Cboe Australia

CXA

Order Conversion Service

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Contents

1. Overview of the Order Conversion Service (OCS)

Cboe Australia (CXA) provides an Order Conversion Service (OCS), an optional service leveraging our existing Port Attribute functionality. Participants can request Cboe systems to 'switch on' pre-defined Cboe instructions, to be applied to certain orders under certain conditions on their behalf.

The OCS applies these pre-defined instructions to orders using **Port Attribute** mechanisms.

The OCS is a platform that provides an **expanding library** of order handling options to participants, which are listed in the appendices of this document.

What is a Port Attribute? Port attributes are CXA-defined mechanisms, that participants may request per order entry port, which instruct CXA systems to perform on the participant's behalf.

A common example of a Port Attribute is 'cancel on disconnect' where CXA systems will cancel a participant's orders entered by a FIX or BOE port if that port loses connection with CXA systems.

Participants may choose to use pre-defined OCS instructions by confirming with CXA Trade Desk, who apply the settings with approved participant signoff as set out below.

- Order Conversion Service options may be applied per FIX or BOE order entry port.
- The Order Conversion Service is applied to the symbols in the symbol inclusion list and/or account(s) specified per order entry port, assisting participant rollout strategies.

2. Benefits of the Order Conversion Service

All mechanisms in the Order Conversion Service library may otherwise be developed independently by participants using existing interfaces, however:

- the OCS uses Port Attribute mechanisms, which facilitate the implementation of pre-defined order handling logic without technical interface message updates;
- participants are not imposed with development efforts to implement these new features, just ‘switch on’ and OCS does the order conversion;
- OCS logic is applied within exchange systems with minimal reaction-time latency;
- the OCS ease of setup facilitates a rapid time to market; and
- All options in the OCS Library are available to all participants.

The appendices below set out the library of OCS mechanisms.

3. Appendix OCS.01: Timed Expiring Order (TEO) Mechanism

Participants who use Pegged Immediate or Cancel (IOC) orders, can choose to utilise the mechanism from the Order Conversion Service Library which converts the incoming **Pegged IOC order to a Hidden Pegged GTD** (with ExpireTime) order for a short duration, to increase their execution opportunities without any development work. This is referred to as a **Timed Expiring Order (TEO)** in this document.

Timed Expiring Order is not a new order type. Participants can emulate this mechanism with existing interfaces, by entering a Pegged GTD order with ExpireTime, which will be automatically cancelled by CXA systems at the ExpireTime.

The Order Conversion Service, however, facilitates this method with no development effort for existing Pegged IOC users, with faster time-to-market and gradual rollout flexibility.

3.1 Port Attributes relevant to Timed Expiring Orders

Participants may configure their usage of **Timed Expiring Order (TEO)** for deployment using the following granularity options, per Order Entry Port (FIX or BOE):

- Set TEO **Default duration**, in milliseconds, for this Port
- Set TEO **Farpoint pricing** option, to override the Pegged instruction (Midpoint, Nearpoint) with Farpoint
- Set TEO **Client Acknowledgement Preference** if the participant's trading application prefers acknowledgement messages to echo back the original request settings (i.e. Pegged IOC) to further reduce impact, rather than the new converted settings (Pegged GTD with ExpireTime).
- Set **Account** to include certain Account field patterns:
    - Null entry means no Account filter and therefore allows all Accounts for the Symbols listed below
    - Account String means only this Account will be included for conversion for the Symbols listed below
    - Length variants to include Accounts of certain lengths:
        - len=5 Account field will only apply TEO where the account FIX tag 1 has 5 chars only
        - len=6+ (plus) Account field will only apply TEO where the account FIX tag 1 has 6 chars or more
        - len=3- (minus) Account field will only apply TEO where the account FIX tag 1 has 3 chars or less
        - len=3-5 Account field will only apply TEO where the account FIX tag 1 has 3,4, or 5 chars
        - ABC… (note 3 dots) Account field will only apply TEO where the account FIX tag 1 has 6 chars starting with 'ABC'

- ..ABC.. (note 4 dots) Account field will only apply TEO where the account FIX tag 1 has 7 chars where chars 3-5 is 'ABC'
  - Comma-delimited example with no whitespace permitted: ABC,len=4,len=6+,AB..C (Account must equal 'ABC', or be 4 chars length, or be 6 chars length or greater, or be 5 chars length with char1=A char2=B char5=C)
  - Note that OCS will not process string matches with "." (dot) or " " (space). Participants will be able to continue to use dot and space in their account values but will not be able to filter using dot or space in OCS.
- Per **Symbol**:
  - The Symbol to be included in the TEO logic. Symbols not listed will not result in a converted order
  - Set TEO symbol duration, in milliseconds, if the preferred duration for this symbol differs from the TEO default duration for this Port

Note that the Account patterns (if set) AND the Symbol inclusions must conform for an order conversion to occur.

3.2 Port Attributes Examples

The following table provides examples to explain the TEO Port Attribute granularities available, to assist with deployment plans.

Order Entry Port '0001'		**Notes**:
		• The configuration example applies to Port 0001 only (ie. Per Order Entry Port)
TEO default duration	**300**	• The Pegged GTD with any remaining volume is cancelled after 300 milliseconds if not traded out prior (valid range 10 – 1000)
TEO Farpoint pricing	**Y**	• If set to 'Y' then Nearpoint and Midpoint are set to Farpoint pricing
TEO Client Acknowledgement Preference	**Y**	• If set to 'Y' Cboe will acknowledge with original order attributes • If set to 'N' Cboe will acknowledge with converted order attributes
TEO Account Inclusions (or) with no spaces	**ABC,len=4,len=6+**	• Orders with Account value 'ABC', **or** a length of 4, **or** a length of 6 or greater will be eligible for conversion, **and only** for Symbols in the inclusion list
TEO Symbol Inclusion list (and)		• Symbol inclusion list. **Only Symbols listed are eligible for conversion**, which also adhere to the Account inclusions above
BHP	**200**	○ BHP GTD orders will expire after 200 milliseconds
CSR		○ CSR GTD orders will expire after 300 milliseconds (port default)
WOW		○ WOW GTD orders will expire after 300 milliseconds (port default)
NAB	**250**	○ NAB GTD orders will expire after 250 milliseconds
ABC	**400**	○ ABC GTD orders will expire after 400 milliseconds

3.3 Order Conversion Service – Sequence for Timed Expiring Orders (TEO)

IOC orders may be entered as follows.

- **Limit IOC** orders, where the quantity that does not immediately trade on entry is cancelled**. Limit IOCs cannot be converted to a TEO**.
- **Pegged IOC** orders (i.e. Mid-point, Near-point, Far-point). **Pegged IOCs can be converted to a TEO on entry**. The order is converted and then entered into the trading system as a Pegged GTD (with ExpireTime) order for a limited duration.
- Pricing and eligibility considerations align with existing pegged order mechanisms.
- The TEO will remain in the order book as a hidden Pegged GTD (with ExpireTime) order and will respect normal order queue priority.
- TEOs, like all pegged orders, respect the entered Limit price and are un-booked and ineligible to trade if the Pegged price is less favourable than the Limit price.
- A TEO may be involved in one or many trades throughout its duration.
- Any untraded order quantity will be cancelled by CXA systems at the end of the Participant's pre-defined duration as defined in the Port Attributes.

3.4 Order Conversion Service – Message Population Samples

The tables below demonstrate that the messaging sequence for a TEO is functionally the same as that of a participant that enters a GTD Pegged order which is cancelled after the desired duration and achieves the same outcome.

Current FIX tag sequence: Pegged GTD order is entered by the participant, partially trades and is then cancelled by the participant after a short duration. Note the equivalent **BOE** field names are represented in the column headings.

Event Description	Direction	Message Type	Order Type	Exec Inst	Time In Force	Expire Time	Exec Type	Client's Order ID	Liquidity Indicator
Pegged GTD with ExpireTime order request is entered into the trading system	**Client to CXA**	35=D New Order	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=user defined Expiration Time	n/a	11=P001	n/a
Pegged GTD with ExpireTime order acknowledged	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=user defined Expiration Time	150=0 **New**	11=P001	n/a
Pegged GTD with ExpireTime order partially trades on entry	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=user defined Expiration Time	150=1 **Partial Fill**	11=P001	9730=R **Removed Liquidity**
Resting Pegged GTD with ExpireTime order is then partially traded	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=user defined Expiration Time	150=1 **Partial Fill**	11=P001	9730=A **Added Liquidity**
Pegged GTD with ExpireTime order cancelled acknowledgement	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=user defined Expiration Time	150=4 **Cancelled**	11=P001	n/a

1. **TEO FIX tag sequence**: Incoming Pegged IOC order is converted to Pegged GTD (with ExpireTime) order (TEO) on entry into the trading system at Farpoint. Note the equivalent BOE field names are represented in the column headings.

Event Description	Direction	Message Type	Order Type	Exec Inst	Time In Force	Expire Time	Exec Type	Client's Order ID	Liquidity Indicator
Client sends a Pegged IOC order request in a pre-defined "TEO symbol" in their Port Attributes.	**Client to CXA**	35=D New Order	40=P Pegged	18=M (Midpoint)	59=3 **IOC**	n/a	n/a	11=P001	n/a
OCS converts the Pegged IOC to a Pegged GTD (with Expiretime) order (TEO) for entry into the trading system at Farpoint, as per the participant's Port Attribute instructions and intentions									
OCS enters the converted Pegged GTD (with ExpireTime) order (TEO) into the trading system	Client OCS instruction executed by CXA	35=D New Order	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=x Calc from TEO Duration	n/a	11=P001	n/a

OPTION: TEO Client Acknowledgement Preference is not set - Acknowledgement messages include converted Pegged GTD with ExpireTime settings

GTD (with ExpireTime) order (TEO) **acknowledged**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=x Calc from TEO Duration	150=0 **New**	11=P001	n/a
GTD (with ExpireTime) order (TEO) **partially trades on entry**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=x Calc from TEO Duration	150=1 **Partial Fill**	11=P001	9730=R **Removed Liquidity**
Resting TEO is then partially **traded**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=x Calc from TEO Duration	150=1 **Partial Fill**	11=P001	9730=A **Added Liquidity**
Remaining TEO quantity is **cancelled** by CXA systems at the end of the client-defined duration	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=6 **GTD**	126=x Calc from TEO Duration	150=4 **Cancelled**	11=P001	n/a

OPTION: TEO Client Acknowledgement Preference is set to 'Y' - Acknowledgement messages echo the original Pegged IOC request settings

GTD (with ExpireTime) order (TEO) **acknowledged**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=3 **IOC**	n/a	150=0 **New**	11=P001	n/a
GTD (with ExpireTime) order (TEO) **partially trades on entry**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=3 **IOC**	n/a	150=1 **Partial Fill**	11=P001	9730=R **Removed Liquidity**
Resting TEO is then partially **traded**	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=3 **IOC**	n/a	150=1 **Partial Fill**	11=P001	9730=A **Added Liquidity**
Remaining TEO quantity is **cancelled** by CXA systems at the end of the client-defined duration	CXA to Client	35=8 Execution Report	40=P Pegged	18=P (Farpoint)	59=3 **IOC**	n/a	150=4 **Cancelled**	11=P001	n/a

3.5 Orderbook Example Scenarios

***Example 1**. Limit IOC orders are out of scope.* *IOC Limit bid order entered with quantity 1000 at price 500 and partially trades quantity 200 on entry leaving quantity 800.*	**Qty BID ASK Qty** IOC (D) ~~1000~~ 500 ~~500 200 (A)~~ (C) 200 499 502 1000 (B)
IOC Limit orders are not converted to Timed Expiring Order in this initial implementation. The untraded quantity of the IOC is cancelled as per normal.	**Qty BID ASK Qty** (C) 200 499 502 1000 (B)

Example 2. IOC converts to TEO on entry with Farpoint option with a duration of 200 milliseconds, however the order is fully traded in multiple executions prior. IOC Pegged (Midpoint) bid order request is converted to an TEO on entry with quantity 1000 which is priced at the NBBO Farpoint of 501, with a limit price 502.	**Qty BID ASK Qty** TEO (D) 1000 **501** 502 1000 (A) (C) 500 498 503 1000 (B)
After 30 milliseconds, an aggressive sell with quantity 600 at price 501 partially trades out the TEO leaving 400.	**Qty BID ASK Qty** TEO (D) **400** 501 502 1000 (A) (C) 500 498 503 1000 (B)
After a further 40 milliseconds, another aggressive sell quantity 1000 at 501 trades out the TEO and the remainder of the sell rests accordingly.	**Qty BID ASK Qty** (C) 500 498 **501** **600 (E)** 502 1000 (A) 503 1000 (B)

Example 3. IOC converts to TEO with a 300 millisecond duration on entry and the price subsequently adjusts with NBBO updates and partially trades before the remainder is cancelled when the order duration expires. IOC Pegged (Farpoint) bid order request is converted to an TEO on entry is entered	**Qty BID ASK Qty** TEO (D) 1000 **501** 502 1000 (A) (C) 500 498 503 1000 (B)

with quantity 1000 which is priced at the NBBO farpoint of 501, with a limit price 505.	
After 30 milliseconds, the NBBO moves to 501 – 502 thus all pegged orders are priced at the half-tick of 501.5 as per standard pegged pricing behaviour.	**Qty BID ASK Qty** TEO (D) 1000 **501.5** 502 1000 (A) (F) 200 501 503 1000 (B)
After a further 40 milliseconds, a sell Mid-point with quantity 500 priced at 501.5 trades against the TEO leaving quantity 500.	**Qty BID ASK Qty** TEO (D) **500** 501.5 502 1000 (A) (F) 200 501 503 1000 (B)
After a further 230 milliseconds, the full 300 millisecond duration has expired and the TEO is cancelled by CXA systems	**Qty BID ASK Qty** (F) 200 501 502 1000 (A) 503 1000 (B)

3.6 Technical Specification Updates relevant to TEO

CXA has minimised the technical specification changes for TEO to reduce client impact.

- **Reference Data Files**

  There are **no changes** to CXATSL or CXALSL reference data files.
- **Order Entry FIX and BOE**

  There are **no changes** to FIX and BOE specification messages for order entry. All configurations for TEO usage are pre-configured in the Port Attributes.
- **Listeners (FIX Drop, ODROP)**

  There are **no changes** to drop copy listener messages.
- **Market Data (PITCH and TOP)**

  Trades that involve a converted order will be indicated in ‘Bit 1’ of the Flags field as shown in the technical specification excerpts below.

  Note there are no field or message length changes, just the re-use of a previously reserved field.

• The **PITCH** Market Data ***Trade*** Message where the prior *Reserved* field is re-purposed as the *Flags* field will be used to indicate a converted order. • The message length remains the same. • Cloud PITCH includes an equivalent field.	*Flags* | 71 | 1 | Bit Field | Bit 0 (Value 1) Reserved; Bit 1 (Value 2) Trade from converted order; Bit 2 (Value 4) Reserved; Bit 3 (Value 8) Reserved; Bit 4 (Value 16) Reserved; Bit 5 (Value 32) Reserved; Bit 6 (Value 64) Reserved; Bit 7 (Value 128) Reserved **Total Length = 72 bytes**
• The **TOP** Market Data ***TOP Trade*** Message within the existing *Flags* field will be used to indicate a converted order. • The message length remains the same • Cloud TOP includes an equivalent field.	*Flags* | 59 | 1 | Bit Field | Bit 0 (Value 1) Trade break; Bit 1 (Value 2) Trade from converted order; Bit 2 (Value 4) Reserved; Bit 3 (Value 8) Reserved; Bit 4 (Value 16) Reserved; Bit 5 (Value 32) Reserved; Bit 6 (Value 64) Reserved; Bit 7 (Value 128) Reserved **Total Length = 60 bytes**

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