T7 Release 15.0

Enhanced Drop Copy Interface (EDCI)

Manual

Version 2

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1. List of Abbreviations

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.

Admin GUI	T7's Graphical User Interface for administrative functions
Clearer GUI	T7's Graphical User Interface for clearing functions
DigiCert	Certificate Issuer
EDC	Enhanced Drop Copy (Session, Gateway, Interface)
EDCI	Enhanced Drop Copy Interface
ETI	Enhanced Trading Interface
FIX	Financial Information eXchange
NCM	Non-clearing member
T7	Deutsche Boerse's trading system
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transport Layer Security
UTC	Universal Time Coordinated
XML	Extensible Markup Language

2. Introduction

The T7 Enhanced Drop Copy Interface (EDCI) is a service for both Trading participants and Clearing members providing order information.

Clearing members will be able to monitor the order book activity of their Non-clearing members (NCMs) in real time, allowing them to react pro-actively before risk positions accumulate. This offering complements the existing Trade Drop Copy service offered to the clearing members.

Another offering extends Trade Drop Copy service to Sponsored Access members. Sponsored Access Providers will be able to monitor the activity of their Sponsored Access Units.

Trading participants will have access to a comprehensive overview of all order activities impacting the order book, including the lean orders.

EDCI does not provide access to historical data. Only order drop copy data generated after the EDCI client application connected to the EDC gateway is available.

2.1 Purpose

The purpose of this document is to provide participants with documentation about the current version of the EDC interface, describing its main concepts.

Please refer to the related documents listed below for details on message formats, release scope, system overview and functional reference.

2.2 Related Documents

2.2.1 EDCI Message References

There will be two message reference manuals for the cash and derivatives markets, EDCI Cash Message Reference and EDCI Derivatives Message Reference, respectively. These documents provide all message formats.

2.2.2 Clearer GUI Manual and Admin GUI Manual

Please refer to the chapter 5.2.5 of the T7 Clearer GUI Manual or the chapter 4.3.13 of the T7 Admin GUI Manual for details regarding the configuration of EDC sessions.

2.2.3 T7 Release Notes

Separate release note documents for the cash and derivatives markets, namely T7 Release Notes Cash Markets and T7 Release Notes Eurex. These documents give an overview of the functional and technical enhancements and changes to be introduced.

2.2.4 Functional and Interface Overview

A single document which gives an overview of T7, irrespective of any cash markets or derivatives markets specifics. The document describes the major functional and system features, and provides a high level description of the interface landscape.

2.2.5 Cross System Traceability

A single overview document providing detailed information on order, quote and trade traceability across trading and clearing systems.

2.2.6 Functional Reference

A single reference document which gives detailed insight into the functional concepts of T7, irrespective of any cash markets or derivatives markets specifics.

2.2.7 Network Access Guide

A single reference document providing details on the network access options for T7 and its clearing interfaces. The document includes detailed technical background information, such as router equipment information, IP addresses and port numbers for the configuration of firewalls.

2.2.8 ETI Manual

Please refer to the ETI (Enhanced Trading Interface) Manual for a more details on party, security and order identifiers and T7 order handling (chapter 4).

3. Technical Overview

The EDCI has the following main characteristics:

3.1 Message Based

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

3.2 Low Footprint

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

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

3.3 Standard

To ease the implementation effort for participants, the EDCI uses best practice methods taken from the financial industry, namely the use of the FIX Protocol standard.

3.4 Session Oriented

The EDCI is a session-oriented interface.

A session is established by opening a TCP/IP session to one of the EDC gateways. Please refer to the Network Access Guide for a list of the available EDC gateways including their addresses and ports.

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

Please aware that there is no queuing of EDC data if not consumed in time by the EDCI client. Consequently, the EDCI client will get disconnected.

3.5 Backward Compatibility

EDCI provides enhancements through a new XML file with each release. The use of this file can be deferred until future releases under certain circumstances.

New or modified field contents (valid values and/or usage), however, are not suppressed. In certain cases, even layout-level backward compatibility cannot be offered.

Therefore an application using the EDC interface should be able to deal with:

- new valid values as field content,
- usage changes of message fields,
- new message layouts in a broadcast stream.

T7 Release 15.0 does not support backward compatibility. i.e., only EDCI clients implementing interface version ’15.0’ will be supported.

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.

EDCI does not include any mechanism for automatic failover. Participant applications can implement a failover mechanism of their choice that supports their requirements.

If the active EDC session is ever disconnected, for any reason, the participant application must establish a TCP/IP connection to any available Gateway and send a Session Logon message. Please refer to chapter 4.5 for more details regarding the order drop copy stream following a successful session logon.

3.7 Session Login and User Login Throttle

The number of session login requests 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 exceeds the limit, T7 will reject that login request and all the following ones within a "cooling" time interval. T7 will subsequently reset the related counter.

4. Service Description

The EDC interface uses a proprietary session layer. EDC follows FIX Latest semantics; however the message headers and trailers have been modified to improve efficiency.

Each message in EDC has a unique numeric *TemplateID (28500)* assigned to it in addition to the standard FIX *MsgType (35)* information provided in the header.

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

4.1 Simple Binary Encoding

EDCI messages have a defined order of fixed-length fields and arrays of fixed-length elements. EDCI avoids string fields wherever 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 the EDCI messages.

Binary values are presented in little endian byte order.

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

Optional fields need to be initialized with NoValues. Please refer to the message reference documents for the details.

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

4.2 Connectivity

After the TCP connect to the TLS port, a TLS handshake must be initiated by the client and the following communication is then TLS encrypted.

EDCI supports TLSv1.3 only.

Please refer to the Network Access Guide for the list of supported cipher-suites.

The session and application layer is not affected.

To verify the EDC (gateway) server certificate, the client must deploy DigiCert root certificates into its trust store.

The server certificate is signed by a DigiCert intermediate certificate, which is provided by the server together with its own certificate during the TLS handshake.

4.3 Session Layer

4.3.1 Session Logon and Session Logon Response

The participant application needs to open a TCP/IP connection to 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 not sent within a certain time interval, the connection will be closed by the T7 architecture.

T7 will validate *PartyIDSessionID (20055)* and *Password (554).* A successful logon will start the order drop copy stream.

If the session logon fails, no further logon attempts will be accepted on that TCP connection. The application must drop the TCP session and establish a new TCP connection.

4.3.2 Heartbeat and Heartbeat Notification

The *HeartBtInt (108)* must be specified by the participant in the *Session Logon* message. This parameter specifies the period in which EDCI sends heartbeats to the participant and the interval EDCI 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. The *Heartbeat* message is used by the EDC gateway to monitor the status of the communication link to the EDCI client during periods of inactivity.

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

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

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

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

4.3.3 Session Logout, Session Logout Response, and Session Logout Notification

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

EDCI 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
- 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.

4.3.4 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.

4.3.5 Session List Notification

After a successful *Session Logon*, EDCI provides a list of trading sessions (including the corresponding *SessionMode*) contributing to the EDC datastream of the related EDC session.

4.3.6 Partition List Notification

After the *Session List Notification*, EDCI provides the list of partitions of the market the related EDC session belongs to.

4.4 User Authentication

EDCI has a two-step logon procedure, with a *Session Logon* at any available gateway and followed by one or multiple *User Logon* messages.

The *User Logon* message identifies and authenticates a qualified user establishing access to the T7 architecture. An EDCI session may be shared by several users 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.

The transaction of *Trading Action Request* Message requires 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 – even at the same time.

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

Note: EDCI 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.

4.5 Order Drop Copy Stream

T7 implements so-called Trading Partitions by grouping its products. An order drop copy stream out of each of these partitions is available (independent from the streams out of the other partitions).

Please note, that the scope of the order drop copy stream for a certain session must be configured by the owner of that session. Please refer to chapter 2.2.2 for more details.

After a successful *Session Logon*, and getting both, the *Session List Notification* and the *Partition List Notification*, the order drop copy stream will start with the *Trading Session Event* message *(Start of Order book synchronization)* per partition followed by a restatement of active orders by *Extended Order Information* messages. The *Trading Session Event* message (*End of Order book synchronization)* indicates the end of the initial order book synchronization per partition.

Following this, additional *Extended Order Information* messages (for order book updates), *Trading Session Event* messages, and *Order (Mass) Cancellation Notification* messages will be sent.

The *Trading Session Event* message *(End of Service)* indicates the end of the order drop copy stream per partition for a certain business day.

4.5.1 Trading Session Event

There are the following *Trading Session Event* messages:

Trading Session Event (TradSesEvent)	Value of TradSesEvent	Context
Start of Order book synchronization	108	Partition
End of Order book synchronization	107	Partition
Order book reset	109	Partition
End of Restatement	103	Product
End of Service	104	Partition

Please note: EDCI consumers should invalidate their local order books (per partition), when capturing either *Trading Session Event (Start of Order book synchronization)* or *Trading Session Event (Order book reset)* messages. In both cases, the restatement of the active orders will be followed by *Extended Order Information* messages (per order).

Trading Session Event (Start of Order book synchronization) message either starts the order drop copy stream (for a certain partition) after a successful *Session Logon*, or re-starts the stream (for a certain partition) in case of internal issues. The field *RefApplLastSeqNum (1357)* indicates the last application sequence number assigned to an EDCI data stream before order book synchronization.

The *Trading Session Event (End of Order book synchronization)* message indicates the end of the order book restatement per partition.

The *Trading Session Event (Order book reset)* message indicates the (re-)start of the matching engine of a certain partition resulting into a restatement of the active orders. As the matching engine reloads these orders product by product from its persistence layer the *Trading Session Event (End of Restatement)* message indicates the end of that reloading per product.

Please be aware that EDCI clients might not get *Trading Session Event (Order book reset)* and/or *Trading Session Event (End of Restatement)* messages depending on startup time of the EDCI client.

The *Trading Session Event (End of Service)* message is the last order drop copy message for a certain partition and business day.

4.5.2 Extended Order Information

The E*xtended Order Information* message is used for reporting the EDC related order activities excluding the cancellation of orders.

4.5.3 Order (Mass) Cancellation

The *Order (Mass) Cancellation* message reports the cancellation or pending cancellation of a single or multiple orders. In both cases, the order references (both, system order id and client order ids) are reported.

4.6 Risk Control

EDCI supports advanced risk protection services. There are the following message formats:

- Derivatives markets only: when a breach on a certain level of risk limits occurs, the participant will be informed via the *Risk Notification* message.
- Entitlement updates triggered from the Clearing system affecting the business unit are communicated via the *Entitlement Notification* message.
- Entitlement updates triggered within the Trading system (GUI) affecting the business unit or the trader are communicated via the *Party Action Report* message.
- Legal text messages in case of suspension from trading will be provided via the *Legal Notification* message.

- For Sponsored Access only: in cash market, when a breach on a certain level of overall risk limit occurs, the Sponsored Access Provider will be informed via the *Risk Notification* message.
- For Sponsored Access only: the Sponsored Access Providers will be informed via the *Party Action Report* message, when their Sponsored Access Units are released or stopped due to *Trading Action Request* Message.

This private stream is automatically sent to each session of the corresponding business unit and clearing unit, no subscription mechanism is supported.

Each Risk Control broadcast message provides a unique sequence number and can be retransmitted.

Please note that the retransmission protocol does not include the access to historical *Risk Notification* messages. There is a cut at the end of the business day.

4.7 Service Availability – market scope

The Service Availability message provides information on the availability of all services on different markets from a certain gateway point of view. Retransmission is not supported for this stream, i.e. service availability messages are not recoverable.

Please be aware that the service availability indicates only which services are available by the EDC gateway the EDCI client interacts with.

Subscription is handled via the Subscribe message. The Subscribe Response message confirms the subscription followed by Service Availability messages providing the current status of market services. Any status change of a service would then be communicated via a new Service Availability message.

The following services are provided:

- RiskControlRtmServiceStatus (25238),
- MarketwideAnalyticsAndRiskServiceStatus (25268).

4.8 Retransmission

Retransmission is supported for recoverable session data and the broadcast types risk control and order drop copy data.

For retransmission, the *Retransmit* message respectively is used.

Retransmission of a Sponsored Access Unit can be only processed by its own Sponsored Access Unit.

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

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 retransmission response will provide the range of recovered data 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.

5. EDCI in a nutshell

- New T7 interface for order drop copies.
- FIX latest, Simple Binary Encoding, own session layer, TLS encryption (version 1.3 only).
- Interested participants must apply for new EDC sessions via the Eurex Member Portal.
- Prior to their use for e.g. even to be able to receive any data, participants must configure their sessions (for basic and scope configuration where relevant) via the Admin GUI.
- Simple session layer: connect to an EDC Gateway, send a Session Logon, get order drop copies.
- The order drop copy stream starts with a restatement of the active orders.
- Subsequent order book activity will follow in near real-time.

6. Appendix

6.1 Uniqueness of Identifiers

The following table documents the criteria required for uniqueness of IDs.

Tag	Field Name	Description	Source	Rule	Uniqueness
11 37 30011 30041 30535 1824 30536 31824	ClOrdID OrigClOrdID FIXClOrdID FIXOrigClOrdID AffectedClOrdID AffectedOrigClOrdID AffectedFIXClOrdID AffectedFIXOrigClOrdID	Client Order ID: Unique participant defined order request identifier.	P[1]	The uniqueness of Client Order ID is checked at entry time among currently live orders for the same instrument and session.	Session Instrument
37 535	OrderID AffectedOrderID	Exchange Order ID generated by the T7 System; it remains constant over the lifetime of an order.	E	An exchange order ID is guaranteed to be unique among all orders of the same product.	Product
17	ExecID	Transaction timestamp.	E	Is unique per product.	Product
34	MsgSeqNum	Message sequence number used by the participant for requests sent to the gateway.	P	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.	Session
28708	FillMatchID	Unique identifier for each price level (match step) of a match event; it is used for public trade reporting.	E	Is unique for the product and business day.	Business Day Product
1363	FillExecID	Private identifier of an order match step event	E	Is unique for the product and business day.	Business Day Product

1 P = Participant, E = Exchange

6.2 Timestamps

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

EDCI provides the following timestamp information:

Timestamp	FIX field	Description
Transaction timestamp	ExecID (17)	Taken when a transaction is functionally processed and used as a unique message identifier per product for messages sent by EDCI.
Gateway request in	RequestTime (5979)	Provides the time the EDC gateway has read an inbound message on a gateway from the TCP socket.
Gateway response out	SendingTime (52)	Provides the time the EDC gateway has written an outbound message on a gateway to the TCP socket.

7. Change Log

7.1 T7 Release 15.0 – Version 2

- Updates in Chapters 4.5.1 Trading Session Event, 4.8 Retransmission

7.2 T7 Release 15.0 – Version 1

- Backward compatibility - see Chapter 3.5
- Addition of Chapters: 4.4 User Authentication, 4.6 Risk Control, 4.7 Service Availability – market scope, 4.8 Retransmission
- Introduction of Sponsored Access – see Chapter 2
- Introduction of User Logon – see Chapter 3.7 and 4.4