Data View	The Cash User Data View role allows the user to view the user data information of himself and other users. This role is relevant for the trading as well as clearing business unit.
Trading View	The Trading View role allows a user to view the trades. This role is relevant for the trading business unit only.
Trade Enrichment Rule	The Trade Enrichment Rule role enables a user to predefine texts that are filled in the respective free text fields of lean orders. This role is relevant for the trading business unit only.
Trade Enrichment Rule	With the Trade Enrichment Rule View role a user is allowed to view

View	predefined texts for lean orders. This role is relevant for the trading business unit only.
Emergency Mass Deletion	The Emergency Mass Deletion role allows a user to delete all open orders and quotes. This role is relevant for the trading business unit only.
Emergency Trading Stop	The Emergency Trading Stop role allows a user to halt the entire trading participant in case of emergency. All open orders and quotes will be deleted and additionally it will not be possible to enter new orders and quotes. This role is relevant for the trading business unit only.
CM Backoffice View	The CM Backoffice View role allows a user to inquire all trades of all of his related trading participants. This role is relevant for the clearing business unit only.

Table 6: Roles available in trading system T7 for User

Users can also be assigned multiple roles at once. The roles Cash Service Administrator, Cash User Data View, Emergency Mass Deletion, Emergency Trading Stop and CM Back Office View are valid market-wide. Other roles have to be granted subject to a product assignment group which means that the same user can act with different roles in different product assignment groups (See for example TRA056 in Figure 4 below).

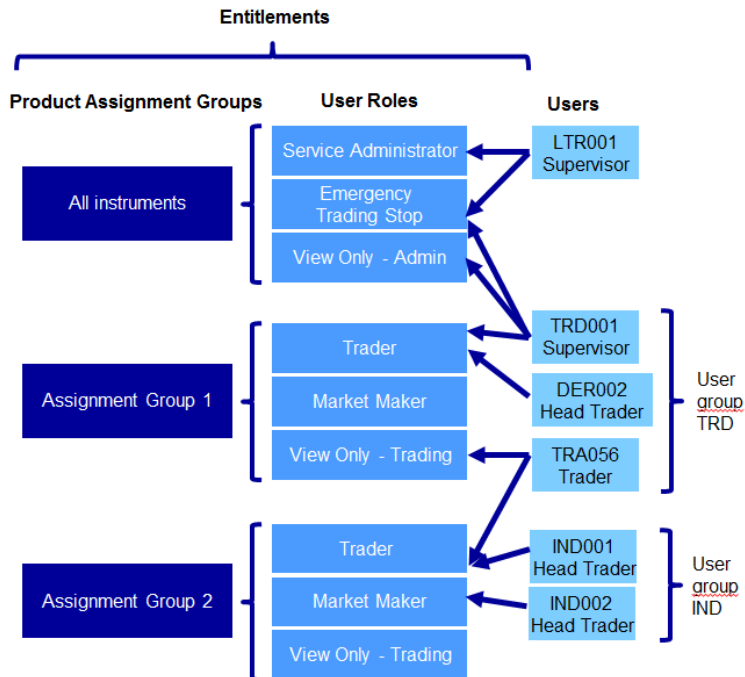


Figure 4: User Entitlement Overview

In addition to the entitlement that needs to be done on user level, at least two more settings need to be configured for users of trading business units: the Maximum Order Volume and the Trading Capacities a trader is allowed to use.

Maximum Order Volume

The Maximum Order Volume is defined per user and is an optional parameter determining the maximum value of an order that a trader is allowed to enter. The value of the order is calculated as quantity times price for buy limit orders and as quantity times last traded price for market orders and sell limit orders. The Maximum Order Volume is stored in the defined exchange currency which will be euro for ISE T7.

Trading Capacities

Whenever a user enters an order, the order will have to be entered with a certain trading capacity. Three different trading capacities will be supported on T7:

A – Agent Account

P – Proprietary

M – Market Maker (currently D: Designated Sponsor in ISE Xetra).

The different trading capacities can be granted or revoked from a user independently of each other.

3.3 Market Model

The trading models “Continuous Trading with Auctions”, “One Auction” and “IPO Auction” will be available in T7. ISE T7 will operate the Continuous Trading Model as per the current Market Model of ISE Xetra.

More details are provided in the “ISE T7 Market Model” which was published in April 2017.

3.3.1 Trading States

Trading states provide a structure to the business day. They control what activities are available to traders and what functions T7 will perform during each period.

Generally T7 supports product states and instrument states. While product states give a structure to the business day and control general access to the system, instrument states control order and quote maintenance and execution, and they also control the availability of public market data.

A product has a trading state, but also every instrument has its own individual trading state. However, the trading state of the instrument is related to the state of the product. Some product states map exactly to one instrument state and in some cases an instrument can have different states within one product state.

3.3.1.1 Continuous Trading Model

The following diagram shows the sequence of product states and the related instrument states for the ISE T7 trading model:

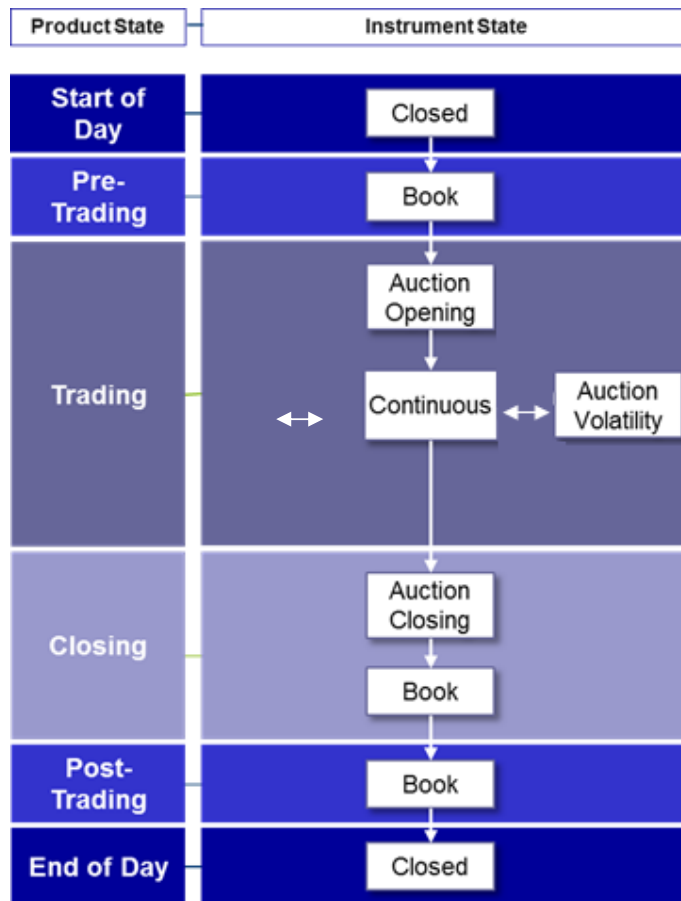


Figure 5: Product and Instrument States in Continuous Trading model

Start of Day

The product state Start of Day represents the time before order book trading activity starts. Members have no access to the order book in this product state.

All instruments are in the instrument state Closed. During this state no access to the order book is available and no public market data is published by the ISE.

The Start of Day phase is followed by the Pre-Trading phase.

Pre-Trading

The product state Pre-Trading occurs before trading starts. It is typically a time where traders may maintain their orders prior to the start of trading however no matching occurs in this phase and instruments are in the instrument state Book. During this phase, Off Order Book trading on ISE Xetra will still be possible and any trade reported during this phase will be published.

With the end of Pre-Trading the Trading phase starts.

Trading

The product state Trading represents the trading phase. The standard procedure for the product state Trading is that after an opening auction call phase, the instruments are in the trading phase Continuous, possibly interrupted by volatility auctions.

For each instrument the phase Trading begins with the auction call phase. This state represents the auction call phase of all types of auctions, i.e. Opening Auction, Closing Auction or Volatility Auction.

In the instrument state Auction, order and quote maintenance is possible. Within this state the order book is partially closed. Information on the current order book situation is provided throughout the call phase. The indicative auction price is displayed when orders are executable. This is the price which would be realised if the price determination was concluded at this time. The best bid/ask limit is displayed if an indicative price cannot be determined. For the ISE T7 trading model additional information in relation to market imbalance is disseminated during the call phase of the auction. This allows the market to react to the surplus before the price determination takes place. In the event of an uncrossed order book, the accumulated volumes at the best bid and best ask are displayed in addition to the best bid and ask limits. In the event of a crossed order book, the executable volume for the indicative auction price and the order book are displayed.

At the end of an auction instrument state, an order book uncrossing may occur, potentially resulting in an auction matching.

After the opening auction the instrument state switches to Continuous. The instrument state Continuous is the state where continuous matching of orders and quotes take place. During this state the order book is open, i.e. price and quantity information is published.

Order and quote maintenance is possible while the instrument state is Continuous.

The instrument state Continuous can be interrupted by auction call phases. This can happen when a volatility interruption is triggered.

Auction call phases based on a volatility interruption are characterised by a special volatility indicator, which will be published to the market. A volatility interruption can also be triggered at the end of an auction call phase. In this case the auction call phase will be prolonged and the volatility indicator is published. Any volatility auction might be followed by an extended volatility interruption in case the potential price deviation is too wide. During such (extended) volatility interruption phases the same level of order and quote maintenance, execution and availability of public market data is given as for any other auction call phase. Extended volatility interruptions are usually followed by a freeze phase if the potential price deviation persists. During the freeze phase no order maintenance activity is possible.

During the Trading phase, Off Order Book trade reporting will continue to be available on ISE Xetra (please refer to the ISE Xetra Market Model for more information).

The product state Trading ends with the start of the scheduled Closing Auction.

Closing

The product state Closing is the phase between Trading and Post-Trading. It covers the time between the end of continuous trading and the end of the closing auction.

The product state Closing ends automatically when the auction in all of the product's instruments has ended. The end of the product state Closing marks the moment when order book trades can no longer occur for the affected product for the rest of the day.

Instruments switch to the state Auction when Closing begins. At the end of this closing auction the order book will be uncrossed with the result of a price determination. Afterwards the instrument state changes to Book. In both phases order and quote maintenance is supported.

During the instrument state Auction additional information in relation to market imbalance is disseminated during the call phase of the auction. This allows the market to react to the surplus before the price determination takes place. In the event of an uncrossed order book, the accumulated volumes at the best bid and best ask are displayed in addition to the best bid and ask limits. In the event of a crossed order book the executable volume for the indicative auction price and the order book are displayed.

At the end of the Closing Auction a volatility interruption is as well possible as described for auctions in product state Trading above.

Post-Trading

The product state Post-Trading terminates the trading session of a business day. It is typically a time where traders can maintain their orders in preparation for the next trading day. No order book matching occurs in this phase however Off Order Book trade reporting is still possible via ISE Xetra.

Instruments are in the instrument state Book. Only Off Order Book trades reported via ISE Xetra will be disseminated to the market.

End of Day

The product state End of Day represents the time that is reserved for the end-of-day processing and housekeeping measures. Members have no access to the order book in this product state.

All instruments are in the instrument state Closed. No market data will be published during this state.

3.3.1.2 Extraordinary Trading States

Holiday

The product state Holiday could be used for a product that is not available for trading on a day that the ISE is open for trading. Members have no access to trade in a product on the order book when it is in the state Holiday.

When a product is in the product state Holiday, every instrument in that product will be in the instrument state Closed. (For the ISE T7 it is intended to have only one instrument in each product).

Halt

The ISE may halt the market if it judges that market conditions or technical conditions impair the integrity of the market. In such a case, a product will be set to the product state Halt. In the product state Halt, no matching occurs and order book access is restricted.

When a product is set to Halt all non-persistent orders/quotes will be deleted and all instruments will be set to the instrument state Restricted.

Restricted

The instrument state Restricted is a state where traders are only allowed to delete their orders. During this state no order and quote maintenance is possible and no order book market data is published.

In the instrument state Restricted no matching occurs.

T7 does not support the presence of non-persistent orders/quotes in the order book during the instrument state Restricted. Therefore, all non-persistent orders/quotes of an instrument are automatically deleted when the instrument enters the state Restricted.

Suspend

Suspend is a special instrument state qualifier (not an instrument state) in T7. It is only available for a specific instrument and can be set any time independently of the product state.

When the instrument state qualifier is set to “Suspend” by the ISE, the instrument state is changed to Restricted and all orders and quotes in the order book will be deleted. In case the order book is not empty, a broadcast message of type “Instrument Suspension” is sent to all sessions indicating that all orders and quotes have been deleted.

3.3.2 Matching Rules

The ISE T7 order book will apply price-time priority as per the current matching rules on ISE Xetra. i.e. buy orders with a higher limit take precedence over buy orders with a lower limit and likewise, sell orders with a lower limit take precedence over sell orders with a higher limit. The second criterion ‘time’ applies in the event of orders sharing the same limit i.e. orders which were entered earlier take priority. All market orders are sorted by time priority. In addition, market orders have priority over limit orders in the order book. This price-time priority matching rule is used in continuous trading as well as in auctions.

While in continuous trading, the limit of the sitting order or the reference price in case of a sitting market order determines the price of the match, in auctions the price determination follows the principle of highest executable volume with the lowest surplus, as per the current ISE Xetra Market Model.

3.3.3 Safeguards

3.3.3.1 Volatility Interruptions

The Market Model for ISE T7 will maintain the volatility interruption facility that is provided in ISE Xetra. Therefore during continuous trading and auction call phases, the potential trade price will continue to be validated against the fixed and floating volatility boundaries. If a potential trade price lies outside the fixed or floating volatility boundary 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.

3.3.3.2 Self-Match Prevention (SMP)

Self-match prevention is an optional functionality which was introduced with Xetra Release 16.0 and will continue to be offered in ISE T7. SMP allows a business unit to prevent certain own orders of the same instrument matching against each other. This functionality can be used by filling in the numeric CrossID in the respective order or quote message. The CrossID will be checked on a business unit level. Its setup and usage lies within a business unit’s responsibility.

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

SMP is performed during the instrument state Continuous only and works as follows:

When an incoming order or quote and a resting order or quote would match against each other in ISE T7, the system will check whether they are owned by the same business unit and whether they carry the same user supplied CrossID. If this is the case, the match between the two orders/quotes is prevented and the quantity which would have matched is cancelled from the open order quantity, for both the incoming order and the resting order. Afterwards, the incoming order is allowed to match further only on the same price level in case of sufficient quantity. After matching completed on that price level, any remaining open quantity left for the incoming order is deleted. In case there is quantity left from the book order after its reduction because of SMP, this quantity remains in the book.

3.4 Orders

ISE T7 will offer a variety of different order types as listed in 3.4.1

As all instruments on the order book are CCP-eligible, all orders entered are anonymous.

On T7, the allowed combination of order types, restrictions, price conditions and validities is defined by an order profile which in turn is then assigned to products and their instruments.

All orders can be entered as persistent or non-persistent and can be defined to be visible only within the entering session (lean order) or also for other sessions of the same business unit (standard order).

Orders can be entered, modified and deleted. However while the priority of an order might change, the 20 digit system order ID assigned by ISE T7 upon entry stays the same over the whole lifecycle. The system order ID is based on the elapsed nanoseconds since 1st January 1970 and does not change over the whole lifecycle of the order. The system order ID is unique per product, i.e. ISE T7 may assign the same system order ID to orders belonging to different products. Please note in this context the same security set up in different markets are considered to be separate products. Every order gets assigned a version number (starting with 0) which increases in case of a user driven order modification with a priority change, i.e. in case of

- Change of limit
- Increasing the quantity
- Extending the validity.

Priority changes triggered by system functionality will not lead to a new version number of the order, i.e.

- Refill of Iceberg Peak
- Activating an Opening, Closing or Auction only order at start of the auction
- Triggering of a stop order.

Functionally the latest status of an order can be identified by the system order ID and the version number, whereas the system order ID is the unique identifier to refer to an order.

3.4.1 Order Types

The following order types will continue to be offered for trading on the ISE's orderbook:

- Limit Order
- Market Order
- Stop (Market or Limit) Order
- Iceberg Order.

NEW T7 FEATURE: With the migration to T7, the Iceberg Order will be enhanced by a new optional facility to set a random peak. In addition the “Minimum Iceberg Volume” and its peak “Minimum Peak Volume” will both need to be defined in euro.

The following trading restrictions currently available in ISE Xetra will also be available in ISE T7 for the execution of Market or Limit Orders:

- Auction Only
- Opening Auction
- Closing Auction
- Book-Or-Cancel.

Modifications of restrictions are generally not supported. If a trader wants to change a restriction it is necessary to delete and re-enter the order with the modified parameters.

The following validity constraints and execution conditions will remain available for orders on ISE T7:

- Good-for-Day
- Good-till-Date
- Good-till-Cancelled
- Immediate-or-Cancel
- Fill-or-Kill.

NEW T7 FEATURE: With the migration to T7 the current maximum validity period of T+359 will be removed and member firms will be able to set a validity period for any date in the future.

Order types, restrictions, price conditions and validity constraints in their supported combinations are reflected in order profiles which can be assigned to products and used for trading via all interfaces (ETI, FIX and GUI).

The following table gives an overview on the order profiles used for ISE T7:

Order Profile	Allowed Price Condition									Allowed Order Validity			
	Regular	Stop	Iceberg	AOO	OAO	CAO	BOC	Limit	Market	IOC	FOK	Day	GTD/GTC
Limit	✓							✓		✓	✓	✓	✓
Market	✓								✓	✓	✓	✓	✓
Auction Only	✓			✓				✓	✓			✓	✓
Opening Auction	✓				✓			✓	✓			✓	✓
Closing Auction	✓					✓		✓	✓			✓	✓
Book-Or-Cancel	✓						✓	✓				✓	✓
Stop		✓						✓	✓			✓	✓
Iceberg			✓					✓				✓	✓

Table 7: Order Profile overview

3.4.2 Further Order Attributes

All orders defined by the respective order profiles described above can be entered either as persistent or as non-persistent. Furthermore orders can be distinguished regarding their visibility only for the entering session or for all sessions of the same business unit (lean vs. standard orders). These attributes can be combined in the following way:

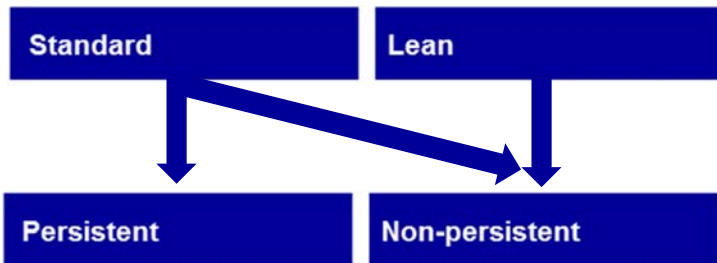


Figure 6: Combination possibilities for Persistency and Visibility of Orders

3.4.2.1 Order Persistency

Both persistent and non-persistent orders will be offered in ISE T7 as they are today in ISE Xetra.

An order entered as persistent will be reinstated at the start of the next business day depending on the order validity or after a failure of the trading system. Non-persistent orders will be deleted in case of session loss, during market resets or trading halts as well as by the end of a business day. The validity for non-persistent orders is always therefore limited to Good-For-Day. In case of a deletion due to session loss, market reset or trading halt, only summary information is sent to sessions that supplied non-persistent orders (or quotes).

3.4.2.2 Standard vs. Lean Orders

T7 also introduces a new additional attribute for orders with the concept of lean and standard orders.

For standard orders, the complete order history of the current trading day can be recovered via re-transmission requests. This order data is visible to all low frequency sessions belonging to the same business unit (including the Trader GUI) via subscription to the listener data broadcast (drop copy). Standard orders can be persistent or non-persistent and can only be used within low frequency sessions. For standard orders, single on-behalf transactions are supported even via other sessions depending on the user rights, while mass deletion also includes lean orders.

In case an order is defined as a lean order, only the execution notifications and unsolicited events can be recovered via a re-transmission request. All data on lean orders are visible only to the session that submitted the order. Lean orders are always non-persistent.

A short order layout is available to reduce latency which only supports limit orders. The usage of the short order layout is limited to the validity constraints "Good for Day", "Immediate or Cancel" and "Fill or Kill".

3.4.3 Order Book Restatement

Order status inquiries are not supported by the Enhanced Trading Interface (ETI). Therefore members must maintain the state of orders based on the execution report messages.

During the start-of-day phase and after a market reset event, all active orders of a session will be transmitted to the market participant via the respective session.

At first a *Trading Session Status Event* message is sent to all sessions informing the participant about start-of-day or a market reset event per partition, optionally followed by *Extended Order Information* messages for each restated order of the corresponding session and finally a *Trading Session Event* message is sent, again to all sessions, indicating the end of the restatement per instrument. *Extended Order Information* messages for restated order and end of the restatement message are only visible to low-frequency sessions.

It is not possible to unsubscribe the order book restatement.

3.5 Quotes

A quote is the simultaneous entry of buy and sell limit orders. Quotes can only be entered via the ETI and are always of validity "Good-for-Day". Quantities to buy and to sell are independent of one another. T7 supports one-sided as well as double-sided quotes for the trading venue XETR. For ISE T7, only double-sided quotes will be available with Release 5.0. The quantity and spread of these quotes will be checked upon entry against the "Minimum Quantity" and "Maximum Spread" set by the ISE.

A quote is owned by the session. A session may have only one quote per instrument. Sessions belonging to the same business unit may have different quotes in the same instrument, but only one quote per session. Quotes of the same business unit might be executed against each other.

Based on the entitlement, a user may overwrite, modify or cancel any quote of another user that is owned by the same session.

Users of one session cannot enter or modify individual quotes of other sessions even though they might have been entered by the same user.

Sessions may cancel all quotes or inactivate and reactivate the quotes of another session belonging to the same business unit.

Quotes are always non-persistent and thus are automatically cancelled in case of:

- Session logs out
- Session loses the connection to the trading gateway
- Session logs in second time via a different connection
- Mass Cancellation events
- At the end of the business day
- Exchange system failure (i.e. market reset, trading halt).

3.5.1 Mass Quote

Quotes are entered using the *Mass Quote* message in the ETI. A Mass Quote request may contain several quotes. As ISE T7 will apply a product-instrument relation of 1:1, the *Mass Quote* message can contain several quotes but only one per instrument.

T7 provides two methods for updating quotes:

- Quote Entry
- Quote Modification.

Quote Entry and Quote Modification cannot be used within the same Mass Quote message.

Every quote entry simply overwrites an existing quote without considering an existing executed quantity. For each quote entry request, the user must specify the new price and the new quantity of the quote. In one request an instrument can only be referred once, i.e. if a two sided quote is entered then both sides must be in the same entry and not separated for buy and sell.

Quote modification allows a trader to modify quotes with a total execution limit, similar to orders where the quantity specified by the trader is always a total order quantity. The previously executed quantity of a quote side is maintained and used to calculate the new open quantity. If this is zero or negative the respective quote side will be cancelled. If the previous quote side is not found, for example as it has been fully executed, then the modification for this quote side is ignored.

Only quotes entered via the same session can be cancelled with the Mass Quote Request. Quote mass cancellation functionality is provided via Quote Mass Cancellation Request. With the help of this request it is possible to cancel all own quotes in a product as well as all quotes in a product of another session belonging to the same business unit.

3.5.2 Quote Activation/Inactivation

Quotes are inactivated by setting the status “quotes inactive” on the applied scope. In this case the system will hide these quotes from trading. When “quotes inactive” is set for a session on a specific scope, none of the quotes of that session for that scope participate in matching nor are visible in the order book depth. The trader can continue to add, modify, and cancel individual quotes for this session and scope, while all these quotes neither participate in matching nor are visible to the market.

The status “quotes inactive/quotes active” is persisted for the current business day. After a system failover, all quotes are cancelled, but the latest status (quote active/quotes inactive) of a session and scope will remain in place after the failover. At the start of a new business day the default status for all sessions is “quotes active”.

3.6 Mass Cancellations

In the T7 system either functional or technical reasons may occur that lead to a mass cancellation of orders triggered by a user, market operations or the system. Such a mass action may impact several products/instruments at once and could lead to only non-persistent orders being deleted or persistent orders as well. However, mass cancellation messages are sent per product to the respective sessions indicating that all affected orders are deleted. No single order deletion message will be sent. However, with regards to “Deleted persistent Orders”, the system order number as well as the client order ID will be listed in the message.

A mass cancellation message on product level could include additional information if the cancellation refers only to a certain instrument within the product e.g. in case of Instrument Suspension or maybe to a dedicated session or a user of the business unit, e.g. in case of Mass Cancellation by Trader.

For mass cancellations not only affecting one instrument it might happen that an instrument’s trading phase does not allow deletion of orders. This is the case especially during the Freeze of an Extended Volatility Interruption. In such a situation the respective orders cannot be deleted directly but the deletion is pending until the respective phase gets released. Within the mass cancellation message the member is informed about all orders with “Pending Deletion” by enumeration of the system order numbers and client order IDs.

If there is a pending delete for a persistent order, the respective order ID(s) will only be part of the “Pending Deletion” list but not part of the “Deleted persistent Orders”.

As soon as 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.

The following table gives an overview on possible scenarios:

Event	Delete Persistent Orders as well (Y / N)	Pending Delete possible (Y / N)
Instrument Suspension	Y	N
Instrument Stop	N	N
Product temporarily not tradeable (Slow Partition)	N	N
Product State Halt	N	N
Mass Delete by Market Operation	Y	Y
Session Disconnect (Loss, Logout or Duplicate Login)	N	Y
Mass Cancellation by Trader	Y	Y
Emergency Mass Delete by Trader	Y	Y
Trader/Business Unit Stop	Y	Y

Table 8: Mass Cancellation Scenarios

Quotes are deleted as well together with non-persistent orders in the scenarios above. Additionally, only quotes are deleted in case the Product State is switched to “Holiday”.

For quotes, there is no list with single IDs in case of pending deletion. However the instruments where the deletion could not be executed are given in the message which is sent to the respective session. This is due to the fact that only one quote per session can exist for an instrument. As soon as the pending deletion is processed, a single quote deletion is formatted.

Further details on the respective implementation can be found in “T7 Enhanced Trading Interface – Manual” and “T7 Enhanced Trading Interface – Cash Message Reference” or “T7 FIX Gateway – FIX 4.2 and 4.4 Manual” respectively.

3.7 Executions, Trades and Order Referencing

When an order is executed the trader is informed via an order execution confirmation. To generate the legally binding trade confirmation which is also sent to the respective sessions, the execution data needs to be enriched with trade details and the counterparty specific information.

As all instruments will be CCP eligible instruments, the counterparty of a trade will always be the CCP. The counterparty specific information that needs to be added is hence always the same even if the execution was done against several orders on the other side of the book. However in order to provide members with the same level of information currently provided in ISE Xetra, ISE T7 will continue to provide trade confirmations based on trade-logic i.e. a trade capture report will be generated for each trade against a counterparty.

Example 1: Execution in Continuous Trading

Buy	Limit (€)	Sell
30 (entered by member B)	17.00	
50 (entered by member C)		
20 (entered by member B)	16.50	

When member A enters a sell order 100@ €16.50 the order gets executed immediately and member A receives three trade confirmations, one for the execution of 30 shares at €17.00, one for the execution of 50 shares at €17.00, and one for 20 shares at €16.50. Member B receives two trade confirmations, one for 30@ €17.00 and another for 20@ €16.50 while member C will get one trade confirmation for the execution of 50@ €17.00.

Example 2: Execution in Auction

Buy	Limit (€)	Sell
30 (entered by member B)	17.00	
50 (entered by member C)		
20 (entered by member B)	16.50	(entered by member A) 100

When the auction is terminated all available orders are executed at €16.50 and member A receives three trade confirmation, one for the execution of 30 shares at €16.50, one for the execution of 50 shares at €16.50, and one for the execution of 20 shares at €16.50. Member B receives two trade confirmations one for 30@ €16.50 and another for 20@ €16.50. Member C will get one trade confirmation for the execution of 50@ €16.50.

As noted above, trade capture reports for executions in ISE T7 will be provided in line with the current approach on ISE Xetra, providing member firms with the same level of granularity that they currently receive.

All order executions of one matching transaction and the respective trade confirmations get assigned one ID which allows the owning members to identify their match/trade in the public market data. The “Fill Match ID” in the order execution confirmation, the “Trade Match ID” of the trade confirmation and the “Match Step ID” in the public trade volume report in the market data are identical and can be used to link the messages together.

Furthermore, each execution/trade gets assigned a private unique ID which can be used to directly map the execution confirmation (“Order Execution ID”) and trade confirmation (“Side Trade ID”) to each other. For the identification in the clearing and settlement process the T7 system assigns a unique trade identifier (“Trade Number”) to each trade confirmation.

Note: all IDs are only unique in the context of a market, i.e. MIC, and a product.

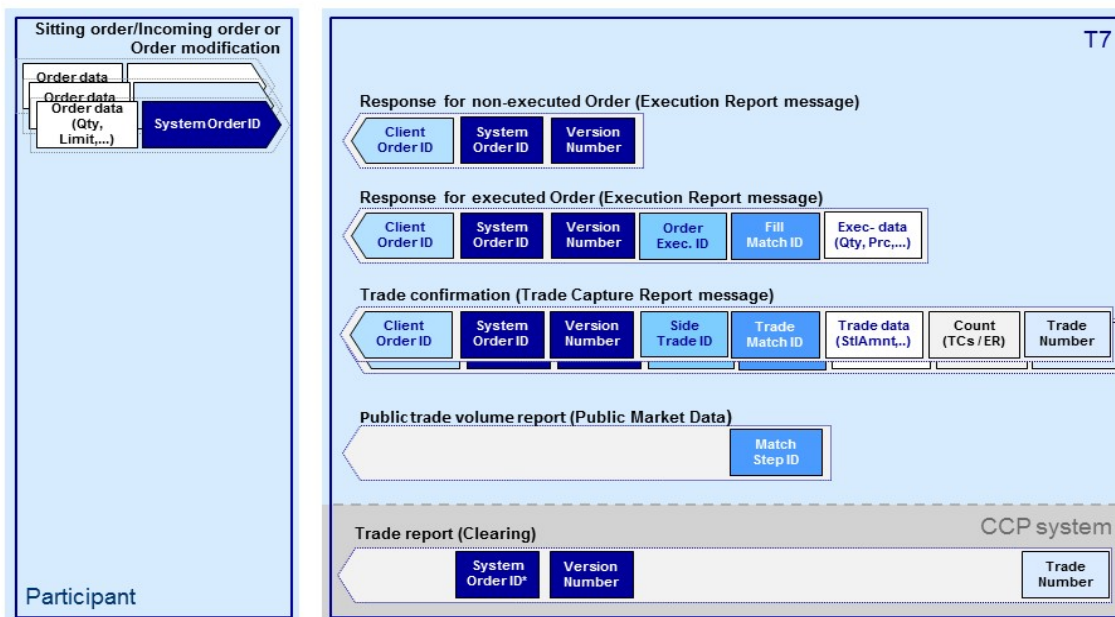


Figure 7: Schematic Overview of Message Flow in case of Matching and Order-Trade-Referencing (same colours represent same content)

Whenever a trade is generated and a trade confirmation is sent to the involved participants, it contains an indicator which declares whether the executed order added or removed liquidity. Valid values are “passive”, “aggressive” or “none”.

Member A in example 1 above enters a sell order which gets executed immediately against the sitting orders of member B and C who will receive a trade confirmation with an indicator as “passive” because their orders were resting, i.e. added liquidity to the order book. Member A will receive a trade confirmation with the indicator set as “aggressive”, i.e. it removed liquidity from the order book.

Order executions in an auction or a volatility interruption will be followed by trade confirmations with the indicator set to “none”. I.e. in example 2 above members A, B and C will receive such a trade confirmation.

3.8 End of Day Processing

3.8.1 Order Deletions

Beside the expiration of an order there might be further reasons which make a deletion of orders necessary in an instrument before the start of the next business day.

For every persistent order not valid anymore on the next business day, an order deletion message is sent to the customer during end-of-day processing. A deletion reason gives information why the deletion became necessary.

For non-persistent orders no order deletion during end-of-day is sent since non-persistent orders are only valid on the day of their entry and no explicit deletion information is necessary.

All persistent orders for which no order deletion message is received are then transmitted within the order book restatement at the start of the next business day (see above).

In case of extraordinary circumstances which do not allow to execute the respective order deletions at the end of a trading day, the deletion messages will be sent at the start of the next business day.

3.8.2 End of Day Service Message

As soon as no trading is possible anymore, i.e. when all products of a partition are moved to end-of-day, a special message is sent via trade notification stream indicating that no more trade data will be sent for this business day.

Afterwards when all order deletions have been processed and when the last product on a partition changes its state to post-end of day, the partition is shut down. In this situation an end of day service message is sent for the respective partition via order notification stream to the customer. As soon this end of service message for the last partition is received members can disconnect without losing information.

3.9 Reports

The order book activities of member firms are reflected in different reports available on T7. Reports will only be available via the Common Report Engine (CRE) and will always be transferred automatically to the member’s CRE account.

The following reports are supported for the cash market in general, and may be relevant for ISE members. More details can be found in “XML Reports - Reference Manual” (Simulation version published in March 2017, final version due to be published in May 2017).

Report Name	Report Description
CB Transactions and Fees Reports	

Report Name	Report Description
CB068 Transaction Overview	<p>This daily report is divided into three parts:</p> <p>The first part of the report contains a participant specific summary of generated transactions per transaction group and instrument. The second part of the report shows the number of transactions per transaction group for every session of the participant. The third part shows the number of transactions per transaction group sorted by the participant's user.</p>
RD Trading RDS Reports	
RD110 User Profile Maintenance	This daily report provides an overview of all changes made to the general attributes of a user and to his entitlement profile, i.e. deletions, additions, modifications.
RD115 User Profile Status	This daily report provides an overview of all current user entitlement profiles for a participant. It includes profiles maintainable by exchange participants and those maintainable only by Market Supervision. In addition, the report provides information on several users attributes like level or status. If a resource is missing in the list, the user is not entitled to use the resource.
RD130 Trade Enrichment Rule Maintenance	This daily report provides an overview of all changes made to trade enrichment rules during the business day (deletions, additions, modifications).
RD135 Trade Enrichment Rule Status	This daily report provides an overview of all current trade enrichment rules. The report is split per market participant, business unit and rule, and is sorted by rule.
TC Trading Order and Quote Maintenance	
TC230 Cross and Quote Requests Report	This daily report lists, for each member all Cross Trade Announcements entered during the day. Reports are grouped per Business Unit, Trader and Request Type and sorted per Product, Instrument Type, Instrument ID and Request Time.
TC540 Daily Order Maintenance	This daily report lists for each member all orders regularly entered, traded, changed or deleted during the day. The report is split per business unit, session and trader and sorted per product, instrument type, instrument and time.
TC550 Open Order Detail	For each market participant, this daily report lists all orders remaining in the order book at the end of the day.
TC810 Daily Trade Confirmation	This daily report contains an inventory of all trades matched by a market participant during a trading day. Identified by their deal item, trades are arranged by market participant, trader, product, instrument and clearing account.

Report Name	Report Description
TC812 Daily Prevented Self-Matches	This daily report contains the prevented self matches during a trading day. The prevented self matches are identified by their transaction times. They are arranged by market participant, trader, product, simple instrument and sorted by transaction time.
TC910 Daily Match Step Activity	<p>This daily report lists for each product and each instrument all match steps created during the day and provides the corresponding trade volume reporting.</p> <p>For each match step, the report gives the trade type, the trade price, the executed quantity and the number of traded buy and sell orders. It gives also for each match step the accumulated trade quantity per instrument since the start of day and the relative higher and lower trade prices at the trade time.</p>
TL Usage Fees	
TL001 System Transaction Overview	This daily report provides each participant with the details about his numbers of orders and quotes for the respective day.
TL900 Message Rate Report	This daily report contains the message rates under Directive 2014/65/EU Article 40(c). The report contains daily, month-to-date and yearly message rates per ISIN as well as daily, month-to-date and yearly message rates on a total of all traded ISINs. The seconds the ISIN was available for trading and the messages are given on a single ISIN basis. For calculation purposes messages include: order and quote insertions, modifications, deletions. This report contains "financial instruments for which there is a liquid market" as per the ESMA database, and market making and proprietary messages only.
TT Trading Security	
TT133 Trading Risk Event Report	This daily report provides an overview of all trading risk actions triggered on T7 during the trading day. i.e. stop/release trading occurrences on user and business unit level. This report does not contain Clearing Member Stop events.

Table 9: Reports

4. Technical Aspects

This section describes the major technical aspects of the migration to T7 Release 5.0, including the T7 interfaces, the data to be sent and received, as well as the GUIs.

The ISE will offer the full suite of connectivity interfaces available for T7, ensuring that multi-market members will be able to continue to leverage their Frankfurt connectivity to access ISE T7. As with the current infrastructure for Xetra, dedicated sessions and GUIs will need to be ordered specifically for ISE T7.

The following picture gives an overview about the interface landscape of T7.

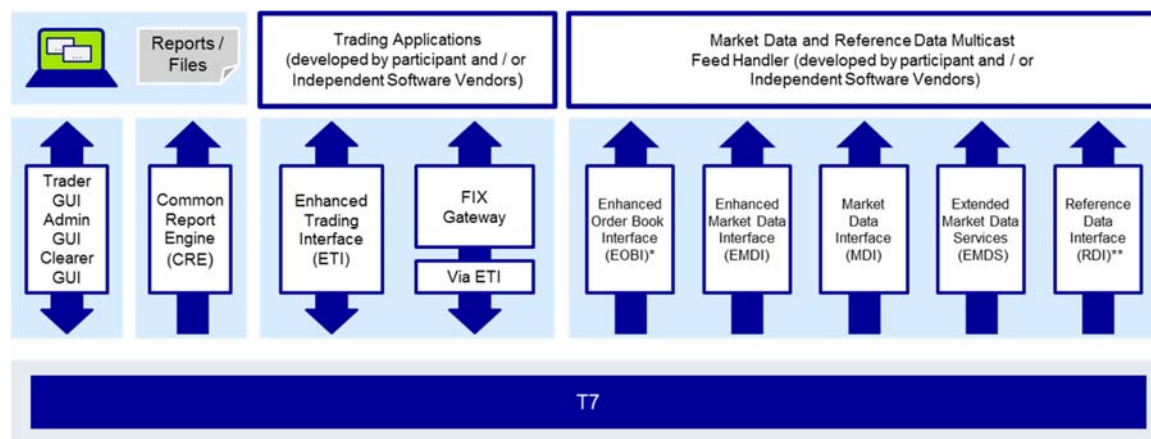


Figure 8: T7 Interface Landscape

* 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

4.1 Enhanced Trading Interface

The T7 Enhanced Report Transaction Interface (ETI) is an asynchronous, message-based interface using TCP/IP sessions. No special hardware, operating system, programming language or compiler version is required on member firm side and no exchange delivered software needs to be installed.

ETI is a high performance interface designed for members who require the highest throughput and the lowest latency for their transactions. A proprietary session layer and flat binary encoding is used in order to provide the best performance.

All application messages between the client and the ETI gateway follow FIX V5.0 SP2 semantics, including all officially approved extension packs.

A dedicated request scope to address the cash market functionalities will be available. Although all information in ETI is session oriented, a subscription mechanism to receive broadcast streams across sessions is provided.

Further details on ETI can be found in the document "Xetra Enhanced Trading Interface - An Introduction" (already published) or in the "T7 Enhanced Trading Interface – Manual" (preliminary version published in December 2016 with final version due to be published in May 2017).

4.1.1 Session Concept

ETI is a session oriented interface whereby the session is the basic scope of the interaction with the T7 architecture. Several users may share a single session, but every session may only be instantiated once. Each TCP/IP connection may only support one session instance. The receiver of the direct response to a request sent to the gateway is always the submitting session. Additionally the session is informed about system events and all unsolicited messages referring to status changes of orders and quotes belonging to that session.

ETI supports two session types: low frequency sessions for regular trading and low frequency sessions for back office. Separate sessions have to be ordered for ISE T7.

Low Frequency Session (LF) – Regular Trading

This session type supports the complete ETI functionality. It is specially aimed at participant applications that rely on the complete order history to be recoverable. Although the submission of, for example, non-persistent and lean orders or quotes is supported, modification for another session of the same business unit is only supported for standard orders.

A LF session may also be used to subscribe to broadcast streams, for example: Listener broadcast, trade notifications.

Low Frequency Session (LF) – Back Office

This session type supports only a subset of the Regular Trading Low Frequency Sessions. In particular it does not support order management functions. Please refer to the table below for the details.

4.1.2 Functional Scope

ETI provides a dedicated request scope for T7.

Due to the character of high and low frequency sessions, not all functional scope is offered via both session types. The following table provides an overview on the T7 functionality supported by the different session types:

Functionality	Low Frequency Session (LF) - Regular Trading	Low Frequency Session (LF) – Back Office
Standard Order	✓	
Lean Order	✓	
Persistent Order	✓	
Non-persistent Order	✓	
Order Book Restatement	✓	✓
Short Order Message Layouts	✓	
Quotes	✓	
Maintaining orders of another session (same BU)	✓	
Maintaining quotes of another session (same BU)	✓	

Functionality	Low Frequency Session (LF) - Regular Trading	Low Frequency Session (LF) – Back Office
Listener Broadcast	✓	✓
Trade Broadcast	✓	✓
Trade Reversals	✓	✓
News Broadcast	✓	✓
Risk control broadcast	✓	✓
Service Availability Broadcast	✓	✓
Session List Inquire	✓	✓
User List Inquire	✓	

Table 10: Functionality per session type

4.2 FIX Gateway

The FIX Gateway will be enhanced to support the cash market functionality in T7. The interface is intended for participants that require a standard FIX connection and is a point-to-point service based on the technology and industry standards TCP/IP, FIX and FIX Session.

The T7 FIX Gateway supports version 4.2 and version 4.4 of the FIX protocol.

For further information please refer to the “Xetra FIX Gateway – An Introduction” (already published) or to the document “T7 FIX Gateway - FIX 4.2 and 4.4 Manual” (preliminary version published in December 2016; final version due to be published in May 2017).

4.2.1 Main Concepts

The FIX Gateway uses the Enhanced Trading Interface to connect to the T7 environment. Therefore in general the before mentioned concepts valid in ETI are also reflected in the FIX Gateway including in particular the order book restatement which cannot be unsubscribed.

From a session concept perspective FIX uses only low frequency session connections. Separate sessions are required for trading and back office. For multi-market members, separate sessions are required specifically for ISE T7.

4.2.2 Functional Scope

FIX Gateway offers the complete functional scope of the ETI except for quote handling. **No quoting functionality is in scope of the FIX Gateway.**

The FIX Gateway provides the following functions for T7 via a respective trading session:

- Order management incl. execution notifications
- Cross requests
- Risk control events.

Additionally the FIX Gateway enables participants to subscribe to private trading data in broadcast form via a back office session:

- Trade notifications at a business unit level
- Drop Copy for standard (not lean) orders at business unit level.

4.3 GUIs

T7 offers a Java-based GUI solution. No front-end software needs to be installed; only the supported Java version is required locally. Front-end updates will be downloaded automatically. Installation of Deutsche Börse delivered software kits will not be necessary.

No MISS infrastructure is necessary, clients will directly connect to a Deutsche Börse server. As a consequence bandwidth requirements increase with the number of open screens.

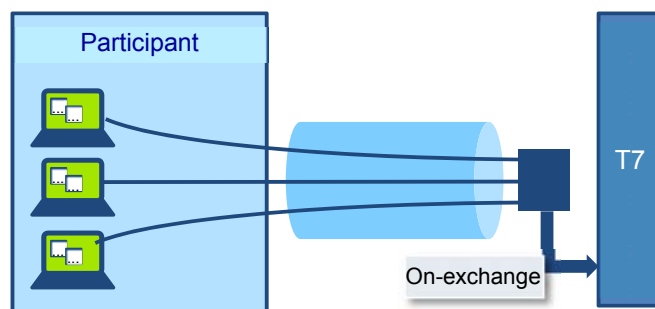


Figure 9: GUI Connection Scheme

T7 provides different GUIs relevant to the activities and operations a user wants to execute: an Admin GUI, A Trader GUI and a Clearer GUI. For multi-market members, separate GUIs are required for ISE T7.

Each of the different GUIs supports different operations and functionalities, which can be taken from the below overview table:

	Exchange GUIs		
	Trader GUI	Admin GUI	Clearer GUI
Order Transactions	✓		
Private Order / execution info	✓		
Private Trade info	✓		✓
Market Data	✓		
User Administration		✓	✓

Table 11: Supported functionality per GUI

More details about the GUIs will be provided in the “Trader, Clearer and Admin GUI – Manual” the final version of which is due to be published in May 2017.

4.3.1 Trader GUI

The Trader GUI provides the functionalities relevant for all trading related activities. This includes addition, modification and deletion of a single standard order, deletion of all orders, as well as the

activation and deactivation of quotes. Cross requests can be submitted and private trading information for orders including the order history and trades will be given.

The GUI is highly customisable in terms of configurable views, instrument profiles or alert notifications. Latest and statistical market information can be retrieved, e.g. market prices with market depth and time and sales data, and a Newsboard window to display system generated or Market Supervision news is provided.

Historic trade information is not available.

The start page of the Trading GUI is shown in the picture below. The screenshot shows the 'Welcome View' and the main menu. From this page it will be possible to navigate directly to each of the different submenus.

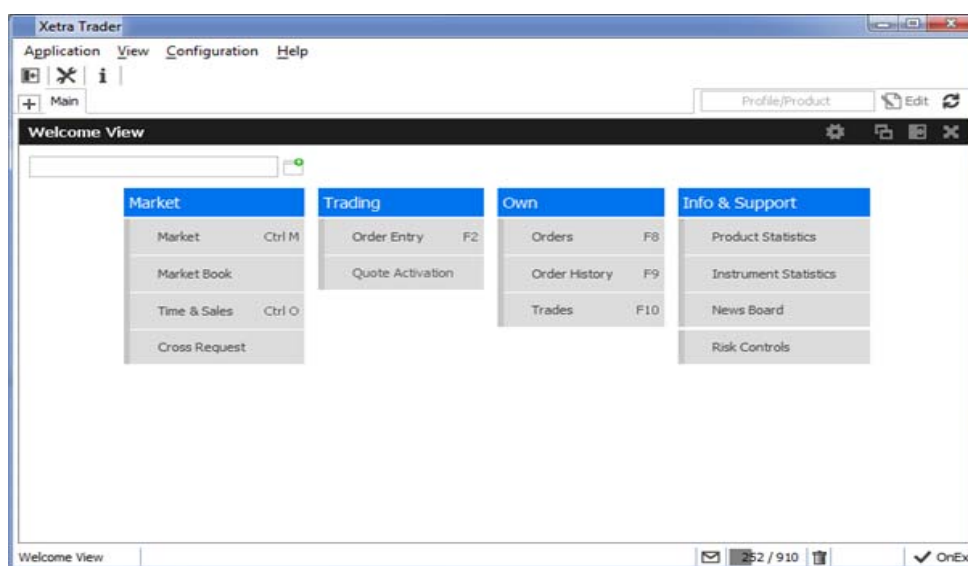


Figure 10: Welcome View of the T7 Trader GUI

4.3.2 Admin GUI

The Admin GUI provides administrative functions and thus is mainly tailored for the service administrator. In the Admin GUI the setup and the maintenance of users can be done. This includes all relevant user information, e.g. the user name as well as the entitlement. Risk parameters like the maximum order volume can be set in the Admin GUI as well. The sessions view and the bandwidth monitor are also provided. In addition a new functionality is introduced to the cash market called Emergency Trading Stop. This functionality can be triggered via a stop button in the GUI which leads to an emergency deletion of all open orders and quotes as well as a temporary halt of the entire trading business unit. No further orders and quotes can be entered while the trading business unit is halted.

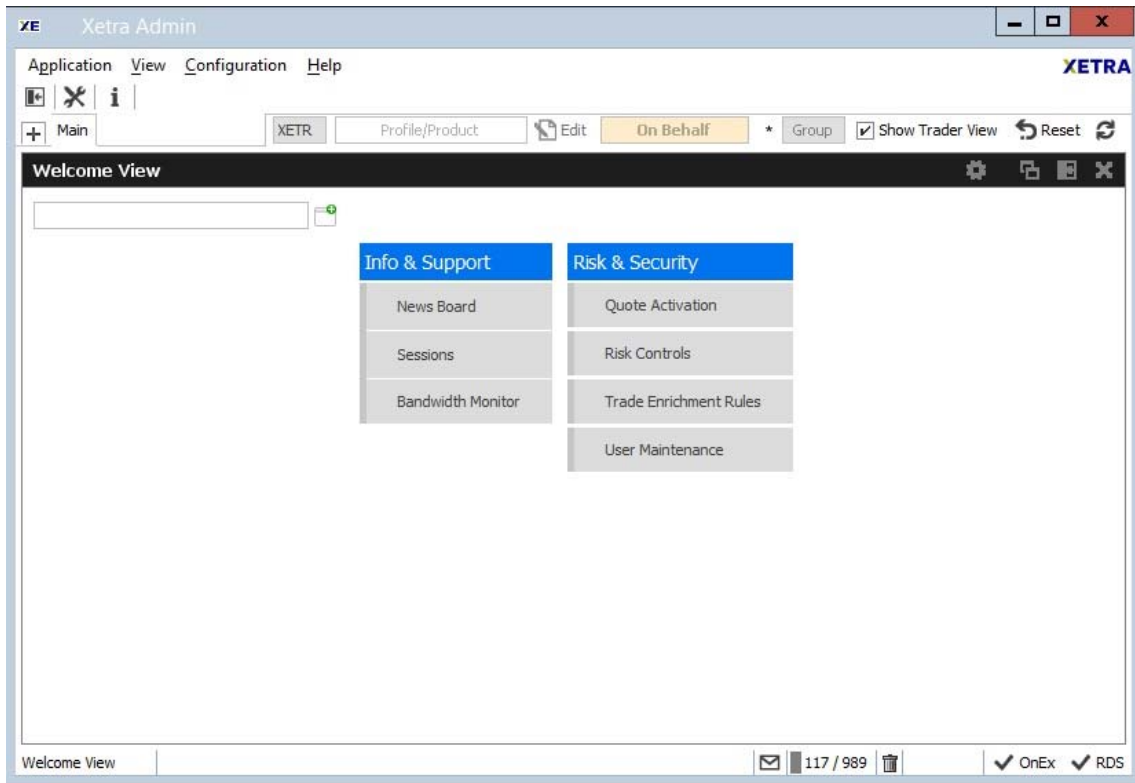


Figure 11: Welcome View of the T7 Admin GUI

4.3.3 Clearer GUI

The Clearer GUI is designed for the back office departments and the clearing risk functions. For clearing members it will be possible to view trades of their related trading participants.

Administration functionality for clearing users is also provided.

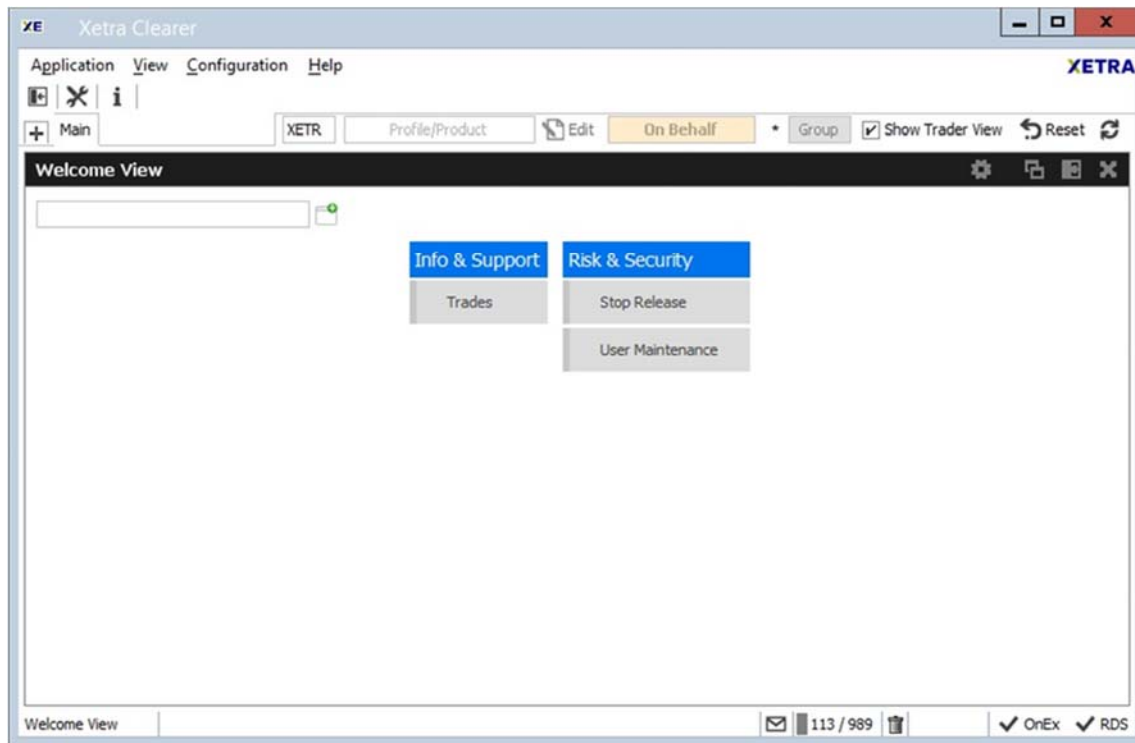


Figure 12: Welcome View of the T7 Clearer GUI

4.4 Market Data

As part of the T7 architecture, T7 will offer public market data via four interfaces – all of which will be available for ISE T7. All interfaces distribute information via UDP multicast; following FIX 5.0 SP2 semantics and are FAST 1.2 encoded (except EOBI). If any messages are lost, complete recovery is possible because every message is published on two identical services (A and B) with different multicast addresses (live-live principle). In the unlikely case of a message-loss on both services, participants can take advantage of the respective snapshot message and rebuild the order book.

The Market Data Interfaces are:

- **Market Data Interface (MDI):** This interface provides netted price level aggregated market data.
- **Enhanced Market Data Interface (EMDI):** This interface provides un-netted price level aggregated market data.
- **Enhanced Order Book Interface (EOBI):** This interface provides the entire visible order book, by publishing information on each individual order and quote.
- **Extended Market Data Services (EMDS):** This interface provides real time and replay dissemination of all order book trade prices.

More details about the market data interfaces is provided in the “Market and Reference Data Interfaces – An Introduction”, as well as in “T7 Market-, Enhanced Order Book- and Reference Data Interfaces Manual”, “Reference Data File – FIXML Schema Files” and “T7 Extended Market Data Services – Manual” which were published as Simulation versions in February 2017. For the ISE, the above Market Data Interfaces will provide information related to order book data only. No Off Order Book trade information will be included.

4.4.1 Market Data Interface

The Market Data Interface (MDI) for netted price-level aggregated market data, introduced with Xetra Release 12.0, also exists on the T7 trading platform. It provides netted price level aggregated order book market data with a market depth of 10. Updates of the order book are sent at regular intervals; they are not provided for every order book change and are sent significantly less frequently than the EOBI or EMDI.

Along with the order book updates, the following market data is disseminated via this interface:

- Product state and instrument state information
- Cross requests
- Order book trades.

Order book trades are not reported individually, but statistical information (daily high/low price, last trade price and quantity) is provided instead.

The Market Data Interface consists of incremental messages (event driven) and snapshots (periodic generated) which will be delivered via one channel (in-band).

4.4.2 Enhanced Market Data Interface

The Enhanced Market Data Interface (EMDI) is the sole source for un-netted price-level aggregated market data. The interface replaces the current Enhanced Broadcast Solution (EnBS). The EMDI interface disseminates the same market data as the MDI, however the updates of the order book are sent for all order book changes up to a market depth of 10 and all order book trades are reported individually.

The un-netted market data is partitioned over several channels; each channel provides information about a group of products. As the market becomes busier, the number of messages (and therefore bandwidth usage) increases.

Snapshots and incremental market data messages are delivered via separate channels (out-of-band).

4.4.3 Enhanced Order Book Interface

The Enhanced Order Book Interface (EOBI) is a market data interface exclusive to the T7 trading platform and provides un-netted order-by-order public market data (including quotes). The EOBI interface provides fixed-length binary messages with no data compression. It is only available in co-location and needs to be ordered explicitly by the customer.

Most of the functional concepts used are similar to those of EMDI, however the EOBI provides greater transparency, together with a high throughput at minimal latency. The following information is provided on the EOBI:

- Order book information, disseminated without any depth limitation
- The side, price, priority timestamp and displayed quantity of each visible order and quote
- Trade prices and traded quantity for each executed order book trade
- Product state and Instrument state information
- Cross requests.

4.4.4 Extended Market Data Services

The Extended Market Data Services (EMDS) is an additional market data interface providing a real time and replay dissemination of all order book trade prices. The replay service allows participants to recover from any data loss for order book trades.

4.5 Reference Data

The Reference data for ISE T7 will be provided via the

- Reference Data Interface (RDI),
- Common Report Engine (CRE), and
- Xetra webpage (www.xetra.com).

The Reference Data Interface (RDI) distributes data over a number of IP multicast addresses via high bandwidth connections. All feeds follow FIX 5.0 SP2 semantics and are sent with FAST encoding.

Information is provided as regular snapshots containing reference data as of the beginning of the day. For intra-day recovery purposes the snapshots are repeated during the day. It uses the same technical means as the market data interfaces.

Via the Common Report Engine the Reference Data is provided in file form as compressed Reference Data File (RDF) in FIXML-layout.

For customers using the Xetra Member Section a link will be established in the Member Section which redirects the member to the file available on the CRE.

Reference Data provided via CRE, RDI and the Xetra webpage includes instrument related information only. In addition to those files, the information about trading schedules, order profiles and descriptions of market segment and market segment supplements will be provided in zipped file on the public webpages. Members have to process these files in parallel to the Reference Data received via RDI, CRE and the public webpages. These static files will only change rarely. Changes will be communicated in advance with sufficient lead time.

More details about the distribution of reference data can be found in the “Market and Reference Data Interfaces – An Introduction” (already published), the “T7 Market-, Enhanced Order Book- and Reference Data Interfaces Manual” (preliminary version published in December 2016; final version will be available in May 2017) as well as the “Xetra Instrument Reference Data Guide” published in April 2017.