T7 Release 5.0

T7 Functional and Interface Overview

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Content

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
- Trade traceability within clearing and settlement.

1.2 Further reading

The following documents provide additional information:

Overview and Functionality	Interfaces
• T7 Release 5.0 (Release Notes for Xetra and Eurex) • T7 Functional Reference • Participant and User Maintenance Manual • Market Model Xetra	• 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	
• Common Report Engine (CRE), User Guide	

Table 1: Further Reading T7 Release 5.0

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 5.0.
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 Counterpart
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 T7 Entry Service
On-book	Refers to on-exchange trading
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
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:
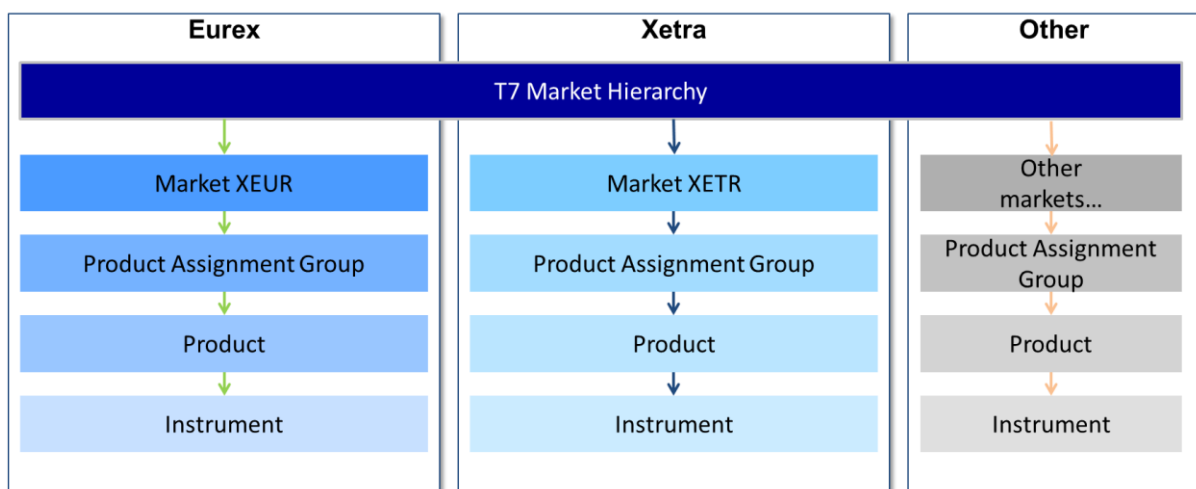
Figure 1: T7 Market Hierarchy

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.

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	➢ Represents the time in the morning before activity begins. ➢ Participants have no functional access to the trading system.
Pre-Trading	➢ Represents the phase before trading starts providing traders the possibility to prepare themselves for trading in terms of order maintenance (without execution).
Trading	➢ 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	➢ 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	➢ 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	➢ 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	➢ 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	➢ 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.
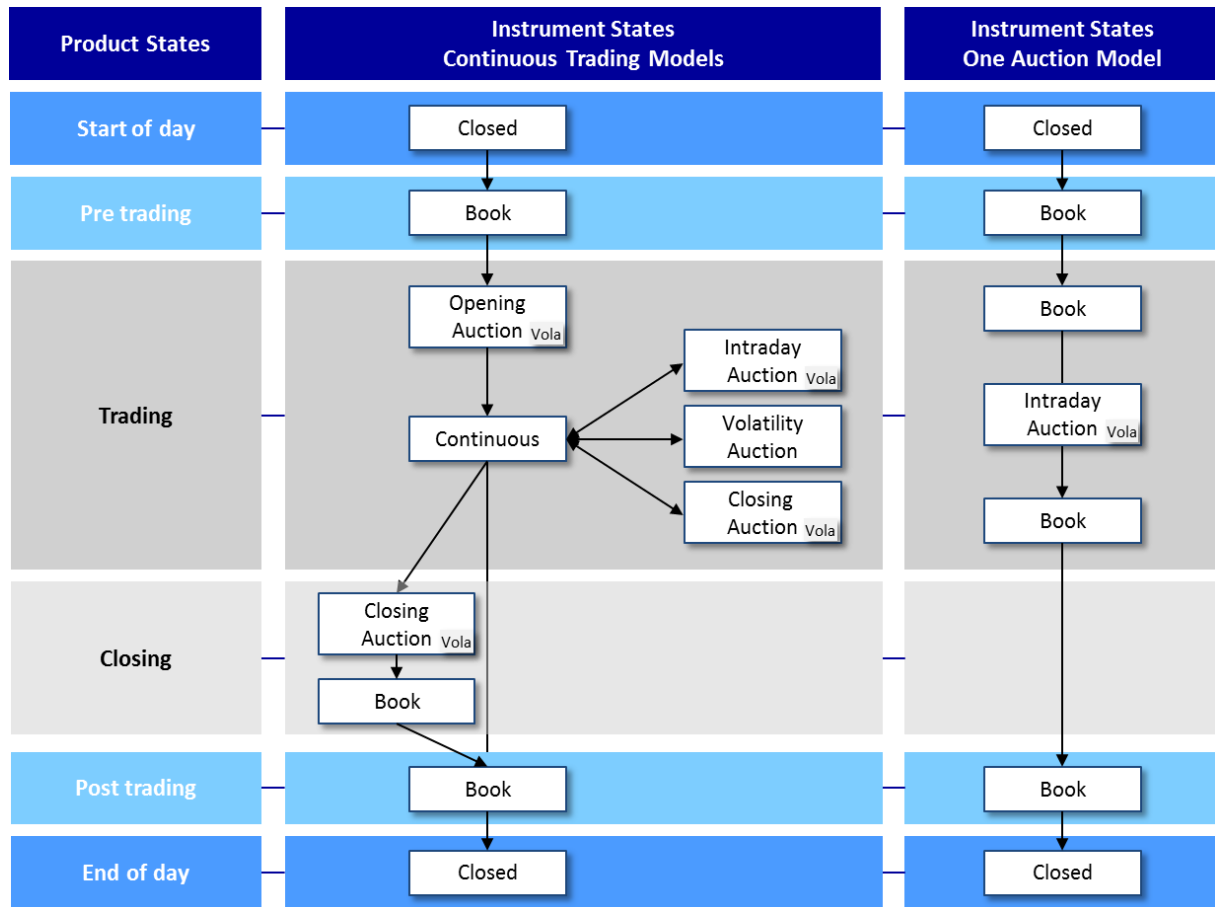
Figure 3: Typical Product and Instrument States

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 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	Ended
End of Day	OFF

Figure 4: TES Activity Status

2.3.5   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 (*Intra-day Expiry*) 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.
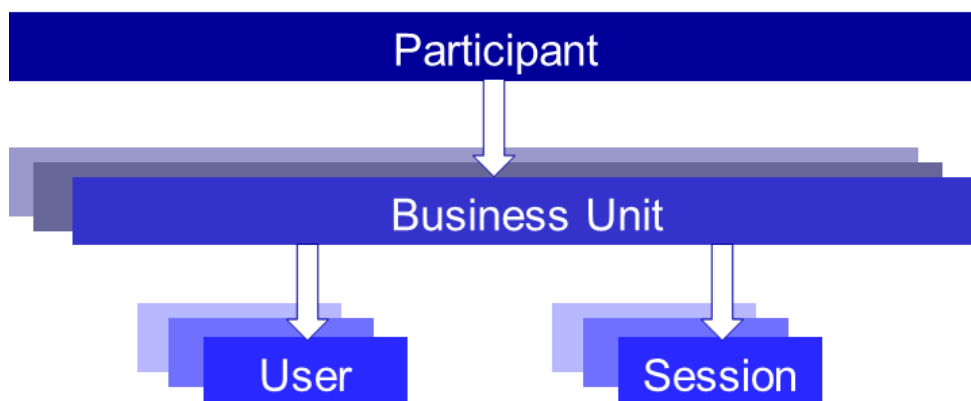
Figure 5: Participant hierarchy in T7

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 also they can make use of the Clearing Member Stop functionality. The clearing member has to apply for this stop functionality specifically.

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**" can enter/ modify/ delete own orders and in addition he is allowed to modify and delete orders of the traders in the same trader group. Entry on behalf is not possible.

- A "**Supervisor**" can enter/ modify/ delete own orders and in addition he is permitted to modify and delete the orders of the traders in the same business unit. Entry on behalf is not possible.

Applying the user levels to off-book trading, there is a minor difference to on-book trading. Head traders and supervisors are not allowed to modify but to delete or approve pending TES trades. 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 participant 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:
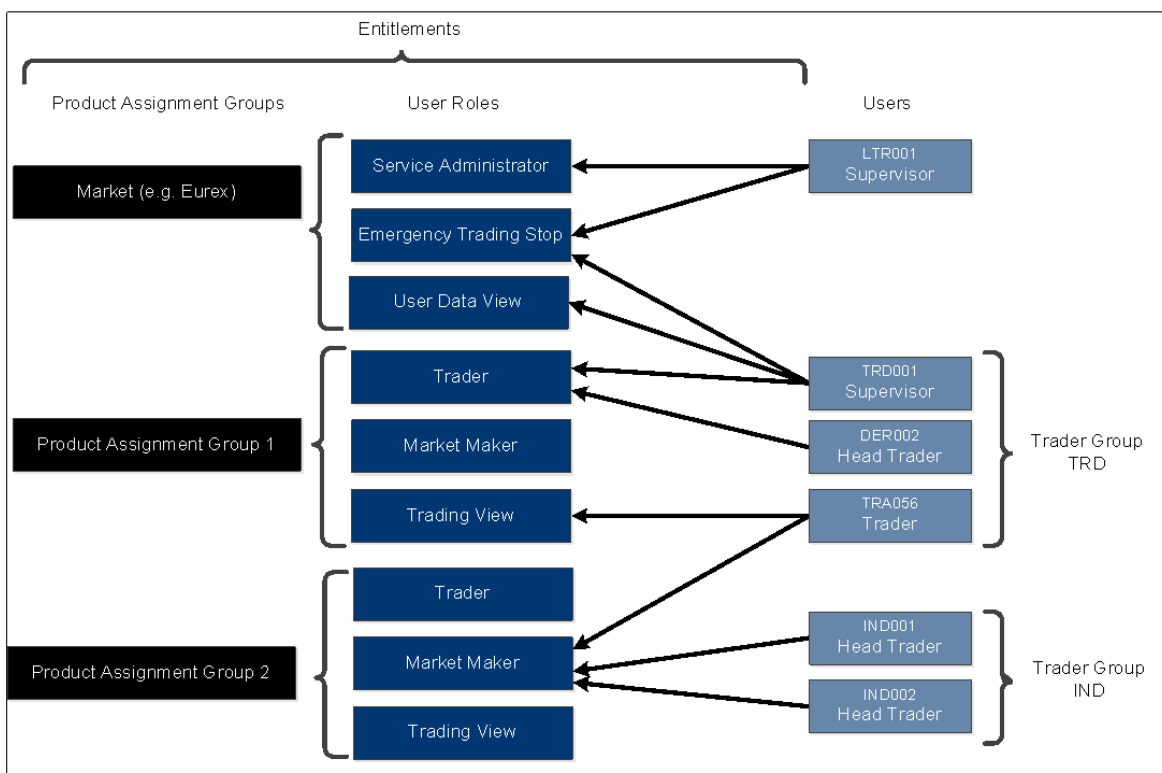
Figure 6: User Entitlement Overview

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 T7[1]:

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 participant in case of emergency. All open orders/ quotes and TES trades not approved finally are deleted. Further (TES) trading is prevented.
Clearing Member Stop (cash markets only)		x	x		Allows a user of a clearing member to stop one or many of his related trading participants.
CM Backoffice View (cash markets only)		x	x		Allows inquiring of trades of his related trading participants.
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.

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[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**	
Pre-trade Limits View (derivatives markets only)	x		x		Enabling to view all pre-trade limits without update capability.
TES Trading[3]					
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.
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.
TES View (derivatives markets only)	x			x	Allows viewing TES trades.

Table 9: Overview of Roles Functionality

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[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.

Persistent Orders
Persistent orders *are re-instated* on the next business day depending on the validity or in case of a technical failure.

Standard Orders
The complete order history can be *recovered* via retransmission requests. This order data is *visible* to all low-frequency sessions belonging to the same business unit. Standard orders can be *persistent* or *non-persistent*.

Non-persistent Orders
Non-persistent orders are *deleted* by the end of a business day, in case of session loss, market resets and trading interrupts (volatility interrupts (derivatives only), state changes to halt).

Lean Orders
For Lean orders, only the *execution notifications* and *unsolicited* events can be *recovered*. Lean orders are always *non-persistent* and *visible* only to the session that submitted the order.

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 öf 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.
Trailing Stop Order ((TSO), 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	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.

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.

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 section 6.

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
Product State Holiday	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 5.1.1. 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.

3.3 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 (maximum order quantity) which enable the Participant to restrict the quantity at order and quote entry (derivatives markets only).
- Maximum Order Value determining the maximum value of an order that a trader is allowed to enter (cash markets only).
- 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).
- Manual stop of trading which can be applied to the whole Participant, on a business unit, or on an individual trader. Manual stop may be performed by an exchange Participant, by a clearing member or by the clearing house.
- 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 section 6 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 section 6 for further information.

4 TES (Off-book) Functionality

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.

- Price Validation Rule – The rule used for price validation of TES trades in accordance to "Conditions for Utilization of the T7 Entry Services".

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):

TES Profile								
Key			Attributes					
Product	Instrument Type	TES Type	Broker Allowed	Max Participants	Minimum Price Step	Minimum Lot Size	Non-disclosure Limit	Price Validation Rule
FDAX	Simple	Block	FALSE	2	0.5	250	999999	FUTURE SIMPLE INSTRUMENT
FDAX	Flexible	Block	FALSE	2	0.5	250	1	FUTURE SIMPLE INSTRUMENT
FDAX	Simple	Vola	FALSE	2	0.5	1	999999	FUTURE SIMPLE INSTRUMENT
FDAX	Simple	EFP_Idx	FALSE	2	0.5	1	999999	FUTURE SIMPLE INSTRUMENT
FDAX	Calendar Spread	Block	FALSE	2	0.5	250	999999	FUTURES SPREAD
OGBL	Simple	Block	TRUE	30	0.005	100	999999	OPTION SIMPLE INSTRUMENT
OGBL	Flexible	Block	FALSE	2	0.005	100	1	OPTION SIMPLE INSTRUMENT
OGBL	Standard Strategy	Block	FALSE	2	0.005	100	999999	STANDARD OPTION STRATEGY
OGBL	Volatility Strategy	Block	FALSE	2	0.005	100	999999	OPTION VOLATILITY STRATEGY
OGBL	Non-standard Strategy	Block	FALSE	2	0.005	100	999999	NON STANDARD OPTION STRATEGY

Table 14: TES Profile

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 the Eurex Clearing's C7. All clearing and settlement functions are performed there.

5   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:
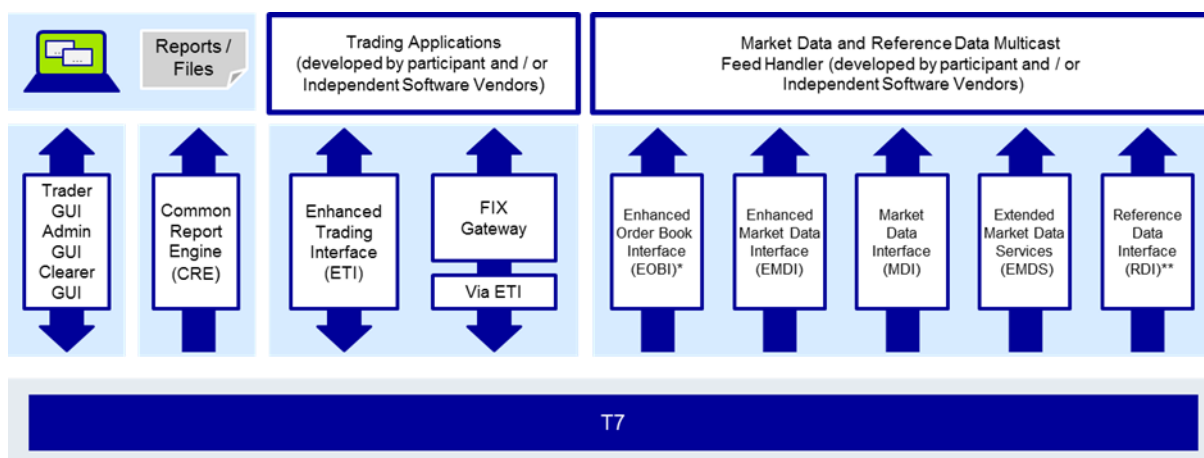
Figure 8: T7 Interface Landscape   * Available in co-locations only
                                          ** In addition to the multicast based solution there will also be a file based solution for reference
                                             data via the Common Report Engine (CRE) and an internet download

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) and T7 Entry Service.

- **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 TES trading 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 and TES. 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]	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 15: 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.

5.1 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.

5.1.1 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 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 16: 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.

5.1.2   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.

5.2   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.

5.2.1 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.

5.2.2 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.

5.2.3 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).

5.3 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.

5.3.1 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.

5.3.2 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.

5.3.3 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).

5.4 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".

5.5 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".

6 Appendix

This appendix contains detailed information on order, quote and trade traceability as well as clearing fields used by the clearing systems.

6.1 Trade Concepts

This appendix describes the on-book matching and trade concepts in T7 for simple and complex instruments, including Match Event, Match Step, Execution, Trade, and Trade Item.

6.1.1 Direct Simple Instrument Match

The following diagram illustrates the concepts describing a direct simple instrument match in T7. A direct match occurs when an incoming order matches against an order on the opposite side of the same order book (it does not match with synthetic orders derived from other order books).

When an incoming order is executed, a Match Event is generated, representing the entire execution. Every price level executed in the match event is called a Match Step, and is assigned a unique Match Step ID.

A Match Step is the total aggregated quantity executed at one price level in a Match Event. For example, Match Step 01 containing a traded volume of 80 at price 17 is generated when incoming Order 4 (Sell 100@16) matches with Orders 2 (Buy 50@17) and 3 (Buy 30@17) in the order book. A second Match Step 02 containing a traded volume of 20 at price 16 is generated when the remaining quantity of Order 4 matches with Order 1 (Buy 20@16). All Match Steps are published in the Public Trade Volume messages.

Each Match Step is broken down into Order Executions, wherein one execution is generated for every order executed at every price level. For example:

- Order Execution 01, Trader A buys 50 @ 17 (Order 2)
- Order Execution 02, Trader B buys 30 @ 17 (Order 3)
- Order Execution 03, Trader D sells 80 @17 (Order 4)
- Order Execution 04, Trader C buys 20 @ 16 (Order 1)
- Order Execution 05, Trader D sells 20 @ 16 (Order 4)

Order Event messages are sent to the trader for every one of their orders involved in a Match Event, including all its executions. One Order Event message is generated per order, for example, one Order Event to Trader D containing both executions of Order 4.

Based on Match Steps, Trades are then generated and assigned unique Trade IDs. T7 distinguishes thereby between two different trade processing methods, which can be set for each instrument separately:

- Price level aggregated trades
  Trades are aggregates of the quantity traded at each price level. For direct simple instrument matches, there is a one-to-one correspondence between Trades and Match Steps (this is not true for complex instrument matches, refer to sections 6.1.2 and 6.1.3)
  Each Trade is broken down into Trade Items with unique Trade Item IDs, wherein one Trade Item is generated for every order executed at every price level. Note that for simple instruments, Trade Item IDs will be equal to the Order Execution IDs. A Trade Confirmation is

then provided for every Trade Item to each Participant involved in a trade.

- Trades based on single executions
  Trade confirmations are generated on the basis of bipartite trades. Each trade contains bilateral trade sides, i.e. the same quantity of the buy and sell side. Contrary to the first rule described above, this procedure can lead to multiple order executions within the same Match Step.

Currently, the first procedure, i.e. the price level aggregated trades procedure is applied to all instruments in the derivatives as well as in the cash markets with except of the partner exchange Vienna. For these instruments traded in the market Vienna, the trades confirmations are generated based on single executions.

Figure 9: Example for Price Level Aggregated Trades

Traders (note that public view is aggregated by price, not by order)

Order Book
2 A 50 @ 17
3 B 30 @ 17
1 C 20 @ 16

Order IDs

Order from D to sell 100 @ 16 (Client order ID=99)

Trader D

Order Response (order ID=4)

Order Book view

Match Event

Match Step 01
(Match Step ID)
Order Book
Allocation:
B80 @ 17
S80 @ 17

Order Executions

Buy	Sell
50@17 Order 2, Order Exec ID=01	80@17 Order 4, Order Exec ID=03
30@17 Order 3, Order Exec ID=02	

Public Trade Volume Report

One message per instrument
Match Step IDs 01,02

Match Step 02
Order Book Allocation
B20 @ 16
S20 @ 16

Order Executions

Buy	Sell
20@16 Order 1, Order Exec ID=04	20@16 Order 4, Order Exec ID=05

Public Trade Volume Report

Conceptual representation only.
Traders belong to Business Units to
Which Order Events are sent

Order Event (order 2)   Trader A

Order Event (order 3)   Trader B

Order Event (order 4)   Trader D

Match Step ID=01
Order Execution IDs=03, 05
Order ID=4, Client Order ID=99

Order Event (order 1)   Trader C

One order event
message per order

Trade view

Clearing system

NCM Trader A   Trade Info

Match Step 01

Trade 01
(Trade ID)

B80 @ 17
S80 @ 17

NCM Trader B   Trade Info

NCM Trader D   Trade Info

NCM Trader D   Trade Info

Trade Items

Bought	Sold
50@17 Order 2, Trade Item ID=01	50@17 Order 4, Trade Item ID=03
30@17 Order 3, Trade Item ID=02	30@17 Order 4, Trade Item ID=04

Trade Confirmation (order 2)   Trader A

Trade Confirmation (order 3)   Trader B

Trade Confirmation (order 4)   Trader D

Trade Confirmation (order 4)   Trader D

Match Step ID=01   Match Step ID=01
Trade ID=01   Trade ID = 2
Trade Item ID = 03   Trade Item ID = 03
Order ID=4, Client Order ID=99   Order ID=4, Client Order ID=99

Match Step 02

Trade 01

B20 @ 16
S20 @ 16

NCM Trader C   Trade Info

NCM Trader D   Trade Info

Trade Items

Bought	Sold
20@16 Order 1, Trade Item ID=06	
	20@16 Order 4, Trade Item ID=05

Trade Confirmation (order 1)   Trader C

Trade Confirmation (order 4)   Trader D

Match Step ID=02
Trade ID=03
Trade Item ID = 05
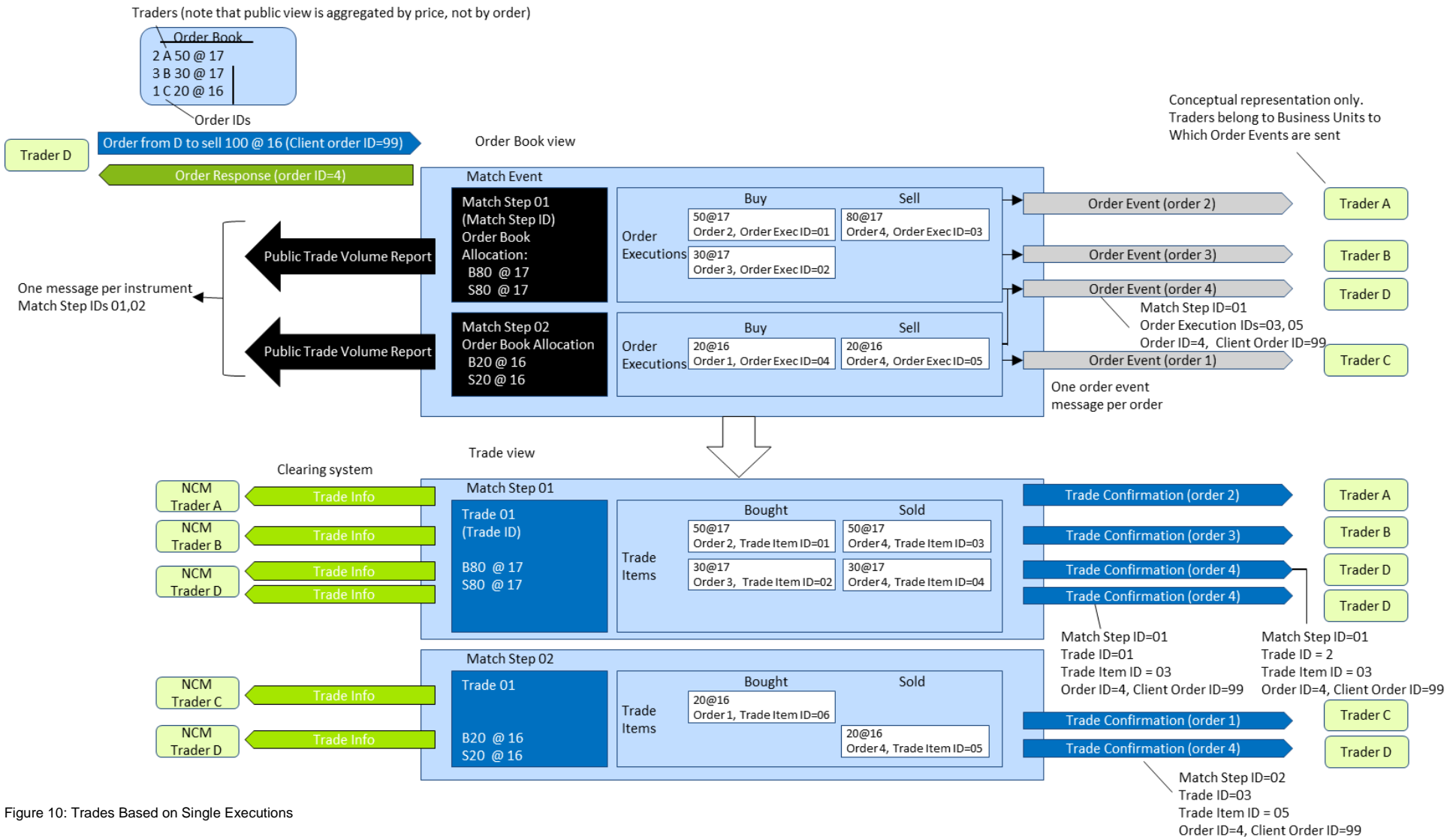Order ID=4, Client Order ID=99

Figure 10: Trades Based on Single Executions

6.1.2   Direct Complex Instrument Match

A direct complex instrument match occurs when an incoming complex order matches against an order on the opposite side of the same complex order book.

When the incoming order is executed, a Match Event is generated for the complex instrument, representing the entire execution, and Match Steps are generated for each executed price level.

Each Match Step is broken down into Order Executions, wherein one execution is generated for every order executed at every price level in the complex instrument. In addition to an Order Execution ID, an Order Leg Execution ID is provided for each leg of the complex instrument match.

Order Event messages are sent to the trader for every order involved in the Match Event, including all its executions.

The trades are generated in the corresponding simple instrument legs of the combination only (not for the complex instrument). For an example, refer to the diagram in section 6.1.3. In Match Step 01, the incoming Order 5 executes with Order 1 in the complex instrument AB order book. Trades are then generated in the simple instrument legs A and B (Trade 01 and 02) – no trades are generated for complex instrument AB.

Each Trade is broken down into Trade Items with unique Trade Item IDs, wherein one Trade Item is generated for every order executed at every price level in every simple instrument leg. Trade Confirmations are provided for every Trade Item to every Participant involved in a trade.

6.1.3   Synthetic Match

The following diagram illustrates the concepts of a synthetic match in T7. Match Step 02 is a Synthetic Match, where complex Order 5 entered into complex instrument AB matches with a combination of orders in the simple instrument legs A and B (Orders 2, 3 and 4).

When an incoming complex order is executed, a Match Event is generated, representing the entire execution. The Match Event includes all instruments (simple and complex) that participated in the match.

Every price level executed in the match event is assigned a unique Match Step ID. If the Match Step includes synthetic matches, then all executions in the simple instrument legs belong to the same Match Step ID. All Match Steps are published in Public Trade Volume messages.

Each Match Step is broken down into executions, wherein one execution is generated for every order executed at every price level in each instrument (either in a complex or in a simple instrument). In addition to an Order Execution ID, an Order Leg Execution ID is provided for each leg of a complex instrument match. An Order Event with the executions is generated per order.

Trades are then generated in the simple instruments only (not complex instruments) and are assigned unique Trade IDs. In Match Step 02, the incoming Order 5 entered into complex instrument AB, executes with Orders 2, 3 and 4 in the simple instrument legs A and B. Trades are generated in the simple instrument legs A and B only (Trade IDs 03 and 04) – no trades are generated for complex instrument AB.

Each Trade is broken down into Trade Items with unique Trade Item IDs, wherein one Trade Item is generated for every order executed at every price level in every simple instrument leg. Trade Confirmations are provided for every Trade Item to every Participant involved in a trade.
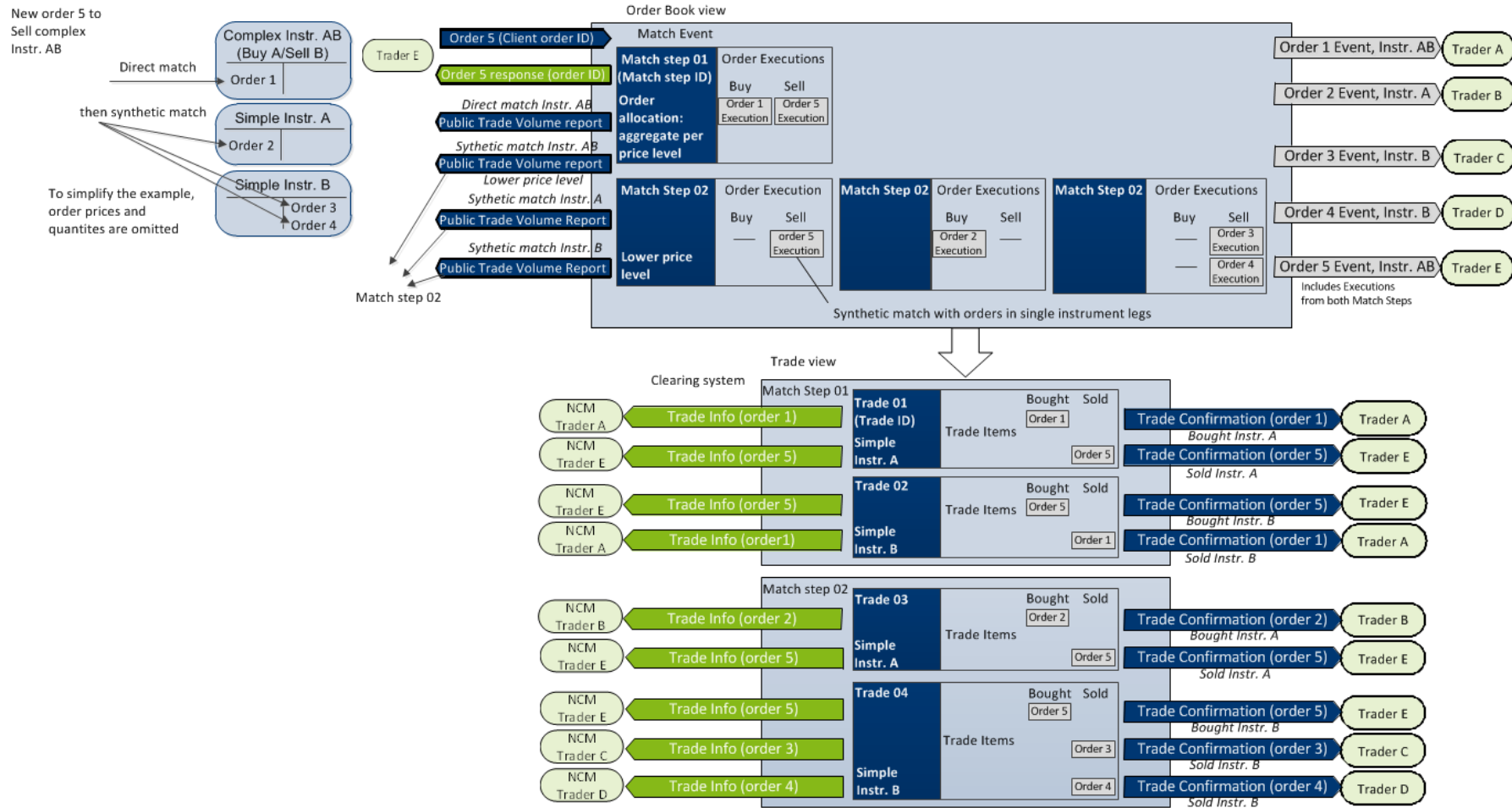
Figure 11: Example Synthetic Match

6.2 Traceability with the Eurex Clearing Classic System

This appendix describes how to reference order, quote and trade messages using the identifiers supported by T7 and how they can be linked to the trade messages from the Eurex Clearing classic system, applicable to all EEX on-book and EEX TES trades.

6.2.1 Order Traceability

The following diagram shows the key identifiers available in the system and how Participants can use them to cross reference the various response messages.

The primary identifier for each message type is shown in bold. Each identifier is assigned a unique color, and aligned vertically in the diagram, making it easy to quickly see the traceability across the messages. The interface field name is specified underneath in parentheses.

On every order, Participants provide a Client Order ID (optional for ETI) and up to three free text fields for their own reference purposes. The system will return these fields on its responses where shown in the diagram. The Client Order ID is checked to be unique among live orders for the same instrument and session.

Each new order received is assigned an Order ID by the exchange, which is unique within a product, and is returned to the Participant on all private messages.

For every match event, T7 assigns identifiers, unique within product and business day, to each aggregated price level (Match Step ID), every order execution (Order Execution ID) and every trade (Trade ID). For the matching of a complex order, in addition to the Order Execution ID, an Order Leg Execution ID is provided for each leg of the complex instrument match. The Trade Item ID is the same as the Order Execution ID/ Order Leg Execution ID.

The Eurex Clearing classic system assigns new (clearing) Trade IDs and (clearing) Order IDs, and provides Participants with the original identifiers (Trading Trade ID, Trade Item ID and Trading Order ID), so there is backwards traceability.

Technical Notes:

- The Order ID generated by T7 and used on all electronic interfaces is a 64-bit unsigned integer (e.g. 100000). On the GUI and on the trading reports it is shown as a (up-to) 20 digit decimal and 12 character hexatridecimal (base 36) representation (e.g. 255S). In the interfaces from the Eurex Clearing classic system the Order ID is shown as decimal number in the field "OrderID2". Please note that the Eurex Clearing classic system assigns an additional clearing system specific Order ID which is shown as a hexatridecimal number in field "OrderID".
- The Client Order ID is provided in the FIXML interface from the Eurex Clearing classic system same as it was entered in the order.
- The Client Order ID of an order entered via the Eurex ETI is contained in the execution confirmation received in the FIX GW. For an order entered via the FIX GW, the Client Order ID returned in the trade confirmation is not the Client Order ID entered with the order, rather an ID used by the FIX GW to communicate via the ETI with T7.
- The Client Order ID is not provided in the drop copy of the FIX GW back office session. Mapping can be achieved using the Order ID.

Participant

ORDER (ETI / FIX)

Client Order id (ETI/FIX: ClOrdID)	Client Free Text

Refer to section 5.5.3   Reports: TE540, TE550)

T7

ORDER RESPONSE (ETI / FIX)

Client Order id (FIXML: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)

Report: TE540   FIX only

Legend

Trade Item ID (ETI/FIX: SideTradeID)

Functional name
Interface name

ORDER EVENT (ETI / FIX)

And Order Leg Execution ID for complex instruments

Client Order id (ETI/FIX: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)	Order Execution ID (ETI/FIX: FillExecID)	Match Step ID (ETI/FIX: FillMatchID)

Report: TE540   FIX and ETI listening sessions only   And ETI/FIX: LegExecID for complex instruments

PUBLIC MARKET DATA(EOBI/EMDI)

	Match Step ID (EOBI: TrdMatchID) (EMDI: MDEntryID)

Report: TE910

Contains QuoteID for traded quotes

TRADE CONFIRMATIONM (ETI/FIX)

Client Order id (ETI/FIX: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)	Trade Item ID (ETI/FIX: SideTradeID)	Match Step ID (ETI/FIX: TrdMatchID)	Trade ID (ETI/FIX: TradeID)

Refer to Technical Note

Eurex Clearing Classic System

TRADE INFORMATION

Client Order id (FIXML: ClOrdID)	Client Free Text	Trading Order ID (FIXML: SecondaryOrderID)	Trade Item ID (FIXML: SideTradeID)		Trading Trade ID (FIXML: TrdMatchID)	Clearing Trade ID (FIXML: TradeRptID)	Clearing Order ID (FIXML: OrderID)

Reports: CB010, TC810 + others   Reports: CB010, TC810 + others   Reports: CB010, TC810 + others   Reports: TC810 + others
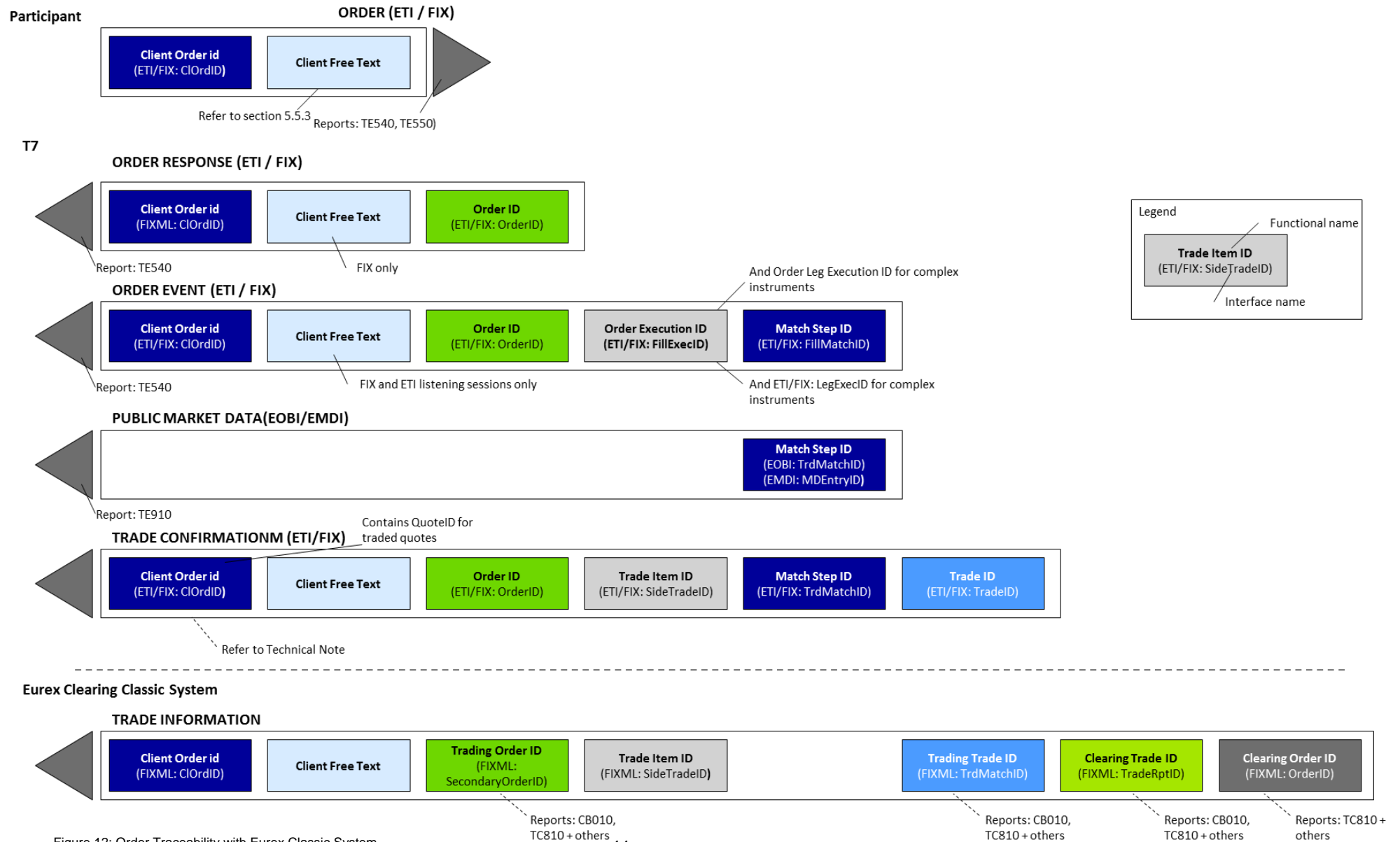
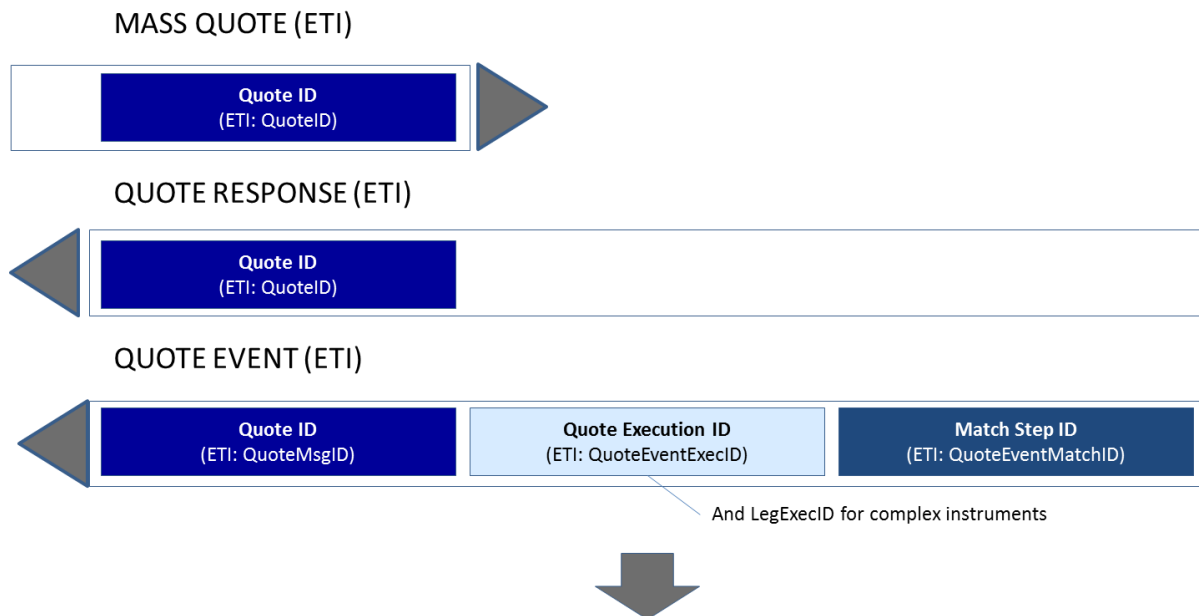Figure 12: Order Traceability with Eurex Classic System

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6.2.2 Quote Traceability

The following diagram shows the key identifiers available for quotes and how Participants can use them to cross reference the various response messages.

T7 supports quotes via the ETI Interface only. One or more quotes can be entered in a Mass Quote, for which Participants provide a Quote ID for the entire Mass Quote (i.e. not per individual quote). This Quote ID is returned on the Quote Response as well as any Quote Events for executed quotes. Quote IDs are not checked for uniqueness.

For every match event, the system assigns identifiers, unique within product and business day, to each aggregated price level (Match Step ID) and every execution (Quote Execution ID). Quote Leg Execution IDs are also provided for executions occurring in complex instruments.

Subsequent Public Trade Volume, Trade Confirmations, and Trade Information are provided using the same messages as with orders, refer to section 6.2.1.

MASS QUOTE (ETI)

Quote ID
(ETI: QuoteID)

QUOTE RESPONSE (ETI)

Quote ID
(ETI: QuoteID)

QUOTE EVENT (ETI)

| Quote ID (ETI: QuoteMsgID) | Quote Execution ID (ETI: QuoteEventExecID) | Match Step ID (ETI: QuoteEventMatchID) |

And LegExecID for complex instruments

Refer to section Order Traceability diagram for Public Trade Volume, Trade Confirmation and Trade Information

Figure 13: Quote Traceability Eurex Classic System

6.2.3 Trade Reversal

When a trade is reversed, T7 sends Participants a Trade Reversal message containing a new Trade ID. For traceability, the original Trade ID is also provided.
The Eurex Clearing classic system will then calculate a new Clearing Trade ID, and provide Participants with Trade Information including a reference back to the new Trade ID.
The following diagram shows how to trace the trade identifiers in the case of a reversal.
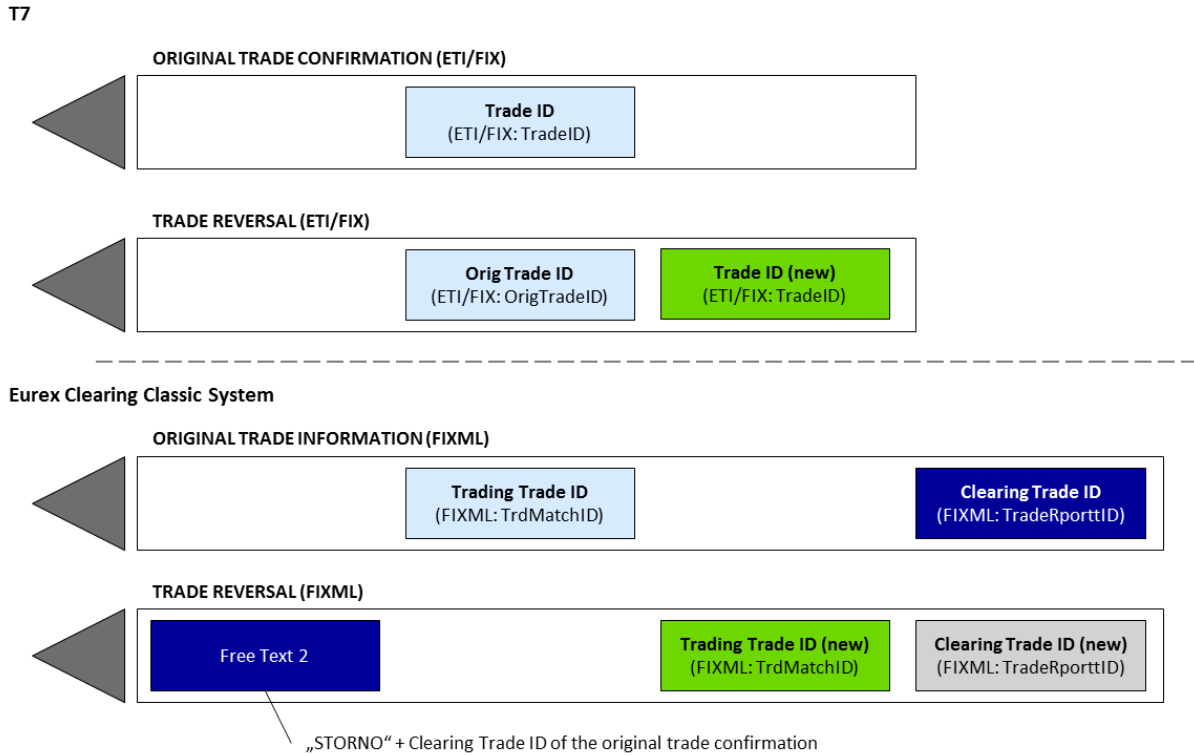
T7

ORIGINAL TRADE CONFIRMATION (ETI/FIX)

Trade ID
(ETI/FIX: TradeID)

TRADE REVERSAL (ETI/FIX)

Orig Trade ID
(ETI/FIX: OrigTradeID)

Trade ID (new)
(ETI/FIX: TradeID)

Eurex Clearing Classic System

ORIGINAL TRADE INFORMATION (FIXML)

Trading Trade ID
(FIXML: TrdMatchID)

Clearing Trade ID
(FIXML: TradeRporttID)

TRADE REVERSAL (FIXML)

Free Text 2

Trading Trade ID (new)
(FIXML: TrdMatchID)

Clearing Trade ID (new)
(FIXML: TradeRporttID)

„STORNO" + Clearing Trade ID of the original trade confirmation

Figure 14: Trade Reversal with Eurex Classic System
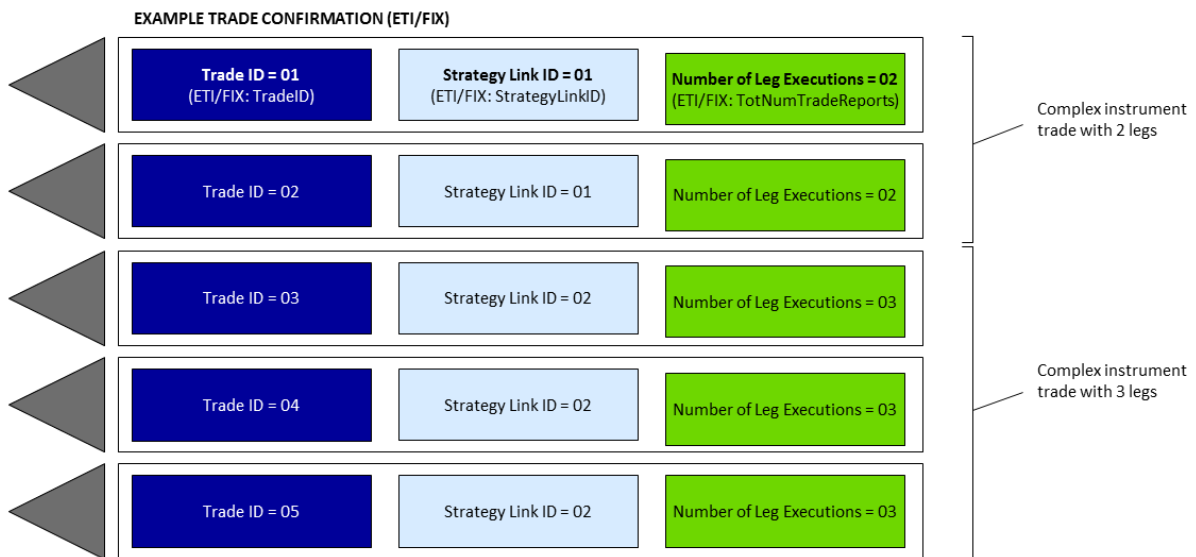
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6.2.4   Complex Instrument Trades

When a trade occurs in a complex instrument, trade confirmations are generated in the corresponding simple instrument legs only (not for the complex instrument). As a result, multiple trade confirmations are sent for one order at a single price level. When this occurs, T7 provides two additional fields, enabling Participants to easily identify and summarize leg trade confirmations that belong to the same complex instrument match:

- A Strategy Link ID to trace all legs of the complex instrument that are matched in one match step (price level).
- The Number of Leg Executions to convey how many trade confirmations were generated for an order in the complex instrument match step.

These fields are also provided with the clearing information published by the Eurex Clearing classic system.

The following diagram is an example of trade confirmations sent to a Participant resulting from two complex instrument matches, one with 2 legs, and one with 3 legs.
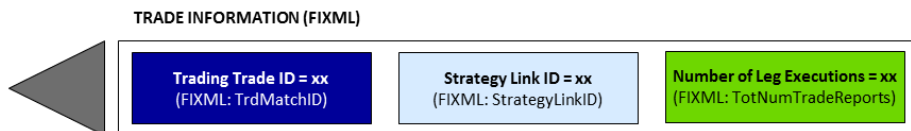

Figure 15: Complex Instrument Trades with Eurex Classic System

6.2.5 Clearing Fields used by the Eurex Clearing Classic System

T7 provides full trading functionality for Participants. Several clearing related fields are available for internal Participant use, and for use by the Eurex Clearing classic system. This appendix describes these fields and their handling.

6.2.5.1 Orders

Clearing fields can be specified on new orders and modifications to existing orders. The following clearing fields are supported and passed through to the Eurex Clearing classic system:

- Open/ Close Indicator.
- Clearing Account.
- Take-Up Member (receiving Clearing Member for Give-Up).
- Free Text 1.
- Free Text 2.
- Free Text 3.

For complex instruments, the Open/ Close Indicator and Clearing Account can be specified individually per leg.

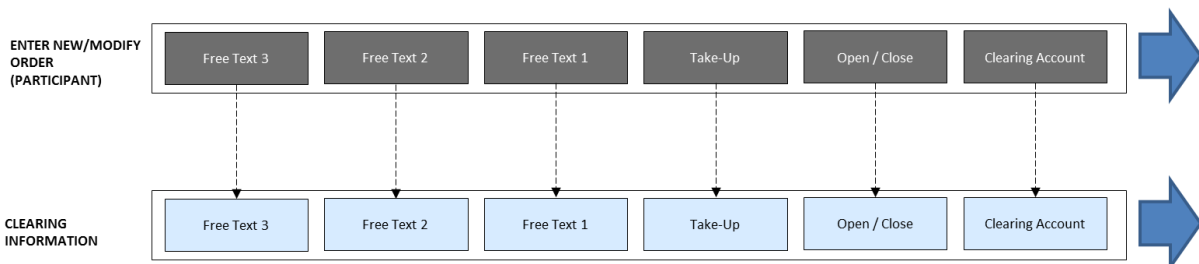The diagram below shows the available clearing fields and their handling:

Figure 16: Clearing Fields with Eurex Classic System

Handling within T7

The system does not perform business validations on clearing fields.

Clearing information from the Eurex Clearing classic system

The Eurex Clearing classic system will validate and update the clearing fields if required, and then provide clearing information to Participants, as follows:

Clearing Field	Handling
Clearing Account	If the Clearing Account is not valid, it will be replaced using rules based on: • Take Up Member (if specified); • Type of Member; and • Trading Capacity (required with the order).
Take-Up Member	Validated to be a valid Take-Up Member, and removes/ ignores if not valid.

Clearing Field	Handling
Free Text 1	This free text is returned for Participant use.
Free Text 2	Free text is returned for Participant use. In case of reversed trades, this field contains the Clearing Trade ID of the original trade confirmation.
Free Text 3	This free text is returned for Participant use.

Table 17: Clearing Information from Eurex Classic System

6.2.5.2 Quotes and Orders Entered Using the Short Layout

To optimize quoting efficiency, clearing fields are not available on quote entry or on orders entered using the short layout. Instead, Participants configure Trade Enrichment Rules that generate default clearing fields every time a quote or order entered using the short layout is executed. These defaulted values are provided in the trade confirmation, and then passed to the Eurex Clearing classic system. The following clearing fields can be set up:

- Clearing Account.
- Free Text 1.
- Free Text 2.
- Free Text 3.
- Open/ Close Indicator.
- Take-Up Member.

The diagram below shows how an executed quote/ order entered using the short layout is enriched using the Trade Enrichment Rules:
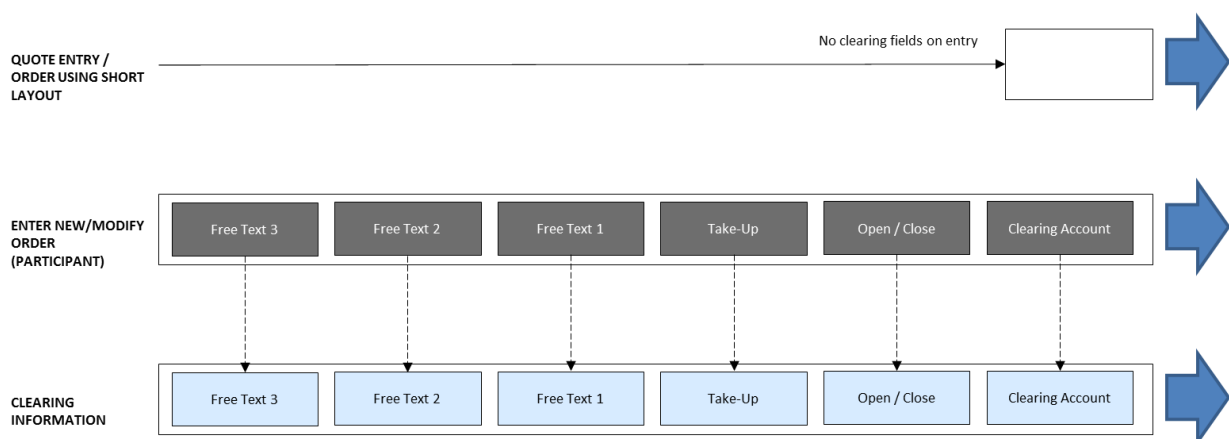

Figure 17: Trade Enrichment with Eurex Classic System

Handling within T7

Using the Admin GUI, Participants are able to define trade enrichment rules as a simple index table and can specify on transaction entry the exact trade enrichment rule to be used at the time of execution. Each enrichment rule will be identified by a Participant-defined integer identifier.

When the quote or order entered using the short layout is executed, T7 will use the Trade Enrichment Rule ID supplied by the Participant to look up the rule and then apply the corresponding clearing fields to the trade information sent to the clearing system and returned to the Participant.

6.2.5.3 Client Free Text

On orders, Participants are provided text fields for their own reference purposes. On quotes and orders entered using the short order layout, the free text fields are added to executed quotes using the Participant configured trade enrichment rules.

The following table shows the mapping of the free text fields across the interfaces to T7 and the Eurex Clearing classic system:

Interface	Field Names			Field Length
Trader GUI	Free Text 1	Free Text 2	Free Text 3	Entry of up to 12 characters.
FIX GW	Text	FreeText2	FreeText3	Entry is truncated to 12 characters, if longer. Trade notification always 12 characters.
ETI	FreeText1	FreeText2	FreeText2	Always 12 characters.
FIXML	FreeText1	FreeText2	FreeText3	Trade confirmation with truncated trailing spaces. I.e. less than 12 characters possible. Field not present if not entered or just spaces entered.
XML-Report TE540	freeText1	freeText2	freeText3	Truncated trailing spaces. I.e. less than 12 characters possible. Field not present if not entered or just spaces.

Table 18: Client Free Text Mapping

The last column shows how the field lengths are handled technically.

6.2.5.4 Clearing Account Rules

If the Clearing Account is missing or determined not valid, then it will be set by the clearing system according to the following logic:

(1) If the Clearing Account is not "G1" or "G2, the Take-Up Member field will be ignored and blanked out.
(2) If the Clearing Account is "G1", a valid Take-Up Member field will be kept, and an invalid Take-Up Member field (including set to member's own ID) will be initialized to spaces.
(3) If the Clearing Account is "G2", a valid Take-Up Member field will be kept, and an invalid Take-Up Member field (including set to member's own ID) will be initialized to spaces, and the Clearing Account will be set to "G1".
(4) If the trade is from a quote, then the Clearing Account is set to "M1" (if "M1" is not allowed for

Participant, then it is set to "P1").

(5) Otherwise, if a valid Clearing Account is provided/ defaulted, then it will be used.

(6) If the Clearing Account is not valid, then it is derived based on Trading Capacity (A -> "A1", P -> "P1", M->"M1").

(7) If Clearing Account derived in (6) is not allowed for Participant, then it is set to "A1" if the Clearing Account supplied by the Participant starts with "A". If not "A", then it is set to "P1".

Note that the trade confirmation from T7 will reference the Clearing Account that has been provided/ defaulted by the Participant. The trade information from the Eurex Clearing classic system will specify the final, potentially updated, Clearing Account.

6.3 Traceability with C7

This appendix describes how to reference order, quote and trade messages using the identifiers supported by T7 and how they can be linked to the trade messages from C7, applicable to all on-book as well as TES trades.

6.3.1 Order Traceability

The following diagram shows the key identifiers available in the system for on-book trading and how Participants can use them to cross reference the various response messages.

The primary identifier for each message type is shown in bold. Each identifier is assigned a unique color, and aligned vertically in the diagram, making it easy to quickly see the traceability across the messages. The interface field name is specified underneath in parentheses.

On every order, Participants provide a Client Order ID (optional for ETI) and up to three free text fields for their own reference purposes. The system will return these fields on its responses where shown in the diagram. The Client Order ID is checked to be unique among live orders for the same instrument and session.

Each new order received is assigned an Order ID by the exchange, which is unique within a product, and is returned to the Participant on all private messages.

For every on-book match event, T7 assigns identifiers, unique within product and business day, to each aggregated price level (Match Step ID), every order execution (Order Execution ID) and every trade (Trade ID). For the matching of a complex order, in addition to the Order Execution ID, an Order Leg Execution ID is provided for each leg of the complex instrument match. The Trade Item ID is the same as the Order Execution ID/ Order Leg Execution ID.

Please note that the Trade ID and Side Item ID is only unique (within product and business day) for either on-book or off-book (TES) trades. Members wishing to reconcile their T7 trade confirmation with their C7 transaction confirmation messages need to take the field TrdType into account.

C7 assigns new (clearing) Transaction IDs and provides Participants with the original identifiers (Trading Trade ID, Trade Item ID and Trading Order ID), so there is backwards traceability. Please note that a trade on T7 is also referred to as a transaction C7.

Technical Notes:

- The Order ID generated by T7 and used on all electronic interfaces is a 64-bit unsigned integer (e.g. 100000). On the GUI and on the trading reports it is shown as a (up-to) 20 digit decimal and 12 character hexatridecimal (base 36) representation (e.g. 255S). In the interfaces of C7 the Order ID is shown as number in the field "OrderID".

- The Client Order ID is provided in the FIXML interface from C7 same as it was entered in the order.
- The Client Order ID of an order entered via the ETI is contained in the execution confirmation received in the FIX GW. For an order entered via the FIX GW, the Client Order ID returned in the trade confirmation is not the Client Order ID entered with the order, rather an ID used by the FIX GW to communicate via the ETI with T7.
- The Client Order ID is not provided in the drop copy of the FIX GW back office session. Mapping can be achieved using the Order ID.
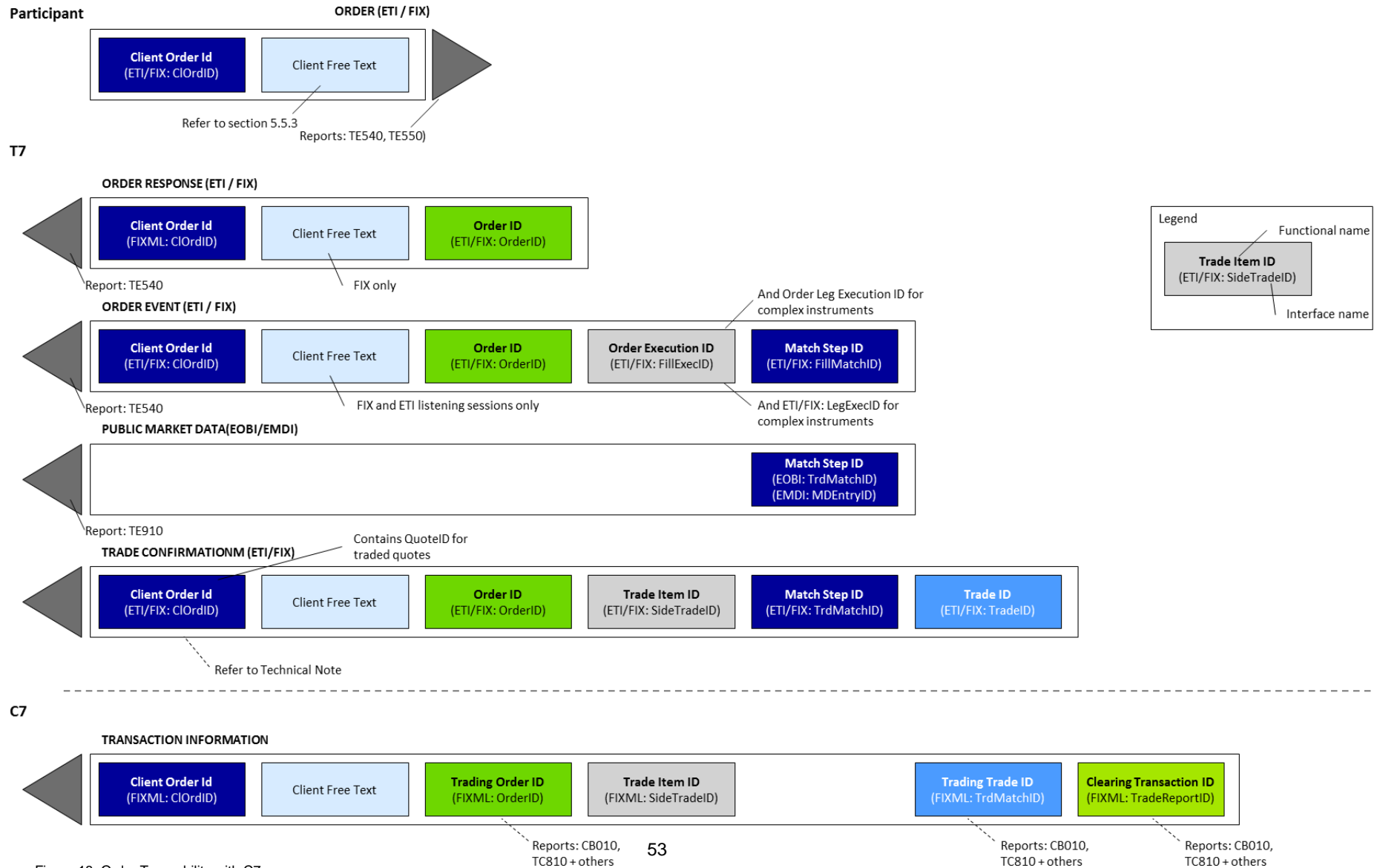
Participant

ORDER (ETI / FIX)

Client Order Id (ETI/FIX: ClOrdID)	Client Free Text

Refer to section 5.5.3

Reports: TE540, TE550)

T7

ORDER RESPONSE (ETI / FIX)

Client Order Id (FIXML: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)

Report: TE540

FIX only

ORDER EVENT (ETI / FIX)

And Order Leg Execution ID for complex instruments

Client Order Id (ETI/FIX: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)	Order Execution ID (ETI/FIX: FillExecID)	Match Step ID (ETI/FIX: FillMatchID)

Report: TE540

FIX and ETI listening sessions only

And ETI/FIX: LegExecID for complex instruments

PUBLIC MARKET DATA(EOBI/EMDI)

Match Step ID (EOBI: TrdMatchID) (EMDI: MDEntryID)

Report: TE910

Contains QuoteID for traded quotes

TRADE CONFIRMATIONM (ETI/FIX)

Client Order Id (ETI/FIX: ClOrdID)	Client Free Text	Order ID (ETI/FIX: OrderID)	Trade Item ID (ETI/FIX: SideTradeID)	Match Step ID (ETI/FIX: TrdMatchID)	Trade ID (ETI/FIX: TradeID)

Refer to Technical Note

C7

TRANSACTION INFORMATION

Client Order Id (FIXML: ClOrdID)	Client Free Text	Trading Order ID (FIXML: OrderID)	Trade Item ID (FIXML: SideTradeID)		Trading Trade ID (FIXML: TrdMatchID)	Clearing Transaction ID (FIXML: TradeReportID)

Reports: CB010, TC810 + others

Reports: CB010, TC810 + others

Reports: CB010, TC810 + others

Legend

Trade Item ID (ETI/FIX: SideTradeID)

Functional name

Interface name

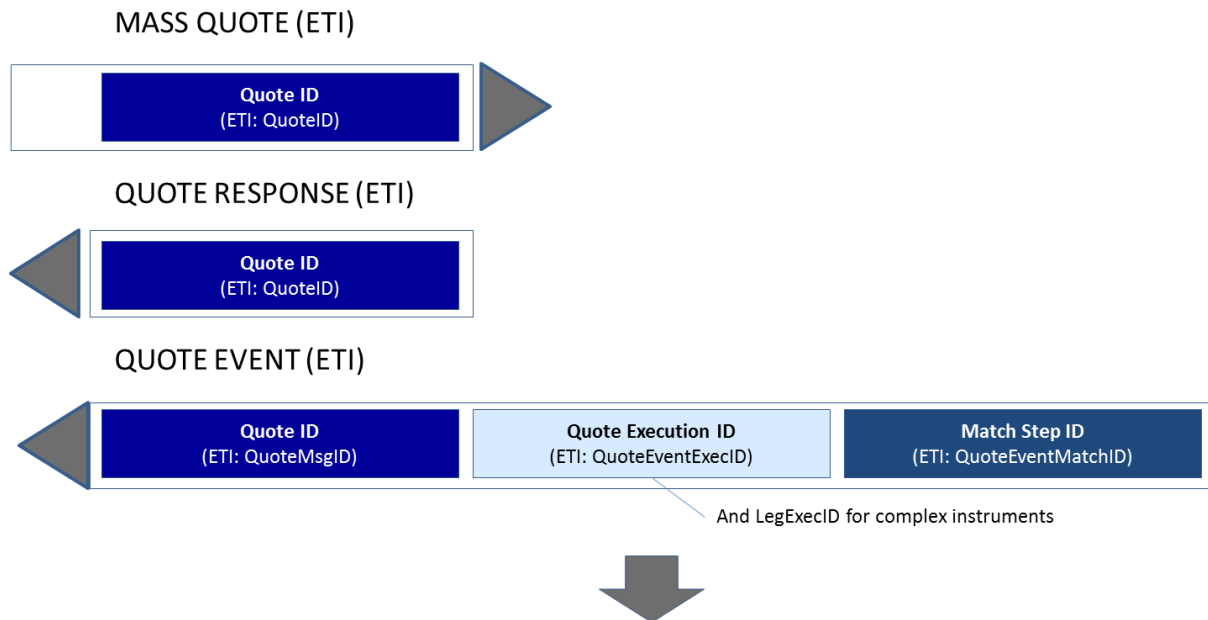Figure 18: Order Traceability with C7

6.3.2 Quote Traceability

The following diagram shows the key identifiers available for quotes and how Participants can use them to cross reference the various response messages.

T7 supports quotes via the ETI Interface only. One or more quotes can be entered in a Mass Quote, for which Participants provide a Quote ID for the entire Mass Quote (i.e. not per individual quote). This Quote ID is returned on the Quote Response as well as any Quote Events for executed quotes. Quote IDs are not checked for uniqueness.

For every match event, the system assigns identifiers, unique within product and business day, to each aggregated price level (Match Step ID) and every execution (Quote Execution ID). Quote Leg Execution IDs are also provided for executions occurring in complex instruments.

Subsequent Public Trade Volume, Trade Confirmations, and Trade Information are provided using the same messages as with orders, refer to section 6.3.1.

MASS QUOTE (ETI)

Quote ID
(ETI: QuoteID)

QUOTE RESPONSE (ETI)

Quote ID
(ETI: QuoteID)

QUOTE EVENT (ETI)

Quote ID (ETI: QuoteMsgID)	**Quote Execution ID** (ETI: QuoteEventExecID)	**Match Step ID** (ETI: QuoteEventMatchID)

And LegExecID for complex instruments

Refer to section Order Traceability diagram for Public Trade Volume, Trade Confirmation and Trade Information

Figure 19: Quote Traceability with C7

6.3.3 TES Trade Traceability

The following diagram shows the key identifiers available for TES trades and how Participants can use them to cross reference the trade/ transaction confirmations:
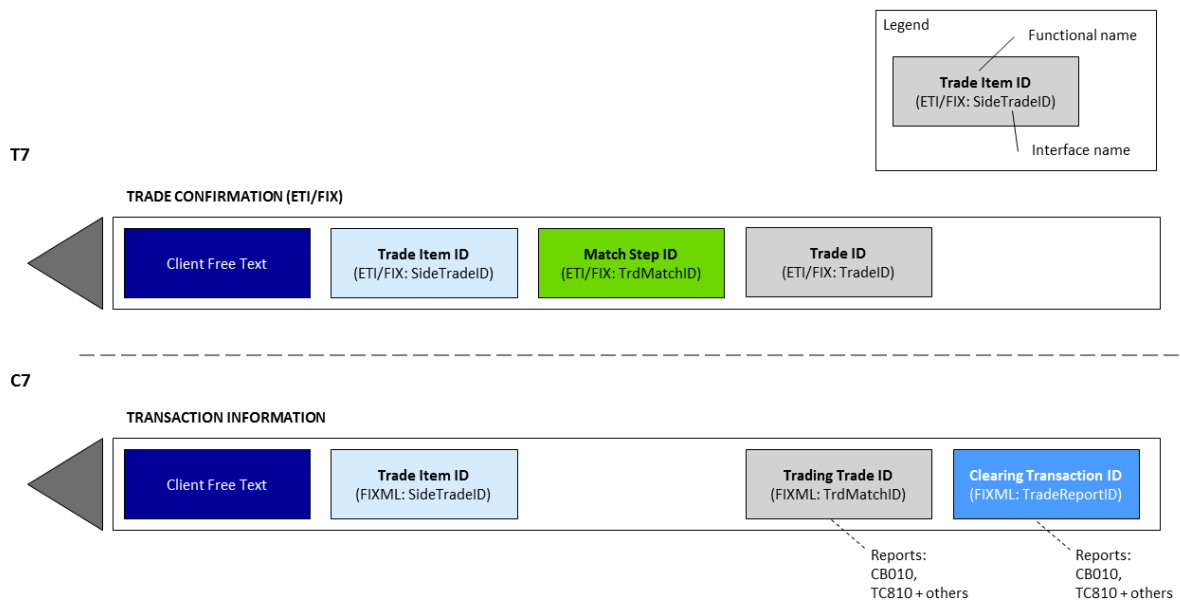

Figure 20: TES Trade Traceability with C7

Please note that the Trade ID and Side Item ID is only unique (within product and business day) for either on-book or TES trades. Members wishing to reconcile their T7 trade confirmation with their C7 transaction confirmation messages need to take the field TrdType into account.

6.3.4 Trade Reversal

When a trade is reversed, T7 sends Participants a Trade Reversal message containing a new Trade ID. For traceability, the original Trade ID is also provided.
C7 will then calculate a new Clearing Transaction ID (based on the original Clearing Transaction ID with an incremented suffix), and provide Participants with trade information including the Order ID as reference back to the T7 trade and trade reversal.
In case one or several transaction adjustment activities have been performed on C7 before a trade (transaction C7's term) becomes subject to a trade reversal, C7 will reverse all adjustments one by one and finally will reverse the original transaction.
For example, a trade A is passed on from T7 to C7, afterwards, several adjustments (O/C adjustment, give-up, take-up) are made: A→B→C→ D.
When the trade reversal happens, C7 will first reverse adjustment D, then C, then B, and finally the transaction A. All adjustments and all reversals will have similar Clearing Transaction IDs which only differ in the suffix (the original transaction A will have the suffix "0"). And each reversal will contain a Reference Clearing Transaction ID which is the Clearing Transaction ID of the adjusted transaction which has been reversed. The final reversal, which reverses the original transaction A, will reference the original Clearing Transaction ID with the suffix "0". For more information on trade reversal in C7, please see FIXML Interface Specification Volume 3: Transaction & Position Confirmation, chapter 3.3.13.

The following diagram shows how to trace the trade identifiers in the case of a reversal without adjustments:
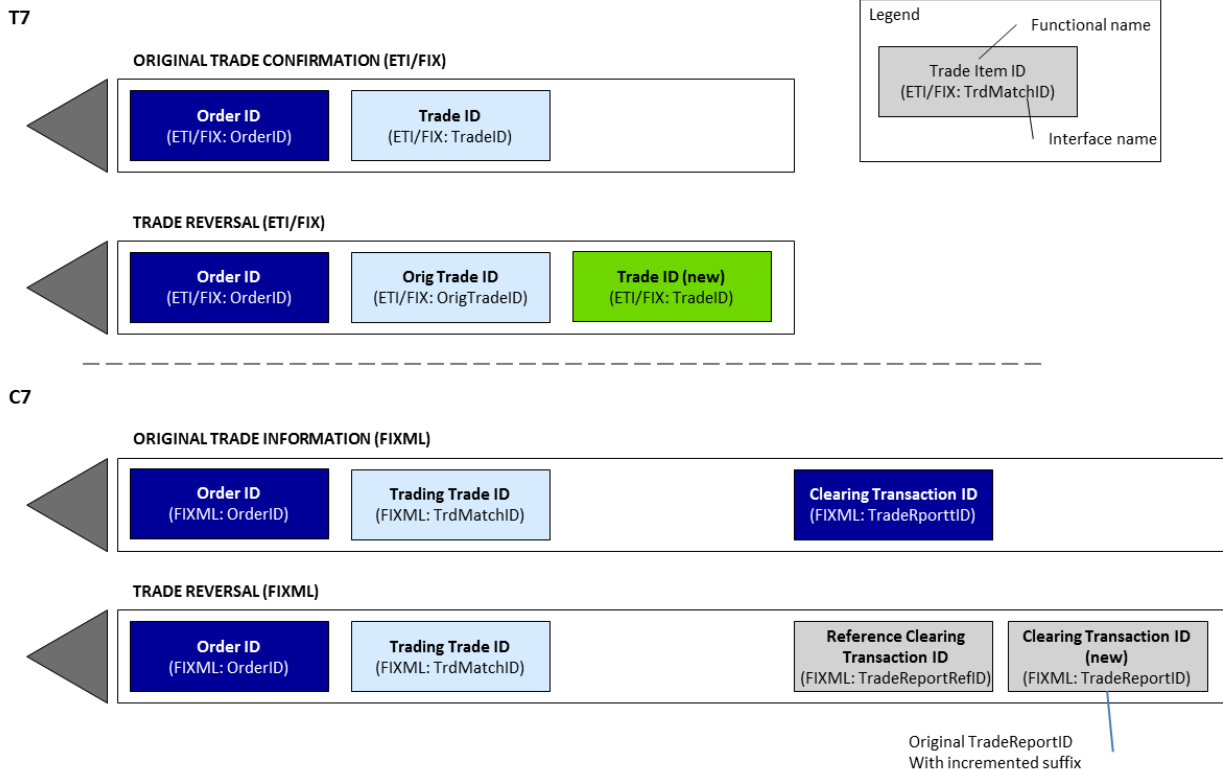

Figure 21: Trade Reversal with C7

6.3.5 Preliminary and Final Trade Confirmations

Currently, there are two types of products on T7 which have a different trading and clearing notations: For Total Return Futures, the trading notation on T7 is specified by the interest rate spread given in basis points. In order to be sent to the clearing system, the trading spread is converted to clearing notation, i.e. a clearing price given in index points. For more information on Total Return Futures, please refer to "T7 Release 4.0 Release Notes" and the "Functional Reference".

For Variance Futures, trading on T7 is performed in volatility-vega trading notation (σ,υ). However, clearing is performed with futures price-quantity clearing notation (P_t,Q_t). For more information on Variance Futures, please refer to "Eurex Release 2.1 Notes" and the "Functional Reference".

Each match in a Variance Futures instrument generates a trade in the trading notation which is converted by T7 into the clearing notation.

As the values for the conversion parameters for both products are known only at the end of the trading day, T7 does a preliminary conversion at the time of the trade, based on the previous day's values of the conversion parameters. The preliminary trade information is immediately communicated to the user and the clearing system. For Total Return Futures, it is possible to enter a special type "Trade at Market" via TES which results in a regular trade and do not require the preliminary and final trade confirmations.

At the end of the trading day, when the day's conversion parameter values have been approved, T7 calculates the final values and replaces the preliminary trades with the final trades. For that, a final trade confirmation is sent which contains the Trade ID of the preliminary trade conformation as

reference.

In addition to the preliminary and final trade confirmations (analogously to the confirmations sent by T7), C7 sends out a transaction reversal message for the preliminary trade. The clearing system uses the TradeReportRefID field to link the three confirmation messages. In case of a trade based on orders, the Order ID from T7 is included in all three confirmation messages.

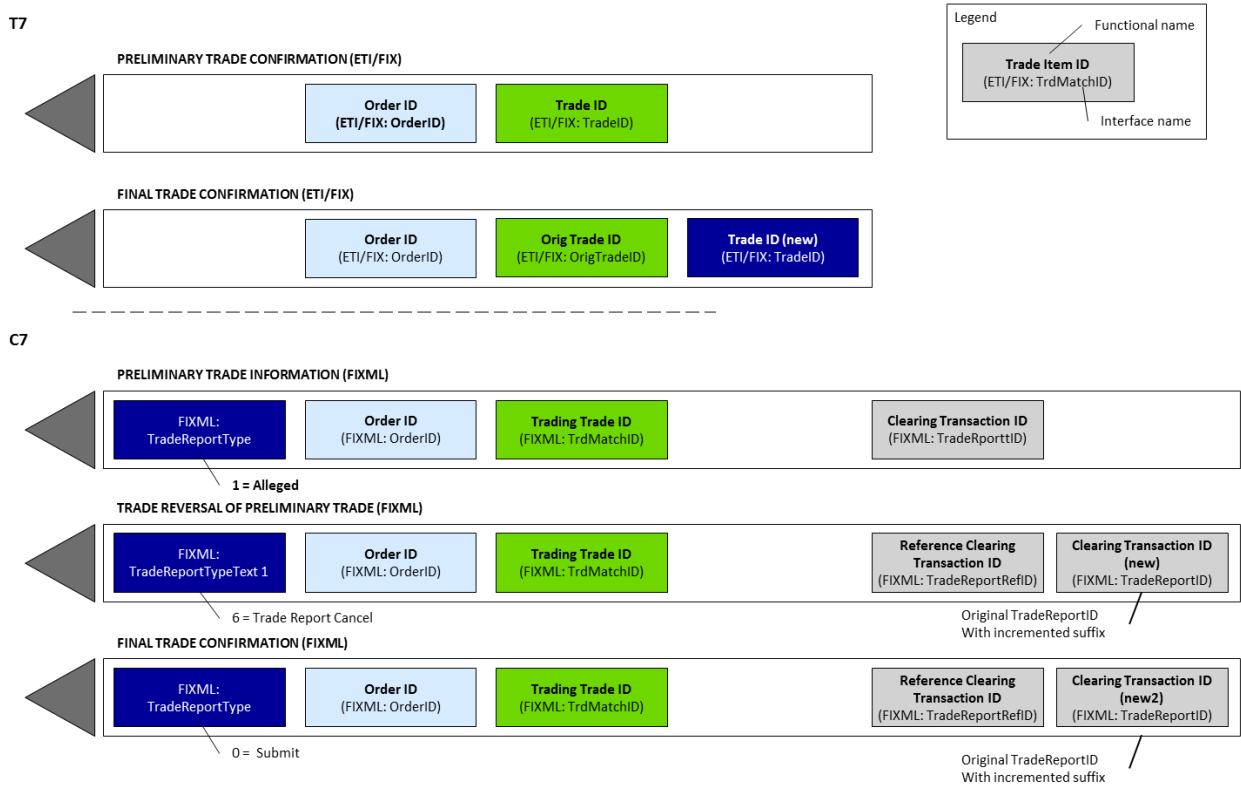The following diagram shows how to trace the trade identifiers in the case of Total Return Future or Variance Future trades.

Figure 22: Preliminary and Final Trade Confirmations with C7

6.3.6 Complex Instrument Trades

When a trade occurs in a complex instrument, trade confirmations are generated in the corresponding simple instrument legs only (not for the complex instrument). As a result, multiple trade confirmations are sent for one order at a single price level. When this occurs, T7 provides two additional fields, enabling Participants to easily identify and summarize leg trade confirmations that belong to the same complex instrument match:

- A Strategy Link ID to trace all legs of the complex instrument that are matched in one match step (price level).
- The Number of Leg Executions to convey how many trade confirmations were generated for an order in the complex instrument match step.

These fields are also provided with the clearing information published by C7.
Additionally, C7 forwards on the information on strategy type and sub type from T7 via the fields RelatedInstrumentGrp (contains information about the strategy type, where applicable), RelatedProductComplex (contains the general strategy type), and RelatedSecuritySubType (contains further detail on the strategy , e.g. the color for packs and bundles).

The following diagram is an example of trade confirmations sent to a Participant resulting from two complex instrument matches, one with 2 legs, and one with 3 legs.
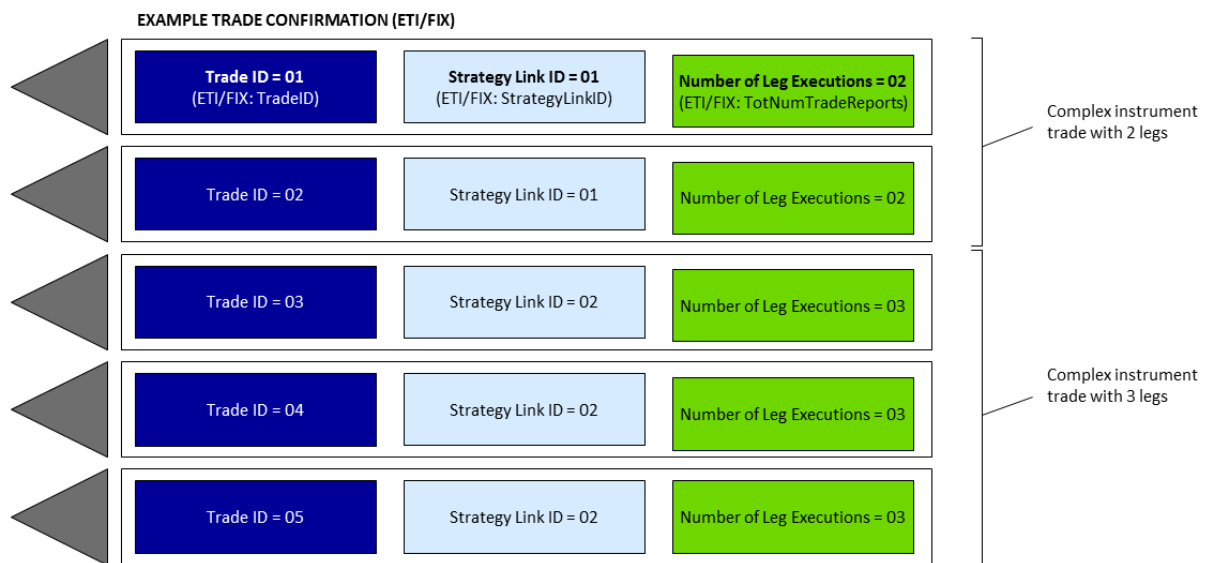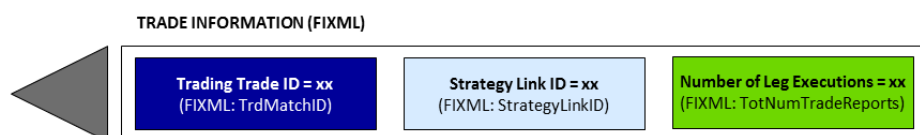

Figure 23: Complex Instrument Trades

6.3.7 Clearing Fields used by C7

T7 provides full trading functionality for Participants. Several clearing related fields are available for internal Participant use, and for use by C7. This appendix describes these fields and their handling.

6.3.7.1 Orders

Clearing fields can be specified on new orders and modifications to existing orders. The following clearing fields are supported and passed through to C7:

- Open/ Close Indicator.
- Clearing Account.
- Take-Up Member (receiving Clearing Member for Give-Up).
- Free Text 1.
- Free Text 2.
- Free Text 3.
- Cooperation details for Eurex KRX or Eurex TAIFEX Products:
  - External Member ID
  - Final Beneficiary
- Customer Order Handling Instruction (identifies the source of an order, in accordance with the FIA guidelines for the rate Identifier for eGains).

For complex instruments, the Open/ Close Indicator and Clearing Account can be specified individually per leg.

The diagram below shows the available clearing fields and their handling:
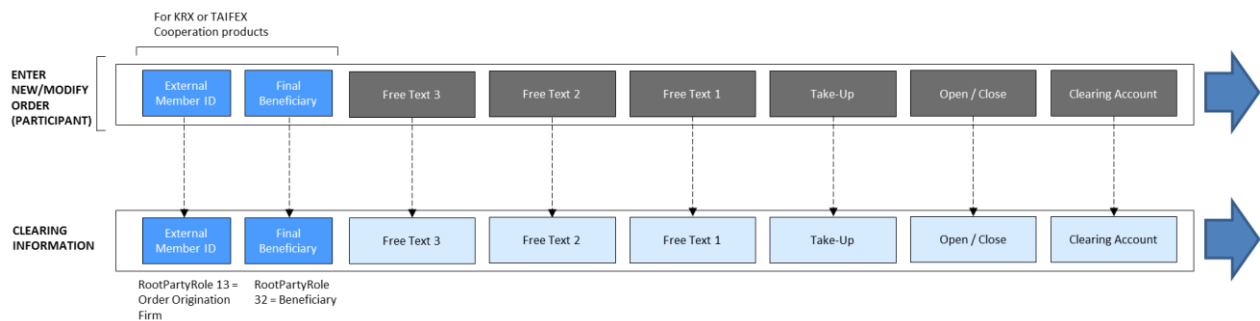

Figure 24: Clearing Fields used by C7

Handling within T7

The system does not perform business validations on clearing fields, except for KRX or TAIFEX Products.

For Eurex KRX Products, the Participant must provide the cooperation details as follows:

- The External Member ID must be allowed for the entering Participant; and
- The Final Beneficiary field must be specified.

For Eurex TAIFEX Products, the Participant must provide the cooperation details as follows:

- The External Member ID must be allowed for the entering Participant;
- The Branch Code field must be specified; and
- The Final Beneficiary field must be specified.

Clearing information from C7

C7 will validate and update the clearing fields if required, and then provide clearing information to Participants, as follows:

Clearing Field	Handling
Clearing Account	If the Clearing Account is not valid, it will be replaced using rules based on: • Take Up Member (if specified); • Type of Member; and • Trading Capacity (required with the order).
Take-Up Member	Validated to be a valid Take-Up Member, and removes/ignores if not valid.
Free Text 1	This free text is returned for Participant use.
Free Text 2	This free text is returned for Participant use.
Free Text 3	This free text is returned for Participant use.
External Member ID	This field is used for KRX/ TAIFEX cooperation products.
Beneficiary ID	This field is used for KRX/ TAIFEX cooperation products.
Customer Order Handling Instruction	This field is used to for the rate identifier for eGains.

Table 19: Clearing Information from C7

6.3.7.2 Quotes and Orders Entered Using the Short Layout

To optimize quoting efficiency, clearing fields are not available on quote entry or on orders entered using the short layout. Instead, Participants configure Trade Enrichment Rules that generate default clearing fields every time a quote or order entered using the short layout is executed. These defaulted values are provided in the trade confirmation, and then passed to C7. The following clearing fields can be set up:

- Clearing Account.
- Free Text 1.
- Free Text 2.
- Free Text 3.
- Open/ Close Indicator.
- Take-Up Member.
- Cooperation Partner (KRX or TAIFEX):

- External Member ID.
- Final Beneficiary.

The diagram below shows how an executed quote/ order entered using the short layout is enriched using the Trade Enrichment Rules:
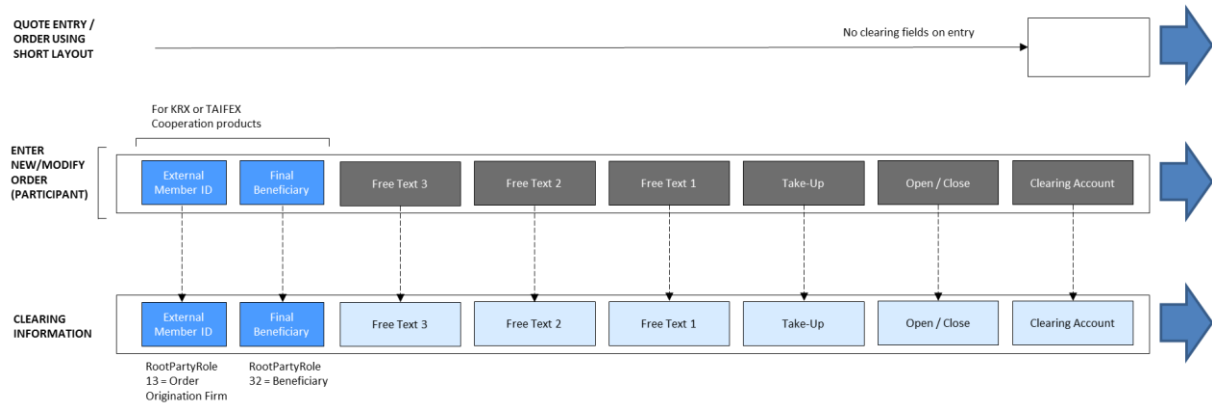

Figure 25: Trade Enrichment with C7

Handling within T7

Using the GUI, Participants are able to define trade enrichment rules as a simple index table and can specify on transaction entry the exact trade enrichment rule to be used at the time of execution. Each enrichment rule will be identified by a Participant-defined integer identifier.

When the quote or order entered using the short layout is executed, T7 will use the Trade Enrichment Rule ID supplied by the Participant to look up the rule and then apply the corresponding clearing fields to the trade information sent to the clearing system and returned to the Participant.

KRX and TAIFEX trade enrichment

Participants may define trade enrichment rules for external member ID and final beneficiary account that will be applied to executed quotes and orders entered using the short layout.

To use this feature, Participants must supply the exchange with a default external member ID and final beneficiary account to be used if a valid trade enrichment rule for the product is not supplied.

6.3.7.3   Client Free Text

On orders, Participants can provide up to three free text fields for their own reference purposes. On quotes and orders entered using the short order layout, the free text fields are added to executed quotes using the Participant configured trade enrichment rules.

The following table shows the mapping of the free text fields across the interfaces to T7 and C7:

Interface	Field Names			Field Length
Trader GUI	Free Text 1	Free Text 2	Free Text 3	Entry of up to 12 characters.
FIX GW	Text	FreeText2	FreeText3	Entry is truncated to 12 characters, if longer. Trade notification always 12 characters.
ETI	FreeText1	FreeText2	FreeText2	Always 12 characters.
FIXML	FreeText1	FreeText2	FreeText3	Text fields can hold 36 characters each. Exclamation mark (!) and pipe (|) are not allowed.
T7 XML-Report TE540	freeText1	freeText2	freeText3	Truncated trailing spaces. I.e. less than 12 characters possible. Field not present if not entered or just spaces.
C7 XML-Report (e.g. CB012)	Text1	Text2	Text3	Up to 36 characters. Field not present if not entered or just spaces.

Table 20: Client Free Text Mapping

The last column shows how the field lengths are handled technically.

6.3.7.4   Clearing Account Rules

If a valid Clearing Account is provided/ defaulted it will be used. If the Clearing Account is missing or determined not valid, then it will be set by the clearing system according to the following logic:

(1) If the Clearing Account is "G1" or "G2", then the Clearing Account will be set as described in (3).
  If the Take Up Member field is filled correctly and
  a.   all validations for the Give Up are fulfilled, Give Up will be triggered automatically.
  b.   in case validations for the Give Up are not fulfilled, no Give Up will be triggered automatically.
(2) If the trade is from a quote, then the Clearing Account is set to "M1" (if "M1" is not allowed for the Participant, then it is set to "P1").
(3) If the Clearing Account is not valid, then it is derived based on Trading Capacity:
  a.   Agency -> "A1" (if "A1" is not allowed for the Participant, then it is set to "P1")
  b.   Proprietary -> "P1" (if "P1" is not allowed for the Participant, then the trade will be flagged as erroneous)
  c.   Market Making -> "M1" (if "M1" is not allowed for the Participant, then it is set to "P1").

Please note that the trade confirmation from T7 will reference the Clearing Account that has been provided/ defaulted by the Participant. The trade information from C7 will specify the final, potentially updated, Clearing Account in accordance with the Clearing Account Rules.

6.4 Traceability with CCP

This appendix describes how to reference order, quote and trade messages using identifiers supported by T7 and how they can be linked to the trade messages from the counterpart CCP, applicable to all on-book trades.

6.4.1 Order Traceability

Each order entered in T7 is assigned by a unique Order ID and a System Order ID Version Number. While the Order ID is the same during the lifetime, the System Order ID Version Number increases in case of a user driven order modification with a priority change.
When an order is executed, the trader is informed via an order execution confirmation. For each price level (match step), the execution confirmation includes a unique ID called Match Step ID. This field can be used as a linkage between the public market data and the trade notification.
For a linkage between the execution confirmation and the trade notification, the execution confirmation provides also the Order Execution ID which maps with the field Trade Item ID in the trade notification.

To trace the order within clearing and settlement, the trade notification is enriched by the field Side Trade Report ID. This field is equal to the Trading Number used in the Trade Report of CCP for clearing and settlement.

Please note that within the trade confirmation sent to the clearing and settlement, the Order ID is converted since the field length in the clearing and settlement systems is limited to 13 alphanumerical. The conversion is done by using the Horner scheme to recalculate the Order ID, which is expressed as decimal number (i.e. basis of 10), to the basis of 36. This information is useful if the mapping from CCP back to T7 is requested, then the conversion has to be conducted back. For more details, please refer to the Enhanced Trading Interface Manual.

The following diagram shows the key identifiers available in the system for on-book trading and how Participants can use them to cross reference the various response messages:
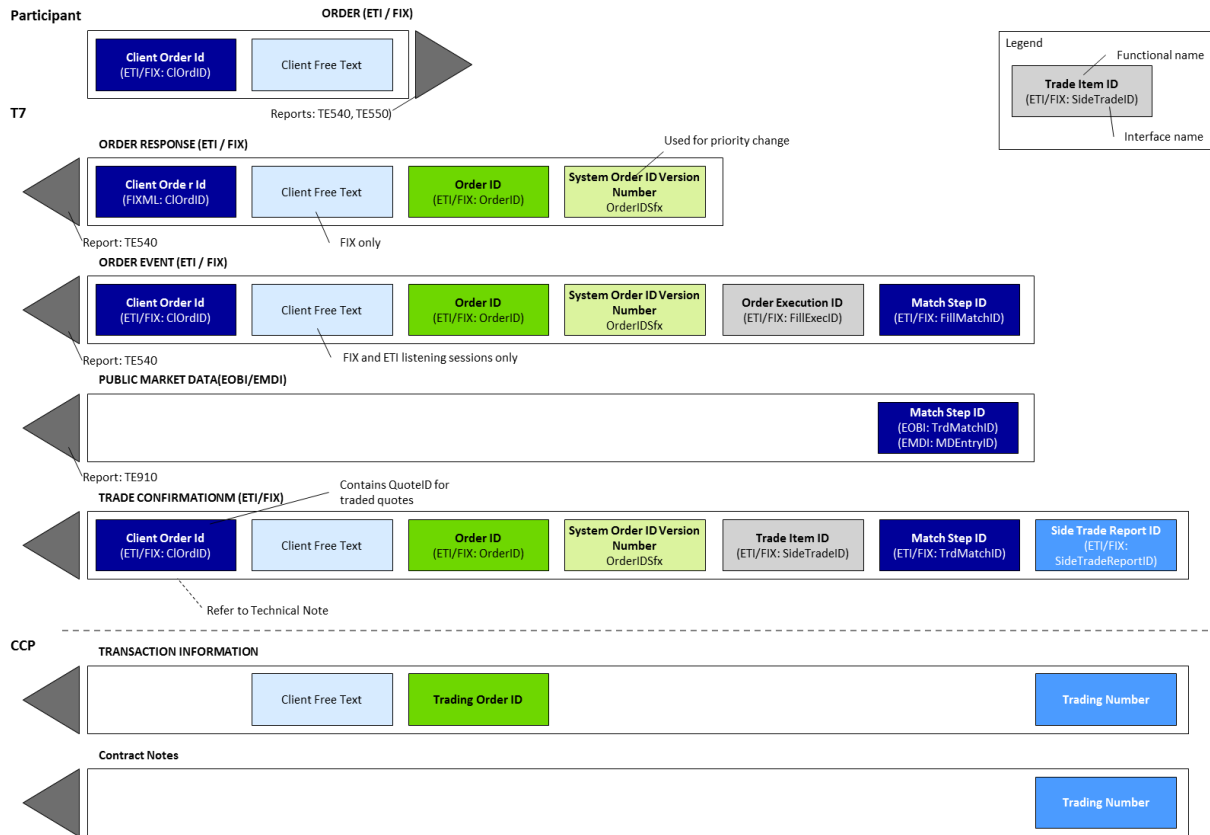
Figure 26: Tracing of orders and trades   *Same content information reflected by the same colour and position of the respective boxes

6.4.2 Quote Traceability

When a quote gets executed, the trader is informed via the quote execution notification. Similar to orders, the execution notification for quotes is sent for each price level (match step) and include the fields Match Step ID and the Quote Execution ID. While the Match Step ID is used for public trade reporting, the Quote Execution ID is the private identifier for the quote match and can be reconciled with the field Trade Item ID in the trade notification. For a mapping regarding to CCP, the trade notification is enriched by the additional field Side Trade Report ID (see also order traceability) which in turn is the Trade Number in CCP Trade Report. Please note, similar to order traceability with CCP, that the Order ID is converted to a field length of 13 due to limitations in the clearing system (refer to section 6.4.1). For more details, please refer to the "Enhanced Trading Interface" Manual.

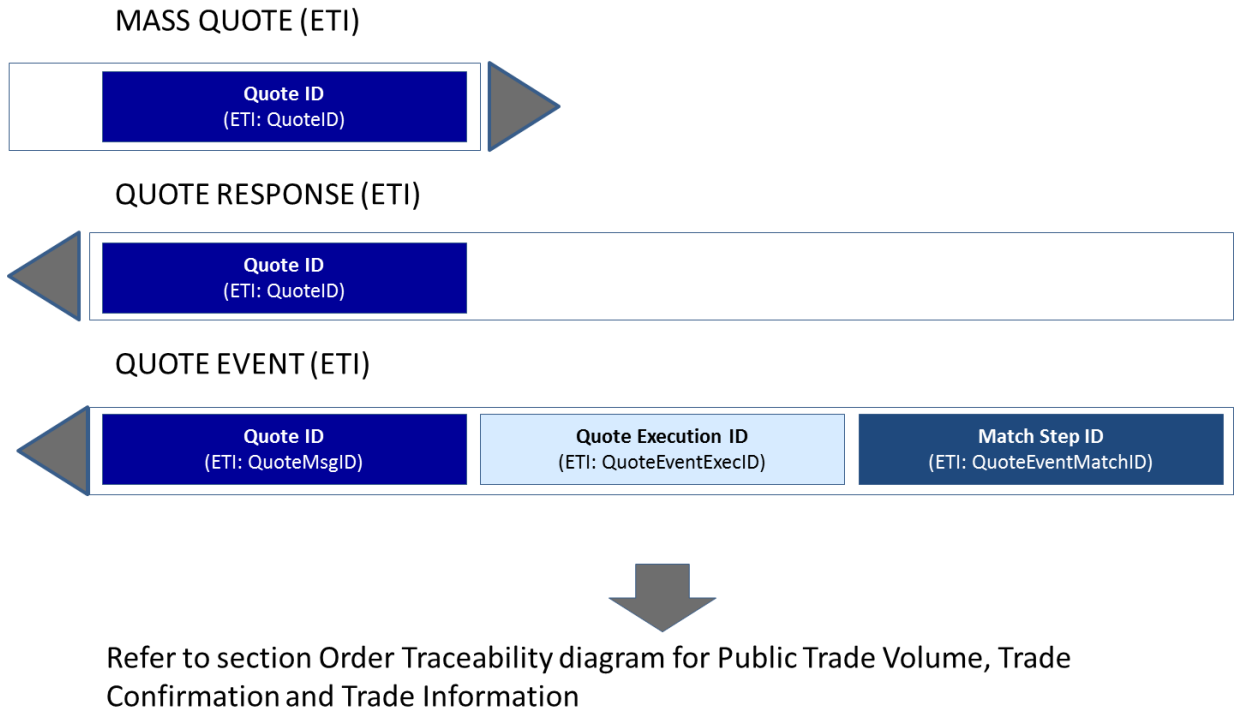The following figure represents a quote match event:

Figure 27: Quote Traceability with CCP

6.4.3 Trade Reversal

A trade reversal can only be executed during the day the trade was created. When a trade is reversed, T7 sends a trade reversal message to the affected participants. The trade reversal message is in the format of a Trade Notification containing a (new) Trade ID for the reversal itself, the Original Trade ID of the reversed trade and a Trade Report Type indicating the reversal. Please note, since no trade modifications are possible on T7, the Original Trade ID contains always the ID of the initial trade. The CCP is informed about the reversal and deletes the original trade accordingly. The following diagram shows how to trace the trade identifiers in the case of a reversal:
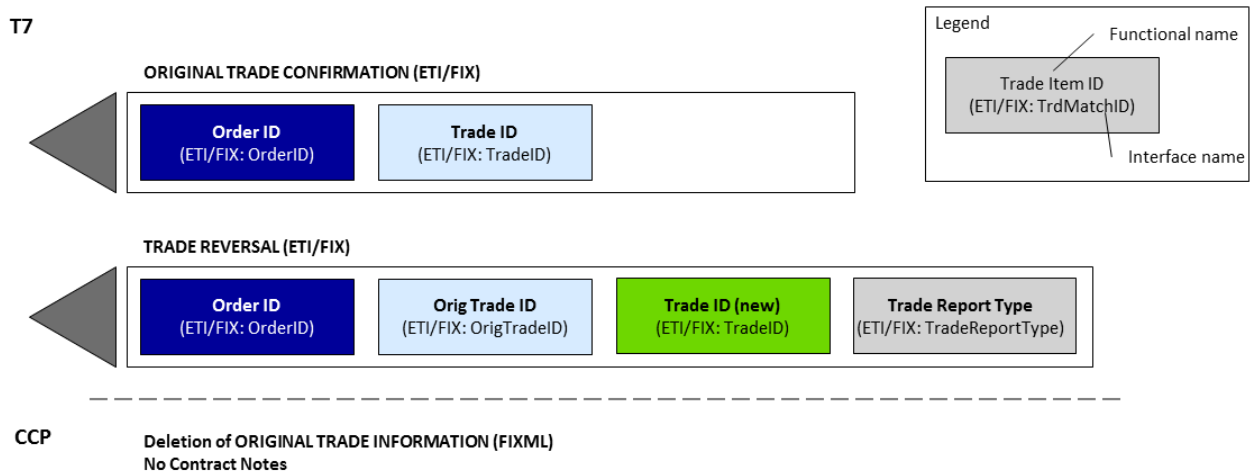

Figure 28: Trade Reversal with CCP

7   Change log

No	Chapter, page	Date	Change
V.5.0.1	• All	18-January-2017	• Creation of complete new version combining functionalities for cash and derivatives markets.