

T7 Release 5.0

Xetra Enhanced Trading Interface

An Introduction

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Abstract

This document provides first information for Xetra Members regarding the Migration to T7. The purpose of this document is to provide an introduction of the T7 Enhanced Trading Interface (ETI) to participants.

Keywords

Xetra, T7, Enhanced Trading Interface

Table of Contents:

1	List of Abbreviations, Acronyms and Definitions	6
2	Introduction	7
2.1	Purpose	7
2.2	Readership	7
3	Technical Overview	8
3.1	Message Based	8
3.2	Low Footprint.....	8
3.3	Standard	8
3.4	Session Oriented.....	8
3.5	Subscription mechanism	8
3.6	Full Control in Case of a Failover	8
3.7	Architecture Throttle.....	9
3.8	Session Login and User Login Throttle.....	9
4	Service Description.....	10
4.1	FIX Semantics	10
4.2	Party Identification	10
4.3	Order Identifiers.....	11
4.3.1	Client Order ID	11
4.3.2	Exchange Order ID	12
4.4	Order Handling.....	12
4.4.1	Order Types and Restrictions	12
4.4.2	Cancellation.....	13
4.4.3	Modification	14
4.4.4	Total Order Quantity Modification	14
4.4.5	Self-Match-Prevention (prevention of cross matches)	14
4.4.6	Order Mass Cancellation	15
4.4.7	Short Order Message Layout	15
4.4.8	Order Book Restatement	16
4.5	Quote Handling	16
4.5.1	Quote Characteristics	16
4.5.2	Maintaining Quotes.....	16
4.5.3	Quote Activation/Inactivation	18
4.6	Trade Notifications.....	18
4.7	Cross request	18
4.8	Listener Broadcast	19
4.9	News.....	19
4.10	Service Availability.....	19
4.11	Mass Cancellation Notification and Mass Cancellation Events	20
4.12	Trading Session Events.....	20
4.13	Timestamps.....	21
5	Connectivity and Session Parameters	22
5.1	Session Concept	22
5.1.1	Low Frequency Session (LF) – Regular Trading.....	22
5.1.2	Low Frequency Session (LF) – Back Office.....	23

5.1.3	High Frequency Session (HF)	23
5.2	Identification and Authentication	23
5.2.1	IP Addresses and Ports	23
5.2.2	Session Authentication	23
5.2.3	User Authentication	24
5.3	Failover	24
5.4	Throughput Limits	24
5.4.1	Transaction Limit	25
5.4.2	Reject/Disconnect Limit	25
5.5	Mass Cancellation on Disconnect	25
5.6	Mass Cancellation on Duplicate Session Login	26
6	Session Layer	27
6.1	Flat Binary Encoding	27
6.2	Logon	27
6.3	Logout	27
6.4	Heartbeat	27
6.5	Reject	28
6.6	Message Sequence Number	28
6.7	Application Message Sequencing	28
6.7.1	Application Message Identifier	28
6.7.2	Application Message Sequence Number	29
6.8	Session Data	29
6.9	Broadcast	29
6.10	Recovery	31
6.10.1	Retransmission	31
6.10.2	Preliminary Execution Report and Legally Binding Trade Notifications	32
7	Appendix	33
7.1	Message Flows	33
7.1.1	Enter Order	33
7.1.2	Enter Mass Quote	33
7.2	Enhanced Transaction Solution Delta	35
8	Change log	37

1 List of Abbreviations, Acronyms and Definitions

Please find a list of all the abbreviations used in the document. The first time an abbreviation is introduced in the document it is written in brackets after the phrase.

ETI	Enhanced Trading Interface
MDI	Market Data Interface
EMDI	Enhanced Market Data Interface
EOBI	Enhanced Order Book Interface
Trader GUI	Graphical User Interface for access to trading functions for orders and OTC trade entry
Admin GUI	Graphical User Interface for Administration functions, for example, user maintenance
LF	Low-frequency
HF	High-frequency
Xetra®	Cash Market Electronic Trading system of DBAG
UDF	user defined fields
Participant	The Xetra concept of a member will be represented by a “participant” within T7

2 Introduction

The T7 architecture is the industry-leading, multi-asset trading platform of the Deutsche Börse Group, its affiliates and partners.

The system has best-in-class performance and is scalable to support any sized market. It can be customized to support different types of markets.

The Enhanced Trading Interface (ETI) is a high performance interface designed for participants who require the highest throughput and the lowest latency for their transactions.

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

A proprietary session layer and flat binary encoding is used in order to provide the best performance.

ETI provides all trading functions of T7:

- Order handling
- Additional support of short order message layouts, which applies streamlined functionality to achieve a comparable latency to quotes
- Quote handling including quote activation and inactivation
- Execution notifications
- Cross request

Additionally ETI enables participants to subscribe to private trading data:

- Drop copy for complete order history of all standard orders of a session
- Trade notifications for all sessions of the business unit

The following trading support information is available for each session:

- News messages from market supervision (optional subscription)
- Private risk control messages ¹(always sent)

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

2.1 Purpose

The purpose of this document is to provide Xetra participants an introduction to the ETI interface on T7.

This document describes the main concepts of ETI and helps to determine the effort needed to implement the necessary changes on the participant side. For further detail the participant should refer to the ETI - Enhanced Trading Interface - Manual (Preliminary version), which will be published on the Xetra Website in December 2016. Furthermore, the document "Interface Differences between Xetra Classic and T7" will be published in November 2016.

2.2 Readership

The main target group is the technical staff within the participant firms. Example message flows are provided in the appendix.

¹ e.g. when a breach on a certain level of risk limits occurs, the participant will be informed via the Risk Notification message

3 Technical Overview

The T7 Enhanced Trading Interface (ETI) is the high performance trading interface designed for participants who require the highest throughput and the lowest latency. This transactional interface is provided in parallel to the FIX Gateway whose target groups are FIX 4.2 and FIX 4.4 customers.

ETI has the following main characteristics:

3.1 Message Based

ETI is an asynchronous, message-based interface. The connection between the participant and T7 is established via a TCP session.

3.2 Low Footprint

Integration of ETI into the participant's existing IT infrastructure is simplified due to the following:

- No special hardware is required.
- No Exchange software has to be installed.
- Free choice of operating system, programming language and compiler versions.

3.3 Standard

In order to ease the implementation effort for participants, ETI uses best practice methods taken from the financial industry, namely the use of the FIX Protocol standard.

3.4 Session Oriented

ETI is a session oriented interface.

Participant applications connect to the trading system by Application Gateways that host the client sessions. A session is established by opening a TCP/IP session to the gateway.

The exchange provides a unique session identifier that is used when logging on. A Session ID can only establish one session in one market at any time. Each participant application requires its own session.

ETI based applications receive information on orders and quotes which were entered in their own session. Several trading groups and traders of the same business unit may share a single session.

3.5 Subscription mechanism

ETI provides information across sessions via a subscription mechanism. This includes trade notifications at a business unit level, the complete order history of standard orders of another session (listener broadcast), and public news messages.

3.6 Full Control in Case of a Failover

A heartbeat mechanism between the participant's application and T7 supports the detection of malfunctions of the underlying trading session between the participant and the Exchange gateway.

ETI does not include any mechanism for automatic failover. Participant applications can implement a failover mechanism of their choice that supports their requirements. Please refer to chapter 5.3 Failover for more information.

3.7 Architecture Throttle

The number of transaction requests transmitted to T7 per pre-defined time interval by each participant session is limited. This is to:

- prevent single participant sessions generating transactions with excessive high frequencies, which might adversely affect the exchange's trading as a whole;
- guarantee fairness between participant sessions.

For more details, please refer to chapter 5.4 Throughput Limits

3.8 Session Login and User Login Throttle

The number of session and user login requests transmitted to T7 per pre-defined time interval is limited. T7 will check both, the number of logins for a certain session and the number of logins for a certain user (via all sessions belonging to its business unit). For both, T7 will count the number of logins (per time interval). If that counter hits the limit, T7 will reject that login request and all the following ones (for either a certain session - session login, or a certain user - user login) within a "cooling" time interval. Then, T7 will re-set the related counter.

4 Service Description

4.1 FIX Semantics

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

Additionally user defined fields (UDF) and messages have been added to cover functional gaps in the FIX standard or to increase performance.

The following changes have been made for performance reasons:

- All rejections and errors on an application and session level are communicated via the FIX standard *Reject (3)* message.
- All parties are identified by individual UDFs instead of repeating groups. UDF tags and names were chosen in a way that supports automated translation to standard FIX repeating groups for parties.

4.2 Party Identification

The **participant** is an entity accessing T7. The Xetra concept of a member remains in place, and will be represented by a “participant” within the new system. When trades are sent to the CCP system, the participant will be replaced by its corresponding member-ID.

A participant may have several **business units** as independent entities taking part in trading at the exchange. Business units are identified by a business unit ID. A business unit belongs to a participant. The Enhanced Trading Interface deals only with the concept of a business unit.

A **user** is a person, e.g. a trader or an exchange market supervisor that interacts with T7. Users are identified by a user ID. A user belongs to one business unit. A user is a trader or administrator that logs on to the system to enter commands on the trading system.

Users can be assigned to a specific **trader group**, along with the *head trader* and *supervisor roles*:

- A user with a user level of head trader may modify or cancel orders of any user belonging to the same trader group
- A user with a user level of **supervisor** may modify or cancel orders of any user belonging to the same business unit.

All requests that are received by the Enhanced Trading Interface (ETI), with the exception of session related requests, must carry the ID of a user that enters the request.

The user of the business unit needs to be provided by the request submitter in the *SenderSubID (50)* of the request header. All orders and quotes must carry the identification of a physical person that is legally responsible for the order or quote.

The following party roles and attributes are used in ETI:

Party	Description	Party Attributes
Participant	The participant is an entity accessing T7.	Participant Short Name
Business Unit	Indicates the company or a part of a company that is set up as an independent entity taking part in trading at T7.	Business Unit ID
User	A business unit can have multiple users. A user can be a trading user and/or an administrator.	User ID

Party	Description	Party Attributes
Owning User	User who owns the transactions.	Owning User ID Owning User Short Name
Entering User	User who initiates/submits the order/quote transaction; could be the head trader or supervisor or a market supervision user.	Entering User ID
Entering Entity	Identifies the entity that entered the transaction; might be market supervision, the participant or the clearing member.	Entering Entity ID Entering Entity Short Name
Trader Group	User can be assigned to a specific trader group.	Trader Group
Session	Identification of the session. A session belongs to a business unit and one market.	Session ID
System	Executing System.	System ID

4.3 Order Identifiers

Participants may choose one of the following **options for order identification**:

- Use a constant client order ID over the complete lifetime of an order, like it is currently supported in the Enhanced Transaction Solution interface.
- Standard FIX policy of client order ID chaining: client order ID must change on every modification and cancellation request.
- Use a constant exchange order ID over the lifetime of an order.

Participants may use the client order ID for order and order related message identification. Modification and cancellation of an order is supported both via the client order ID and the exchange order ID. Once an order has a client order ID, it must have a client order ID for the rest of its life cycle. Respectively an order without a client order ID cannot be modified to have a client order ID later on in its life cycle.

4.3.1 Client Order ID

The FIX standard field *CIOrdID (11)* is used for the client order ID.

Note: T7 will not enforce market participants to use a new *CIOrdID (11)* for application messages related to a resting order; i.e. the *CIOrdID (11)* may stay the same during the life cycle of an order.

The standard FIX policy regarding usage of client order IDs is additionally supported by ETI:

- When modifying or cancelling an order, a new *CIOrdID (11)* must be provided.
- The order to be modified or cancelled is identified with the *OrigCIOrdID (41)*. In this way the customer is able to find and track individual requests by their client order ID.

If a participant changes the client order ID, the uniqueness of *CIOrdID (11)* is checked at entry time among currently live orders for the same instrument and session. Duplicate *CIOrdID (11)* values for the same session and instrument will be rejected with the exception of Immediate or Cancel (IOC) Orders.

4.3.2 Exchange Order ID

The exchange order ID is assigned by the matching engine on order entry and remains unchanged for the entire life time of the order, for example, even an order modify with a change of the matching priority does not result in a change of the exchange order ID.

An exchange order ID is guaranteed to be unique among all orders and quotes of the same product². The FIX standard field *OrderID (37)* is used for exchange order ID.

4.4 Order Handling

4.4.1 Order Types and Restrictions

The following order types and trading-/validity-/execution-restrictions are supported via the ETI:

Order Type/Restrictions	Description
Market	Market orders are visible in the order book for any market participant and have no specific price limit, but are matched to the best available contra-side bid or offer.
Limit	Limit orders include a specific price limit, and may not be executed at a price worse than that limit.
Stop (Market)	Stop market orders create market orders when the specified trigger price is reached. Similar to market orders, stop orders are visible in the order book for any market participant.
Stop (Limit)	Stop limit orders create limit orders when the specified trigger price is reached. Similar to market orders, stop orders are not visible in the order book for any market participant.
Iceberg Order	Limit Order that contains a peak quantity and an overall quantity. The peak quantity can be determined absolutely or randomly. Once the displayed quantity has been completely executed, a new peak is entered into the book. In auction trading, iceberg orders contribute with their overall volume.
Immediate or Cancel (IOC)	An IOC order is to be filled immediately, either completely or to the extent possible; the portion that cannot be filled immediately is cancelled.
Fill or Kill	A Market or Limit order, which is executed immediately and fully or not at all. If immediate and full execution is not possible, the order is rejected without entry in the order book.
Book or Cancel	An order, which is placed as resting liquidity in the order book to ensure passive execution. If immediate (and hence aggressive) execution is possible, the order is rejected without entry into the order book.

² A product is equal to an instrument for the cash market in general. ETFs & ETPs can be grouped as one product.

Order Type/Restrictions	Description
Trailing Stop	A Trailing Stop order is a Stop order whose stop limit is adjusted in accordance with the development of the reference price. Because of the dynamic adjustment of the stop limit the investor does not need to permanently watch the market in order to optimise his stop limit.
One-cancels-the-other	An order that combines the functionality of a limit order and a stop (market) order, expressed as a single order. Traders will specify a limit price and a trigger price as part of one order.
Opening Auction only	Order only valid in opening auctions.
Closing auction only	Closing auction only orders may be entered during the entire trading day, but are only active during the closing auction phase.
Auction only	Order only valid in auctions.
Good-for-day (Day)	Day orders are deleted automatically in the next end-of-day processing.
Good-till-date (GTD)	Order carries a specified date on which the order is automatically cancelled.
Good-till-cancelled (GTC)	Order remains valid until it is executed, cancelled, or if the last trading day is reached.
Persistent	A persistent order is an order that is reinstated at the beginning of the Business Day (if valid for that Business Day) or after a Market Reset.
Non-persistent	Non-persistent orders are automatically cancelled at the end of the Business Day or after a Market reset. They are also cancelled in case of some system events and session connection problems.
Standard	The complete order history can be recovered via retransmission requests. The order data is visible to all low-frequency sessions belonging to the same business unit. Standard orders can be persistent or non-persistent.
Lean	For lean orders, the execution notifications can be recovered (via retransmission requests on the session data channel). All data on lean orders are visible only to the session that submitted the order. Lean orders are always non-persistent.

4.4.2 Cancellation

The owner of an order is the entering business unit, session and user. On behalf cancellation via a different session of the same business unit is supported. Head traders of the same trader group and the supervisor of the business unit may cancel on behalf of the owning user.

Cancelling an order will remove the remainder of a live order from T7's order book.

The participant may either use the *OrigClOrdID* (41, unique per instrument) and the *TargetPartyIDSessionID* (20655) or the *OrderID* (37, unique per product) to identify the corresponding order to cancel. ETI will respond with an *Execution Report* (8) or *Reject* (3) message for confirmation or rejection respectively.

4.4.3 Modification

An order may only be modified if the request comes from the same order user, head trader or supervisor from the same trader group. Modification by another session of the same business unit is only supported for standard orders.

The participant may either use the *OrigClOrdID* (41) or the *OrderID* (37) to identify the corresponding order to modify. The ETI will respond with an *Execution Report* (8) or *Reject* (3) message for confirmation or rejection respectively.

The ownership of the modified order can be modified by the *OwnershipIndicator* (28743). The Short Order Message Layout does not support the change ownership functionality.

Ownership Indicator (28743)	Description
No change of ownership	No change of the orders's ownership. The executing user is not changed.
Change ownership to execution trader	The entering trader becomes the owner of the order, i.e. is now the executing trader.

4.4.4 Total Order Quantity Modification

Participants need to specify the new total order quantity when modifying the field *OrderQty* (38). This approach leads, from a participant's point of view, to a clear and deterministic behaviour by specifying a total execution limit. The previously executed quantity of an order is maintained and is used to calculate the new open quantity. If this is zero or less then the order will be cancelled.

During the lifetime of an order, the total quantity of the order is always equal to the sum of the open order quantity and the accumulated traded quantity:

$$OrderQTY (38) = CumQty (14) + LeavesQty (151)$$

After an order has been cancelled (*OrdStatus* (39) is "4 = Cancelled"), the total quantity of the order is equal to the sum of the cancelled order quantity and the accumulated traded quantity, while the open order quantity is zero.

$$OrderQty (38) = CumQty (14) + CxlQty (84)$$

4.4.5 Self-Match-Prevention (prevention of cross matches)

T7 offers a Self-Match-Prevention mechanism to avoid matching (crossing) of orders and/or quotes of one business unit having the same value in the field *MatchInstCrossID* (28744).

For orders, any Self-Match-Prevention event involved in a transaction is reported in the order response and/or notification by the field *Crossed* (28745) set to "1 = Cross rejected". In the case the order has not been deleted completely (*OrderStatus* (39) is not "4 = Cancelled"), the total order quantity of the order is reduced by the system and must be recalculated by the formulas given in the previous section.

For quotes, a Self-Match-Prevention event is reported in the Quote Execution Notification (10407) by the *QuoteEventReason* (28733) field set to "16 = Cross rejected". If the Self-Match-Prevention event leads to a partial deletion of the quote (*QuoteEventType* (28539) set to "2 = Modified quote side") the deleted quote quantity is given in *QuoteEventQty* (28542).

4.4.6 Order Mass Cancellation

Using the *Order Mass Action Request*, a user can cancel all orders within a specified instrument, user or session scope. The instrument scope can be extended to an entire product. The session scope can be extended to all sessions of the submitting user or may reference a single but different session.

If the *Order Mass Cancellation Request* is rejected by the trading system, no orders have been deleted.

The following filter criteria can be specified:

Filter Criteria: Target Parties	Description
TargetPartyIDExecutingTrader (20612)	Cancel all orders owned by a user ID.
TargetPartyIDSessionID (20655)	Cancel all orders of a session depending on the authorization of the user role.
Price (44)	Price to which limit orders are deleted (only in connection with the Side filter attribute).
Side (54)	Side for which limit orders are deleted (only in connection with the Price filter attribute).

The user may filter on a specific owning session or the session scope can be extended to all sessions of the business unit.

A **head trader** may cancel all orders of any user belonging to the same trader group or for the complete trader group. Additionally the session may be used as filter criteria.

A **supervisor** may opt for the cancellation of all orders of any user, any trader group and any session of the business unit.

The omission of filter criteria results in a mass cancellation request for all orders within the business unit in an instrument.

Note: Mass cancellation confirmation is not provided on a single order or quote level. Using the Filter *Price (44)* and *Side (54)* affects only limit orders (Stop or Market orders are not affected) The owning session will be informed about the scope of the cancellation by a summary record with an exception list. Please find more information regarding unsolicited mass order cancellation in chapter 4.11 Mass Cancellation Notification and Mass Cancellation Events.

4.4.7 Short Order Message Layout

T7 supports order message layouts with reduced message content for: New Order Single (Short Layout) and Replace Order Single (Short Layout).

The reduced payload of these messages, which is similar to quote messages, provides improved latency.

For short order message layouts the following order attributes are implicitly set:

- Lean
- Limit order

The usage of *TimeInForce (59)* in short order message layouts is limited to the following options:

- Good for Day
- Immediate or Cancel (IOC)

Note: Orders entered via New Order Single (Short Layout) may only be modified via Replace Order Single (Short Layout). The combined usage of short and "normal" order message layouts for the same order is not supported.

4.4.8 Order Book Restatement

Order status inquiries are not supported by ETI. Participants must maintain the state of orders based on the *Execution Reports (8)* message.

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

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

Note: Order book restatement messages (and the Trading Session Event messages mentioned above) are recoverable. The owning session can request a retransmission in the event it was not logged on at the time. Order book restatement messages (including the Trading Session Event message mentioned above) are also sent on the listener broadcast. These messages are only visible to LF sessions.

4.5 Quote Handling

4.5.1 Quote Characteristics

A (double sided) quote establishes both a limit to buy and to sell within a single transaction. Quantities to buy and to sell are independent of one another. T7 supports one-sided as well as double-sided quotes.

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

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

Users of one session cannot enter or modify individual quotes of another session.

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

Quotes are non-persistent; they are automatically cancelled in case of:

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

4.5.2 Maintaining Quotes

Quotes are entered using the *Mass Quote* message. A Mass Quote request may contain several single-sided or double-sided quotes for different instruments of the same product.

There can only be one quote for an instrument in a *Mass Quote* message. Actions can be different for each side of a single instrument, for example in a double-sided quote; a trader can cancel one side and replace the other side.

The Client Order ID is not supported for quotes; instead the participant defines a mass quote identifier (*QuoteID (117)*) for each Mass Quote message. The mass quote identifier is provided in each Quote Execution Notification (*QuoteMsgID (1166)*) and Trade Notification (*ClOrdID (11)*).

T7 has two methods for updating quotes:

- Quote Entry
- Quote Modification

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

The two types of quoting models are distinguished by the usage of different values in field *QuoteSizeType (28723)*:

Quoting Model	QuoteSizeType (28723)
Quote Entry	2 = Open Size
Quote Modification	1 = Total Size

Every **quote entry** simply overwrites an existing quote without considering an existing executed quantity. For each quote entry request, the user must specify the new price and the new quantity of the quote side. Under quote entry, there can only be one entry per instrument. If a two sided quote is entered then both sides must be in the same entry.

Accepted quotes are not confirmed in the Mass Quote Response unless additional information needs to be conveyed back to the submitter. The field *QuoteEntryStatus (1167)* identifies the status of quote entries of a Mass Quote that could not be processed as requested.

If an individual quote side of a double-sided quote in a mass quote request is rejected (for instance after the price reasonability check or the extended price range validation), then both sides of the quote for the instrument are not processed, and both sides of the current quote are cancelled; see *Mass Quote Request* message.

If however, the entire mass quote request is rejected, then any old quotes of the session remain unaffected; even if there had been new quotes for the corresponding instruments in the rejected mass quote request.

Participants may define via the Admin GUI trade enrichment rules for text fields applied to trades resulting from quote executions.

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

The priority timestamp of a quote stored in the order book is preserved when the price is left unchanged and the open quote quantity is not strictly increased. Like for orders, when price and quantity are not modified, the priority timestamp is also preserved. In all other cases, the priority timestamp is refreshed.

To **cancel** a quote side, the quote quantity must be set to zero and the limit price field must be omitted. Only quotes entered via the same session can be cancelled with the *Mass Quote Request (i)*.

Quote mass cancellation functionality is provided via *Quote Mass Cancellation Request*. With the help of this request it is possible to cancel all own quotes in a product as well as all quotes in a product of another session belonging to the same business unit. Please find more information regarding unsolicited mass cancellation in chapter 4.11 Mass Cancellation Notification and Mass Cancellation Events.

4.5.3 Quote Activation/Inactivation

Quotes are inactivated by setting the status “quotes inactive” on the applied scope. In this case the system will hide all inactive quotes from trading. Quote activation is not meant to be used for liquidity taking trading strategies.

When “quotes inactive” is set for a session on a specific scope, none of the quotes of that session for that scope participate in matching nor are visible in the order book depth. The trader can continue to add, modify, and cancel individual quote sides for this session and scope, while all these quotes neither participate in matching nor are visible to the market.

The participant may set the status “quotes inactive/quotes active” for a session and scope using the message *Quote Activation Request* and specifying *MassActionType (1373)*.

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

Note: The processing of the Quote Activation Request (for activation) will be slowed down by the core system. As a consequence, the first-in/first-out principle for a certain instrument of a transaction set including a Quote Activation Request (for activation) is not guaranteed any more.

The processing of the Quote Activation Request (for inactivation) will not be slowed down.

4.6 Trade Notifications

If subscribed to the Trade broadcast (see chapter 6.9 Broadcast), a session will receive *Trade Notification* messages that confirm each trade for the entire business unit.

Notifications about trades are only provided on the T7 architecture via *Trade Capture Report (AE)* messages. Information provided via *Execution Reports (8, U8)* is indicative only and needs to be confirmed via a *Trade Capture Report (AE)*. For further details see chapter 6.10.2 Preliminary Execution Report and Legally Binding Trade Notifications.

T7 will send out *Trade Notification* messages for each order and quote execution to the parties involved in the trade.

4.7 Cross request

A cross trade is a trade where a participant trades against an own order in the order book. In a pre-arranged trade, orders from at least two participants are executed against each other as previously negotiated. Participants wanting to consciously enter cross and pre-arranged trades into T7, must precede them with the entry of a cross request.

A trader sends *the Cross Request* message which is then published via the market data interfaces to all other participants, to alert them of the intention to trade with an own order or to conduct a pre-arranged trade.

The cross request contains the security identification and the *OrderQty* (38), which is mandatory for regulatory reasons. The quantity is valid for both sides of the cross request.

4.8 Listener Broadcast

T7 offers 'drop copies' for standard orders (not lean orders) to sessions within the same business unit. This service is provided on session level; for example each listener session may subscribe to listener broadcast data of one specified session or all sessions of a business unit.

The parallel subscription to listener data of more than one session of a business unit is supported.

The listener broadcast provides information of the complete order history of standard orders of a session and can be retransmitted.

Complete order history means here: all changes to an order happening on the current business day.

4.9 News

The *News* message provides public information from market supervision.

This public stream provides a unique sequence number to support retransmission, i.e. news messages are recoverable. The retransmission protocol includes the access to historical news, i.e. there is no cut at the end of the business day.

4.10 Service Availability

The *Service Availability* message provides information on the availability of all services on different partitions. Retransmission is not supported for this stream, i.e. service availability messages are not recoverable.

Subscription is handled via the *Subscribe* message. As filter criteria for subscription a single partition or all partitions may be specified. The *Subscribe Response* message confirms the subscription followed by *Service Availability* messages providing the current status of all services on all partitions. Any status change of a service would then be communicated via a new *Service Availability* message.

The following three services reside on a partition:

- *MatchingEngineStatus* (25005): Order/Quote Management service - informs if trading is active for a grouping of products.
- *TradeManagerStatus* (25006): Trades service - informs about the availability of the retransmission service of trades for a grouping of products.
- *AppSeqStatus* (28732): Retransmission of Order/Quote Events service - informs about the availability of the retransmission services for order and quote events (session data and listener data) for a grouping of products.

In addition to the (availability) status, the current business day of the related service is provided. The business day defines the visibility scope for retransmission data. Only data related to the current business day can be requested for retransmission. The ETI Gateway rejects requests if their target service is not available on the respective partition. If a request has no target service, the request processing is independent of the published service states.

If a certain service on one or even on all partitions becomes unavailable, the system will

- NOT logout any user
-

- NOT logout any session
- NOT cancel any subscription
- NOT delete any orders (persistent or non-persistent) or quotes

4.11 Mass Cancellation Notification and Mass Cancellation Events

Mass cancellation notification is not provided on a single order or quote level. The FIX message format *OrderMassActionReport (BZ)* is used for responses and notifications. The owning session will be informed about the scope of the cancellation by a summary record. The summary record will also provide the entering parties involved and the reason for the mass cancellation.

Orders that couldn't be cancelled due to an incompatible instrument state are provided with their client order ID (*NotAff OrigClOrdID (1372)*) and Exchange Order ID (*NotAffectedOrderID (1371)*) in the *<NotAffectedOrdersGrp>*.

Instruments where quotes couldn't be cancelled due to an incompatible instrument state are provided with their Instrument ID (*NotAffectedSecurityID (28702)*) in the *<NotAffectedSecuritiesGrp>*.

T7 informs additionally about events that implicitly led to the mass cancellation of orders or quotes via the *Mass Cancellation Event* message.

4.12 Trading Session Events

Trading session events triggered by T7 are communicated to **all** trading and listener sessions via the *Trading Session Event* message. It is part of the session data stream and the listener data stream, regardless if orders or quotes were entered for an instrument by the session.

Trading session events might imply mass cancellation events, where no explicit mass cancellation notifications are provided; for details see the following table:

Trading Session Event	Level	Persistent Orders	Non-persistent Orders	Quotes
Start of Service	Partition	No	Yes	Yes
Market Reset	Partition	No	Yes	Yes
End of Restatement	Product	N/A	N/A	N/A
End of Service	Partition	No	Yes	Yes
Service Resumed	Partition	N/A	N/A	N/A

For all Trading Session Event messages to be sent out on Partition level (see above) the field *MarketSegmentId* is not set.

4.13 Timestamps

All ETI timestamps will provide date and time, in UTC, represented as nanoseconds past the UNIX epoch (00:00:00 UTC on 1 January 1970).

ETI provides the following timestamp information:

Timestamp	Description
Transaction timestamp	Taken when a transaction is functionally processed and used as a unique message identifier per product for messages sent by ETI. <i>ExecID (17)</i> maps to <i>MDEntryTime (273)</i> in EMDI for order and quote events.
Entry timestamp	Time of the creation of the order. It will be set when an order is received and processed by the Matching Engine. This timestamp is only provided for Standard Orders.
Priority timestamp	Is initially set to the entry timestamp and then gets re-stamped when the order loses time priority, see chapter 4.4.3 Modification. This timestamp is only provided for Standard Orders.
Creation timestamp	Creation Time of a strategy, respectively of market supervision News.
Gateway request in	Provides the time the application has read an inbound message on a gateway from the TCP socket.
Gateway request out	Provides the time the application has sent an outbound message from a gateway to the matching engine.
Gateway response in	Provides the time the application has received an inbound response message on a gateway from a matching engine.
Gateway response out	Provides the time the application has written an outbound message on a gateway to the TCP socket
Matching engine in	Provides the time the application has received an inbound message on a matching engine.
Matching engine out	Provides the time the application has sent an outbound message from a matching engine.
Gateway notification in	Provides the time the application has received an inbound notification message on a gateway from a matching engine.

5 Connectivity and Session Parameters

5.1 Session Concept

ETI is a session oriented interface whereby the session is the basic scope of the interaction with the T7 architecture. Several users may share a single session, but every session may only be instantiated once. Each TCP/IP connection may only support one session instance.

The receiver of the direct response to a request sent to the gateway is always the submitting session. Additionally the session is informed about system events and all unsolicited messages referring to status changes of orders and quotes belonging to that session.

ETI supports three session types: low frequency sessions for regular trading, low frequency session for back office, and high frequency session.

The following table provides an overview on the functionality supported by the different session types:

Functionality	Low Frequency Session (LF) – Regular Trading	Low Frequency Session (LF) – Back Office	High Frequency Session (HF)
Standard Order	Yes	No	No
Lean Order	Yes	No	Yes
Persistent Order	Yes	No	No
Non-persistent Order	Yes	No	Yes
Order Book Restatement	Yes	Yes	No
Short Order Message Layouts	Yes	No	Yes
Quotes	Yes	No	Yes
Maintaining orders of another session (same business unit)	Yes	No	Yes
Maintaining Quotes of another session (same business unit)	Yes	No	Yes
Listener Broadcast	Yes	Yes	No
Trade Broadcast	Yes	Yes	No
Trade Reversals	Yes	Yes	No
News Broadcast	Yes	Yes	No
Risk Control Broadcast	Yes	Yes	Yes
Service Availability Broadcast	Yes	Yes	Yes
Session List Inquire	Yes	Yes	No
User List Inquire	Yes	No	Yes
Trade Enrichment List	Yes	Yes	Yes

5.1.1 Low Frequency Session (LF) – Regular Trading

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

Modification for another session of the same business unit is only supported for standard orders.

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

5.1.2 Low Frequency Session (LF) – Back Office

This session type supports only a subset of the Regular Trading Low Frequency Sessions. In particular it does not support order management functions.

Please refer to the table above for the details.

5.1.3 High Frequency Session (HF)

This session type is aimed at high frequency trading; only executions of orders and quotes and foreign events may be recovered.

The submission of standard and orders is not supported by this session type.

The HF session type does not support the subscription of the broadcasts listener, trades, and news.

Mass cancellation and quote activation/inactivation for another session is supported.

5.2 Identification and Authentication

ETI has a three-step logon procedure, with a *Connection Gateway Request* message to retrieve the assigned application gateway from the connection gateway, followed by a *Session Logon* at the assigned gateway and followed by one or multiple *User Logon* messages.

5.2.1 IP Addresses and Ports

At first the participant must establish a TCP/IP session to the Connection Gateway — the IP/port numbers are provided by the exchange. Participants will be provided with a "Primary" and "Secondary" Connection Gateway address via the participant portal. If the connection to the primary Connection Gateway fails, participants should connect to the secondary Connection Gateway.

Once that connection is established, the participant sends a Connection Gateway Request message. The Connection Gateway will validate *PartyIDSessionID (20055)* and *Password (554)*, which are parameters provided by the exchange. The Connection Gateway cannot be used for any other purpose.

The Connection Gateway Response contains the IP/Port of the primary and secondary application gateway where the participant application can establish an active ETI session. Once the Connection Gateway Response message is received, the Connection Gateway connection is closed.

The participant must now try to connect to one of the provided application gateways within 120 seconds. If the connection is not made within this time, the slots are released and the participant must start again from scratch.

5.2.2 Session Authentication

After requesting the Application Gateway addresses and ports the participant must open a TCP/IP connection to the specified gateway. The *Session Logon* message must be the first message sent by the participant authenticating the ETI session.

The gateway will validate *PartyIDSessionID (20055)* and *Password (554)*, which are parameters provided by the exchange. A successful logon will initiate an ETI session.

Note: The Session Logon message is not used to log on and authenticate a user on T7.

The following messages may be sent on a session without any authenticated trader:

- Session logon/logout
-

- Heartbeat messages
- Subscription and un-subscription of broadcasts
- Retransmission of recoverable data
- Trader authentication
- Session List Inquire
- User List Inquire
- Trade Enrichment List Inquire

All other requests must be submitted with an authenticated trader name in the *SenderSubID (50)* of the message header.

5.2.3 User Authentication

The *User Logon* message identifies and authenticates a qualified user establishing access to the T7 architecture. An ETI session may be shared by several traders belonging to the same business unit.

The participant must provide the binary **User ID** in the *Username (553)* field, and the corresponding password in the *Password (554)* field.

A successful user logon will grant the user access to the trading system. All further transactions that require a user scope from the session are validated in the gateway against an authenticated User ID, i.e. *SenderSubID (50)* in the message header.

Users may logon to the T7 architecture via all sessions of their business unit.

Multiple User Logon messages for a user via the same session are rejected.

Note: ETI uses binary identifiers for users (User ID) and business units (Business Unit ID). A mapping to the current Member (Business Unit Short Name) and Trader ID (User Login Name) is available in the Admin GUI.

5.3 Failover

In the event of a network connection failure, active ETI sessions will be disconnected from the gateway. There will be no automatic session failover if a connection to the gateway is lost.

In the event of an ETI gateway failure, active sessions will be disconnected.

If the active ETI session is ever disconnected, for any reason, the participant application must reconnect to the Connection Gateway by resending the Gateway Request message, and then receives a new gateway assignment.

Please note, that quotes and non-persistent orders (both, lean and standard ones) are automatically deleted in such cases.

5.4 Throughput Limits

HF and LF sessions differ in the number of requests per time interval allowed.

A participant application may send multiple messages without waiting for a response. However, the number of messages allowed within a given timeframe, is limited by the use of throttles.

The limits are configured by T7 for each session type, and are provided to the participant application in the *Session Logon Response* message.

The limit parameters are upper limits and do not guarantee throughput rates.

The throttle mechanism uses three components:

- Transaction limit
- Reject/disconnect limit
- Time interval

5.4.1 Transaction Limit

The transaction limit is the maximum number of messages that a participant application may send within a configured time interval without getting rejected (sliding window approach).

If a participant application exceeds the threshold “number of transactions per time interval”, the exceeding request will be rejected and not queued. The unit of the time interval is milliseconds.

Required heartbeats do not count against the transaction limit.

For example, a transaction limit of 200 messages per second could be represented in the Logon (A) response message as:

ThrottleNoMsgs (1613) = 200

ThrottleTimeInterval (1614) = 1000

5.4.2 Reject/Disconnect Limit

The purpose of the Reject/Disconnect Limit is to protect the gateway from large amounts of invalid data. It defines the maximum number of sequential message rejects due to the violation of the transaction limit allowed by ETI. Once an acknowledgement has been sent, the reject/disconnect limit counter is reset to zero.

If the participant application continues to send messages which are rejected for exceeding the transaction limit and when the disconnect limit is exceeded, ETI will terminate the session. For example, a disconnect limit of 500 rejects is represented in the Logon (A) response message as: *ThrottleRejectNoMsg (25002) = 500*.

5.5 Mass Cancellation on Disconnect

Quotes and non-persistent orders are automatically cancelled on session disconnect.

In case of a session loss or a session logout the following messages will be generated for all instruments where the Matching Engine cancelled non-persistent orders (either lean or standard orders) and/or quotes of the lost session:

- Order Mass Cancellation Notification (retransmittable, via listener broadcast and session data) for cancelled non-persistent orders (*MassActionReason (28721): 6 = “Session Loss”*). Potentially followed-up by Cancel Order Notification messages for each order of `<NotAffectedOrdersGrp>` that could not be cancelled due to an incompatible instrument state.
- Quote Mass Cancellation Notification (non-retransmittable, via session data) for cancelled quotes (*MassActionReason (28721): 6 = “Session Loss”*). Potentially followed-up by Quote Execution Notification (retransmittable, via session data) messages for each quote on an instrument in `<NotAffectedSecuritiesGrp>` that could not be cancelled due to an incompatible instrument state.

5.6 Mass Cancellation on Duplicate Session Login

Quotes and non-persistent orders of a session are automatically cancelled if the session tries to login again via a new connection to a gateway.

In such a scenario, the already logged in session stays logged in while the second session login (via a different connection) is rejected. The following messages will be generated for all instruments where the Matching Engine cancelled non-persistent orders (either lean or standard orders) and/or quotes of the session:

- Order Mass Cancellation Notification (retransmittable, via listener broadcast and session data) for cancelled non-persistent orders (*MassActionReason (28721): 7="Duplicate Session Login"*). Potentially followed-up by Cancel Order Notification messages for each order of <NotAffectedOrdersGrp> that could not be cancelled due to an incompatible instrument state.
- Quote Mass Cancellation Notification (non-retransmittable, via listener broadcast) for cancelled quotes (*MassActionReason (28721): 7="Duplicate Session Login"*). Potentially followed-up by Quote Execution Notification (retransmittable, via session data) messages for each quote on an instrument in <NotAffectedSecuritiesGrp> that could not be cancelled due to an incompatible instrument state.

6 Session Layer

ETI uses a proprietary session layer. ETI follows FIX 5.0 semantics; however the messages headers and trailers have been modified to improve efficiency.

Each message in ETI has a unique numeric message id assigned to it in addition to the standard FIX *MsgType* (35) information provided in the header.

ETI will echo the participant's *MsgSeqNum* (34) of the request header in the corresponding response header.

6.1 Flat Binary Encoding

ETI messages have a defined order of fixed-length fields and arrays of fixed-length elements. ETI avoids string operations where possible.

The arrays (repeating groups) consist of a counter (FIX NoXXX fields, indicating the number of array elements) and their fixed-length elements. In general, repeating groups are at the end of ETI messages.

Binary values are presented in little endian byte order.

The length of ETI messages (*BodyLen* (9)) sent by the ETI gateway is always set to a multiple of 8. If there is a variable size string at the end of a message, it is "filled up" with binary zeroes.

Padding bytes required for proper alignment do not need to be initialized.

6.2 Logon

The participant application needs to open a TCP/IP connection to the T7 during start-up.

The first message to be sent on the connection must be the *Session Logon* message.

If the *Session Logon* message is sent within a certain time interval, the connection will be closed by the T7 architecture.

If the session logon fails, no further logon attempts will be accepted on that TCP connection. The application must drop the TCP session and restart the logon to the Connection Gateway.

6.3 Logout

The participant may log out the session using the *Session Logout* message.

ETI will automatically drop a session if:

- The TCP/IP session is disconnected
- If three consecutive heartbeats are missed or on receipt of too many Heartbeats
- If throttle reject/disconnect limit is exceeded
- In case of severe protocol errors

After a successful session logout, the participant should shut down the connection and close the socket.

The system will perform a forced logout overnight after which time the participant may log back in.

6.4 Heartbeat

The *HeartBtInt* (108) must be specified by the participant in the *Session Logon* message. This parameter specifies the period in which ETI sends heartbeats to the participant and the interval ETI checks for request messages from the application.

The Heartbeat message should be sent by the participant if no other message has been processed during the defined *HeartBtInt* (108) interval. It is used by the ETI gateway to monitor the status of the communication link to the ETI client during periods of inactivity.

A heartbeat interval of zero indicates that ETI will not take any action for missed heartbeats. This setting can only be used on test systems.

The minimum value is 100 milliseconds in the production system. The upper limit is 60 seconds.

If the field is not supplied, then ETI will use a default value. The applied heartbeat interval is provided in the *Session Logon* Response.

Note: Heartbeats do not count against any of the throttle counters. Anyhow, a session sending too many heartbeats is disconnected by the system.

The *Heartbeat Notification* is sent by ETI based on the heartbeat interval, regardless if the participant application sends Heartbeat messages or not. It may be used by the ETI client to monitor the status of the communication link to the ETI gateway during periods of inactivity.

6.5 Reject

All rejections and errors on the application and session level are communicated via the FIX standard *Reject* (3) message; i.e. none of the fields in the request message other than *MsgSeqNum* (34) will be echoed.

6.6 Message Sequence Number

The *MsgSeqNum* (34) in the request header must increment with each message sent by the participant to the gateway, starting with the *Session Logon* message as sequence number 1.

ETI will echo the participant's *MsgSeqNum* (34) of the request header in the corresponding response header.

In case of any unexpected sequence numbers, sequence number gaps, or duplicate sequence numbers, the request message will be rejected with a sequence number error, and the session will be disconnected.

Note: There is no recovery mechanism for message sequence numbers in ETI. All participant connections (including a reconnection after a disconnection) are considered "new," and all *Session Logon* requests are expected to contain the message sequence number 1.

6.7 Application Message Sequencing

6.7.1 Application Message Identifier

All recoverable session and listener data sent by ETI will provide an application message identifier, *AppMsgID* (28704), to uniquely identify order and quote related data sent by the gateway.

With the help of the application message identifier, the participant is able to ask for a retransmission of recoverable order/quote data.

The same message application message identifier is also provided in the Listener Broadcast (standard order drop copy).

The *AppMsgID* (28704) has the following characteristics:

- It is unique per partition and business day.
 - It is ascending during a business day until end-of-stream.
-

- Gap detection is not possible.
- It does not start at any particular number.
- Consists of 16 bytes, ordered with the highest significant byte first (as in big endian).

Memory comparison functions such as `memcmp()` can be used to compare two Application Message Identifiers:

- Two Application Message Identifiers `AppMsgID1` and `AppMsgID2` are equal, if the character array of size 16 of `AppMsgID1` and `AppMsgID2` is equal at all positions.
- The `AppMsgID1` is greater than `AppMsgID2`, if at the first differing position `i`, the corresponding character `AppMsgID1[i]` is greater than `AppMsgID2[i]`.
- The `AppMsgID1` is less than `AppMsgID2`, if at the first differing position `i`, the corresponding character `AppMsgID1[i]` is less than `AppMsgID2[i]`.

6.7.2 Application Message Sequence Number

ETI will assign an application message sequence number, the *AppSeqNum* (1181), to messages related to Trade Notification, News and Risk Control Events (Risk Notification and Entitlement Notification).

The *AppSeqNum* (1181) has the following characteristics:

- The first message will be the message sequence number 1.
- It is ascending during a business day until end-of-stream (Trade Notification).
- The message sequence will be gapless and allows gap detection.
- Trade notification: unique per business day, partition and business unit.
- News: unique per market.
- Risk Control: unique per business unit.

6.8 Session Data

Each session receives information on orders and quotes which were entered in their own session automatically without any subscription. The Session Data include Trading Session Event messages: start of service, market reset, end of restatement (for LF sessions only), and end of service.

For standard orders the complete order history may be recovered.

For lean orders and quotes only match events in the session scope may be recovered.

Session Data are recoverable, if and only if they have an *AppMsgId* (28704).

The complete history for standard orders is distributed via the listener broadcast, too. In these cases, both messages for (session and listener data) will have the same *AppMsgId* (28704).

Note: The retransmission message template used for order and quote events may differ from the session data response template.

6.9 Broadcast

A broadcast is an application message that is available to multiple sessions, such as Trades or News messages.

Sessions may receive the following broadcast types:

Broadcast	FIX Message Type	Application Identifier (1355)	Broadcast Message Identifier
Listener: complete order history of standard orders of a session	Execution Report (8), Trading Session Status (h), Order Mass Action Report (BZ)	5	AppMsgID (28704)
Trades: Trade data on business unit level	Trade Capture Report (AE)	1	AppSeqNum (1181)
News: Public general messages from market supervision	News (B)	2	AppSeqNum (1181)
Risk Control: Private risk control messages	Party Risk Limits Update Report (CR), Party Entitlements Update Report (CZ)	6	AppSeqNum (1181)
Service Availability: Provides information on the availability of service on a partition	User Notification (CB)	3	N/A

After a session is established, it is not subscribed to any broadcast, but the risk control broadcast; nevertheless unsolicited session data is received.

For broadcast subscription, the *Subscribe* message is used. Per request only one broadcast type, via *RefAppID (1355)*, may be subscribed. The response provides a unique subscription identifier in *AppSubID (28727)*.

For broadcast un-subscription, the *Unsubscribe* message is used. Per request only one subscription, via *RefAppSubID (28728)*, may be un-subscribed.

The following table shows the results of different subscriptions:

RefAppID (1355)	SubscriptionScope (25001)	Result
Trade (1)	0xFFFFFFFF (no value)	All trade data of the own business unit.
News (2)	Market ID	All public general messages from the market supervision of the specified market.
Service Availability (3)	Partition ID	Availability of the services provided by the specified partition.
Service Availability (3)	0xFFFFFFFF (no value)	Availability of the services provided by all known partitions.
Listener Data (5)	Session ID	Complete history of standard orders (of the current business day) submitted via the specified session.
Listener Data (5)	0xFFFFFFFF (no value)	Complete history of standard orders (of the current business day) of the own business unit.

Note: Broadcasts may only be subscribed by LF sessions with the exception of service availability, which are available on HF and LF sessions. The receipt of the risk control broadcast is required by the regulator for all sessions; therefore no subscription is needed.

The FIX Application Sequencing concept³ is used for broadcasts on ETI:

- Each broadcast type is assigned a unique *AppID (1180)*.

³ See FIX 5.0 SP2 Specification, Vol.1

- Application-level messages are uniquely identified using a combination of *AppIID* (1180) and *AppSeqNum* (1181) or *AppIID* (1180) and *AppMsgID* (28704) respectively.

6.10 Recovery

6.10.1 Retransmission

Re-transmission is supported for recoverable session data and the broadcast types listener, trades, news, and risk controls.

Since application message identifiers and sequence numbers are unique per partition, the *PartitionID* (5948) is a mandatory parameter for all retransmission requests.

For retransmission, the *Retransmit* and *Retransmit (Order/Quote Event)* message is used respectively.

With a re-transmission request, only data in the scope of one broadcast type and partition can be requested via *RefAppIID* (1355) and *PartitionID* (5948).

The FIX application level recovery concept can be used by the participant for selective recovery and late start restatements:

Recoverable Data	Scope	Application Message Sequencing	Application Identifier RefAppIID (1355)	Retransmission Sequencing
Recoverable session data	session	AppMsgID (28704)	4	ApplBegMsgID (28718), ApplEndMsgID (28719)
Listener broadcast (standard order drop copy)	session	AppMsgID (28704)	5	ApplBegMsgID (28718), ApplEndMsgID (28719)
Trades	business unit	AppSeqNum (1181)	1	ApplBegSeqNum (1182), ApplEndSeqNum (1183)
News	market	AppSeqNum (1181)	2	ApplBegSeqNum (1182), ApplEndSeqNum (1183)

Optionally, the application message identifiers and respectively the application message sequence numbers provide the retransmission sequencing range. If no start value is specified, it is assumed to be "1". If ending range is absent, it is assumed to be infinity ("all available messages").

The re-transmission response, *Retransmit Response* and *Retransmit response (Order/Quote Event)* message respectively, will provide the range of recovered order and quote data in the fields *ApplBegMsgID* (28718) and *ApplEndMsgID* (28719) and for all other broadcasts respectively in the fields *ApplBegSeqNum* (1182) and *ApplEndSeqNum* (1183).

This range may differ from the requested range, i.e. further retransmission requests may need to be submitted.

Please note, Risk Control and News messages are not deleted at the end of the trading day.

If you specify *ApplBegSeqNum* (1182) with no value in your retransmit request, you may receive old Risk Control/News messages in your retransmit response, where the data relates to a trading day from the past.

Please check the value of the field

- *OrigTime* (42) in case of News (*TemplateID* 10031),
- *TradeDate* (75) in case of *Entitlement Notification* (10034), *Risk Notification* (10033) and *Party Action Report* (10042).

This value indicates the date when either the respective risk data event has occurred or the respective news has been created and can therefore be used as a filter.

6.10.2 Preliminary Execution Report and Legally Binding Trade Notifications

All order and quote response information in ETI is sent out immediately after the order/quote has been processed by the core matching process.

All order and quote response information in ETI is preliminary; this includes *Execution Reports (8)* sent out for persistent and non-persistent orders as well as *Quote Execution Reports (U8)* sent out for quotes. This is also true for the standard order drop copy information published via the Listener broadcast.

Note: Market data on T7 is based on order and quote execution information. The T7 MDI, EMDI and EOBI interfaces provide trade price messages on the basis of this preliminary information.

For these reasons, a participant application always needs to confirm the preliminary execution information with the corresponding legally binding *Trade Notification* message (*Trade Capture Report (AE)*).

In case of an exchange system failure, the participant is informed of a market reset event via the *Trading Session Event* message including the last persisted application message identifier. This message is followed by an order book restatement of all active orders.

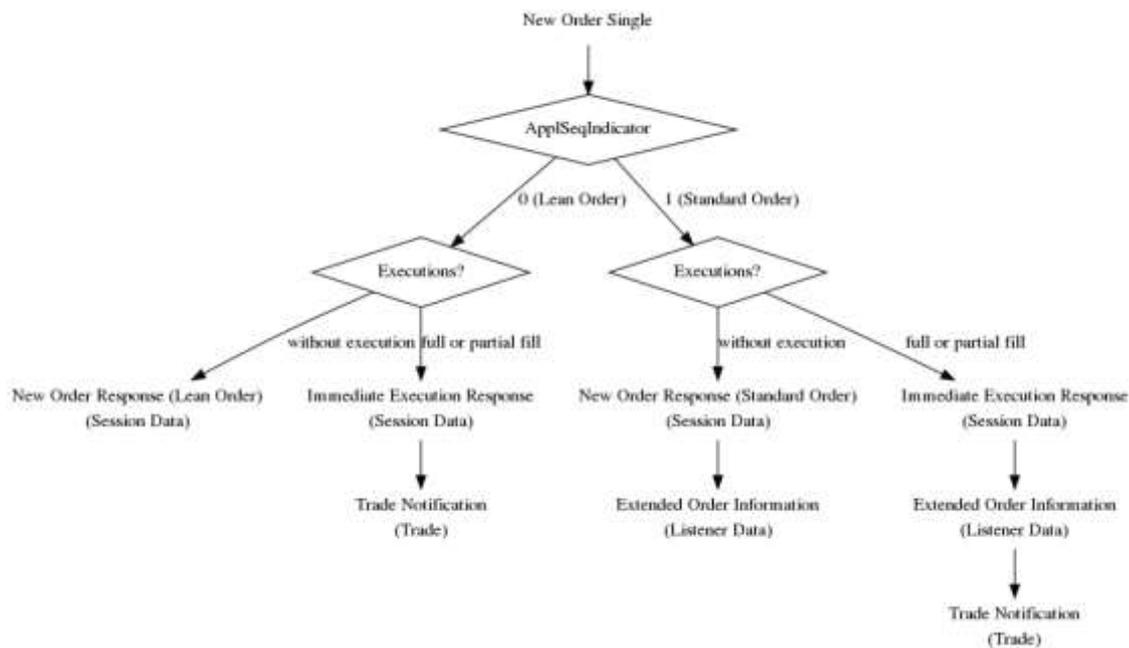
In this event it is highly recommended to reconcile all *Execution Reports (8, U8)* with higher application message identifiers with the corresponding *Trade Capture Reports (AE)*. If there is no *Trade Capture Report (AE)* for a given *Execution Report (8)* or a *Quote Execution Report (U8)* then this *Execution Report (8, U8)* has to be considered invalid and should be discarded.

7 Appendix

7.1 Message Flows

7.1.1 Enter Order

The following example message flow shows the entry of an aggressively matching order:



Each successful order entry will be answered by the Gateway with the *Execution Report (8)* message indicating *OrdStatus (39)* and *ExecType (150)*. In case of an immediate match, the fill details (i.e. prices, quantities and IDs) of all partial executions (*<FillsGrp>*) will be provided as well.

The *Execution Report (8)* message within the session submitting the request will not completely contain the order data sent by the participant. The participant application should record the details of each sent order. The field *MsgSeqNum (34)* in the response header contains the message sequence number of the original *New Order Single (D)* request.

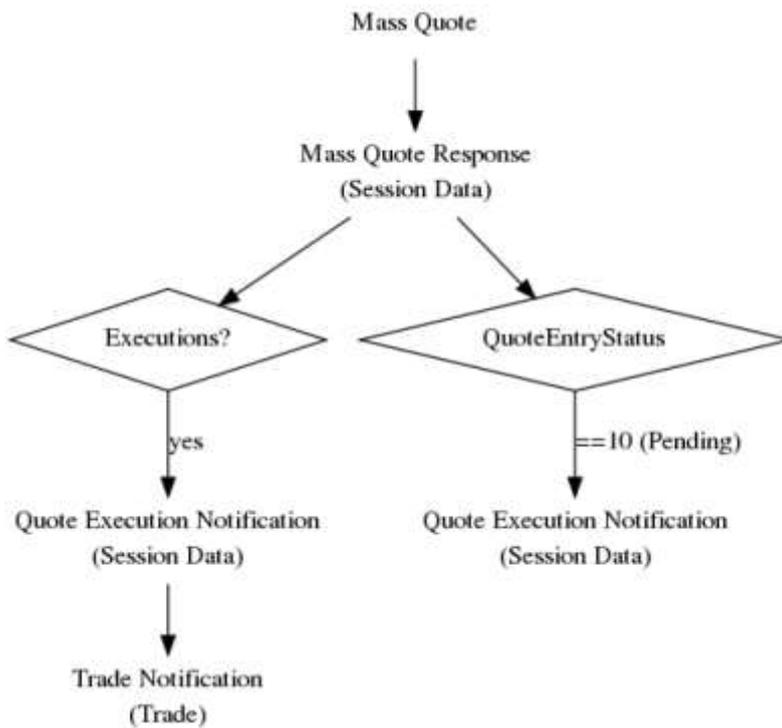
Note: For standard orders the listener broadcast will contain the complete data of the original order.

The message key *AppMsgID (8704)* is always provided for standard orders, (*AppSeqIndicator (8703)* = 1); hence the complete order history is recoverable.

For lean orders, (*AppSeqIndicator (8703)* = 0), a message key is only provided in the response of the order entry in case the order has been immediately executed. Regarding lean orders only executions and unsolicited messages are recoverable

7.1.2 Enter Mass Quote

The following example message flow shows the entry of a mass quote request which results in the immediate execution of its quote items. This message is sent to the service "Order and Quote Management".



Each successful mass quote entry will be answered by the gateway with the *Mass Quote Acknowledgement (b)* message indicating that the quote has been accepted (*QuoteStatus (297) = 1*). The *Mass Quote Acknowledgement (b)* message will not echo at all the quote data sent by the participant. The participant application should record the details of each sent quote. The field *MsgSeqNum (34)* in the response header contains the message sequence number of the original *Mass Quote (i)* request message.

When a quote is matched, an *Execution Report (U8)* message is sent to the owning session. The field *QuoteResponseID (693)* contains the *QuoteID (117)* of the quote. The message key *AppMsgID (8704)* is provided in the *Execution Report (U8)* message to enable retransmission of quote match events.

7.2 Enhanced Transaction Solution Delta

The following table provides an overview of the main areas where the T7 ETI differs from the Xetra Enhanced Transaction Solution.

Category	Area	T7 ETI
General concepts	Legally binding trade information	Only Trades (Trade Capture Report (AE)) are legally binding; executions reported via Execution Reports (8, U8) are only a preliminary indication and need to be confirmed via Trade Capture Reports (AE).
	Ownership of data	Orders: User Quotes: Session
	Recovery	No State recovery (inquiry) is supported; Order book replay at start-of-day and in case of market reset in addition to retransmission recovery.
	Notifications	Execution Report (8, U8) message will not completely echo the order/quote data sent.
Session Parameters	Session concept	LF and HF sessions with different throughput and supported functionality.
	Session authentication	Business unit, user id and password required.
	Mass Cancellation on Disconnect	On session disconnect all non-persistent orders and quotes will be deleted.
Session Layer	General	Proprietary session layer using FIX semantics.
	Message header	Three types of headers: Request, Response and Notification.
	Reject	All sessions and application rejects are communicated via FIX standard <i>Reject</i> (3) message.
	Message Sequence Number	Participant needs to increment <i>MsgSeqNum</i> (34) in request header with each message; echoed by Gateway in response.
	Message Key	Order/Quote status: unique message key does not support gap detection; only provided for order/quote data that may be retransmitted.
Syntax	Encoding	Flat Binary encoding.
	Data types	New data types; some ETS data types have become obsolete.
Semantics	Messages and Fields	FIX V5.0 SP2 semantics including all officially approved extension packs. Additional messages and fields wherever FIX does not provide the required functionality. These will be submitted for official approval over time.
	Message Flow	In general the standard FIX standard message flow is supported; with the exception of rejects.
Functionality	Party identification	Uses the concept of business units for ownership of sessions, broadcast distribution, session authentication.

Category	Area	T7 ETI
	Order ID policy	Three options for order identification: Status quo: use a constant client order ID over the complete lifetime of an order. Standard FIX policy of client order ID chaining: client order ID must change on every modification and cancellation request. Use the exchange order ID.
	Mass cancellation	Cross session deletion is supported for head traders and supervisors.
	Order book restatement	New: provided in case of a market-reset.
	Quote inactivation	New functionality.
	Quote lifecycle concept	New functionality.
	Listener broadcast	New functionality.
	News broadcast	New functionality; currently provided via VALUES API
	Timestamps	Additional timestamp information: entry timestamp and priority timestamp
	Reference Data	Not supported
	Trade Inquiry	Not supported

8 Change log

The document contains the following changes compared to the previous versions.

No	Chapter, page	Date	Change
1	General	30.09.2016	Initial version