T7 Release 5.0

Derivatives Markets

Participant Simulation Guide

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Abstract

This document describes the timeline, new and changed features as well as simulation focus days for the T7 Release 5.0 Simulation. The T7 Release 5.0 Simulation includes the environments 95 (for all derivatives exept FX futures) and environment 75 (FX Futures and FX Rolling Spot Futures). Derivatives trading participants should use this document to plan and prepare their T7 release 5.0 simulation participation for both environments. If not announced specifically liquidity provision and focus days are offered exlusively in environment 95. This document should be read alongside the **T7 RELEASE 5.0 PRELIMINARY RELEASE NOTES**, all required technical interface descriptions, the regular **SIMULATION CALENDAR** and the regularly updated **IMPLEMENTATION NEWS** on www.eurexchange.com > Technology.

Keywords

T7 Enhanced Trading Interface, T7 Enhanced Market Data Interface, T7 Enhanced Order Book Interface, T7 Extended Market Data Service, T7 Reference Data Interface, T7 FIX Gateway, Common Report Engine, T7 Trader GUI, T7 Admin GUI, GUI Administration and Restart, T7 Entry Services, T7

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Definitions and abbreviations

Term	Explanation
CEF®	Deutsche Börse Group Real Time Data Feed
CRE	Common Report Engine
EMDI	T7 Enhanced Market Data Interface
EOBI	T7 Enhanced Order Book Interface
ETI	T7 Enhanced Trading Interface
FIX	Financial Information eXchange protocol
FIXML	Financial Information Exchange Mark-up Language
ISV	Independent Software Vendor
GCM, DCM, NCM	General-, Direct-, Non-Clearing member
MDI	T7 Market Data Interface (netted)
TES	T7 Entry Services
T7	T7 trading system developed by Deutsche Börse Group
RDF	Reference Data File
RDI	Reference Data Interface
SMP	Self-Match Prevention
XML	eXtensible Mark-up Language

1. Simulation Overview

1.1 Introduction

The purpose of T7 Release 5.0 simulation is to provide an opportunity for participants and ISVs to become familiar with the new and enhanced functional and technical setup and features of T7 Release 5.0 and to prepare for production.

The key objectives of the T7 Release 5.0 simulation:

- Provide high quality information and simulation to support participant and ISV readiness.
- Familiarize participants with the new trading services functionality.
- Early identification of issues both from the Exchange and from the participants' side to minimize risk of T7 Release 5.0 launch and production operation.

The T7 Release 5.0 simulation execution is scheduled for the period from Tuesday, 18 April 2017 until Friday, 16 June 2017. From Friday, 31 March until 17 April the simulation environments (95 and 75 for FX futures) will not be available due to conversion to the Release 5.0. The production launch of T7 Release 5.0 is planned for Monday, 19 June 2017.

The exchange offers several dedicated focus days during the simulation phase to help participants become accustomed to new or changed features of T7. On those days, which are marked in the simulation calendar, special testing scenarios will be provided in environment 95. This document describes the different test scenarios for the T7 Simulation.

The latest Simulation Calendar is always available on the Eurex website under the following path:

www.eurexchange.com -> Technology -> Simulation Calendar

A description of the new/changed functionality and technical enhancements has been communicated in the form of the document "**T7 5.0 Release Notes**" (one single document for functional and technical aspects in both, preliminary and final version), as well as Interface Specifications and User Manuals:

www.eurexchange.com -> Technology -> Eurex Exchange's T7 -> System documentation -> Release 5.0

The Migration of Deutsche Börses Cash markets from their legacy system to T7 will be an integral part of Deutsche Börse Groups T7 Release 5.0 simulation phase and production rollout. The Cash market migration and simulation guide is handled in separate documents available on the Cash market website www.xetra.com > Technology > T7 trading architecture

1.2 Intended audience

This document serves as the guide for all simulation participants, i.e. current and future users of the T7 system. In particular, the following participants will be involved in the simulation:

- Exchange trading participants
- ISVs (Front, Middle and Back office)

In order to achieve a common understanding of the responsibilities and tasks, the distribution of this Simulation Guide to the appropriate project teams and line organizations of participants and ISVs is recommended as soon as possible. All parties involved, e.g. central coordinators, system administrators, traders and ISV representatives, should be aware of their tasks before the start of the simulation.

1.3 Timeline

Below the key dates concerning the introduction of T7 Release 5.0 are outlined.

• T7 release 4.0 to Release 5.0 simulation conversion	31 March – 17 April 2017
• Start of T7 Release 5.0 simulation	18 April 2017
• Conversion of production environment 4.0 to 5.0	16 (eob)/17 June2017
• Connection Test	17 June 2017
• T7 Release 5.0 production launch	19 June 2017

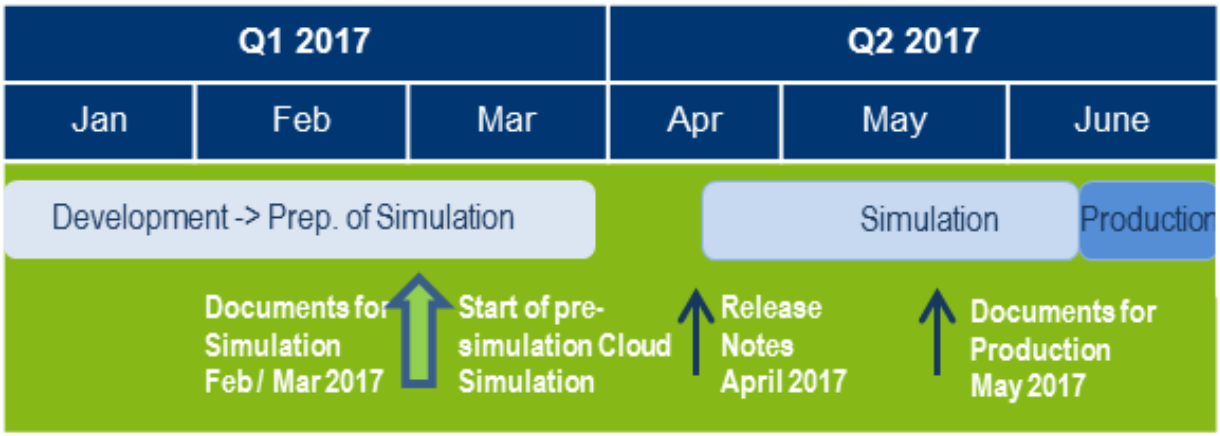


Figure 1: T7 Release 5.0 document publication timeline

1.4 T7 Cloud Simulation

In addition to T7's release simulation participants can also use the T7 Cloud Simulation which allows trading participants and ISVs to test against the current T7 production and simulation environment. In this environment participants can initiate predefined market scenarios and test specific strategies more easily than in a shared environment. The T7 Cloud simulation is available 24/7 for a fixed price per hour and is accessible using an SSL-encrypted internet connection. The T7 Cloud Simulation will make a pre-simulation available for early adopters from March 2017. For more information on the T7 Cloud Simulation please refer to

http://www.eurexchange.com/exchange-en/technology/t7-cloud-simulation

1.5 Simulation calendar

During Simulation, the number of end-of-day batches per week vary between 2 to 4 times per week.

The Simulation Calendar will be available on Eurex Exchange's website under the following path:

www.eurexchange.com -> Technology -> Simulation Calendar

1.5.1 Guiding principles for simulation calendar

- The simulation will be set up and run from both a functional and technical perspective as production-like as possible to help simulate business processes under realistic conditions. In order to provide a production-like system environment, the different Eurex components will be set up as an integrated simulation environment. Nevertheless, system availability and technical performance will be scaled to simulation requirements and will differ from production.
- T7 release 4.0 permanent simulation will terminate with the end of day processing on 30 March 2017. The T7 simulation environments will not be available for participants and ISVs from 31 March until and including 17 April 2017 in order to prepare the T7 Release 5.0 simulation environments.
- The T7 Release 5.0 simulation is planned to start on 18 April 2017 and will last for approximately nine weeks until 16 June 2017. All functional and technical preparations should be completed before the start of the simulation.
- After the T7 5.0 release simulation has finished on 16 June 2017, the T7 Release 5.0 permanent simulation will continue in both environemnts.
- On batch days, calendar days correspond to actual business days. The following days until the next batch day have the business date of this forthcoming batch day. Here several calendar days (with 24 hours trading availability) constitute one business day.
- Weekends are generally open for simulation, but no technical and functional support will be available on weekends.
- In order to provide those participants and ISVs not located in a European time zone with the maximum possible access to the simulation environment, it is envisaged that T7 Release 5.0 participant simulation back-end systems and network will be re-opened as soon as the batch has been successfully completed.
- Quarterly and monthly last trading/maturity & expiration dates for standard products are planned throughout the T7 Release 5.0 simulation. Details are listed in the Simulation Calendar.
- During the T7 Release 5.0 simulation, two month-end batches for April and May 2017 will be executed and month-end reports will be provided. Further month-end batches with the respective reports will be provided in T7 Release 5.0 permanent simulation from June 2017, onwards.

1.6 Liquidity for selected products in the simulation environment

1.6.1 Liquidity (bid/ask prices)

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

Options

- **OESX** and **ALV**: only best bid, best ask
- **OGBL, OGBM** and **DB1**: Bid and ask prices with an order book depth up to 3
- **OTX**: Bid and ask prices with an order book depth up to 3
- **OTX1-OTX5**: only best bid, best ask
- **OKS2:** only best bid, best ask

Futures

- **FGBL**: Bid and ask prices with an order book depth up to 20
- **FESX:** Bid and ask prices with an order book depth up to 30
- **FTX**: Bid and ask prices with an order book depth up to 10
- **EVAR:** Bid and ask prices with an order book depth up to 3

Futures Calendar Spread orders

- **FESX**: Bid and ask prices with an order book depth up to 5
- **FGBL**: Bid and ask prices with an order book depth up to 10

Complex Instrument Types (in FEU3):

- **Packs:** 1st white pack
  1st red pack
  1st green pack

- **Bundles:** 2-year bundle and 3-year bundle

2. New and modified features introduced by T7 Release 5.0

The Migration of Deutsche Börses Cash markets from their legacy system to T7 will be an integral part of Deutsche Börse Groups T7 Release 5.0 simulation phase and production rollout. The Cash market migration and simulation guide is handled in separate documents available on the Cash market website www.xetra.com > Technology > T7 trading architecture

T7 Release 5.0 will introduce the following important new enhancements for the derivatives markets:

2.1 Trade at Reference Price

The new Trade at Reference Price functionality will be supported for Futures with T7 Release 5.0 in on-book trading and for block trades in off-book trading.

The new T7 functionality Trade at Reference Price will allow trading of a futures product at differential prices relative to a reference price whose actual value may not yet be fixed during the trading phase, but finally defined only after (or later in) the trading phase. Differential prices will be used in trading, and are referred to as prices in trading notation. For clearing and settlement, differential prices will be converted to actual prices by adding the reference price and are referred to as prices in clearing notation. Before the finalization of the reference price at the end of the trading day, trades will be preliminary with respect to the trade price in clearing notation. These trades are denoted as preliminary trades. As soon as the final reference price will be set and approved by the exchange, all preliminary trades will automatically be finalized by subtracting the preliminary reference price from and adding the final reference price to the differential pricel. Trade at reference price will be supported for on-book and off-book trading (Block Trades only). Initially the new Trade at Reference Price functionality will be used for index futures, and the corresponding approach is denoted as Market-on-Close (“MOC”).

2.2 Market on Close (MOC)

Market on Close will allow trading of the difference between the index futures price and the index level at index close (also denoted as trading the basis). A separate product, denoted as the MOC product, will be provided for this purpose on T7 and resultant trades will be settled on a daily basis in positions in an associated product, denoted as the MOC reference product. For this purpose C7 will introduce a new dedicated process for MOC products, known as transaction based settlement. On T7, trading at index close will be implemented using the trade at reference price functionality. The MOC product will be traded like any other futures product on T7, independent from the MOC reference product. The association of the MOC product to its MOC reference product will only be established in C7.

The new Trading at Index Close functionality will be supported for on-book trading and off-book trading.

Eurex initially plans to introduce MOC products which are settled in listed index Futures. The launch date of the new MOC products will be communicated in a subsequent Eurex circular. In the following chapters, the main features of the market at close functionality on T7 are described: i) the representation of prices in two notations depending on the affected area, trading or clearing, and ii) the support of preliminary and final trades.

2.2.1 Trading versus Clearing Notation of Prices

In T7, order and trade prices of MOC products will be quoted in trading notation, representing the difference between the index futures price and the index level at index close. In order to be sent to the clearing system, the trade price will be converted into clearing notation. The relation between a price in trading notation and in clearing notation will depend on the index close price which corresponds to the reference price which will be set by the exchange for the MOC product. An additional static clearing price offset can be defined per product. The reference price and the clearing price offset constitute the conversion parameters for a MOC product. The current conversion parameters will be disclosed via T7 RDI/RDF and will also be available via the Trader GUI. Note that, depending on the product setup, a MOC product may also be traded with negative prices in the trading notation, whereas trade prices in clearing notation are always positive.

The price conversion is based on the following:

Price in Clearing Notation = Price in Trading Notation + Reference Price - Clearing Price Offset

Example:

MOC Future: FES1 (zero clearing price offset)
MOC underlying Future: FESX
Underlying Index: SX5E
Index close price (final reference price): 2,485.62

Please note that the trading price granularity of FESX and FES1, i.e. the smallest price increment of FESX and FES1 for trading purpose, is given in 1.0 and in 0.1, respectively, and that the price granularity of the Index Close Price is provided by 0.01.

Participant A: Buy to long 1 contract FES1 traded @3.1
Delivery price: 2,488.72 (3.1+2,485.62)
Long 1 contract FESX on the next business day

Participant B: Sell to short 1 contract FES1 traded @3.1
Delivery price: 2,488.72 (3.1+2,485.62)
Short 1 contract FESX on the next business day

Participant C: Buy to long 1 contract FES1 traded @-2.4
Delivery price: 2,483.22 (-2.4+2,485.62)
Long 1 contract FESX on the next business day

Participant D: Sell to short 1 contract FES1 traded @-2.4
Delivery price: 2,483.22 (-2.4+2,485.62)
Short 1 contract FESX on the next business day

Order and quote broadcasts and TES broadcasts will be filled with prices in trading notation only. Trade price statistics in the market data interfaces will be provided exclusively in trading notation. Once executed, the traded price in trading notation will be converted to clearing notation before it is sent to C7. ETI trade notifications will be provided with prices in both trading and clearing notations.

The T7 Trader GUI will display prices in clearing notation for orders and trades in addition to prices in trading notation. The GUI trades view will indicate the state of a trade in a MOC product as preliminary or final.

The report T7 Daily Trade Confirmation TE810 will show preliminary and final trades indicated with a corresponding trade type.

The conversion parameters which will be used in the calculation of the clearing price (reference price, clearing price offset) will immediately be available via a dedicated TARP (Trade at Reference Price) status message in the T7 RDI (Reference Data Interface) snapshot messages and will also be included in the T7 RDF (Reference Data File). Final conversion parameters will be tagged as the current business day in the business day type. Note that the previous day's settlement price in the T7 RDI instrument snapshot message will be published in clearing notation.

2.2.2 Preliminary and Final Trades

During the day, before the index close price is known the calculation of the clearing price takes into account the yesterday's index close price denoted as preliminary reference price. Trades where the calculation of the trade price in clearing notation is based on a preliminary reference price will be marked as preliminary trades and sent immediately to C7. Every morning, the preliminary reference price will automatically be set to the final reference price of the previous business day, corresponding to the index close value of the previous day.

In the evening, when the index close value of the index is known for the current business day, market supervision will enter the index close value as the final reference price thereby triggering the recalculation of the trade prices in clearing notation for all preliminary trades that are concluded during the day. All preliminary trades will be converted to final trades using the final reference price. At their creation, final trades will immediately be forwarded to C7.

2.3 Maintenance of Trading Capacity at User Level

With T7 Release 5.0, a Service Administrator user of a business unit will be able to maintain the Trading Capacity i.e. Proprietary, Agency or Market Making, which a particular user is allowed to use for on-book order and quote maintenance activities.

By default all Eurex users will have all three trading capacities assigned to them. A Supervisor user of a business unit will be able to intra-day assign / de-assign multiple trading capacities to an user of the business unit using the User maintenance window in the T7 Admin GUI.

2.4 Enhancement of the T7 ETI Interface

The TES Trade Approve Broadcast (template ID 10607) is enhanced to additionally contain the actual TES trade approver which can be different from the original TES trade approver specified at the point in time when the off-book trade is initially entered in T7. Please note that the actual TES trade approver must belong to the same user group of the original TES trade approver and must be assigned to the head trader level.

Together with T7 release 5.0, the T7 ETI will change to version "5.0". ETI version "4.0" will be supported in backward compatibility mode. **Please Note: ETI version "3.0" will no longer be supported.**

2.5 Introducing the Market concept to Sessions

Currently T7 supports two markets, Eurex and EEX. In the context of the Cash Market migration to the T7 platform with release 5.0, T7 will extend its support to include markets such as Xetra. In order to help market participant's communication with T7 interfaces, T7 ETI will introduce the concept of a market at the session level with release 5.0. As a result the following impact is expected:

- The session logon response will contain the market identifier for which that particular session is configured.
- A subscription to the broadcasts is only accepted for the market that corresponds to the session. In case the market identifier is not provided in the subscription request then the session's market is taken as the default. The data provided in the broadcast will only be from the session's market.

2.6 Processing based on the network sequence

The T7's High Frequency gateways will be enhanced with T7 release 5.0 to process the incoming transactions in the network sequence and will prevent any re-ordering within the gateway. More precisely the sequence will be kept for all transactions processed by a specific gateway and targeting the same matching engine. Requests processed by different gateways and/or by different partitions may still overtake.

2.7 Enhancement of the T7 FIX interface

With T7 Release 5.0 onwards, the T7 FIX interface will provide a generic interface with common messages for all T7 markets. That implies:

- Changes in the existing functionality and messages. For more details on the changes please refer to the T7 FIX Gateway manual on the Eurex website.
  Please Note: With T7 Release 5.0 the T7 FIX interface will not be backwards compatible to the FIX interface for Release 4.0.

2.8 Enhancement of Order Execution Response and Notification

With T7 Release 5.0 the Immediate Execution Response and Book Order Execution messages on the T7 ETI interface will be enhanced to help participants manage their incoming orders and open orders in the book more efficiently.

- Side will be included as a mandatory field to the Immediate Execution Response and Book Order Execution Notification on the T7 ETI interface.

2.9 Extending FIX compliance

With T7 release 5.0 T7 ETI will incorporate the FIX Extension Pack 188 which will result in following changes:

- Tag NoFillsIndex (25010) will be changed to Tag FillRefID (2421).

PartySettlementLocation will be renamed to PartyIDSettlementLocation

3. Simulation preparation

Preparation activities should be completed prior to the start of T7 Release 5.0 simulation.

3.1 Organisational preparation

Prior to the start of T7 Release 5.0 simulation, the following organisational preparatory activities need to be completed by all participants to ensure readiness for the simulation phase:

- All participants and ISVs will be asked to name a person acting as a single point of contact (SPoC) during the simulation. This person shall coordinate all internal activities, functional as well as technical, and shall communicate with affiliated participants during simulation, when collaboration is required. The SPoC maintenance is available to the participant via the web application under the following path:

  www.eurexchange.com -> *Member Section -> Technical Service -> Release Contacts*

- Documents will be made available in order to facilitate and support general simulation needs. However, in order to simulate the individual requirements participants are encouraged to define specific simulation objectives and scenarios on their own.
- Personnel for participation in simulation on the focus days (specified in the simulation calendar) should be identified and confirmed.
- Participants are encouraged to set up an internal issue management processes.

3.2 Functional preparation

Participants and ISVs planning to participate in the simulation should verify their individual setup/clearing-relationship and inform the exchange of any changes that may be required prior to the start of their simulation testing activity.

The completion of functional preparations prior to production start is mandatory.

3.3 Technical preparation

In order to ensure technical readiness for simulation, members/ISVs should consider the following topics:

- The changes for the following interfaces have to be implemented:
    - T7 Enhanced Trading Interface (backwards compatible to T7 Release 4.0)
    - T7 FIX Gateway (**not** backwards compatible)
    - T7 Market and reference data interfaces
    - Reports (Common Report Engine)
- A technical connection to T7 systems needs to be established (if not existing).
- Internal resources for timely installation of simulation software should be identified and confirmed.
- Related in-house systems should be set up to simulate subsequent processing.

4. Focus Day Overview

In the overview below, all focus days offered during the permanent simulation are listed and described:

Technical Focus Days – Triggered by the Exchange:

- Fix Gateway Failover
- Matching Engine Failover and Failure, EOBI Failure
    - Matching Engine Failover
    - Matching Engine Failure / EOBI Failure
- Market Data Services Failure
- RDI Failover
- ETI Session to Gateway Reassignment
- Matching Engine Processing Delay
- GUI (forced user log out)
- Move products from one partition to another (emergency procedure)

Functional Focus Days – Triggered by the Exchange

- Corporate Actions
- Market Halt
- Product Halt
- Volatility Interrupt

Functional Focus Days – Executed by Exchange Participants

- Self-Match Prevention
- Full Spread Matrix
- Instrument / product state changes
- New Strategy Setup – complex instruments
- Market Maker Protection
- Trade Traceability
- Quote Handling
- Risk Events
- Stop/Release User / Risk Controls view

4.1 Technical Focus Days – Triggered by the Exchange

Technical focus days will be offered on several occasions during the simulation and will be triggered by the Exchange. Participants should use this opportunity to test the behaviour of the Eurex trading and market data interfaces in conjunction with their own front office applications as well as their order book- and session management systems.

4.1.1 FIX Gateway Failover

In case of a FIX Gateway Application Failover, all FIX sessions connected to this FIX Gateway will be disconnected and the corresponding port will be closed.

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

Schedule:

- 15:00 CEST: Application Failover FIX Gateway
  (IP address: 90.150.253.32 becomes unavailable)
- 15:15 CEST: Restart of FIX Gateway
  (IP address: 90.150.253.32 available again)

- 15:30 CEST: Application Failover FIX Gateway
  (IP address: 90.151.253.32 becomes unavailable)

- 15:45 CEST: Restart of FIX Gateway
  (IP address: 90.151.253.32 available again)

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

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

Recovery notes:

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

- After reconnection of the FIX session, the FIX Gateway may receive a sequence number higher than the one expected and sends a Resend Request (2) message to the member.
- The member should resend all potentially missed messages with PossDupFlag (43) =”Y”, to indicate that a message may have been previously transmitted with the same MsgSeqNum (34).
- Please note: No Gap Fill messages should be sent by the member during the resend series for application messages. Application messages should always be re-transmitted since the T7 FIX

Gateway requires all missing application messages for the purpose of reconciliation with the T7 trading system fall-back.

- If a participant sends Gap Fill messages during the resend series for application messages the related orders might not be accessible any more via the FIX Gateway and related order specific information will not be forwarded to the FIX session.

4.1.2 Matching Engine Failover and Failure, EOBI Failure

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

4.1.2.1 Matching Engine Failover

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

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

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

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

Afterwards an order book replay will be sent including the persistent orders which were recoverable. Participants with low frequency sessions will receive an extra end of replay message on a product level. Participants with high frequency sessions will only receive the previously mentioned Market Reset Event Message. Hence, there are no extra deletion messages.

The Matching Engine failover triggers automatically an EOBI failure

4.1.2.2 Matching Engine Failure

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

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

The Matching Engine failure triggers automatically an EOBI failure as well.

T7 Enhanced Order Book Interface (EOBI) Failure

Prior to the focus day, participants should check whether they are able to receive market data from the T7 Enhanced Order Book Interface (EOBI) in advance, i.e. they should try to send some orders on benchmark futures products which are available in the T7 permanent simulation (e.g. FGBL, FGBM, FGBS, FGBX, FBTM). Public market data information from Eurex EOBI will be provided in packages/UDP datagrams marked with a *MarketSegmentID*, i.e., product identifier; *PartitionID*; *ApplSeqNum* (continuous numbering format); Packages are sent over redundant multicast address and port combinations. Each package is uniquely identified by its *MarketSegmentID* and *ApplSeqNum* combination. In addition to the packet sequence numbering, individual messages are sequenced by *MsgSeqNum* which is contiguous per *MarketSegmentID*.

In case of an EOBI Failure, both the *ApplSeqNum* and the *MsgSeqNum* for a specific *MarketSegmentID* will restart from 1.

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

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

➔ Matching Engine and EOBI Failover / Failure_scenario will be offered between 15:00-16:00 CET.

4.1.3 Market Data Services Failure

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

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

will be affected and therefore the test will refer to all products which are available at that time in the permanent simulation.

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

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

➔ The Market Data Services Failure scenario will be offered between 15:00-16:00 CET.

4.1.4 RDI Failure

In this test scenario both the failover and the restart of the RDI will be simulated[1]. As a precondition for the tests, participants are advised to create some complex instruments in the simulation environment before the failover and restart of the RDI are performed.

In the first part of the test scenario when the RDI fails over, a new initial reference file for Eurex will be generated with a new file set identifier. This file will contain any complex instruments, already created and deleted during the day, i.e. the entire history.

In the second part of the test scenario, when the RDI is restarted, a new initial reference file will be generated with a new file set identifier. This file contains the existing complex instruments but not the entire history of creations and deletions.

➔ The RDI Failure scenario will be offered between 15:00-16:00 CET.

[1] EEX RDI ist independent of RDI and will not be affected by the RDI Failure. .

4.1.5 ETI Session to Gateway Reassignment

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

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

To assist participants in preparing for the ETI session to gateway reassignment and to ensure that trading applications are able to handle the scenario once it occurs, focus days will be offered whereby the session to gateway assignment will be changed for all sessions.

There will be two focus days for this scenario whereby both focus days will take place in the same week. In the simulation environment the end-of-day processing usually takes place on a Tuesday, Wednesday and a Thursday.

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

A list of all the possible trading gateways together with their IP addresses is listed in the “Network Access Guide” document which is available Eurex Exchange’s website www.eurexchange.com > Technology

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

➔ The ETI to Gateway Session Reassignment scenario will be offered over a time spanning two batch days with part 1 deleting all existing mapping and part two restoring the original session to gateway mappings.

4.1.6 Matching Engine Processing Delay

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

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

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

This focus day will be provided in the product **AFR** only.

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

Please refer to the simulation calendar on Eurex Exchange’s website www.eurexchange.com > Technology for the days on which this focus day will be provided.

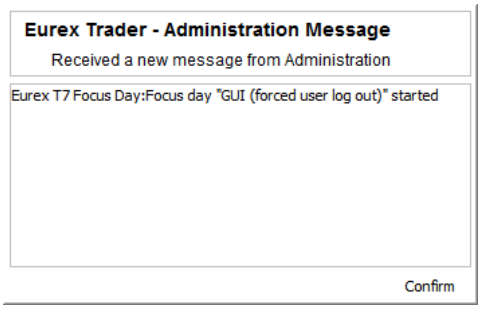
4.1.7 GUI (forced user log out)

The GUI Focus Day scenario is provided to first of all make participants aware of a function within T7 whereby in an emergency/exceptional situation Eurex Operations can not only send messages directly to the users screen but also force the termination of the GUI itself. In addition, the focus day is also provided to make participants aware of the effects of a full GUI environment restart. The GUI (forced user log out) focus day will be sub-divided into three parts:

- Send Admin Message only
- Admin Message + Forced Trader GUI Shutdown
- Full GUI environment restart

4.1.7.1 Send Admin Message only

All GUI instances (both Admin and Trading) logged in at the point when the focus day is initiated will receive a message “Eurex T7 Focus Day: Focus day “GUI (forced user log out)” started”. This message will appear in a new popup window.



This window can be closed by pressing the Confirm button.

4.1.7.2 Admin Message + Forced Trader GUI Shutdown

After this first message the following message will be send 10 minutes prior to the GUI environment shutdown: “Eurex T7 GUI Focus Day: Automatic GUI shutdown has been triggered and the GUI environment will be restarted”. On the Trader and Admin GUI the following pop-up windows will be displayed:



The colour of this popup window will turn to yellow 15 seconds prior to the forced shutdown and turns red for the last 5 seconds.

4.1.7.3 Full GUI environment restart

Following a full restart of the GUI environment in simulation will be performed. On the day where the focus day is scheduled, participants will be encouraged to suspend orders so that the effect on suspended orders caused by a GUI restart can be observed. Suspended orders will all be deleted, the rest of the order book will be unchanged after a restart.

➔ The GUI (forced user log out) focus day scenario will be offered between 15:00-15:30 CET.

4.1.8 Move products from one partition to another (emergency procedure)

This focus day scenario is intended to simulate the unlikely event that products need to be moved from one partition to another before the start of trading.

Under normal circumstances, the assignment of products to a partition will not change on a day-to-day basis but either as a result of hardware failure or due to a re-configuration, the assignment of products can and will change.

In this focus day scenario all products belonging to the product group FBND will be moved from one partition to another prior to the start of the trading phase (closed & pre-trading) in the T7 simulation environment.

As a consequence of the product move from one to another partition the entire T7 system will be restarted. All non-persistent orders, quotes entered and recoverable broadcast streams disseminated before restart will be deleted. Please be aware that persistent orders will be moved to the other partition too and are part of the orderbook restatement. The PartitionID in the reference data, product snapshot and packet header for EMDI and EOBI for the affected product(s) will change. When the RDI is restarted, a new initial reference file will be generated with a new file set identifier. Reference Data via RDI and RDF must be reprocessed by client applications following the restart. The SenderCompID in the Market Data for the product will change following the restart. The service on which the market data is published first for EMDI / EOBI may change (even to odd or vice versa). The multicast addresses on which the market data is disseminated will not change

Participants must ensure that their applications support the automatic reassignment of products. Hardcoding of product to partition assignments may lead to the inability to identify or trade these products.

- ➔ Affected products are: CONF, FBCM, FBON, FBTM, FBTP, FBTS, FCBL, FCBS, FGBL, FGBM, FGBS, FGBX, FOAM, FOAT, GE02, GE05, GE30.
- ➔ The Move products from one partition to another one (emergency procedure) focus day scenario will be performed in the morning after a batch run and should be completed before 11am (CET/CEST). Please note: The products which have been moved from one partition to another, will remain on the “new” partition until this focus day scenario is repeated.

4.2 Functional Focus Days – Triggered by the Exchange

4.2.1 Corporate Actions

Participants will have the opportunity to test Corporate Action processing between T7 and the current Eurex Clearing classic system. On the first focus day, i.e. before end-of-day processing starts, participants are requested to generate positions in T7 in the defined products to check the system behaviour on the effective focus day (second business day).

➔ The exact dates of the Corporate Actions scenario are displayed in the current simulation calendar available on Eurex Exchange website www.eurexchange.com > Technology

4.2.2 Market Halt

As a possibility to reflect a market halt in T7 and Eurex Clearing classic system, the Exchange has planned one predefined focus day. This market halt will be done on an intraday basis between 15:00 and 15:30 CET.

Test scenario and expected result:

Prior to the planned Market Halt participants are recommended to enter non persistent orders and quotes and persistent orders in any products which are available in the permanent simulation. As a result of the market halt, products will not be tradable between the given times in the T7 simulation. In this scenario all non-persistent orders and quotes will be deleted after the market reset and participants must re-enter those orders and quotes. Persistent orders will stay in the system.

Additionally the following message will be sent:

10308 - (ETI: Mass Cancellation Event)

➔ The exact dates of the Market Halt scenario are displayed in the current simulation calendar available on the Eurex website.

4.2.3 Product Halt

As a possibility to reflect a product halt in simulation, the Exchange has planned one product halt on a predefined focus day. This test will be done on an intraday basis between 15:00 and 15:30 CET.

Test scenario and expected result:

Prior to the planned Product Halt participants are recommended to enter non persistent- and persistent orders and quotes in the affected product. As a result this product will not be tradable between the given times in the T7 Simulation. In this scenario all non-persistent orders and quotes will be deleted after the market reset and participants must re-enter them. Persistent orders for the affected product will stay in the

system. Additionally the following message occurs:

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

➔ The exact dates and products of the Product Halt scenario are displayed in the current simulation calendar available on the Eurex website.

4.2.4 Volatility Interrupt

With volatility interrupts participants will be able to familiarize themselves with the product specific system handling. For this focus day the volatility interruption will be triggered by the Exchange. between 15:00 and 15:30.

Test scenario and expected result

I. Prior to the planned volatility interruption, participants are recommended to enter non persistent orders and quotes in several maturities on both sides (bid & ask) on the respective product. As a result of this test scenario all non-persistent orders and quotes will be deleted and a clean-up message will be sent out after the volatility interrupt. Participants will have to re-enter those orders and quotes. During the time of the volatility interrupt the respective product is not tradable in the system.
Furthermore, the volatility interrupt leads to a volatility auction state, which is triggered before the affected order is matched outside the volatility range.

II. Prior to the planned volatility interruption participants are recommended to enter persistent orders in the respective product. As a result of this test scenario all persistent orders are still visible after the volatility interrupt. During the time of the volatility interrupt the product is not tradable in the system.
Furthermore the volatility interrupt leads to a volatility auction state, which is triggered before the affected order is matched outside the volatility range.

The exact dates and product of the Volatility Interrupt scenario are displayed in the current simulation calendar available on Eurex Exchang'e website www.eurexchange.com > Technology > Simulation Calendar

4.3 Functional Focus Days – Executed by Participants

The following focus days are offered, but must be executed by participants.

4.3.1 Full Spread Matrix

In T7 it is possible to set up and trade products with up to 20 different calendars spreads.

The exchange can configure which calendar spreads of a futures product are considered for synthetic matching; a synthetically linked full spread matrix is achieved by considering all calendar spreads of a futures product.

The following products are configured with a synthetically linked full spread matrix in the permanent simulation:

Group	Product	Currency	Product Name
FINT	FEU3	EUR	THREE-MONTH-EURIBOR FUT. (ACI)
FINX	FEXD	EUR	FUT ON EURO STOXX 50 INDEX DIV
FVOL	FVS	EUR	FUT ON MINI VSTOXX

4.3.2 Instrument / product state changes

T7 applies trading states at both a product level and at an instrument level. Instruments of the same product can be in different instrument states. Product states apply to all instruments of a product.

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

4.3.3 New Strategy Setup – complex instruments

Typically, complex instruments are requested by traders, however, some futures spreads are created by the exchange by default. Complex instruments requested by traders with open orders valid beyond the current trading day will be available the next day.

It is possible to have different trading parameters per instrument type, for example allocation schemes and price validations. Therefore, different instruments of the same product can vary in their trading behaviour.

Please note: Strategies are always created on a temporary basis and are cancelled during the end of day processing when their order book is empty.

Traders may request complex instruments from T7 at any time during the simulation. If the requested complex instrument matches a predefined standard option strategy, then the matching engine will create a standard option strategy.

4.3.4 Market Maker Protection

A Market Maker protection mechanism on a session level is provided to prevent too many simultaneous executions on quotes provided by a Market Maker. Market Maker protection parameters can be specified on either the product level or the product/instrument type level.

The participant may use the *MMParameterDefinitionRequest* in Eurex ETI or the T7 Trader GUI Market Maker Protection screen to define market maker protection parameters. There are additional features in T7 provided for MMP:

- MMP is available for both futures and options.
- MMP can be applied to all simple and complex instrument types independently, supplementing the existing protection on a product level.
- MMP uses quote inactivation rather than quote deletion.
- MMP can be maintained separately via the T7 Trader GUI, T7 Admin GUI and Eurex ETI.
- An additional percentage limit supplementing the already existing volume, delta and vega limits can be used for MMP.

4.3.5 Trade Traceability

T7 provides improved trade traceability, allowing orders to be linked to executions, trade confirmations, and trades in clearing for simple instruments and complex instruments.

While sending a new order participants can provide a client order ID and up to three free text fields, which are optional for Eurex ETI. For each new order received by Eurex Exchange a separate order ID by the exchange is assigned which is unique and 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, every order execution and every trade.

For the matching of a complex order in addition to the order leg, the execution ID and order leg execution ID is provided for each leg of the complex instrument match.

4.3.6 Quote Handling

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

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

Mass quote entry:
In this scenario it is possible for the trader to enter, modify and delete multiple quotes of a session simultaneously. This scenario can be tested with futures as well as options as well as in combination with simple and complex instruments. This function is different from the "delete all quotes" feature, which deletes all quotes in one session.

Quote check:
A newly inserted or amended quote which fails the price reasonability or extended price range validation results in a complete deletion of the quote. This scenario can be tested with a positive and negative test scenario.

Automatic deletion:
In this scenario it can be tested that quotes are automatically deleted when the instrument status changes to "closed" or "restricted" or when the instrument has expired.

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

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

4.3.7 Risk Events

Risk parameters are adjusted in a way that risk events will be triggered due to defined trading volume or quantity limits. Limits can be set by Clearing Members for their Non-Clearing Members (Exchange Participants) or by Non Clearing Members themselves on an intraday basis. There are three levels of limitation which can be defined by participants and is the same for all business units.

1. *Alert message*

   The user will receive a popup message which informs him that he has exceeded a predefined limit, no further actions will happen.

2. *Threshold message*

   The user will be informed that he has exceeded the second limit and therefore a throttle mechanism is implemented for the trading. For traders it is no longer possible to trade in a general way and volume as the trade volume will be limited as per the threshold limitation given from the clearing members.

3. *Blocking message*

With this scenario trading will be disabled for the respective trading user if he exceeds his trading limits or any other given quantity limits for trading. User entitlements are independent of those extra limitations.

4.3.8 Stop/Release User / Risk Controls view

The Risk Controls View comprises of two different functions; the Panic Cancel actions which results in the deletion of orders and/or quotes and the Stop/Release actions, which will not only delete orders and quotes but will prevent a single or group of traders/machines from further entry of quotes and orders. Please read more in the "Eurex Trader and Admin GUI Manual" available on the Eurex Website at

www.eurexchange.com -> Technology -> Eurex Exchange's T7 -> System Documentation -> Release 5.0 -> Eurex GUI Solutions

5. T7/FX Simulation

During the Release 5.0 simulation period T7/FX trading will be possible in environment 75 analogue to the times for environment 95. No special simulation scenarios are offered for environment 75.

5.1 Simulation processing scenario for FX Rolling Spot Futures

Due to the perpetual nature of FX Rolling Spot Futures (daily rollover of all positions) and the fact that it replicates holding a FX spot position and entering a T/N FX swap each day to synthetically move the spot FX delivery day, a daily adjustment of the variation margin is required for cleared contracts, to account for the costs of the T/N FX swap. This is technically achieved by booking technical trades at a correction price which is then used in the End of Day calculation of the variation margin.

Technical trades will trade out “to close” the ending position balance of the previous day at the defined position closing price e.g. for FX rolling spot positions it is the prevailing spot FX rate as determined by 360T at around 17:00 CET and trade in “to open” the ending position balance of the previous day at the defined position reopening price (per member and account), which e.g. for FX rolling spot positions is the prevailing spot FX rate as determined by 360T at around 17:00 CET plus or minus the prevailing T/N FX swap rate as determined by 360T at around 17:00 CET. Technical trades are required both for the long and short side of the ending balance.

The technical trades have the following characteristics:

- Booked as off-book trades (TES)
- Technical trades will be automatically approved by T7, Eurex Exchange’s trading system, by using a dedicated technical user ID
- The technical user ID will be set up by Eurex Clearing and will be assigned to those market participants who are admitted for trading and clearing the Rolling spot future contract
- Field ”text 3” is reserved for entries generated by Eurex Exchange only. Field “Text 3” will contain the T/N FX swap rate in the first six characters, the seventh character will be an “O” or a “C”, depending whether it is an opening or the closing technical trade

Participants and ISVs are encouraged to test these products as well in order to make sure they can handle the workflow for these products as well.

6. Documentation

The Migration of Deutsche Börses Cash markets from their legacy system to T7 will be an integral part of Deutsche Börse Groups T7 Release 5.0 rollout. Therefore the T7 Release 5.0 documentation is split into two parts, a set of combined documents which are relevant for all the markets supported by the T7 platform and another set of market specific documents which are relevant only for a particular market such as 'Eurex' or 'Xetra'.

The following existing documents will be revised for T7 Release 5.0. Preliminary versions (identified by ◆) in **October and December 2016** and simulation versions (identified by ■) in **March and April 2017** will be published prior to the start of simulation. The final versions (identified by ●) will be published in **March 2017 and May 2017** prior to the production launch.

T7 Release 5.0	Eurex	Xetra	Combined	Q3 2016			Q4 2016			Q1 2017			Q2 2017		
				Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Release Notes															
T7 Release 5.0, Release Notes	X	X					◆						●		
Simulation															
Participant Simulation Guide	X	X										●			
Overview and Functionality															
T7 Functional and Interface Overview			X										●		
T7 Funtional Reference			X										●		
Participant and User Maintenance Manual	X	X											●		
Xetra Market Model Equities & ETPs		X										●			
GUI Solutions															
Trader, Admin and Clearer GUI - Manual	X	X											■	●	
T7 Trader, Admin and Clearer GUI - Installation Manual			X										■	●	
Trading Interfaces															
Xetra Enhanced Trading Interface - An Introduction		X				●									
Xetra FIX Gateway - An Introduction		X				●									
T7 Enhanced Trading Interface – Manual incl. Repository and Header files			X						◆		■			●	
T7 Enhanced Trading Interface – XML Representation			X						◆		■			●	
T7 FIX Gateway - FIX 4.2 and 4.4 Manual incl. Fiximate and Repository			X						◆		■			●	
Market and Reference Data Interfaces															
Xetra Enhanced Market Data Feed Interface, Market Data Feed Interface, Reference Data Interface – An Introduction		X				●									
T7 Market-, Enhanced Order Book- and Reference Data Interfaces, Manual incl. Fast Message Template and Repository			X						◆		■			●	
Reference Data File – FIXML Schema Files	X	X							◆		■			●	
Xetra Instrument Reference Data Guide		X											●		
T7 Extended Market Data Services – Manual incl. Fast Message Template and Underlying Ticker Data			X						◆		■			●	
T7 Multicast-Addresses			X									●			
Reports															
XML Reports - Reference Manual	X	X							◆			■		●	
Common Report Engine User Guide			X										●		
Network Access															
Exchange and Settlement Network Access			X												●

T7 Release 5.0	Eurex	Xetra	Combined	Q3 2016			Q4 2016			Q1 2017			Q2 2017		
				Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Rules & Regulations															
Xetra Rules & Regulations		X											●		
Connectivity Pricing															
Information on Connectivity Pricing Concept		X		●											
Price List		X											●		

All the Eurex relevant documents including the combined documents will be available on the Eurex website www.eurexchange.com **> Technology > Eurex Exchange's T7 > System Documentation > Release 5.0**

7. Support

The standard support times of the Exchange will be in effect during the simulation phases. The helpdesk departments and further information sources are provided in the following section.

7.1 Contacts and support hours

The following helpdesks provide first level support for specific topics from Monday till Friday:

7.1.1 Group Client Key Account Management

Phone: +49-69-211-1 17 00 (09:00 - 18:00 CET)

- Participants readiness activities
- Participant preparation requirements
- Participant setup questions for simulation and production
- Participant data changes for simulation and production
- ISV related queries

7.1.2 Functional Helpdesk Eurex

Phone: +49-69-211-1 12 10 (07:00 - 22:30 CET)

- Functional trading related issues for trading and the clearing
- Functional focus days
- Product data management
- Market Control
- Simulation participation and execution

7.1.3 Helpdesk Clearing Data Control

Phone: +49-69-211-1 24 53 (08:00 - 20:00 CET)

- Clearing functionality
- Entitlement Management
- Participant- and user data management

7.1.4 Customer Technical Support

Phone: individual VIP number (24 hours, Monday - Friday)

- All Technical issues related to the simulation environment (e.g. connectivity issues)
- Technical focus days

7.2 Further sources of information

Changes and further information regarding the T7 simulation will be provided via the following channels:

1. Circulars
2. Info-Mail
3. Implementation News on Eurex Exchange's website for T7 under following path:

   www.eurexchange.com -> Technology -> Eurex Exchange's T7 -> Implementation News

8. Change log

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

No	Date	Chapter	Change
1.0	8 March 2017	All	Initial version for Eurex Exchange's T7 Release 5.0 Simulation