

T7 Release 6.0

Functional and Interface Overview

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1 Introduction

T7 is a state-of-the-art trading architecture developed by Deutsche Börse Group. T7 offers high performance together with reliable connectivity, enriched trading functionality, as well as a faster time-to-market. The T7 trading architecture is used to operate the derivatives markets as well as the cash markets. Currently, for the cash markets trading is enabled for all CCP eligible instruments.

This document provides an overview of the T7 trading architecture's functionality with all its interfaces. Please refer to the "Functional Reference" for extensive information.

1.1 Purpose of this document

This document describes the main capabilities of T7's trading architecture used for both the cash and derivatives markets. The following reflects the main functionalities:

- Concept of multiple markets, products and instruments (incl. states)
- Concept of participant, business unit and user set-up
- Overview of on-book functionality
- Overview of off-book functionality (T7 Entry Services)
- Overview of interfaces for trading and market data, respectively reference data

1.2 Further reading

The following documents provide additional information:

Overview and Functionality	Interfaces
<ul style="list-style-type: none"> • T7 Release 6.0 Release Notes for Xetra and Eurex • T7 Functional Reference • Participant and User Maintenance Manual • Market Model Xetra 	<ul style="list-style-type: none"> • Trader and Admin and Clearer GUI - Manual • T7 Market and Reference Data Interfaces – Manual • T7 Enhanced Order Book Interfaces – Manual • T7 Extended Market Data Services – Trade Prices, Settlement Prices and Open Interest Data Manual • T7 Extended Market Data Services – Underlying Ticker Data Manual • T7 Market and Reference Data Interfaces
Reports	
<ul style="list-style-type: none"> • Common Report Engine (CRE), User Guide 	

Table 1: Further Reading T7 Release 6.0

All the documents are available on the websites of Deutsche Börse Group:

Derivatives Markets: www.eurexchange.com > Technology > Eurex Exchange's T7 > System Documentation > Release 6.0.

Cash Markets: www.xetra.com > Technology > T7 Trading Architecture > T7 System Documentation.

1.3 Definitions and Abbreviations

The following are the definitions and abbreviations used in the Functional and Interface Overview:

Abbreviation	Definition
CCP	Central Counter Party
EEX	European Energy Exchange
EMDI	Enhanced Market Data Interface
EOBI	Enhanced Order Book Interface
ETC	Exchange Traded Commodity
ETF	Exchange Traded Fund
ETI	Enhanced Trading Interface
ETN	Exchange Traded Note
FIX	Financial Information eXchange (Protocol)
Off-book	Off-book refers to the trading functionality not involving the central limit order book
On-book	Refers to trading functionality of the central limit order book
MDI	Market Data Interface
RDF	Reference Data File
RDI	Reference Data Interface
T7	Cash & Derivatives trading system developed by Deutsche Börse Group
TES	T7 Entry Service
SRQS	Selective Request for Quote Service
EMDS	Extended Market Data Service

Table 2: Definitions and Abbreviations

2 Main Components

The following chapter describes the main components of the T7 trading architecture.

2.1 Markets, Products and Instruments

The T7 trading architecture provides the capability to operate multiple markets (i.e. Eurex, EEX, Xetra, Vienna, Dublin) on one technical instance. The following figure shows the T7 market hierarchy with its markets, product assignment groups, products and instruments:

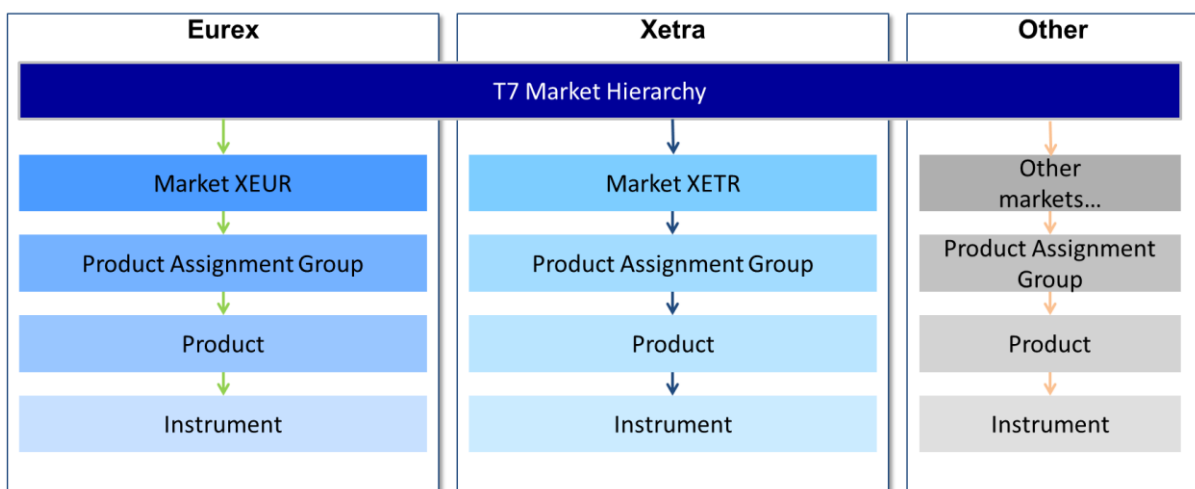


Figure 1: T7 Market Hierarchy

Instruments in T7 are the tradeable entities, i.e. an order refers to buying or selling a specified quantity of a certain instrument. Instruments of the same type are grouped to form products. However, every instrument must belong to a product. The product itself is associated to a product assignment group. For instance, the product assignment group “German Interest Rate Futures & Options” contains the Eurex products FGBL, FGBM, FGBS, FGBX, OGBL, OGBM, and OGBS. A simple instrument would be FGBL DEC 2018.

The product assignment group is used for Entitlement. Please refer to section 2.4.2 for more details. Each product assignment group refers to a specific market.

Please note, that a product may contain only one instrument or is equivalent to the instrument (relation 1:1) as applied in Xetra. For example, the product assignment group “DAX1” comprises all DAX products such as ADS, ALV, BASF, BMW etc. In turn, the product ADS includes the simple instrument ADS. A product and its instruments always belong to a single market.

2.2 Instrument Types

This section introduces instrument types in T7. In general, it is distinguished between three instrument types referred to as “**Simple Instrument**”, “**Complex Instrument**” and “**Flexible Instrument**”.

The following figure represents an overview for the cash and derivatives markets. The cash markets use only simple instruments (e.g. equities, ETFs, ETCs, ETNs):

	Derivatives Market	Cash Market
Simple Instruments	Futures Contracts, Option Series	Equities, Exchange Traded Funds, Exchange Traded Commodities, Exchange Traded Notes, Money Market Funds
Complex Instruments	Futures Spreads Standard Futures Strategies Packs and Bundles Strips Inter-Product Spreads Standard Options Strategies Non-Standard Options Strategies Option Volatility Strategies	-
Flexible Instruments	Flexible Futures, Flexible Options	-

Figure 2: Instrument Types on T7

Simple instruments in the derivatives markets can be individual futures contracts or options series. Complex instruments enable trading of two or more simple instruments simultaneously. Flexible instruments are tailor-made futures or options contracts. They can be traded only off-book via T7 Entry Services. The following table defines the supported complex instrument types:

Complex Instrument Type	Description
Futures spread	Calendar spread combinations for futures.
Standard options strategy	Strategies with up to four legs which conform to standard rules (e.g. Bull, Bear, Straddle).
Non-standard options strategy	Any combination of simple options instruments, not covered by a standard options strategy, with up to five legs.
Option volatility strategy	Volatility strategies with up to five legs (e.g. Call vs. Underlying, Put vs. Underlying, Bull vs. Underlying).
Standard futures strategy	Analogous to standard options strategy. Currently, T7 supports two standard futures strategies: Futures Butterfly and Futures Condor.
Pack and bundle	Futures strategies containing consecutive quarterly maturities.
Strip	Futures strategy similar to packs and bundles with at least two and at most 20 legs.
Inter-product spread	Combination of contracts that belong to different futures products of the same market.

Table 3: Complex Instrument Types

Usually complex instruments are requested by traders. However, some futures spreads, packs and bundles and inter-product spreads are created by the exchange.

2.3 Trading States

This section provides an overview of the trading states supported by T7. Overall, T7 supports two trading states, i.e. the “**product state**” and the “**instrument state**” which are explained in the following sections.

2.3.1 Product States

With the help of the product state, the business day is structured in a timely manner and the overall access to the trading system is controlled on product level. The following table represents typical product states for a common trading day:

Product State	Description
Start of Day	<ul style="list-style-type: none"> ➤ Represents the time in the morning before activity begins. ➤ Participants have no functional access to the trading system.
Pre-Trading	<ul style="list-style-type: none"> ➤ Represents the phase before trading starts providing traders the possibility to prepare themselves for trading in terms of order maintenance (without execution).
Trading	<ul style="list-style-type: none"> ➤ Represents the trading phase during the day where order execution is possible and market data is available. ➤ Different trading models as well as auction call phases are supported.
Closing	<ul style="list-style-type: none"> ➤ Phase between Trading and Post-Trading phase which covers the time between the end of continuous trading and the end of the closing auction. ➤ For products that have no closing auction at the end of the trading phase, the product state Closing has normally a zero duration.
Post-Trading	<ul style="list-style-type: none"> ➤ State in the evening after trading has ended. It is typically a time where traders can maintain their orders in preparation for the next trading day (no execution).
End of Day	<ul style="list-style-type: none"> ➤ Phase in the evening reserved for the end-of-day processing by the exchange. ➤ Participants have no access to the trading system any more.

Table 4: Overview of Product States

Additionally, T7 supports two other product states for specific situations:

Product State	Description
Halt	<ul style="list-style-type: none"> ➤ The exchange may halt a product if it deems that market conditions or technical conditions require this. In this product state, no trading occurs and access to the order book is restricted.
Holiday	<ul style="list-style-type: none"> ➤ This product state applies to products that are not open for trading on that day, even though the exchange is open. Participants have no access to the trading system for a product that is in the product state Holiday.

Table 5: Special Product States

2.3.2 Instrument States

The instrument state refers to the individual state of the instrument and controls the trade activity in the order book as well as the market data distribution. The following figure shows the typical sequence of instrument states in the normal continuous trading model. However, T7 supports also other trading models/ forms as used for the cash markets. See e.g. the One Auction trading model as displayed in the figure or the IPO Auction as a special trading form described in table 7. Please refer to the “Market Model Xetra” for more information regarding trading models/ trading forms in the cash markets.

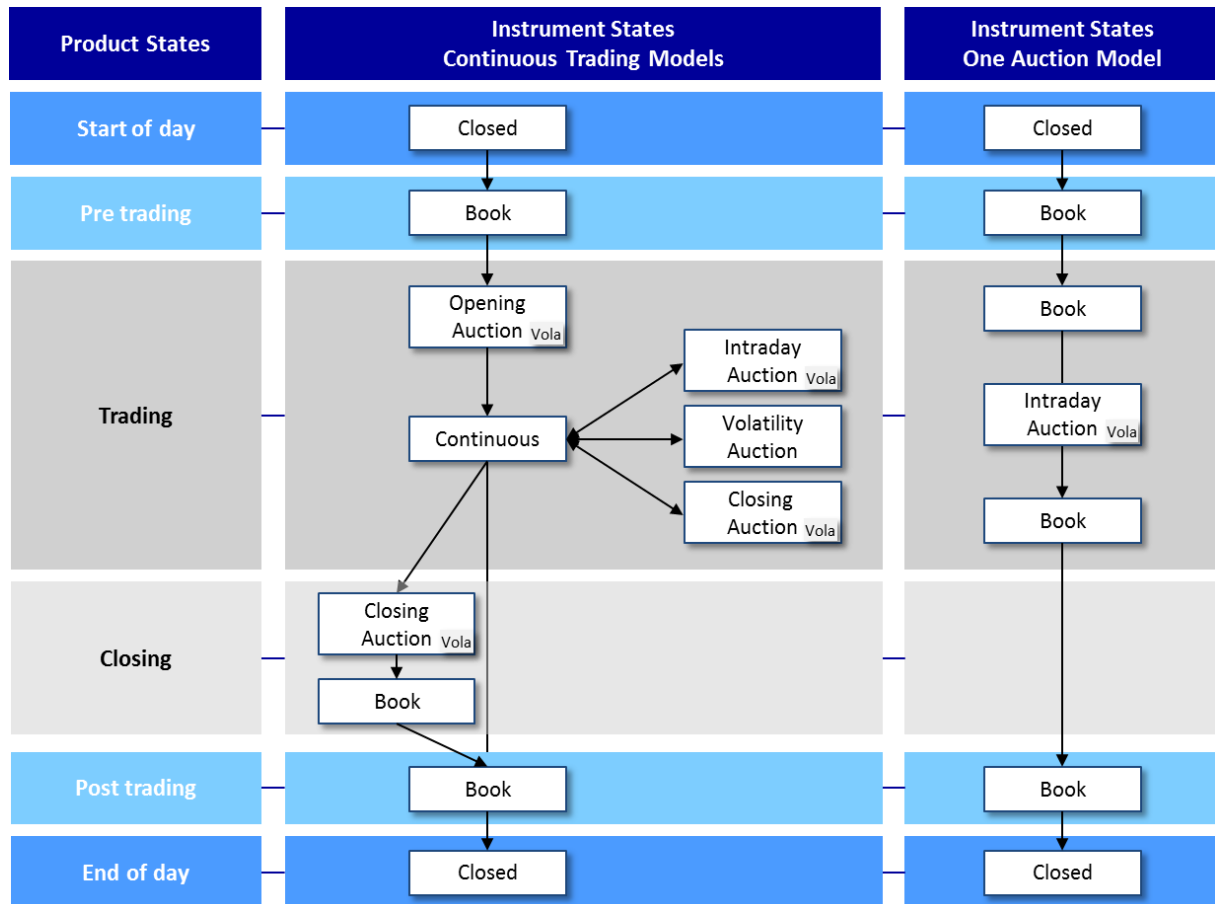


Figure 3: Typical Product and Instrument States

The table below describes the instrument states referred above:

Instrument State	Description
Closed	No access to the order book, no executions and no data distribution.
Book	Order/ quote maintenance is possible but no executions and no data distribution.
Continuous	Order/ quote maintenance as well as continuous matching of orders and quotes are possible. Trade data is published by the exchange.
Opening/ Intraday/ Closing Auction	Order/ quote maintenance are possible but no executions. Only top of the book is published (either best bid/ ask or the potential auction price). It is possible that within an opening/ intraday or a closing auction, a volatility auction is triggered if the auction price is outside a predefined price range.

Table 6: Time Triggered Instrument States

Further instrument states may occur throughout the trading day, which are event triggered:

Instrument State	Description
Volatility Auction	Order/ quote maintenance are possible but no executions. Only top of the book is published (either best bid/ ask or the potential auction price). Volatility auctions occur if the potential execution price is outside a predefined price range.
Restricted	Only deletions are possible (no order/ quote maintenance, no executions, no data distribution).
Freeze	No order/ quote maintenance and no executions are possible. Deletions are marked as 'pending'. Top of the order book is published (either best bid/ ask or the potential auction price). After freeze, potentially resulting trade is published. This state is used by the exchange to check the order book specifically. For the cash markets, this state occurs typically at the end of an extended volatility interruption.
IPO Auction	Order/ quote maintenance are possible but no executions. Only the matching range that is relevant for the price determination is published. Before the IPO auction is terminated, the instrument state is set to freeze to control the order book situation. After price determination, the instrument is integrated into its usual trading model sequence, starting with an intraday auction; except for the trading model One Auction. The IPO Auction is used by the cash market for the inclusion of an instrument in the secondary market and is a special version of an auction.

Table 7: Event triggered Instrument States

2.3.3 Fast Market

A Fast Market is declared by an exchange when an especially volatile market situation is expected. During this time, certain price controls are relaxed, e.g. minimum quote spread requirements. In T7, Fast Market is a special status of the product that the exchange can set independently of the product and instrument states. This allows for example, a product to be set to Fast Market early in the morning before trading starts, without any impact on the sequence and timing of the product states.

2.3.4 Market Conditions

The regulatory relevant states of market conditions for market making are Normal Market Conditions, Stressed Market Conditions and Exceptional Circumstances. T7 publishes using the market data interfaces the Normal and Stressed Market Conditions. The Exceptional Circumstances are published only via news messages.

2.3.5 TES Activity Product Status

T7 applies trading status at both the product and instrument level. The TES activity status for a product determines which TES activities are allowed in the product. Please note that the product

status for TES is independent of the product status for on-book trading. For a given product, the following values for the TES activity status are foreseen:

- **On** - When the TES activity status is “On” for a product then TES trade entry, TES trade modification, TES trade deletion and TES trade approval are allowed for all the instruments of the corresponding product.
- **Ended** - The TES activity status “Ended” terminates the TES trading session of a business day. All the pending TES trades (pending entries/ modifications/ deletions) will be deleted during transition to the TES activity status “Ended”. TES trade entry/ modification/ approval and deletion are not allowed.
- **Off** – The TES activity status “Off” indicates that the product is no longer available for TES trading or TES trading has not been started for the day. In this case, all TES activities are disabled for the product.
- **Halted** – The TES activity status “Halted” is reserved for emergency situations. Market Supervision may set the TES activity status to “Halted” for a product if they judge that market conditions or technical conditions impair the integrity of the market. In this state TES trade, entry/ modification/ approval and deletion are not allowed. Pending TES trades remain when the TES activity status is “Halted”.

Product States	TES Activity Status
Start of Day	OFF
Pre Trading	
Trading	ON
Closing	
Post Trading	
End of Day	Ended
	OFF

Figure 4: TES Activity Status

2.3.6 On-book and TES (Off-book) Instrument Status

In T7, the instrument status is different from the instrument state. The instrument status controls in

principle if the instrument is available for trading or not. Thereby, it is **distinguished** between the instrument status for **on-book** (on-exchange) and **off-book trading** (i.e. TES trading). Both can be **determined separately**, i.e. an instrument can be deactivated for on-book but not for TES trading. The following instrument status are available in T7:

Instrument Status	Description
Active	The instrument status of an instrument to allow trading.
Inactive	Market supervision may decide to deactivate an instrument during the day. Trading is deactivated at all.
Expired (for derivatives only)	Instruments that expire during the trading day, rather than at the end of the trading day (<i>Intra-day Expiry</i>) will upon expiration acquire the listing status 'Expired' as opposed to 'Active'. Trading is not possible any more, the instrument state is changed to 'Restricted'.
Suspended	Market supervision may suspend an instrument under unusual circumstances. A suspended instrument will acquire the listing status 'Suspended' as opposed to Active. Trading is not possible any more, the instrument state is changed to 'Restricted'.

Table 8: Instrument Status

2.4 Participant, User Concept & Entitlement

The member structure in T7 consists of three hierarchal levels: The **Participant** on the first level, the **Business Unit** on the second level and the **User** as well as the **Session** on the third level.

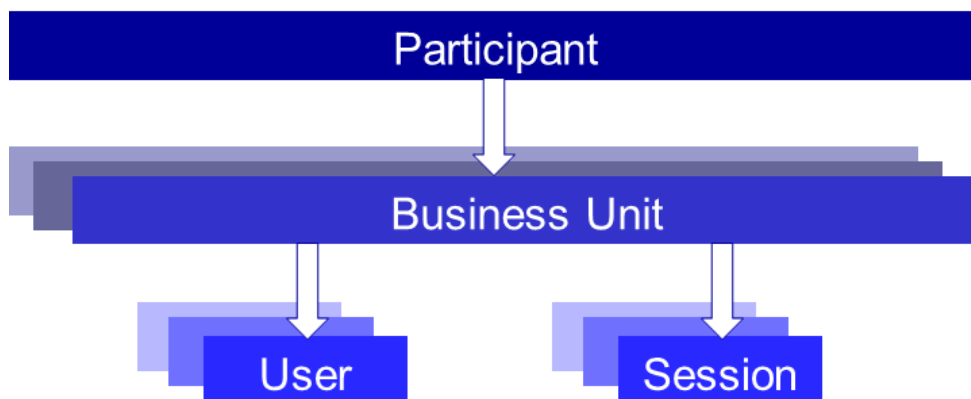


Figure 5: Participant hierarchy in T7

The following provides definitions on the member structure:

- **Participant:** The Participant is the highest level entity in the member structure of T7. It is the member legal firm and can be an exchange participant, a clearing member, or a service provider.
- **Business Unit:** A participant may have several business units working independently. There is distinguished between two types of business units:
 - **A Trading Business Unit** - used by participants for trading only.
 - **A Clearing Business Unit** - used by clearing members to receive trade confirmations from its own trading business units and from the trading business units of their related non-clearing members. Only for the cash markets: A clearing member business unit supports the user concept as for the trading business units. Users can view the above mentioned trades in the T7 Clearer GUI and they can also make use of the Clearing Member Stop functionality.

Each trading member initially has just one trading business unit and each clearing member has just one clearing business unit. Participants providing both trading and clearing will get both a trading and a clearing business unit.

- **User(s):** A business unit can have multiple users. A user can be a trading user and/or an administrator.
- **Session(s):** Sessions are permanently registered connection channels to T7. A session is set up for and belongs to exactly one business unit. In order to send requests to the trading system, a user must use a session that is connected to T7 and that belongs to the same business unit 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. As long as the session belongs to the same business unit, users can use different sessions simultaneously.

2.4.1 User Concept

There are three user levels: **‘Trader’**, **‘Head Trader’** and **‘Supervisor’**.

- A **‘Trader’** can enter/ modify/ delete his orders only.
- A **‘Head Trader’** is allowed to do following activity on-behalf of the traders in the same trader group.
 - modify and delete orders.
 - approve and delete pending TES trades
 - all the activity on SRQS except entering the RFQ.
- A **‘Supervisor’** is allowed to do following activity on-behalf of the traders in the same business unit
 - modify and delete orders.
 - approve and delete pending TES trades
 - all the activities on SRQS except entering the RFQ.

Quote ownership does not depend on the trader group, please refer to section 3.2 (Quotes).

With T7, users are configured by the participant for trading via the Admin GUI and for Clearing via the Clearing GUI. Users have to be registered via the Member Section and trading users must be activated by the exchange.

2.4.2 Entitlement

The entitlement in T7 consists of a concept of roles, in combination with product assignment groups or a market. The roles enable the participant to manage user resources more easily. For example, a trader role is enriched by all resources enabling the user to trade (e.g. enter order request, modify order request, etc.). Another example is the role of the “Service Administrator” enabling the user maintenance.

The roles are assigned to the (trading/ clearing) business units by the exchange. From here, the business unit can inherit the entitlement to its users. It is possible that a user has more than one role, some effective market-wide and some per product assignment group. The following figure represents an overview of the entitlement:

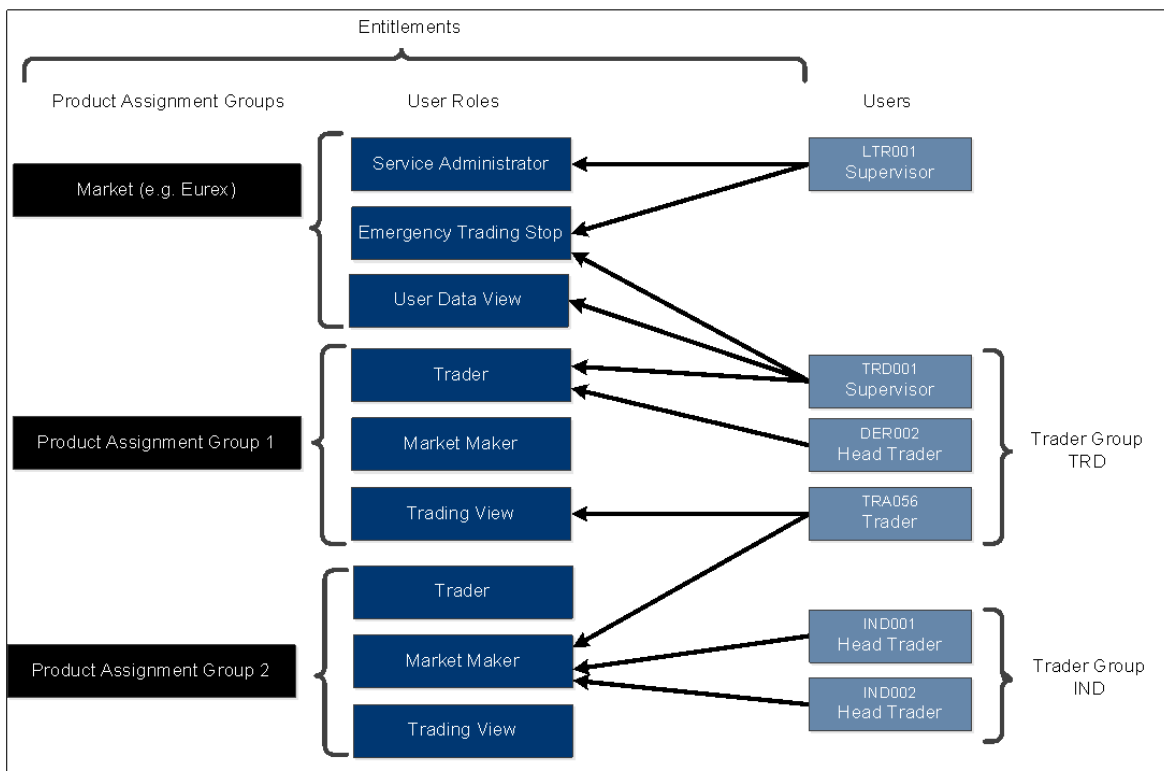


Figure 6: User Entitlement Overview

Thus, it is possible that a user having the “Trading View” role (i.e. he is only allowed to see trading information) in one product assignment group can act as Market Maker in another product assignment group.

The following overview provides an insight to all available roles in T7¹:

Roles	Relevant for ²				Description
	TBU	CBU	MKT	PAG	
(Cash) Service Administrator	x	x	x		Set up new users, maintain their entitlement as well as delete users.
(Cash) User Data View	x	x	x		Allows viewing user data information of himself and other users.
(Cash) Trader	x			x	Enables trading, e.g. enter orders.
(Cash) Trading View	x			x	Allows viewing the trades, e.g. to inquire them.
Market Maker Protection (derivatives markets only)	x			x	Allows to maintain Market Maker protection parameters and to delete quotes automatically if predefined parameters are exceeded, as a part of risk control.
(Cash) Market Maker	x			x	Enables Market Maker activities, e.g. enter quotes.
(Cash) Emergency Mass Deletion	x		x		Allows deleting all open orders and quotes.
(Cash) Emergency Trading Stop	x		x		Allows stopping the entire trading business unit in case of emergency. All open orders/ quotes are deleted.
Clearing Member Stop (cash markets only)		x	x		Allows a user of a clearing member to stop one or many of his related trading business units.
CM Backoffice View (cash markets only)		x	x		Allows inquiring of trades of his related trading business units.
Trade Enrichment Rule	x		x		Enables to view and maintain trade enrichment rules. This feature is used for automatic enrichment of executed orders and quotes that use the short order message layout. TES trades are not affected.
Trade Enrichment Rule View	x		x		Enables to view all trade enrichment rules without update capability.
Pre-trade Limits (derivatives markets only)	x		x		Enabling to view and maintain pre-trade limits for on-exchange trading, i.e. without impact on TES trades. Pre-trade limits compose functional limits on the number of open orders and quote sides stored in the order book for a business unit and a session.
Pre-trade Limits View (derivatives markets only)	x		x		Enabling to view all pre-trade limits without update capability.

¹ For further details, please refer to the "Participant and User Maintenance Manual".

² TBU = Trading Business Unit, CBU = Clearing Business Unit, MKT = Market, PAG = Product Assignment Group.

Roles	Relevant for ²				Description
	TBU	CBU	MKT	PAG	
Off-book Trading³					
TES Trader (derivatives markets only)	x			x	Allows to enter, modify and to delete a TES trade as well as to approve his TES side. Enable trader to use SRQS.
TES Broker (derivatives markets only)	x			x	Allows to enter, modify and delete a TES trade but not to approve a TES trade as a TES Broker is not involved as a counter party. Enable trader to use SRQS.
TES View (derivatives markets only)	x			x	Allows viewing TES trades.

Table 9: Overview of Roles Functionality

²) TBU = Trading Business Unit, CBU = Clearing Business Unit, MKT = Market, PAG = Product Assignment Group.

³) Participants receive TES Trader, TES Broker and TES View roles by default. TES Trader and TES broker include also the resources to create and submit instrument request for flexible instruments.

3 On-book Functionality

This section describes the on-book functionality for the cash and the derivatives markets provided on T7.

3.1 Orders

T7 supports multiple types of orders to fulfill customer needs and expectations. All orders entered are anonymous, i.e. the business units do not receive any information on who entered an order.

Depending on the market and the traded instrument, the allowed combinations of order types, restrictions, price conditions and validities may differ. These combinations determine the exchange within an order profile disclosed to the customers in the reference data.

Nevertheless, there are two attributes which are mandatory and valid for all orders: the order persistency and if it is standard or a lean order. The following figure depicts the differences as well as the combination possibilities.

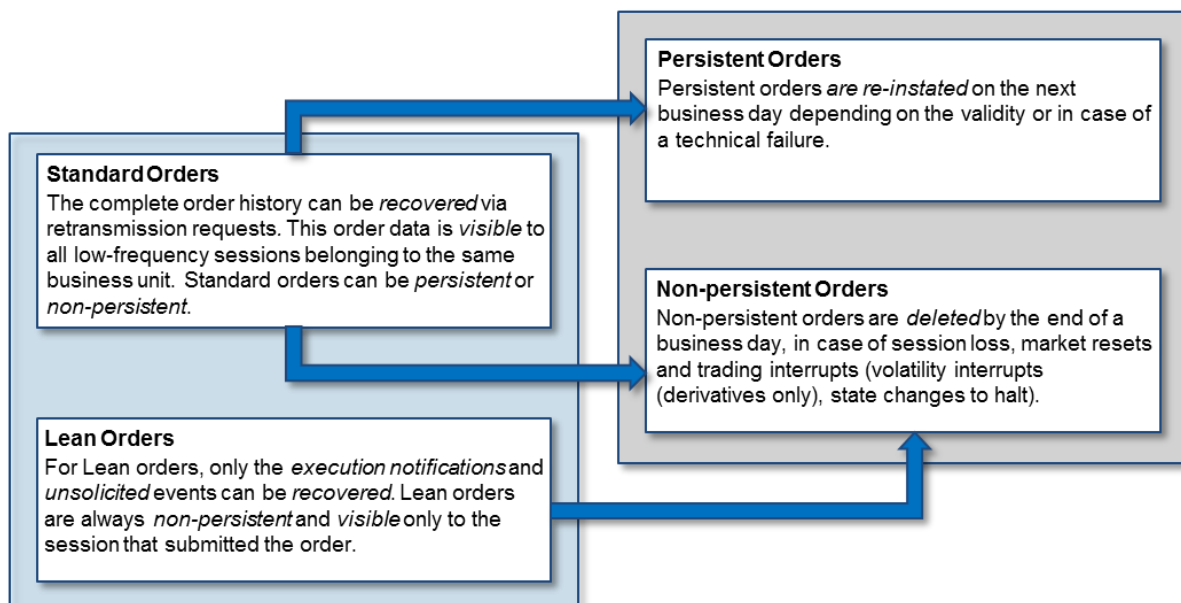


Figure 7: Standard/ Lean Orders vs. Persistent/ Non-persistent Orders

Overall, T7 supports the following order types, price conditions, restrictions and validities:

Order Type	Description
Limit Order	A limit order is an order that does not get executed at a price worse than its limit.
Market Order	A market order is an order without price.
Stop Order (Stop Limit only for the cash markets)	In case the market reaches the stop price, the stop order is triggered and routed to the order book. The stop order is available as a stop market or a stop limit order.
One-Cancels-the-Other Order (OCO)	The OCO combines the behaviour of a limit order with that of a stop market order. On entry, it first behaves exactly like a Limit Order. Once the trigger condition is fulfilled, the OCO order behaves like a triggered Stop Market Order.

Order Type	Description
Iceberg Order (cash markets only)	Iceberg Orders are orders with quantities only partially visible, i.e. only visible with its peak in the order book. The refill of the peak after execution can be configured to be random.
Volume Discovery Order (cash markets only)	Volume Discovery Orders (VDO) behave like Iceberg orders for matching in the visible order book. They are entered as Iceberg orders with the Volume Discovery Price as additional parameter. VDOs only get executed against other VDOs and the execution price is determined by the midpoint of the visible order book.
Trailing Stop Order (cash markets only)	Trailing Stop Orders (TSO) behave like Stop Orders but having an absolute or relative distance between the stop limit and the current reference price (trailing amount). TSOs can be entered only as "Market". The stop limit of a TSO adjusts automatically according to the trailing amount until the trigger condition is fulfilled and the TSO is triggered.

Table 10: Order Types

Order Restriction	Description
Auction Only (cash markets only)	If this restriction is set, the order can only get executed during a scheduled auction phase but not during continuous trading or an (extended) volatility interruption.
Opening Auction (cash markets only)	If this restriction is set, the order can only get executed during the opening auction.
Closing Auction	If this restriction is set, the order can only get executed during the closing auction.
Book-Or-Cancel	Orders using the restriction Book-or-Cancel (BOC) are accepted and written only to the order book if its execution is not possible (fully/ partially) on entry.
Best Execution (cash markets only)	Incoming orders with the BEST Execution flag set will either match at an execution price better than the current order book price against the quote from the BEST Executor or go in the book as a regular order.

Table 11: Order Restrictions

Order Validity	Description
Good-for-Day	Orders entered "Good-for-Day" (GFD) will be deleted at the end of the trading day they were entered on.
Good-till-Date	Orders entered "Good-till-Date" are valid until the date specified by the user. The order is then deleted automatically during the end of day processing of its last validity day.
Good-till-Cancelled	Orders entered "Good-till-Cancelled" (GTC) remain in the system until the deletion by the user itself.
Immediate-or-Cancel	For orders entered as "Immediate-or-Cancel" (IOC), the quantity that cannot be executed immediately upon entry, is deleted.
Fill-or-Kill (cash markets only)	For "Fill-or-Kill" (FOK) orders either the total quantity is matched upon order entry or nothing is executed at all and the whole order is cancelled.
Good Till Crossing/Auction (cash markets only)	Only Volume Discovery Orders can be entered with validity "Good Till Crossing/Auction" (GTX). A Volume Discovery Order entered with the restriction GTX will be deleted at the start of an auction or in case of volatility interrupt.

Table 12: Order Validity

Order Identification

An order can be tracked via the Order ID assigned to every order on entry. The Order ID is unique per product and does not change over the whole lifecycle of the order. This means that T7 may assign the

same Order ID to orders belonging to different products. Please note in that context that the same security set up in different markets will be assigned to separate products.

In addition to the Order ID, in the cash markets every order is assigned a System Order ID Version Number (starting with 0) which increases in case of a user driven order modification with a priority change, i.e. in case of

- Changing of limit price
- Increasing the quantity
- Extending the validity

For more information on order tracing, please refer to the document T7 Cross System Traceability.

Order deletions

Orders can be either be persistent or non-persistent. Depending on the scenario, order deletions are triggered automatically. The following provides an overview:

Event	Delete Non-Persistent Orders (N), Delete Persistent Orders (P)		Pending Delete possible (Y / N)
	Derivatives	Cash Markets	
Volatility Interruption	N	-	N
Instrument Suspension	N	N, P	N
Instrument Stop	N	N	N
Product temporarily not tradeable (Slow Partition)	N	N	N
Product State Halt	N	N	N
Mass Delete by Market Operation	N, P	N, P	Y
Clearing Member Stop	-	N, P	Y
Session Disconnect (Loss, Logout or Duplicate Login)	N	N	Y
Mass Cancellation by Trader	N, P	N, P	Y
Emergency Mass Delete by Trader	N, P	N, P	Y
Trader/ Business Unit Stop	N, P	N, P	Y

Table 13: Order deletion scenarios

Please note, that the order deletion scenarios include quotes which are non-persistent as well.

3.2 Quotes

T7 supports both, one-sided and double-sided quotes. The following applies for quotes:

- Quotes belong to the session on which they are entered, refer to section 6.1.1. A business unit can have multiple sessions, each with its own quotes.
- The “mass quote” function allows the users to enter, overwrite and delete multiple quotes of a session simultaneously.
- T7 provides “quote entry” to replace an existing quote with the new quote. This is done by starting a new quote life cycle with an accumulated traded quantity set to zero. It also provides

“quote modification”, which refers to an existing quote and preserves the accumulated traded quantity. The priority timestamp of a quote stored in the order book is changed when the price is changed or the open quote quantity is increased.

- The “delete all quotes” function can be used to delete all quotes of a session in a product.
- Quotes for complex instruments are supported and can be mixed with quotes for simple instruments inside a single “mass quote” transaction.
- An incoming or a modified quote side which fails the price reasonability check or the extended price range validation results in:
 - Rejection of the incoming or modified quote
 - Deletion of the old quote (i.e. with both sides) in the book belonging to that session and instrument.
- Quotes are always non-persistent and automatically deleted in specific situations. Please refer to the table “Order deletion scenarios” in section 3.1 including quotes as well. In difference to these scenarios, quotes are also deleted in case of an intraday expiry (derivatives markets only) while orders remain in the order book.
- All quotes of a session can be inactivated and re-activated. This feature can be applied within the product scope or the product and instrument type scope. When quotes of a session are inactivated, they are unavailable for matching, but can be updated while remaining inactive. During the time of the inactivation, any new quote entered into the session will also be inactivated. When quotes are (re-)activated they receive a new matching time priority. The market maker protection functionality which is provided for the derivatives markets only uses this inactivation function rather than quote deletion.

3.2.1 BEST Quotes (cash markets only)

In order to provide BEST Execution, the BEST Executor can enter a special quote type called BEST quote that is not shown in the public order book. T7 supports BEST Execution functionality only for cash markets. BEST quotes have relative price limits that dynamically adjust according to the top of the order book.

3.3 Market Models & Matching

T7 has the capability to support different trading models or trading forms. A predominating trading model is the “Continuous Trading (with Auctions)” model. Besides that, T7 supports the trading model “One Auction” or the trading form “IPO Auction” which are set up for some products in the cash markets only.

However, in principle trading is arranged in a way that the best priced orders in the book are traded first when an order is entered into the order book. If there are multiple orders at the best price, the allocation scheme specifies how the quantity of the incoming order is allocated to those book orders. T7 supports the following allocation schemes: Time allocation, Pro-rata allocation, Time-pro-rata allocation.

3.3.1 Allocation schemes

- **Time allocation:** The quantity of the incoming order is allocated to the oldest book order first. If there is any remainder then it is moved to the next oldest order, until the quantity of the incoming order is exhausted or all orders at the best price have been executed.
- **Pro-rata allocation:** The allocated quantity of the incoming order is shared amongst all book orders at the best price. The allocation is proportional to the size of each book order. All book orders at the best price are considered in the allocation.
- **Time-pro-rata allocation:** The allocation of an individual order is based on its order size as well as on the order priority time, combining aspects of pro-rata and time allocation. In that way, best price orders with an older order priority time receive a higher share of the quantity of the incoming order, at the expense of orders with younger order priority times, and there are potentially less book orders involved, compared to the pro-rata allocation.

The allocation schemes applied to the derivatives markets can be different per product and instrument type. For the cash markets, the “Time allocation” scheme is used.

3.3.2 Synthetic matching

Synthetic Matching is a functionality that is specific to derivatives markets. Also known as Implied Matching, it denotes the matching of orders from different instruments against each other. Besides the normal Direct Matching of incoming orders against orders on the other side of the same instrument’s order book, T7 supports synthetic matching of futures spread orders or inter-product spread orders against orders belonging to their leg instruments, as well as synthetic matching between orders from different futures spreads. See the Functional Reference for extensive descriptions of the various types of synthetic matching in T7.

3.3.3 Safeguards for Participants

Participant safeguard functions in T7 include:

- Transaction Size Limits (derivatives markets only) and Maximum Order Quantity (cash markets only) enable the participant to restrict the quantity at order and quote entry on user level.
- Maximum Order Value determining the maximum value of an order that a trader is allowed to enter.
- Market Maker Protection (MMP) mechanism which can prevent that too many quotes of a market maker match during a short period of time (derivatives markets only).
- Pre-Trade limits which enable the participant to set limits on the number of open orders and quote sides stored in the order book, to help prevent accidental massive submission of orders from algorithmic trading or order routing systems (derivatives markets only).
- Clearing member may stop a trading member, for whom they are a designated clearing member. When a trading member is stopped, the corresponding trading business unit in T7 is automatically stopped, and all orders and quotes within the business unit are deleted.
- Manual stop of trading can be applied to the whole participant, on a business unit, or on an individual trader. Manual stop may also be performed by an exchange participant or by the clearing house in addition to the clearing member.
- Advanced Risk Protection functionality; it can provide warnings, slow or stop a participant if a

predefined position limit is exceeded (derivatives markets only).

- Price validations for orders and quotes safeguarding that the limits entered are not done by accident or that the orders and quotes are executed at a price far away from the market without a notification to the traders or the market.
- Volatility Interruptions which interrupt trading by a volatility auction state to provide the customers to adjust their orders due to the current market condition. Volatility interrupts are supported at both the instrument and the product level.
- Self-Match Prevention (SMP) functionality which allows a business unit to prevent that own orders of the same instrument match against each other. SMP is supported during continuous trading, but not in any matches in an auction or order book uncrossing. SMP is not supported for synthetic matching, i.e. it does not prevent matches between orders of different instruments.

3.4 Trade Traceability

T7 provides trade traceability, allowing orders to be linked to executions, trade confirmations, and trades in clearing and settlement. Please refer to the T7 Cross System Traceability document for detailed information.

3.5 Clearing

Trade information is forwarded for clearing and settlement to different systems depending on the traded product. The following is applied:

- Eurex Clearing classic system serves for clearing and settlement of EEX products,
- C7 is the clearing system used for all Eurex products,
- CCP acts as the counterpart for all cash products which are CCP eligible.

Please refer to the T7 Cross System Traceability document for further information.

4 TES (Off-book) Functionality

T7 Entry Service offers functionality of entering pre-arranged trades into the exchange system. The price and quantity of an off-book trade is already agreed upon by the participants before entry of the trade into the exchange system. This section describes key aspects of the TES functionality provided by the T7 trading architecture for the Eurex market only. TES functionality for EEX and cash products is currently not available.

4.1 TES Types and TES Type Eligibility

The T7 Entry Service supports the following TES types:

- Block Trade - Supports the bi- and multilateral off-book trading of standard Eurex products.
- Exchange for Physicals (EFP) Fin – Supports bilateral off-book trading on futures products and a cash reference to specific bonds.
- Exchange for Physicals (EFP) Index – Supports bilateral off-book trading on futures products and a cash reference to an equity basket.
- Exchange for Swaps (EFS) – Supports bilateral off-book trading on futures products and a cash reference to a swap contract.
- Vola Trade – Supports bilateral off-book trading on futures products and a reference to an options off-book (Block TES trade) trade. On-book options trades are not allowed to be used as a reference for a vola trade.
- Trade at Market – Specific TES type for Total Return Futures products (TRF). TRF contracts are associated with an underlying index and replicate the daily performance of a Total Return Swap corresponding to the contract expiration.
- Basis Trade – Specific TES type only used for basis trades resulting from Eurex Bonds to indicate the derivative futures leg in T7; this TES type cannot be used via the ETI or T7 Trader GUI.

The TES type eligibility defines on business unit and user level if TES trading in one or more of the above mentioned TES types is allowed.

The supervisors of each business unit are able to assign the eligibility of certain TES types to the users belonging to their business unit.

If a user is eligible for the TES type “Block Trade”, he is automatically eligible for the TES types “Trade at Market” and “Basis Trade”. This means that there is no independent TES type eligibility for “Trade at Market” and “Basis Trade”.

4.2 TES Profiles

TES profiles support a configurable mapping between products and their instrument types on the one hand and TES types on the other hand.

The TES profile will summarize all valid product – instrument type – TES type combinations termed as TES profile key and corresponding TES profile attributes.

The key is a combination of the product, instrument type and TES type while the TES profile attributes consist of:

- Broker Allowed – This flag defines whether broker trades are supported or not.
- Max Participants - This field provides information about how many participants / TES

approving users can be involved on both sides of a TES trade

- Minimum Price Step – This field provides the information about the minimum price increment allowed for a TES trade.
- Minimum Lot Size - This field provides the information about the minimum TES side quantity allowed in a single leg.
- Non-disclosure Limit – This field provides the quantity threshold for using the non-disclosure feature.
- Leg Prices Allowed – This field provides the information whether it is allowed to provide prices for the leg instrument or not and if allowed whether the leg prices must always be provided.
- Price Validation Rule – The rule used for price validation of TES trades in accordance to “Conditions for Utilization of the T7 Entry Services”.

TES Profile									
Key			Attributes						
Product	Instrument Type	TES Type	Broker Allowed	Max Participants	Minimum Price Step	Minimum Lot Size	Non-disclosure Limit	Leg Prices Allowed	Price Validation Rule
FDAX	Simple	Block	FALSE	2	0.5	250	999999	Not Allowed	FUTURE SIMPLE INSTRUMENT
FDAX	Flexible	Block	FALSE	2	0.5	250	1	Not Allowed	FUTURE SIMPLE INSTRUMENT
FDAX	Simple	Vola	FALSE	2	0.5	1	999999	Not Allowed	FUTURE SIMPLE INSTRUMENT
FDAX	Simple	EFP_Idx	FALSE	2	0.5	1	999999	Not Allowed	FUTURE SIMPLE INSTRUMENT
FDAX	Calendar Spread	Block	FALSE	2	0.5	250	999999	Allowed	FUTURES SPREAD
OGBL	Simple	Block	TRUE	30	0.005	100	999999	Not Allowed	OPTION SIMPLE INSTRUMENT
OGBL	Flexible	Block	FALSE	2	0.005	100	1	Not Allowed	OPTION SIMPLE INSTRUMENT
OGBL	Standard Strategy	Block	FALSE	2	0.005	100	999999	Allowed	STANDARD OPTION STRATEGY
OGBL	Volatility Strategy	Block	FALSE	2	0.005	100	999999	Allowed	OPTION VOLATILITY STRATEGY
OGBL	Non-standard Strategy	Block	FALSE	2	0.005	100	999999	Allowed	NON STANDARD OPTION STRATEGY

Figure 8 TES Profile

The TES profiles are available on the Eurex web page under www.eurexclearing.com > Technology > Eurex Exchange’s T7 > Documents.

The table below shows an example of a TES profile (the actual configuration in production might be different):

4.3 TES Requests

The following TES requests are supported by T7 via the ETI interface:

- TES Trade Entry:
The request enables the entry of a pending TES trade containing the general TES trade information which encompasses the instrument Id, the trade price, the traded quantity, the TES closure time or the text field “TES trade description”. It also specifies all users involved on the buy and sell side of the TES trade (approving users).
- TES Trade Modify:
The request allows the modification of a pending TES trade by its initiating user. As long as the TES trade is not approved by all of its approving users, the modification of the general TES trade information except instrument Id and external references is supported. This also includes the approving users and the number of the approving users involved on the TES trade sides.
- TES Trade Delete:
The request allows the deletion of a pending TES trade by its initiating user.

- **TES Trade Approve:**
The request allows the approval of a pending TES trade side by its approving user. All TES trade side specific information (e.g. trading capacity, open/ close indicator, text fields) needs to be specified in this request. A TES trade also needs to be approved by the initiating user if the initiating user is identical to an approving user, i.e. if the user who was initiating the TES trade is also involved on any side of the same TES trade.

4.4 Clearing

Similarly to on-book trades, TES trade information is forwarded to Eurex Clearing's C7. All clearing and settlement functions are performed there.

5 Selective Request for Quote Service

5.1 Overview

T7 provides a Selective Request for Quote Service (SRQS) to negotiate off-book transactions electronically. The primary objective of the selective request for quote service is to find a counter party willing to execute a trade in the specific instrument with the negotiated price and quantity. However, as a result of the negotiation process, the negotiated deal is non-binding and requires an additional entry and approval as a block trade if it is intended to finally result in a binding trade. A deal generated on the SRQS is a non-binding agreement between two participants. It is not registered at the exchange as a binding trade. The SRQS deal can be transferred into a binding trade registered at the exchange by entering it as a Block trade using T7 Entry Service and by approving this Block trade by the parties involved in the SRQS deal.

5.2 Process Workflow in the Selective Request for Quote Service

The process workflow in the SRQS is divided in two parts: *Negotiation Event workflow* and *Deal workflow*.

5.3 Negotiation Event Workflow

The Negotiation Event workflow has the following steps:

1. The requester (typically a broker) sends a RfQ request to start a Negotiation Event.
2. The targeted respondents (market makers) are informed about the start of the Negotiation Event with the details about the RfQ.
3. The respondents provide quotes and the requester receives information about each quote.
4. Based on the quotes received, the requester can decide to target a specific quote by sending an order that results into a deal.

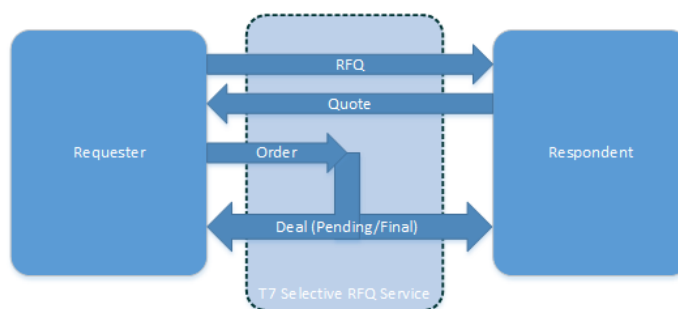


Figure 9 SRQS Negotiation Event Workflow

5.4 Deal Workflow

The Deal workflow in the SRQS starts with the creation of a deal.



Figure 10 SRQS Deal Workflow

1. A deal is generated when an order is allocated to a quote side. The deal is communicated both to the requester and the respondent.
2. A deal generated within an *Indicative* Negotiation Event has the status *Pending*. The respondent can change the status from *Pending* to *Final* or to *Rejected*. The requester can change the status from *Pending* to *Rejected*.
3. A *Pending* deal can have a limited validity time. In case the validity time is reached, the deal is *Rejected* automatically.
4. Once the status of the deal is changed to *Rejected* or *Final*, it cannot be updated any more.

6 Interfaces

The T7 trading architecture provides participants a portfolio of interfaces: Gateways act as entry points for transactions, public market and reference data are distributed using multicast, additionally a GUI solution is offered.

One general design principle of the interfaces is to minimize the exchanges' effect on the participants. Participants do not need to install exchange hardware or software components. T7 can be accessed without the need for specific hardware, operating system, programming language, and compiler versions, as long as they support the general communication components, like TCP/IP and IP multicast.

The next figure followed by a brief overview describe all interfaces supported by T7:

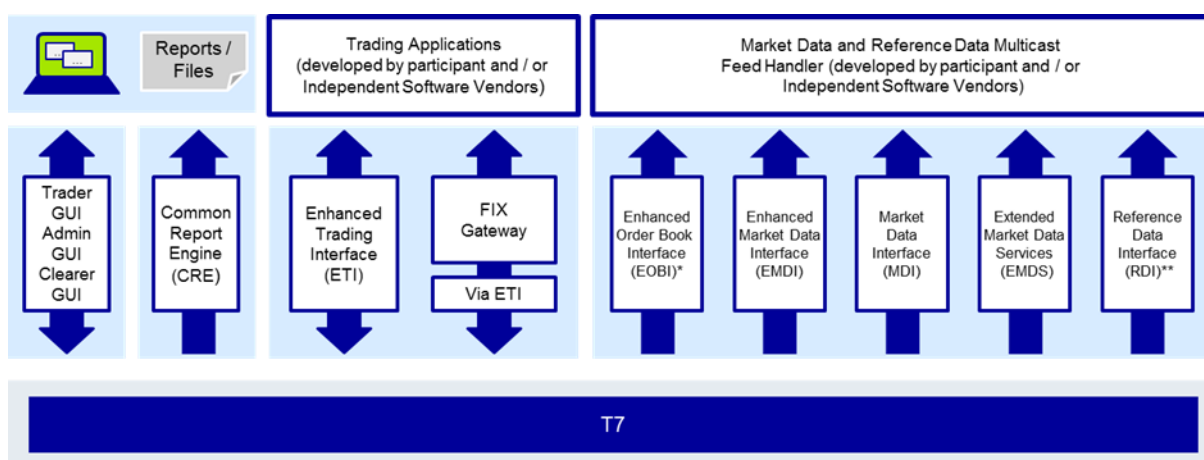


Figure 11: T7 Interface Landscape

* 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

Trading Interfaces:

- **Enhanced Trading Interface (ETI):** ETI is the high performance trading interface designed for Participants who require the highest throughput and the lowest latency. The ETI supports full trading functionality, including market making (quoting), T7 Entry Service and SRQS.
- **FIX Gateway:** The FIX Gateway is intended for Participants who require a standard FIX connection to the exchange. Thereby, both versions 4.2 and 4.4 of FIX protocol can be used for trading. Market making (quoting) functionality is not supported by this interface.

Market Data:

- **Enhanced Order Book Interface (EOBI):** Provides the entire visible order book by distributing public and anonymous information on each individual order and quote in un-netted manner, along with all on-book executions and state information (i.e. *on-book information only*, no off-book data). For the derivatives markets, the EOBI include selected products only while for the cash markets, no selection of products takes place but all instruments are considered.
- **Enhanced Market Data Interface (EMDI):** Provides un-netted price level aggregated market data for *on-book* and *TES trading* using multicast technology.
- **Market Data Interface (MDI):** Provides netted price level aggregated market data using multicast technology.

- **Extended Market Data Service (EMDS):** This interface provides intraday settlement prices, adjusted open interest, trade prices and underlying ticker data for the derivatives markets. For the cash markets, the EMDS include all trade prices as well as underlying data like indices (T7 ticker).

Reference Data:

- **Reference Data Interface (RDI):** This interface provides reference data via high bandwidth connections, including intra-day updates which is for relevant for derivative products only. Intraday updates (created/ deleted complex instruments) are also disseminated via MDI and the incremental channel of EMDI.
- **Reference Data File (RDF):** Reference data is also delivered as a start-of-day file (RDF) including updated intraday files for incrementals.
- **Reference Data via webpage:** Depending on the product if it is a derivative or a cash product, reference data is provided via the internet as well as via the respective member section.

Graphical User Interfaces (GUIs)

- **GUIs (Trader/ Admin/ Clearer):** Graphical user interfaces for basic trading functions (Trader GUI) such as order maintenance , TES and SRQS. Quoting is not supported. The Admin GUI is provided for administration functions, such as for user maintenance, for example. The Clearer GUI is exclusively designed for the cash markets, to manage the back office departments and the clearing risk functions (e.g. clearing member stop button functionality).

Reports

- **Common Report Engine:** Trading reports, audit trail reports, and the reference data file are provided exclusively via the common report engine.

The following table illustrates as a summary which functions are supported by each interface:

	Core Trading ¹	Market Making ²	Info ³	T7 Entry Services ⁸	Selective Request for Quote Service	Market Data	Reference Data	Admin ⁵	Reports	Clearing Member Stop/Release
ETI	✓	✓	✓	✓	✓					
FIX Gateway	✓		Private risk control messages							
MDI						✓ ⁴	New & deleted complex and flexible instruments			
EMDI						✓ ⁴	New & deleted complex and flexible instruments			
EOBI ⁶						✓ ⁷	New & deleted complex instruments			
EMDS						Intraday settlement prices, open interest, underlying ticker data, trade prices, indices				
Trader GUI	✓	Only quote deletion, activation/deactivation, protection maintenance	✓	✓	✓	✓	✓			
Admin GUI		Protection Maintenance						✓		
Clearer GUI			Private Trade Info					✓		✓
RDI							✓			
Common Report Engine							✓		✓	

Table 14: Overview of Interfaces and Functions

¹ Order management, trade confirmations, complex instrument creation, cross request, quote request.

² Quote management, market maker protection.

³ Public news, private risk control messages.

⁴ Public market data, on-book and off-book trade information, product and instrument states, quote and cross requests.

⁵ User maintenance, password maintenance, PIN procedure, trade enrichment rule, stop trading, risk control actions.

⁶ For selected products only.

⁷ Does not provide off-book trade information.

⁸ TES trade management, TES trade approval, TES trade confirmations.

6.1 Trading Interfaces

There are two types of trading interfaces: The Enhanced Trading Interface (ETI) and the FIX Gateway. Both are session oriented interfaces. Participants are requested to order their sessions from the exchange.

Participant applications are connected to the trading system by opening a TCP session to an application gateway.

6.1.1 The Enhanced Trading Interface

The Enhanced Trading Interface (ETI) is the high performance trading interface designed for Participants who require the highest throughput and lowest latency.

A Participant must establish a TCP session to connect to T7. All application messages exchanged between the client and the ETI are close to the FIX V5.0 SP2 semantics, including all officially approved extension packs. A proprietary session layer is used to provide the highest flexibility.

ETI provides all trading functions of T7:

- Order handling for simple and complex instruments.
- Additional support of short order message layouts for simple instruments, which applies streamlined functionality to achieve a comparable latency to quotes.
- Quote handling, including quote inactivation, for simple and complex instruments.
- Execution notifications.
- Market maker protection mechanisms (derivatives only).
- Creation of complex instruments ((strategies), derivatives only).
- Request for quote.
- Cross request.
- TES entry, modification, deletion and approval (derivatives only).

ETI enables Participants to subscribe to private trading data in broadcast form:

- Drop copy of order events other than for lean orders (optional subscription).
- Trade confirmation at a business unit level (optional subscription).

The following trading support information is available for each session:

- News messages from market supervision (optional subscription).
- Private risk control messages (always sent).

ETI does not provide any market data, reference data, or administrative functions.

ETI is a session oriented interface. ETI responds to each request on the same session after the request was submitted. It also sends unsolicited messages when there are changes or executions to any orders and quotes entered on that session.

ETI is based on the following general concepts:

- Trade confirmations are the only legally binding information that a trade has occurred.
- Orders are owned by the user.
- Lean orders can only be modified through the same session, where they had been entered previously.
- Quotes are owned by the session.
- Order and quote responses as well as execution messages do not completely echo the data

of the original order. Hence Participant applications should save the details of each order and quote sent.

- No state recovery (inquiry) is supported; Participant applications must keep track of the order book and use retransmission recovery and the order book replay, which is sent at start-of-day and in case of an exchange system failure (i.e. market reset).
- For quotes and lean orders only the execution notifications and unsolicited events are recoverable.
- For standard (non-lean) orders all order events are recoverable.
- A listener broadcast contains order events for standard (non-lean) orders but not for lean orders (refer to 3.1).

ETI supports two session types: high-frequency (HF) and low-frequency (LF) sessions. Both session types differ in functionality:

- The HF session only supports lean orders. Standard orders are rejected. A HF session does not support the subscription of broadcasts.
- A LF session may also be used for the receipt of broadcasts; for example, listener broadcast or trade notifications at a business unit level/ clearing member level. Orders in a LF session can be persistent or non-persistent, standard (non-lean) or lean, refer to 3.1. TES and SRQS requests are only supported via LF sessions.

In order to protect its trading system, T7 has several measures in place to ensure that its most vital components are not harmed by a malfunctioning client application. In particular, the following technical transaction limits (throttle) are used for the respective combinations of environment, session type and capacity type:

Environment	Session type	Capacity type	Transactions/sec
Production	HF	Full	150
	HF	Light	50
	LF	Full	150
	LF	Light	50
Simulation	HF	Full	20
	HF	Light	20
	LF	Full	20
	LF	Light	20

Table 15: Transaction Limits in Production and Simulation

Additionally, all ETI sessions have an assigned disconnection limit of:

- 450, i.e. in case of more than 450 consecutive rejects due to exceeding the technical transaction limit for sessions with a throttle value of 150 txn/sec.
- 150, i.e. in case of more than 150 consecutive rejects due to exceeding the technical transaction limit for sessions with a throttle value of 50 txn/sec.

For both limits all technical transactions are counted using a sliding window.

Dedicated back-office ETI LF sessions are available to receive trade and listener broadcasts. This session type cannot be used to enter order/ quotes.

Please refer to the “T7 Enhanced Trading Interface Manual” for further details.

6.1.2 The FIX Gateway

The FIX Gateway is intended for Participants that require a standard FIX connection to the exchange. The FIX Gateway will support two types of FIX sessions; Trading and Back-Office FIX Sessions. The interface is a point-to-point service based on the technology and industry standards TCP/IP, FIX and FIX Session Protocol. The session and application event models and messages are based on version 4.2 and 4.4 of the FIX Protocol.

The FIX Gateway supports the following features of T7 via FIX trading sessions:

- Order handling for simple and complex instruments.
- Execution notifications are sent to the session where the order is submitted.
- Request for quote.
- Cross request.
- Enhanced support for mass deletion events (market reset, risk control events).
- Creation of complex instruments ((strategy), derivatives only).
- Simplified handling of orders for multi-leg instruments due to enhanced security identification (derivatives only).
- Private risk control messages

Each FIX session has a technical transaction limit of 50 transactions per second.

Dedicated back-office FIX sessions are available to receive trade confirmations and drop copies of standard orders at a business unit level. The FIX Gateway does not provide quote functionality, market data, reference data, or administrative functions. Please refer to the “FIX Gateway Manual” for further details.

6.2 The Market Data Interfaces

Public market data is available using multicast interfaces:

- Enhanced Order Book Interface (EOBI) provides the entire visible order book by publishing information on each individual order and quote, along with executions and state information. It is the most granular source of *on-book* market data, i.e. no off-book (TES) information. The EOBI requires a 10GB connection and is available in co-location installations only. For the derivatives markets, the EOBI include selected products only and comparing to the cash markets, no selection of products takes place but all instruments are considered.
- Enhanced Market Data Interface (EMDI) offers un-netted market data and TES trade data (i.e. *on-book* and *off-book* data) and requires a high bandwidth connection.
- Market Data Interface (MDI) offers netted market data, with fewer order book and trade updates, requiring a lower bandwidth connection.

All data feeds are distributed over a number of IP multicast addresses which is available via RDI/ RDF.

6.2.1 Market Data Interface (MDI) and Enhanced Market Data Interface (EMDI)

The EMDI and MDI feeds follow FIX 5.0 SP2 semantics and are FAST encoded. EMDI uses out-of-band recovery, while MDI uses in-band recovery.

The following information is provided:

- Netted (MDI) and Un-Netted (EMDI) price level aggregated market data Less price levels are provided on the MDI feed, which can be different to the number provided on the current trading system.
- Product state and instrument state information.
- On-book and TES trade information (EMDI: individual trade information, MDI: trade statistics only such as high, low, last etc.)
- Quote requests and cross requests.
- Description of complex instruments created intra-day.
- The Market Data Interface consists of incremental messages (event driven) and snapshots (periodic generated) which will be delivered via one channel (in-band).

Please refer to the “Market and Reference Data Interfaces Manual”, which contains further details on the interface.

6.2.2 Enhanced Order Book Interface

EOBI is available for a selected product group. The EOBI feed is distributed in the form of fixed length binary messages, without any compression, and uses out-of-band recovery. 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 on-book trade.
- Product state and Instrument state information
- Quote requests and cross requests
- Intra-day changes with regard to complex instruments.

The required reference data information is available via the Reference Data Interface (RDI) feed and the Reference Data Files (RDF). Please refer to the “Enhanced Order Book Interface Manual”, which contains further details.

6.2.3 Extended Market Data Service

Participants and CEF ultra+ clients can receive via multicast the following:

- Intraday settlement prices (derivatives only).
- Open interest information (derivatives only).
- Underlying ticker data (derivatives only).
- Trades prices.
- Indices (cash products only).

6.3 Reference Data

The following public reference data is provided to Participants:

- Product information.
- Instrument information (simple and complex instruments).
- Settlement prices and open interest from previous day (derivatives only).

Information is provided for published and active, but not for delisted products/ instruments.

Please refer to the “Market and Reference Data Interfaces Manual”, which contains further details on the interface.

6.3.1 Reference Data Interface (RDI)

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 information as of the beginning of the day and as incremental messages for intra-day updates (created/ deleted complex instruments). For intra-day recovery purposes the snapshots are repeated during the day. It uses the same technical means as the market data interfaces.

6.3.2 Reference Data File (RDF)

Reference Data Files (RDF) are provided at the beginning of the day with the full set of products and instruments. Additional Reference Data Files with updates are provided at fixed intervals during the exchange trading day, containing intra-day created/ deleted complex instruments (derivatives markets only). The files are available on the common report engine.

6.3.3 Reference Data in the market data interfaces

All information about intra-day created complex instruments is also provided in the EMDI, MDI and EOBI (derivatives market only).

6.4 Graphical User Interfaces

The Graphical User Interfaces (GUIs) provide exchange Participants with trading, market data and administrative and clearing related functions. The GUIs are started from a standard web browser with java web start.

The GUIs are based on web technology; there is no need to install software kits provided by the exchange. The GUIs can be accessed by standard leased lines or via the internet. For authentication, user/ password methods, and client certificate (only for internet access) technologies are used.

The Trader GUI provides access to the following functions for products and instruments traded on T7:

- Market overview and depth for simple and complex instruments.
- Display of theoretical prices (derivatives only).
- Maintenance of standard (non-lean) orders.
- View of standard (non-lean) orders of the business unit.
- Execution information for on-book trading of the business unit.
- Display of underlying ticker (derivatives only).

- Creation of complex instruments (derivatives only).
- Request for quote.
- Cross requests.
- The setting of market maker protection parameters (derivatives only).
- Quote deletion and activation/ deactivation.
- Emergency risk control functions (panic cancel and stop/ release button).
- Private risk control messages.
- General messages from market supervision.
- T7 Entry Services.

Entry or query of Quotes or lean orders is not supported.

The Admin GUI contains the following functions:

- Administrative functions, such as creation of users, assignment of entitlements and transaction size limits.
- Trade enrichment rules setting
- Emergency risk control functions (panic cancel and stop/release button).

The Clearer GUI is designed for the cash markets only and contains following functions:

- Administrative functions for clearing
- Display of trades of related trading participants
- Clearing stop member functionality with deletion of orders/ quotes of halted participant

For more information on the GUIs please refer to the “Trader, Clearer and Admin GUI - Manual”.

6.5 Reports

Trading reports, audit trail reports, and reference data files are provided via the Common Report Engine, where they can be retrieved by Participants. Please note that the reports do not match in the layout for derivatives and cash products.

For details, please refer to the “Common Report Engine (CRE), User Guide”.

7 Change log

No	Chapter, page	Date	Change
V.6.0.1	<ul style="list-style-type: none"> • All 	22-September-2017	<ul style="list-style-type: none"> • Document has been split into two documents. The T7 Cross System Traceability part is a separate document • Added information on the new Selected Request for Quote Service • New order type (Volume Discover Order) and new order restriction (BEST Execution) added. • Description for BEST Quote functionality included • Added the new regulatory relevant market conditions • Updated the section Safeguards for Participants • Updated the TES Profiles section
V.6.0.2	<ul style="list-style-type: none"> • Chapter 3, page 22 • Chapter 4 onwards 	15- November-2017	<ul style="list-style-type: none"> • Updated the table 12 and 13 in Chapter 3 • Chapter 4 has been split into Chapter 4 TES (Off-book) Functionality and Chapter 5 Selective Request for Quote Service.