OneChronos MTF User Manual

Table of Contents

Version Control

Version	Description	Publication Date
V1.0	Initial version of MTF user guide	14-03-25
v1.1	Update Minimum Quantity description.	23-03-25
v1.2	Update to include reference to UTC and business clock synchronisation	10-07-25
v1.3	Updated to include regulatory authorisation number and remove disclaimers not required once operational, removed Luxembourg as an available market, and other minor updates.	27-04-26

About This Document

The purpose of this document is to provide an overview of the key technical, operational, and business features of the OneChronos United Kingdom (UK) and European Union (Netherlands) domiciled Multilateral Trading Facilities[1] (MTF), collectively referred to as the **'OneChronos MTF'** throughout this document.

This document is not intended to serve as a technical specification for software development. Instead, it aims to inform market participants about practical information on the technology and operation of the OneChronos MTFs in the UK and Mainland Europe.

For any questions or feedback, please contact sales_europe@onechronos.com.

Why use OneChronos Europe?

About OneChronos

OneChronos is a United States (US) domiciled technology company, founded and driven by diverse thinkers who are innovating at the intersection of capital markets, mechanism design, and operations research. As an operator of Smart Market trading venues, OneChronos leverages advanced combinatorial auction techniques and artificial intelligence to enhance price improvement, liquidity, and fairness.

Our proprietary software and systems, developed in-house, as of 2026 already powers billions of dollars in daily security transactions in the US, helping to grow global GDP by designing and operating more efficient matching markets. In 2024-26, OneChronos established a European business presence - in summary:

- **Debut product**: Launched an Alternative Trading System (ATS) in 2022 for US equity trading, using a unique periodic auction model.
- **Growth**: One of the fastest-growing ATS in US equities since inception in Q4 2022, while maintaining industry-leading execution performance and continues to grow.
- **Global operations**: Established Smart Market Trading venues in the US, UK and the Netherlands
- **Philosophy**: OneChronos prioritises liquidity quality over speed, applying auction theory to create a fair market where execution is based on price and size rather than order timing, reducing potential adverse selection risk and levelling the playing field for investors.

[1] MTF (within the meaning of article 2(1)(14A) of UK MiFIR and article 2(1)(14) of MiFIR)

About OneChronos MTF

The OneChronos MTF operates with a single, pre-trade transparent order book, utilizing a periodic auction mechanism to efficiently match its trading members (known as 'Subscribers'). The OneChronos MTF technology infrastructure, including its matching engine, is housed within the London Equinix campus, ensuring high-performance and reliable connectivity.

The OneChronos MTF is active only during the continuous trading hours of the Primary Market applicable for the instruments admitted to trading on its venue, which is therefore Monday - Friday, between 8:00-16:30 London local time, and 09:00 - 17:30 Amsterdam local time, excluding market holidays for the relevant underlying market. OneChronos does not facilitate orders or executions within opening, closing, or other scheduled auction periods. Further details are available in the ***OneChronos FIX Specification****.*

The OneChronos MTF facilitates trading in equity and equity-like instruments that are admitted to trading in the UK, Switzerland and the EEA.

Benefits of using OneChronos MTF

The OneChronos MTF is built to integrate seamlessly into its Subscribers' existing trading workflow, utilising standardised interfaces, established post-trade processes, and industry best-practices. Through this, it introduces a progressive approach to pan-European equity trading, designed to maximize execution quality for its Subscribers.

Key Advantages to the OneChronos MTF:

- **Trade Matching**: The OneChronos unique auction model prioritizes Maximisation of Notional Price Improvement, focusing on trade quality rather than solely maximising volume.
- **No speed-based advantages**: Trading outcomes are determined by liquidity quality, not speed, ensuring a level playing field for all.
- **Minimised Latency Arbitrage:** A bespoke market data buffer is designed to reduce opportunities for latency exploitation and reduce negative mark-outs for Subscribers executions.
- **Cross-Instrument Auctions**: The OneChronos venue-initiated auction schedule enables future multi-security contingent trading opportunities, unlocking greater potential for strategic execution.
- **Reduced information leakage:** Data publication that occurs via the OneChronos MTF minimises unnecessary exposure, protecting trading strategies and enhancing execution outcomes.

These innovations have already made OneChronos in the US a market leader in execution quality, with continued expansion across multiple asset classes and geographies, all built on the same core technology that underpins its trading venues.

Market and Security Coverage

The OneChronos MTF supports trading in securities that qualify as equity and equity-like instruments in accordance with UK and European Union regulatory requirements.

- **OneChronos MTF UK**: Trades equity and equity-like securities with a primary listing in the United Kingdom or Switzerland.

- **OneChronos MTF Europe**: Trades equity and equity-like securities with a primary listing in the European Economic Area (EEA), including:
  - Austria
  - Belgium
  - Denmark
  - Finland
  - France
  - Germany
  - Ireland
  - Italy
  - Netherlands
  - Norway
  - Portugal
  - Spain
  - Sweden

Subscribing to OneChronos MTF

Eligibility Criteria

OneChronos defines the Eligibility Criteria to become a Subscriber in the **OneChronos MTF Rulebook(s)** hereinafter collectively referred to as **'the Rules'**. Subscribers must be either an investment firm or credit institution authorised by a regulator (within the meaning of Article 2 1.(1) of MiFIR) and Article 2 1.(1A) of UK MiFIR.

Subscriber Onboarding Requirements

To ensure a seamless and compliant integration with the OneChronos MTF, all prospective Subscribers are required to complete and return the following mandatory forms as part of the onboarding process:

1. **Subscriber OnBoarding Form**
   This form collects essential details about the Subscriber's firm, including:
   - Firm name and contact information for trading, escalation, and billing enquiries.
   - Clearing firm information and associated MPIDs.
   - Any additional administrative data required to verify eligibility.
     Subscribers should ensure all fields are completed accurately, as any omissions or errors may delay onboarding.
2. **Subscriber Port Session Configuration Form**
   This form is used to configure the Subscriber's trading session parameters, including:
   - Fat finger protection settings and maximum order size limits.
   - Session-specific defaults (e.g., cancel-on-disconnect rules, and self-trade prevention).
   - Technical parameters critical to risk management and maintaining the integrity of the trading platform.

It is imperative that these settings are accurately configured to safeguard against trading errors and to ensure optimal system performance.

Complete and accurate submission of both forms is required for access to the OneChronos MTF. For detailed instructions on how to complete these documents, please refer to the guidance provided within each form or contact the OneChronos MTF support team at ops_europe@onechronos.com.

In addition, Subscribers must be able to satisfy the functional conformance testing requirements as prescribed by OneChronos and certify by this testing that their systems are compatible with the OneChronos MTF and in accordance with the Rules, including:

- Demonstrating that systems and controls are in place (including sufficient staff, adequate policies and procedures) in relation to the validity and execution of any instruction type submitted to the MTF; and to

prevent the submission of any erroneous Order which would affect the integrity of the MTF or the market more generally;

- Certifying that any Algorithmic Trading has been tested prior to deployment on the MTF to the extent required by RTS 6;
- Evidencing that the Subscriber maintains appropriate order management, order routing, execution, voice and other recording facilities to provide OneChronos (if requested) with such information as it may require in relation to the validity and execution of any Order; and,
- Meeting any other requirement under Applicable Law, this Rulebook, or the Subscriber Agreement relevant to the Subscriber's participation on the OneChronos MTF.

Trading Capacities and Order Flagging

OneChronos MTF supports Subscribers who are trading in a principal or agency capacity. A Subscriber may place an Order as principal (i.e. for the Subscriber's own account), or on behalf of its customer in its capacity as agent (or on a riskless principal basis) however, where a Subscriber enters an Order as an agent, the Subscriber represents that it has the requisite legal authority to do so on behalf of the respective customer.

Subscribers must provide information for each Order as specified by OneChronos (as outlined in Commission Delegated Regulation (EU) 2017/580, i.e. RTS24) and explained within the **OneChronos FIX Specification document**. Orders that do not include all required information will be rejected.

Access

Subscribers can only access OneChronos MTF using designated Access Credentials, which must be kept confidential and only shared with Authorised Persons (employees, agents, or representatives).

- Authorised Persons must be trained, supervised, and compliant with all rules and regulations.
- OneChronos will treat all instructions from Authorised Persons as valid and binding, with Subscribers fully liable for all activity.
- Unauthorized individuals must not access the MTF. Subscribers must maintain an updated list of Authorised Persons and provide it to OneChronos upon request.
- OneChronos may suspend access if an Authorised Person fails to comply with the Rules, and Subscribers must immediately revoke their access if requested.

OneChronos further defines the Access Criteria in the Rules.

Notices

OneChronos will periodically publish or issue notifications to Subscribers regarding interpretations, supplements, or amendments to the Rules, as well as information regarding the addition or removal of Securities to/from the OneChronos MTF. These notifications will be communicated via email where this is the respective Subscriber's wish and will be published on the OneChronos website.

OneChronos is not obligated to inform Subscribers of any pending market event or corporate actions that may affect the pricing of a security admitted to trading to the OneChronos MTFs.

Subscribers must submit notifications to OneChronos via email in accordance with the Rules. If the notification concerns a significant event, such as a change in regulatory status or control, the Subscriber must inform OneChronos immediately, as required by the Rules.

Any Rule requiring notification shall be interpreted as a written notice. Subscribers must send such notifications to: compliance_europe@onechronos.com**.**

Complaints procedure

If a Subscriber has a complaint about the MTF, OneChronos, or conduct of another Subscriber, such complaint should be made in writing to: compliance_europe@onechronos.com**,** in accordance with the Complaint Procedures which are made available on the OneChronos website.

Suspension or Termination of Access

OneChronos may, in its sole discretion, determine if a Subscriber is in breach of any Rule and may restrict, suspend, limit, or terminate access to the MTF at any time, with or without notice in accordance with the Rules. Additional actions may be taken if a Subscriber is found to be in breach of the Rules, the terms of the Subscriber Agreement, or any Applicable Law. Additional actions may also be taken if a Subscriber faces insolvency, or if it is necessary for OneChronos to maintain market order, comply with applicable law, or meet regulatory requests.

OneChronos will make reasonable efforts to notify affected Subscribers promptly where it is taking action to suspend, limit, terminate or take any other action in relation to the Subscriber's access to the OneChronos MTF.

A Subscriber may suspend its access to the OneChronos MTF by terminating the Subscriber Agreement in accordance with that agreement's terms.

Pricing and Liquidity Provision

OneChronos publishes current pricing information to the website and informs Subscribers at least 30 days in advance of any changes being made to the pricing scheme.

Tax and Levies

Purchases of certain shares on the OneChronos MTF may be subject to stamp duty, levies, or other taxes. The information below is for general guidance only and does not constitute tax advice. Subscribers should seek independent advice on their tax obligations and potential exemptions in the UK, Ireland, and other markets where OneChronos operates.

PTM Levy

The PTM Levy is payable on both purchases and sales by the purchaser or seller of trades in securities of companies admitted to the OneChronos MTF which are incorporated in the United Kingdom, the Channel Islands or the Isle of Man. Subscribers must collect the PTM levy from their clients for transactions on the OneChronos MTF when applicable. The levy rate is set by the Panel on Takeovers and Mergers and may change over time. The latest PTM levy information can be found on the Panel on Takeover and Mergers' website: http://www.thetakeoverpanel.org.uk.

Tax (UK SDRT, Irish Stamp Duty, FTT)

UK Stamp Duty Reserve Tax: All purchases of UK shares on OneChronos will be subject to UK Stamp Duty Reserve Tax (UK SDRT) under the UK Finance Act 1986. However, some Subscribers may qualify for intermediary relief, which exempts them from paying UK SDRT.

If you are already approved as a recognised intermediary for trading on other exchanges or designated markets, you do not need separate approval for trades on OneChronos MTF.

A Subscriber can apply for relief if it is classified as an intermediary, meaning it operates a legitimate business dealing in securities and does not engage in excluded activities. HM Revenue & Customs (HMRC) will determine whether a Subscriber qualifies. To be eligible, the Subscriber must have a UK address for HMRC to inspect records. If the Subscriber does not have a UK address, it may use the UK address of its General Clearing Member, with their consent. For further details, the full text of section 88A of the Finance Act 1986 is available at www.legislation.gov.uk.

Subscribers who believe they qualify for intermediary relief and wish to apply through OneChronos must submit a completed UK SDRT Intermediary Relief Form to compliance_europe@onechronos.com who will review the form and forward it to HMRC for processing. The form is available on the OneChronos website.

As part of the onboarding process, Subscribers must disclose their intermediary relief status when joining the MTF. Additionally, they may be required to review and confirm or update their status annually to reflect any changes.

Irish Stamp Duty Tax: If you buy Irish securities on the OneChronos MTF, you may have to pay Irish stamp duty tax, as outlined in the Stamp Duties Consolidation Act 1999, at the current rate.

Some Participants may qualify for intermediary relief under section 75 of the Act. To claim this relief, you must be approved as an intermediary by the Irish Revenue Commissioners, and the trade must not be for an excluded business (as defined in section 75). Subscribers should refer to the Irish Revenue for additional information at: https://www.revenue.ie/en/property/stamp-duty/other-stamp-duty/crest/index.aspx

If you are already approved as a recognised intermediary for trading on other exchanges or designated markets, you do not need separate approval for trades on OneChronos MTF.

Guidance on intermediary relief and the self-certification form for approval as an intermediary are available on the Irish Revenue Commissioners' website. Applications for intermediary status must be sent directly to the Irish Revenue Commissioners, not to OneChronos MTF.

Financial Transaction Tax: If a financial transaction tax (FTT) applies to a Subscriber's transactions, they are responsible for handling the tax as required. This may involve paying it through their CSD, settlement agent, or custodian. OneChronos does not collect and is not responsible for any taxes owed that result from transactions made through its platform.

Clearing and Settlement

Subscribers are fully responsible for all transactions executed on the MTF, including ensuring timely settlement in accordance with the rules of the relevant settlement system and Central Counterparty (CCP). They must have appropriate arrangements, systems, and controls in place to meet their obligations under applicable law.

OneChronos assumes no liability for settlement failures or non-performance by any party. If a Subscriber acts as an agent and a settlement failure occurs, they will be bound as the principal with the counterparty.

Subscribers must also maintain clearing arrangements with a connected CCP, such as CBOE Clear, LCH, or SIX X-Clear.

Connectivity to OneChronos MTF

The OneChronos FIX Specification describes the FIX interfaces for MIC OCXL (OneChronos UK MTF) and MIC OCXE (OneChronos EU MTF), covering both order entry and drop-copy. Subscribers initiate a connection to the relevant MTF FIX gateway to access these services.

All timestamps on FIX trading messages must be specified in Coordinated Universal Time (UTC), as per the FIX Protocol standard. Subscribers may use the Sending Time (Tag 52) field to monitor message latency and detect potential clock drift.

Subscribers are responsible for maintaining accurate and synchronised business clocks in accordance with their regulatory obligations.

OneChronos FIX is a modern variant of the FIX 4.2 protocol specification. For connectivity inquiries, contact ops_europe@onechronos.com.

Gateway Options

Trading gateway: The certification environment is accessible via **WireGuard or IPsec VPN.** UAT and production connections require a private cross-connect in OneChronos data centres, and all FIX connections use TCP/IP.

Drop copies: OneChronos offers two types of FIX drop copy: Order-by-Order, which forwards all business-level messages (including trade breaks if enabled), and Fills Only, which sends only ExecutionReport-Fill and ExecutionReport-PartialFill messages.

Post Trade Gateway: OneChronos publishes transaction details per MiFIR and RTS 1, in real-time during operating hours, subject to any permitted deferrals or waivers. Transactions cannot occur after hours on the OneChronos MTF. Subscribers can subscribe to the OneChronos Market Data feed directly or obtain it from an alternative source.

Market Data Gateway: Subscribers can connect to the last trade feed at OneChronos. For connectivity inquiries, contact ops_europe@onechronos.com.

For details, please refer to the **OneChronos FIX Specification document.**

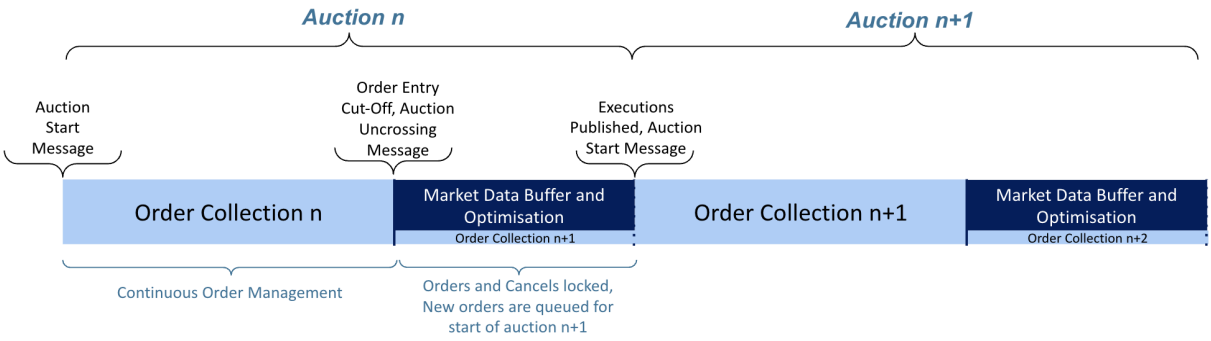
Testing

OneChronos provides a conformance testing environment. Subscribers must undertake conformance testing prior to the deployment of, or a substantial update to, either the Subscriber's access to the MTF or the Subscriber's trading system, trading algorithm, or trading strategy.

Full details of the testing requirements are outlined in the **Rules.**

Order Book Behaviour

The OneChronos MTF runs venue-initiated multilateral periodic auctions that synchronise across all traded securities. These auctions have randomised durations, with a maximum of 120ms per auction. That ensures that all instruments in the OneChronos MTF universe follow the same auction cycle, with timing following a randomised distribution by OneChronos.



Order Collection

Order collection has a duration of up to 75ms, initiated with an 'Auction Start' message. The orderbook is unlocked during this phase. Pre-trade market data is calculated and published (see the Market Data section for further details). The ending of the Order Collection phase is randomised and communicated to the market with an 'Uncrossing' message informing the change of state of the book and closing order entry for that auction. Orders received after the Uncrossing message are queued for the start of the next auction.

Uncrossing: Market Data Buffer and Optimisation

The publication of the 'Uncrossing Message' communicates a change in phase from Order Collection phase to Uncrossing phase. During this phase (up to 45ms in total), orders on the book are locked and can no longer be amended or cancelled. Any instructions received to amend/cancel will be acknowledged with a 'pending' message and will be actioned at first opportunity.

For instruments where the OneChronos MTF has an absence of a known contra, orders will be unlocked in at least 95% of instances and either cancelled (IOCs) or rolled into the Order Collection of the next auction.

The Market Data Buffer is designed to eliminate stale price trades on the venue, ensuring that all market data packets relevant to a security are received with respect to the time stamp from the moment OneChronos locks the order book in the auction.

After correcting for reference data latency using the Market Data Buffer, OneChronos applies its smart market optimisation to determine the outcome of the auction.

Matching Logic

OneChronos matches buyers and sellers, per auction, with the objective function of maximising notional price improvement (PI). The matching logic is a multi-stage process to determine the execution price, designed to consider scenarios where there may be multiple trade outcomes possible as the result of an auction.

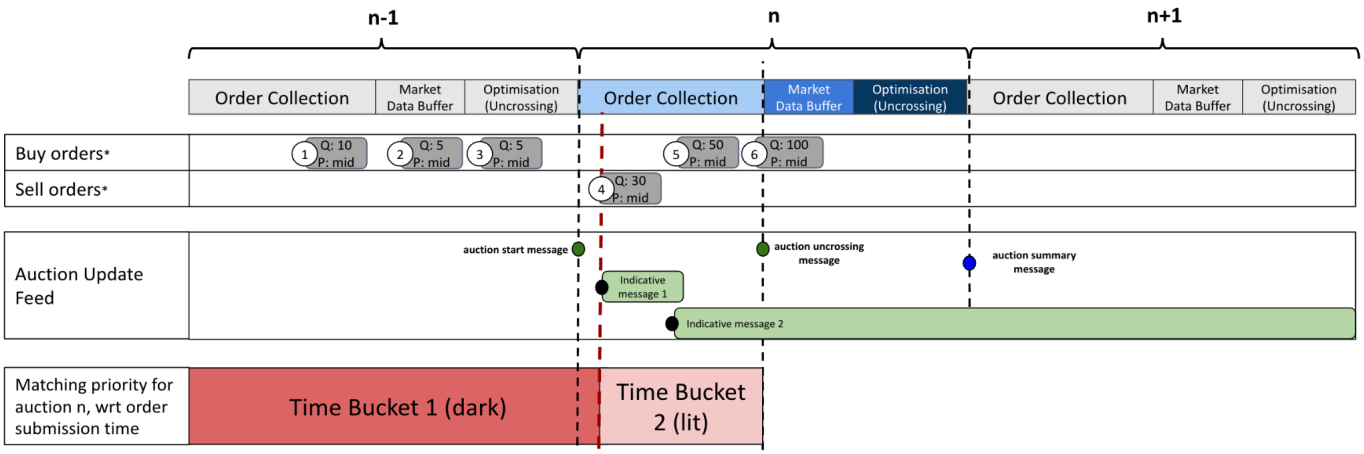
OneChronos uses 4 levels of "tie-break", If multiple permutations of orders being executed can generate the same outcome at a level of tie break, the tie-break moves sequentially to the next tie-break level.

1) Level 1 - Maximum Notional Price Improvement (PI)

OneChronos matches orders to maximise the notional price improvement achievable. This is defined by the difference between the price that an order is represented at within the OneChronos order book, and the price at which it can be executed at, multiplied by the number of shares tradable. The PI calculation is capped at the collars of 1 tick outside of EBBO. See OneChronos Reference Price.

2) Level 2 - Maximum Number Of Shares Traded

3) Level 3 - Time bucket 1 (TB1), Max order size within TB1, Time bucket 2 (TB2), Max order size within TB2



OneChronos auctions have 2 time buckets:

- TB 1 is the period preceding the publication of the first indicative auction message (dark)
- TB 2 is the period following the publication of the first indicative auction message (lit)

OneChronos prioritises filling the largest to smallest orders in TB1 before the largest to smallest orders in TB2.

4) Level 4 - Randomisation

OneChronos uses auto-generated randomisation logic with the following process:

a) Orders that have made it to randomisation are randomly assigned an order
b) OneChronos attempts to fill the maximum quantity to orders in the order they are sequenced

Tick Sizes

OneChronos will follow the MiFID tick size regime, observing the tick size used by the relevant reference market for an instrument. The tick size regime will be published on the OneChronos website.

Orders will only be accepted by the OneChronos MTF on tick, and executions will be generated on tick, with the exception of OneChronos EBBO midpoint. Where OneChronos calculates that the maximum notional price improvement is most equally shared between buyers and sellers off tick, OneChronos will split the executions between the two nearest available price levels, and in the case of an odd number of shares, it will round the last share towards the OneChronos EBBO midpoint.

OneChronos Reference Price

OneChronos calculates EBBO "European Best Bid Offer" based on the primary market and CBOE order books (BXE and CXE for UK and Swiss, DXE for EEA securities).

All pegging functionality and execution collars are generated from the combined EBBO of these relevant order books.

Market Data Publication

Public Market Data

OneChronos will publish the following public market data:

- **15-minute delayed trade publication on website**
- **Last Trade Feed**: Publishing executions in real-time
- **Auction Update Feed:** consisting of 4 message types
    - Security State Change Message
    - Auction Status Message
    - Auction Indicative Message: Publishing the indicative auction quantity and price
    - Auction Summary Message

Private Market Data

Private market data will be delivered to Subscribers consisting of acknowledgement messages and execution information via a private session.

OneChronos offers a duplication of these messages via a drop copy service (optionally) to Subscribers or their designated clearing firm.

Order Types

OneChronos will offer the following order types:

- Limit
- Pegged

OneChronos will offer optional pegging to the following price points:

- Near touch EBBO, with optional offset in ticks
- Far touch EBBO, with optional offset in ticks
- Midpoint EBBO, with optional offset in ticks

OneChronos will support the following Time in Force:

- **GFA**: "Good for Auction" Orders expire after one full auction cycle, or until cancelled (whichever is sooner)
- **Day**: Orders will expire after at the end of the trading day on OneChronos, or until cancelled
- **GTT**: "Good Till Time" Client sets defined **Day** order life duration expiry time.

Self-Match Prevention

OneChronos will offer optional self-match prevention on a Subscriber level, session level and order level (FIX tag). Self-Match Prevention enabled orders are prevented from executing against one-another in an auction, but neither order is cancelled. Both orders remain available to fill against other Subscribers in the auction.

Minimum Quantity (MinQty)

OneChronos supports the use of Minimum Quantity in combination with any valid order type, pegging and Time-in-Force (TIF). MinQty is optionally defined by the subscriber per order upon order entry. OneChronos ensures that partial fills below the specified threshold do not occur. If an execution would result in a fill below the MinQty, the order will remain unexecuted. During the Uncrossing of the auction, multiple contra-orders can be aggregated to meet the MinQty threshold requirement specified by a subscriber on an order.

Pre-Trade Controls

Subscribers will be subject to a number of pre-trade controls when submitting orders to OneChronos MTF. These include limits on the maximum order quantity for each security class, price collars that restrict how much an order can deviate from the reference price, and a maximum order size limit that applies to all Subscribers—orders exceeding this limit will be rejected.

Additional controls are in place to prevent erroneous trades, manage order sizes and message rates, and maintain market integrity while preventing potential market abuse. OneChronos sets these pre-trade control limits at the venue level, and any order that exceeds them will be automatically rejected.

Subscribers are also responsible for implementing their own pre-trade controls, ensuring they set appropriate limits on order quantity, order value, and price levels to reduce the risk of errors. To support this, OneChronos provides Subscriber-defined pre-trade controls through Port Settings, allowing further customization of trading limits.

Trading Timing, Suspensions and Halts

Trading start

The OneChronos MTF commences trading once the relevant security has opened for trading in the market of primary listing.

Trading stop

The OneChronos MTF ceases trading when the primary listing market enters into the closing auction for a security or has ceased continuous trading for the day.

Halts

The OneChronos MTF will not automatically halt trading in a security if the primary market suspends trading. Instead, each case will be evaluated individually i.e. in the case of any regulatory activity, resulting in a suspension.

Each Subscriber has the option to configure through the port settings, to Cancel all orders for halted symbols. If the halt impacts any one leg of a combinatorial order, all legs will be cancelled.

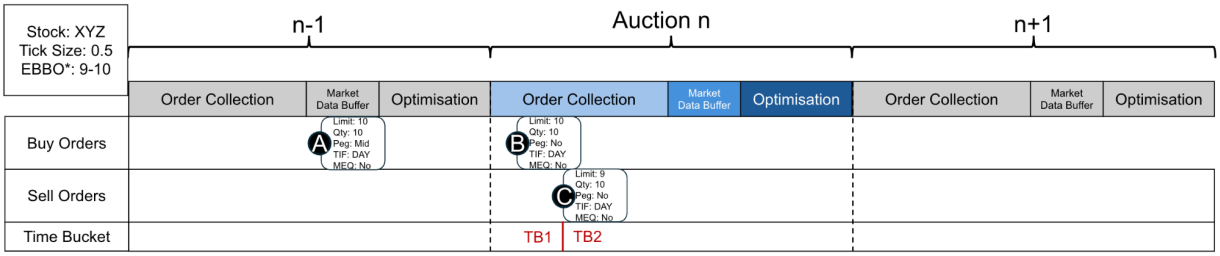
Trading will be stopped if there is a crossed market, locked market, or if OneChronos is unable to provide well-formed market checks.

Regulatory Suspensions

OneChronos will not permit trading in any security that is subject to a regulatory suspension.

Matching Examples

Example 1: Level 1 tiebreak - Price Improvement Maximization

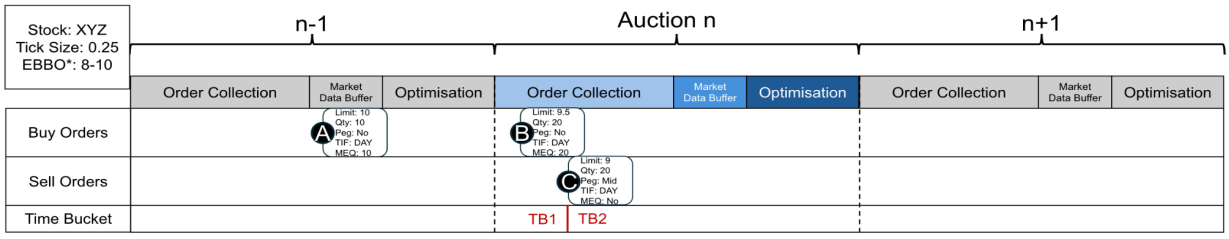


* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

Outcome
- 10 shares are executed at price 9.5
    - Buy Order B trades 10 shares
    - Sell Order C trades 10 shares

Explanation
- Buy Order A, Buy Order B and Sell Order C arrive in TB1
- The max notional price improvement of Order A and Order B executing against Order C are compared:
    - Order A crossing Order C offers 5 PI (10 shares x 0.5)
    - Order B crossing Order C offers 10 PI (10 shares x 1)
- Orders B and C are fully executed against one another at the end of the optimisation of auction n, with PI shared equally between them
- Order A, with a DAY TIF, is rolled into auction n+1 order collection

Example 2: Level 2 Tiebreak - Max Number of Shares

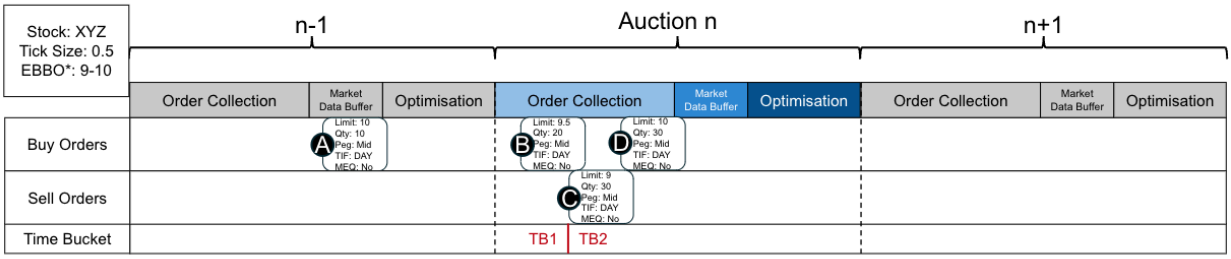


* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

Outcome
- 20 shares are executed at 9.25
    - Buy Order B trades 20 shares
    - Sell Order C trades 20 shares

Explanation
- Buy Order A, Buy Order B and Sell Order C all enter into the book in Time Bucket 1 (TB1)
- Both Buy Orders A and B have a MEQ of their full order size.
- Due to the use of MEQ buy orders A and B, Sell order C cannot trade the highest price improvement outcome (10 shares against A, 10 shares against B), it has to therefore trade against either order A or B
- The max notional price improvement (PI) of Order A and Order B executing against Order C are compared:
- Order A crossing Order C offers 10 PI (10 shares x 1)
    - Order B crossing Order C offers 10 PI (20 shares x 0.5)
- As PI in both scenarios is tied, level 2 of tiebreak is used to determine who is filled: maximum number of shares that can be traded.
    - Order B trading Order C sees 20 shares executable. Order A trading Order C would only execute 10 shares. Order B is therefore selected for the execution of 20 shares against Order C.
- PI is shared equally between buyer and seller so the execution price is 9.25.
- Order A, with a DAY TIF, is rolled into auction n+1

Example 3: Level 3 Tiebreak - Time Buckets



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

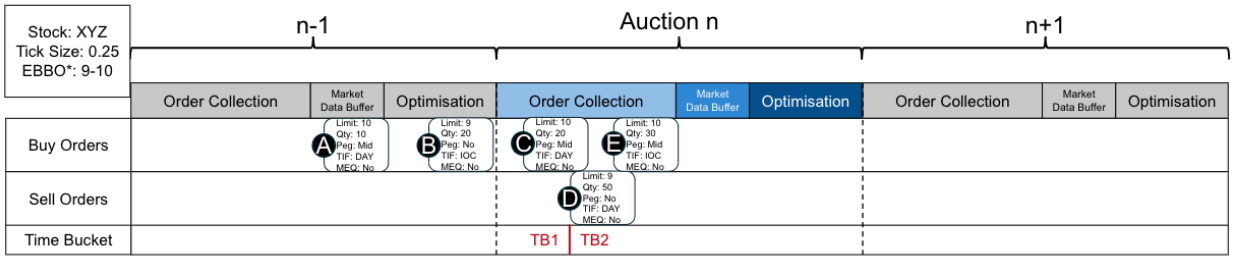
Outcome

- 30 shares are executed at a price of 9.5 (midpoint)
  - Buy Order B trades 20 shares at midpoint (9.5)
  - Buy Order A trades 10 shares at midpoint (9.5)
  - Sell Order C trades 30 shares at midpoint (9.5)

Explanation

- Buy Order A, Buy Order B and Sell Order C are all submitted during TB1
- Buy Order D arrives after the publication of the first indicative auction message, and is therefore in TB2
- All 30 shares of Sell Order C are executable against a combination of orders A, B and D. All orders are pegged to midpoint, and as there is no MEQ usage, any combination of share allocation between the orders generate both the same PI (zero) and number of shares tradable (30)
- The third layer of tiebreak prioritises fills for the largest order in TB1: Order B, followed by Order A
- Buy order D is a DAY order and rolls into auction n+1

Example 4: Level 3 Tiebreak - Time Buckets #2



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

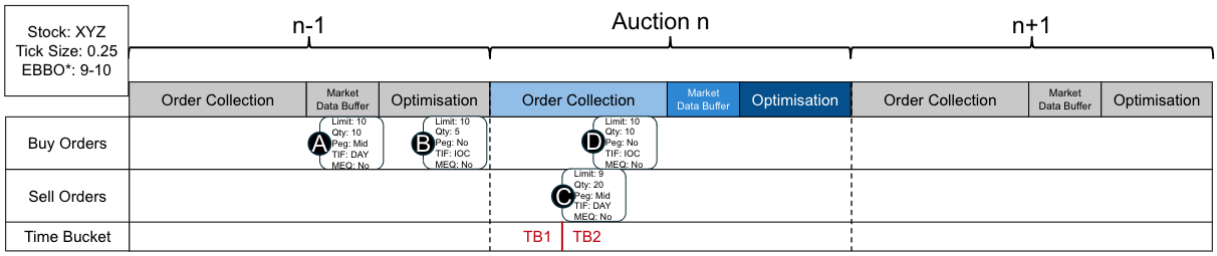
Outcome

- 50 shares are executed at a price of 9.5
  - Buy Order C trades 20 shares
  - Buy Order A trades 10 shares
  - Buy Order E trades 20 shares
  - Sell Order D trades 50 shares

Explanation

- Buy Order A, Buy Order B and Buy Order C and Sell Order D all enter the book during TB1.
- Buy Order E enters the book in TB 2
- 50 shares are executable in auction n. Max PI achievable is 25, with combination of Buy Orders A, C and E against Sell Order D. Buy Order B cannot be filled whilst maximizing PI
- Multiple combinations of Sell Order D executing against Buy Orders A, C and E generate the same PI and maximise the number of shares traded
- Tiebreak Level 3 prioritises the largest orders from TB1, placing order for hierarchy for fills: Order C > Order A > Order E
- As Buy order B and Buy Order E are IOC orders, the remaining quantity from both are cancelled at the end of auction n

Example 5: Orders Trading With and Without PI



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

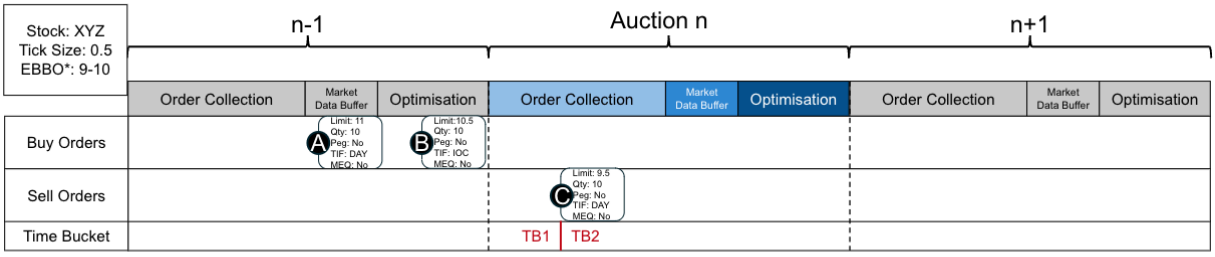
Outcome

- 20 shares are executed at a price of 9.5
  - Buy order B trades 5 shares
  - Buy Order D trades 10 shares
  - Buy Order A trades 5 shares
  - Sell Order C trades 20 shares

Explanation

- Buy Order A, Buy Order B and Sell Order C all enter the book during TB1
- Buy Order D enters the book during TB2
- The maximum PI that can be generated from the auction is 7.5 (15 shares x 0.5 coming from Orders B and D crossing Order C)
- The maximum number of shares tradeable with PI=7.5 is 20 shares, the only price at which 20 shares can be filled is midpoint (9.5), which becomes the execution price
- Buy Order B receives PI of 2.5, Buy Order D receives PI of 5. Orders C and A do not receive any PI
- Residual quantity of Buy Order A rolls into auction n+1

Example 6: Execution Collars and Randomisation



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

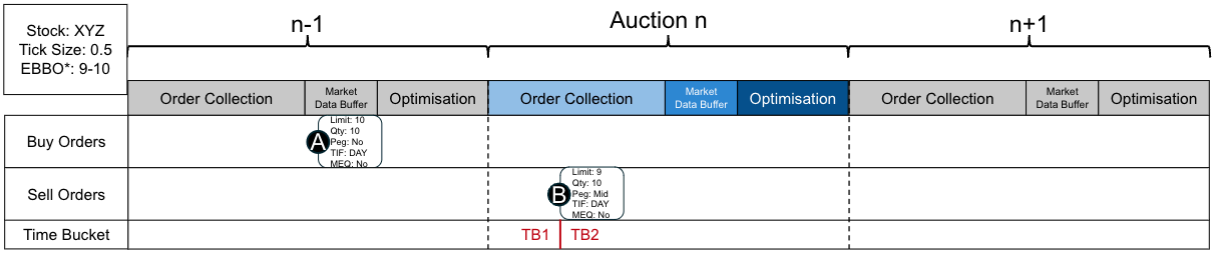
Outcome

- 10 shares are executed at a price of 10
  - Buy Order B trades 10 shares
  - Sell Order C trades 10 shares

Explanation

- Buy Order A, Buy Order B and Sell Order C all enter the book during TB1
- Stock XYZ has an execution collar of 8.5 to 10.5. The price of Order A is therefore collared in the auction to 10.5, within its limit of 11
- Both Orders A and B or a combination of Orders A and B can generate the same outcome (PI of 10) by executing against Sell Order C. Neither have Time Bucket or size within Time Bucket priority over the other.
- OneChronos randomly selects Buy Order B to execute against Sell Order C
- Buy Order A is rolled into auction n+1

Example 7: Sharing PI Equally when Tick Constrained



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

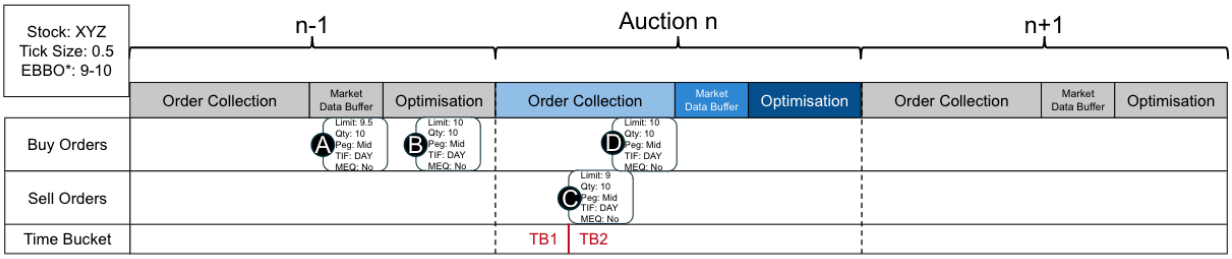
Outcome

- 5 shares are executed at a price of 9.5, 5 shares are executed at a price of 10
  - Buy Order A trades 5 shares at 9.5
  - Buy Order A trades 5 shares at 10
  - Sell Order B trades 5 shares at 9.5
  - Sell Order B trades 5 shares at 10

Explanation

- Both Buy Order A and Sell Order B are in TB1
- They are fully executable against one another and are the only orders in the book. They generate a PI of 5 (10 shares x 0.5)
- In order to share the PI as equitably as possible the execution price would be 9.75, but this is off-tick and not midpoint
- Therefore the execution is split between the two nearest valid execution prices, both within the limits of the orders

Example 8: EBBO move during Market Data Buffer



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

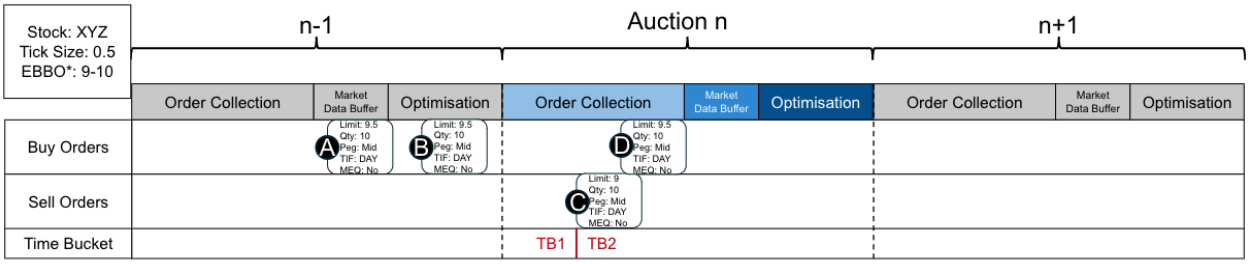
Outcome

- 10 shares are executed at a price of 10
  - Buy Order B trades 10 shares
  - Sell Order C trades 10 shares

Explanation

- Both Buy Orders A and B, and Sell Order C are in TB1
- Buy Order D arrives in TB 2
- EBBO price update received during the Market Data Buffer to show EBBO is now 9.5-10.5.
- At the end of the market data buffer, orders B, C and D are re-pegged to the new midpoint. Order A remains at 9.5 due to limit price.
- No PI is achievable in the auction, and a maximum number of shares tradeable is 10: between Sell Order C and either buy Order B or D.
- As Buy Order B arrived in TB1 it is prioritised for a fill over Buy Order D at the new midpoint price of 10
- Buy Orders A and D roll into auction n+1

Example 9: Move of EBBO, no trade

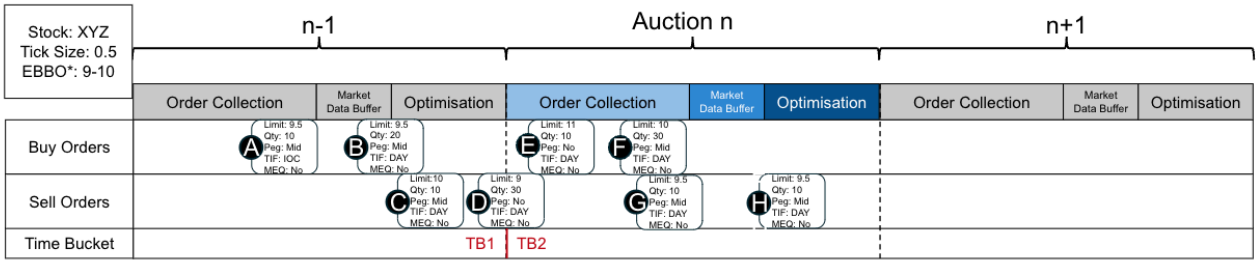


* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

Outcome
- No trade

Explanation
- Buy Orders A and B, and Sell Order C all arrive in TB1
- Buy Order D arrives in TB2
- EBBO price update received during the Market Data Buffer to show EBBO is now 9.5-10.5.
- There are no longer any crossed shares in the book, as Buy Orders A, B and D are limited to 9.5 and midpoint (and Sell Order C) are now represented in the book at 10
- Orders A, B, C and D roll into Auction n+1

Example 10: Multiple Buyers and Sellers, With and Without PI

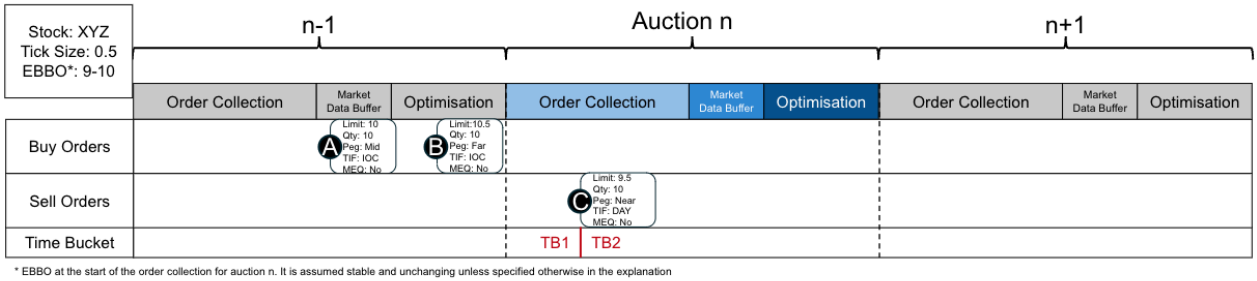


* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

Outcome
- 40 shares execute at price 9.5:
  - 10 Shares trade from Buy Order E, 20 Shares trade from Buy Order B, 10 Shares trade from Buy Order F
  - 30 Shares trade from Sell Order D, 10 Shares trade from Sell Order G

Explanation
- Buy Orders A was submitted during the order collection of auction n-1 with an IOC TIF, therefore is cancelled before the start of auction n
- Sell Order H was submitted after the cutoff for auction n (end of Order Collection), and so is queued for the start of auction n+1
- Buy Order B and Sell Orders C and D arrive in TB1
- Buy Orders E and F, and sell Order G arrive in TB2
- Buy Order E is priced at 10.5 due to execution collars.
- At the optimisation, the Max notional PI that can be generated is calculated at 25.
  - Sell Order C cannot be executed with PI maximisation
- The max number of shares tradeable with 25 PI is 40. The only execution price possible is at 9.5
  - Buy Order E and Sell Order D receive price improvement (10 and 15 respectively)
  - Buy Orders B and F, and Sell Order G do not
- Multiple permutations of Buy Orders B and F getting traded can achieve the same PI and number of shares tradable. Therefore as Order B is in TB1, and Order F is in TB2, Order B is fully filled (20 shares) before the residual (10 shares) is traded by Order F
- The remaining quantity from Order F (20 shares) and Order C are rolled into auction n+1.

Example 11: Mid, Near and Far EBBO Pegs, with an EBBO move



* EBBO at the start of the order collection for auction n. It is assumed stable and unchanging unless specified otherwise in the explanation

Outcome

- 10 shares are executed at 10.5
  - Buy Order B trades 10 shares
  - Sell Order C trades 10 shares

Explanation

- Buy Order A, Buy Order B and Sell Order C all enter the book during TB1
- Currently 10 shares could be crossed at 10 between Buy Order B and Sell Order C at 9.5, with no PI
- EBBO price update received during the Order Collection to show EBBO is now 9.5-10.5
- Order A, B and C are all repriced to reflect this
- No PI can be achieved in the auction, and the max number of shares that can be traded is 10
- Buy Order B crosses Sell Order C at price of 10.5 (Far touch for Buy Order B, Near Touch for Sell Order C)
- Order A is cancelled at the end of the optimisation as it has an IOC TIF

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