



ASX Trade

ASX Trade Introduction and Business Information

April 2024

Table of Contents

1	Introduction.....	7
1.1	Software Distribution Restrictions	7
1.2	Supported Platforms.....	7
1.3	ASX Trade Support	7
1.4	ASX Trade OI Documentation Suite.....	7
1.5	Restrictions	8
1.5.1	Trading Participant Specific Information	8
1.5.2	Broker Service Providers	8
1.6	Version History.....	8
2	Trading System Environment and Connectivity.....	10
3	Connectivity.....	11
4	ASX Trade Setup Requirements	13
4.1	Mandatory Testing.....	13
4.2	ASX Confirmation of Completed Tests	13
4.3	Arrange Connection to ASX Trade.....	14
4.4	Change Implementation	14
5	Working with an Open Interface	15
5.1	Types of Messages	15
5.2	Message Identifiers.....	16
5.3	Instrument Series Structure	17
5.3.1	Market Hierarchy	17
5.3.2	Examples	18
5.4	Facilities	19
5.5	Partitions.....	19
5.6	Trading, Instrument and Active Session States	21
5.6.1	Trading Session State	21
5.6.2	Instrument Session State	22
5.6.3	Active Session State	22
5.7	User Types	24
5.8	Conducting a Standard Session	25
5.8.1	Conducting a Standard Session	27
5.9	Application Design Considerations.....	28
5.9.1	Market Picture of Order Information	28
5.9.2	Multiple Threads - Concurrent Broadcasts.....	28
5.9.3	Single Threaded – Poll for Broadcasts	28
5.9.4	Multiple Logins.....	28
5.9.5	OMNet Throttling.....	29
5.9.6	OUCH Throttling.....	30
5.9.7	System Event Timestamping	31
5.10	Programming Considerations.....	31
5.10.1	Data Types	31
5.10.2	Endianness of Data.....	31

5.10.3	Byte Alignment.....	32
5.10.4	String Handling.....	33
5.10.5	Logout Timer.....	33
5.10.6	Segmented Queries.....	33
5.10.7	Coupled Queries.....	34
5.10.8	Delta Queries	35
5.10.9	Variable Information Messages	36
5.10.10	Variable Information Transactions.....	38
6	ASX ITCH and Glimpse	40
6.1	ASX Trade OMNet API and ITCH Market Data Features Comparison	40
7	ASX OUCH	42
7.1	ASX Trade OMNet API and OUCH Features Comparison.....	42
8	Market Structure in ASX Trade	44
8.1	Equity Products.....	44
8.1.1	Equity Market Groups	44
8.2	Listed Funds, Warrants and Structured Products.....	44
8.3	Quote Display Board	46
8.4	Interest Rate Products	47
8.5	Derivative Products.....	48
8.5.1	Options.....	48
8.5.2	Futures	48
8.5.3	Derivatives Combinations	49
8.6	Indices.....	49
8.7	Avistas.....	49
8.8	Practice Market.....	49
9	Trading Cycles.....	51
9.1	System Availability	51
9.2	Market Trading Cycles.....	51
9.2.1	Equities, Interest Rate Products and Listed Funds, Warrants and Structured Products ..	51
9.2.2	Quote Display Board and Wholesale Interest Rate Securities and Government Loans ...	53
9.2.3	Index, Currency and Commodity Warrants	53
9.2.4	Stock Derivatives.....	55
9.2.5	Index Derivatives.....	55
9.2.6	Other Session States	56
9.3	All Securities Closed	57
9.4	Settlement Prices Available.....	58
9.5	Open Interest Prices Available	58
10	Special Markets	59
11	Corporate Actions.....	61
12	Exchange Traded Funds	62
12.1	ETF and EIN Structure under ASX Trade.....	62

13	Price Units.....	63
14	Combination Trading.....	64
14.1	Tailor Made Combinations.....	64
14.1.1	TMC Naming Conventions.....	65
14.2	TMC Programming Guidelines	65
14.3	Example	66
14.4	Standard Combinations.....	67
14.5	Optimised Bait Generation	67
	Trade Reporting.....	68
14.6	Selecting the Trade Reporting Transaction	69
14.6.1	The One Sided Trade Report (MO75).....	69
14.6.2	The Two Sided Trade Report (MO76).....	69
14.6.3	The Combination Trade Report (MO77).....	71
14.7	Trade Report Types.....	72
14.8	Trade Source	73
14.9	Updating Market Statistics.....	74
15	Naming Conventions for Options	75
16	Reconstructions.....	76
17	Mapping from Trading Code to ASX Code	77
17.1.1	Reconstructions	77
17.1.2	Special Markets.....	77
17.1.3	Exchange Traded Options	77
17.1.4	Exchange Traded Futures.....	78
17.1.5	Modifiers in Warrants	78
18	Price Limits	80
18.1	Background.....	80
18.2	Functionality Overview	80
18.3	Price Limit Broadcast and Query.....	80
18.4	Price Limit Range and Price Limit Reference Price	80
19	Order Purging	81
19.1	Reason Codes for Order Purging	81
19.2	Schedule for Order Purging.....	81
20	Inactive Order Entry and Activation	84
21	Querying for Central Inactive Orders.....	85
22	Derivatives Crossings.....	86
22.1	Derivatives Crossing Procedures.....	86
22.1.1	Two Sided Crossing	86
22.1.2	Cross with Book.....	87

23	Unintentional Crossing Prevention	88
23.1	Applicable Instruments	88
23.2	Post Trade Disclosure	88
24	Centre Point Orders	89
24.1	Centre Point Order Types	89
24.1.1	Mid-point Only	89
24.1.2	Dark Limit	89
24.1.3	Any Price Block	90
24.2	Volume Controls - Minimum Acceptable Quantity and Single-Fill	91
24.3	Order Validation	92
24.4	Centre Point Price and Extended Price	92
24.5	Order Priority	92
24.6	Trade Broadcasts	92
24.7	Equilibrium Price Calculations	92
24.8	Public Information Dissemination	93
24.9	Amending Order	93
24.10	Centre Point Preferencing	93
24.11	Order Validity	93
25	ASX Sweep Orders	94
25.1	Sweep Order Types	94
25.2	Matching Logic and Dual Posting	94
25.3	Minimum Acceptable Quantity	94
25.4	Iceberg	95
25.5	Amendment of Sweep Order Attributes	95
25.5.1	Mid-tick Flag	95
25.5.2	Minimum Acceptable Quantity	95
25.5.3	Iceberg	95
25.6	Public Information Dissemination	95
25.6.1	Orders	95
25.6.2	Trades	95
26	Auction Imbalance Orders	96
26.1	Auction Imbalance Order Entry	96
26.2	Order Priority	96
26.3	Equilibrium Price Calculations	96
26.4	Central Inactive Order	96
26.5	Public Information Dissemination	96
26.6	Trade Broadcasts	96
27	Iceberg Orders	97
27.1	Message Fields	97
27.2	Matching Examples Scenario	97
27.3	Matching as a Result of an Auction Scenario	98
28	Undisclosed Quantity Orders	101
28.1	Minimum Order Value	101

28.2	Order Validation	101
28.3	Order Priority	101
28.4	Trade Broadcasts	101
28.5	Partially Traded Undisclosed Orders	101
28.6	Amending Order	101
28.7	Private Order Book Broadcasts and Queries	102
28.8	Public Information Dissemination	102
28.9	Price Level Flag	102
28.10	Order Book Flag	102
28.11	Derived Orders from Undisclosed Quantity	102
28.12	Equilibrium Price Calculations	102
28.13	Trade Statistics	102
29	Reporting of Short Sell Quantity	103
29.1	Entry and Amendment of Short Sell Orders	103
29.2	Entry of TMC Orders with Cash Legs	103
29.3	Short Sell Trade Reports	103
29.4	Remaining Short Sell Quantity	103
29.5	Short Sell Quantity Example	104
29.6	Short Sell Quantity Example for a Cash Only TMC Order with Different Ratios	104
30	ASX Market Maker Protection	106
30.1	Overview	106
30.2	ASX Market Maker Protection Parameters	106
30.3	Trades Included in Protection Calculation	107
30.4	Market Maker Protection Trigger	107
30.5	Market Maker Protection Trigger through Block Quotes	108
30.6	ASX Market Maker Protection Example	108
31	Cancel on Disconnect	110
31.1	Cancel on Disconnect for OUCH	110
31.2	Cancel on Disconnect for OI	110
31.3	Cancel on Disconnect during ENQUIRE session state	111
32	Trader Authorisation	112
33	Recovery	113
33.1	Gateway Connections	113
33.2	BN1 (OMNI_DU_DATALOST)	113
33.3	Market Data Recovery	113
34	Gateway Timeouts	114
34.1	API Call Timeout	114
35	Appendix 1 –Session States	116
36	Appendix 2 – CANCEL_ONLY Session State	117

1 Introduction

This document provides an introduction to ASX Trade, ASX's integrated equities and derivative trading platform powered by the Nasdaq NFF platform. It is targeted at ASX Trade Open Interface (OI) developers and application providers, giving a high-level introduction of the ASX Trade architecture and how to work with the OI. The document also provides details of business functionality to enable OI developers and application providers to cater for the rich functionality provided by ASX Trade. The following business topics are covered:

- Market and instrument structure and instrument naming conventions
- Trading cycles
- Special markets
- Corporate actions and reconstructions
- Price units
- Combination trading
- Trade reporting
- Price limits
- Order purging
- Derivatives crossings
- Available order types
- Market Maker Protection.

1.1 Software Distribution Restrictions

Restrictions on the distribution of the OI software are detailed in the Developer's Agreement.

1.2 Supported Platforms

The following platforms are supported by ASX Trade:

- Linux Redhat Rhel 6.10 x86 (32 and 64 bit)
- Linux Redhat Rhel 7 x86 (32 and 64 bit)
- Linux Redhat Rhel 8 x86 (64 bit)
- Windows 6.3 x86 (Windows Server 2012 R2 - 32 and 64 bit)
- Windows 10 x86 (Windows Server 2016 - 32 and 64 bit)

1.3 ASX Trade Support

For ASX Trade OI Support, contact the ASX Customer Technical Support (CTS) team either via email on cts@asx.com.au or phone 1800 663 053 (or on +61 2 9227 0372 from outside Australia).

1.4 ASX Trade OI Documentation Suite

ASX Trade Open Interface documentation has been created as a suite of documents that reference each other. The suite of documentation includes the following documents:

- ASX Trade Introduction and Business Information – This includes an introduction to ASX Trade for Open Interface developers and application providers. It also details business functionality to enable ASX Trade to be fully utilised.
- ASX Trade Open Interface Function Calls – This details the Open Interface function calls that enable communication between ASX Trade and the participant.
- ASX Trade Transactions – This contains the transactions that are used to instruct ASX Trade to perform particular actions.
- ASX Trade Queries – This details the queries that are used to retrieve information from ASX Trade.
- ASX Trade Broadcasts – This includes the broadcasts that are used to notify participants of an event or change occurring in ASX Trade.

1.5 Restrictions

Certain confidential information is prescribed by ASX as 'restricted information'. Details of what constitutes restricted information are set out below.

Some ASX Trade information is restricted information and may not be divulged to anyone who is not a Designated Trading Representative (DTR), except where that person is employed by an ASX Trading Participant and has a need to access that data as part of their duties.

1.5.1 Trading Participant Specific Information

Trading Participant Specific Information is the information specific to the trading participant that instigated a transaction on ASX Trade and which is not distributed by ASX to other participants. Trading Participant Specific Information must not be divulged to anyone who is not a Designated Trading Representative of the trading participant, except where the person is employed by the trading participant and that person has a need to access that data as part of their duties.

Trading participant specific information includes, but is not limited to, the following:

- Client and Info references on orders and trades
- Total quantity for Iceberg orders and undisclosed quantities on orders
- The unique identifier of a trading participant allocated by ASX, i.e. the trading participant number, or the participant name in relation to Products other than Listed Funds, Warrants and Structured products, Exchanged Traded Options and Futures.
- Some order types, e.g. short sell
- Signum (user/session identifier) on orders and trades
- Expiry dates on orders
- Centre Point orders
- The short sell information on orders and trades
- Regulatory data
- Certain trade types e.g. BP (Booking Purpose); LN (Loan); LR (Loan Return).
- Booking reports resulting from Unintentional Crossing Prevention.

Trading Participant Specific Information is not included in messages where the order or trade does not belong to your trading participant ID.

1.5.2 Broker Service Providers

The trading participant may use dealing/information systems provided by an information vendor.

If your trading participant requests, ASX can provide the vendor with:

- All of the trading participant's specific information as detailed in Trading Participant Specific Information above.
- The vendor participant's service provider can then integrate this information into their dealing/information systems for the trading participant.
- A service provider that has access to Trading Participant Specific information is known as a Broker Service Provider (BSP).

The BSP must keep this Trading Participant Specific Information confidential and must not collate or distribute this information to anyone other than the relevant trading participant.

1.6 Version History

This document has been revised according to the table below:

Version	Date	Comment
v1.1	Aug 2014	<ul style="list-style-type: none"> • XT added in the condition code mapping table for item 79 in ASX Signals/Reference Point column
v2.0	Mar 2015	<ul style="list-style-type: none"> • Any Price Block details added for Centre Point. • New deal source values added to the trade condition code mapping table. • New trade types added in the Mapping table
v2.1	Mar 2016	<ul style="list-style-type: none"> • Added new status not SC in section 11
v2.2	Sept 2018	<ul style="list-style-type: none"> • Updated to new ASX branding • Removal of market, instrument group and trade condition code appendices, which are now covered in ASX Trade Markets, Instrument Groups and Trade Condition Codes • Updated to new night batch time • Removed reference to crossing transactions in TMCs • Removal of references to ASX BookBuild
v2.3	Nov 2018	<ul style="list-style-type: none"> • Addition of information about Cancel on Disconnect
v3.0	Nov 2019	<ul style="list-style-type: none"> • ASX Trade Refresh updates
v3.1	Jan 2020	<ul style="list-style-type: none"> • Clarification about Broadcasts being sent to client library in section 5 • Purge examples updated in section 20
v3.2	Apr 2020	<ul style="list-style-type: none"> • Removal of BN1 OMNI_DU_LINKLOST & OMNI_DU_SENDERLOST
v3.3	Oct 2020	<ul style="list-style-type: none"> • 29.6 change_reason_c value corrected to “39” • 5.8 Updated description for trade broadcast sequence numbers • 5.9.2 Multiple threads, OMNet API library uses a single connection • 5.9.5 addition of information about OUCH Throttling • Addition of protocol comparison to sections 6 & 7 • 14.5 addition of bait generation algorithm changes • 15 Updated description for options naming convention • Updated description of OAPI_TIMEOUT
v3.4	Dec 2020	<ul style="list-style-type: none"> • 5.9.2 Multiple threads – concurrent broadcast updated • 5.9.6 OUCH throttling updated
v3.5	May 2021	<ul style="list-style-type: none"> • 7 Update OUCH to nanosecond time-stamping • 7.1 Remove reference to deprecated transaction – MO99 • 18.2 Remove reference to entry of inactive orders • 19 Remove reference to activation of inactive orders • 24.2 Update MAQ description • 25.3 Update description of MTL Sweep order • 25.3 Update MAQ description
v3.6	July 2021	<ul style="list-style-type: none"> • 32 Trader authorisation description added
v3.7	April 2022	<ul style="list-style-type: none"> • 5.9.7 System Even Timestamping description
V3.8	August 2022	<ul style="list-style-type: none"> • 1.2 Supported Platforms include Rhel 8
V3.9	August 2023	<ul style="list-style-type: none"> • 23 Updated information for Unintentional Crossing Prevention • 31 Updated description and information of Cancel On Disconnect
V4.0	March 2024	<ul style="list-style-type: none"> • 9.2.4 Removal of the ENQUIRE session state from Stock Derivatives schedule • 9.2.6 Addition of CANCEL_ONLY session state • 31.3 Addition of Cancel on Disconnect information on ENQUIRE session state • Removal of Trade Reporting from PURGE_ORDER session state • Appendix 1 Addition of CANCEL_ONLY session state • Appendix 2 Addition of CANCEL_ONLY information
V4.1	April 2024	<ul style="list-style-type: none"> • 31.1 & 31.2 Updated for additional CoD options for OUCH & OI

2 Trading System Environment and Connectivity

The trading system consists of components that reside on ASX's premises, at the Australian Liquidity Centre (ALC) and Secondary Data Centre (SDC), and participants' sites. This includes ASX Trade as well as interface components. ASX Trade is based on client/server architecture. For any OI user it is important to have at least a broad understanding of these components.

The main components of the trading system environment include:

- **ASX Trade**

ASX Trade is the central system that provides all of the functions required for the operation of the ASX market. Based on the Nasdaq Financial Framework, ASX Trade is a modular trading platform supporting trading and market data dissemination across multiple asset classes. The platform is built on a modern distributed architecture with internal components and customer APIs centred around a high performance messaging bus. This includes order entry and amendment, trade generation and trade reporting. It also provides the functionality used by ASX Trading Operations to establish and maintain the trading environment.

- **ASX OUCH**

ASX OUCH is the premium ultra-low latency order handling protocol for ASX Trade.

- **ASX ITCH**

ASX ITCH is the premium ultra-low latency protocol for accessing ASX Market Information.

3 Connectivity

ASX offers multiple connectivity options to ASX Trade including via 10Gb Liquidity Cross Connect at the ALC, Gateway in cabinet solution or a distributed gateway at the customer's site via ASX Net. Test connectivity is available via any of these options and via IPsec.

- **ASX Net**

ASX Net is a low latency fibre network connection used by clients for connecting to ASX Trade. The point-to-point Ethernet connections enable fast access to a wide range of financial markets and third-party products and services, without the cost and complexity of duplicating network infrastructure.

ASX Net is an internal ASX managed component. For more information on ASX Net, see

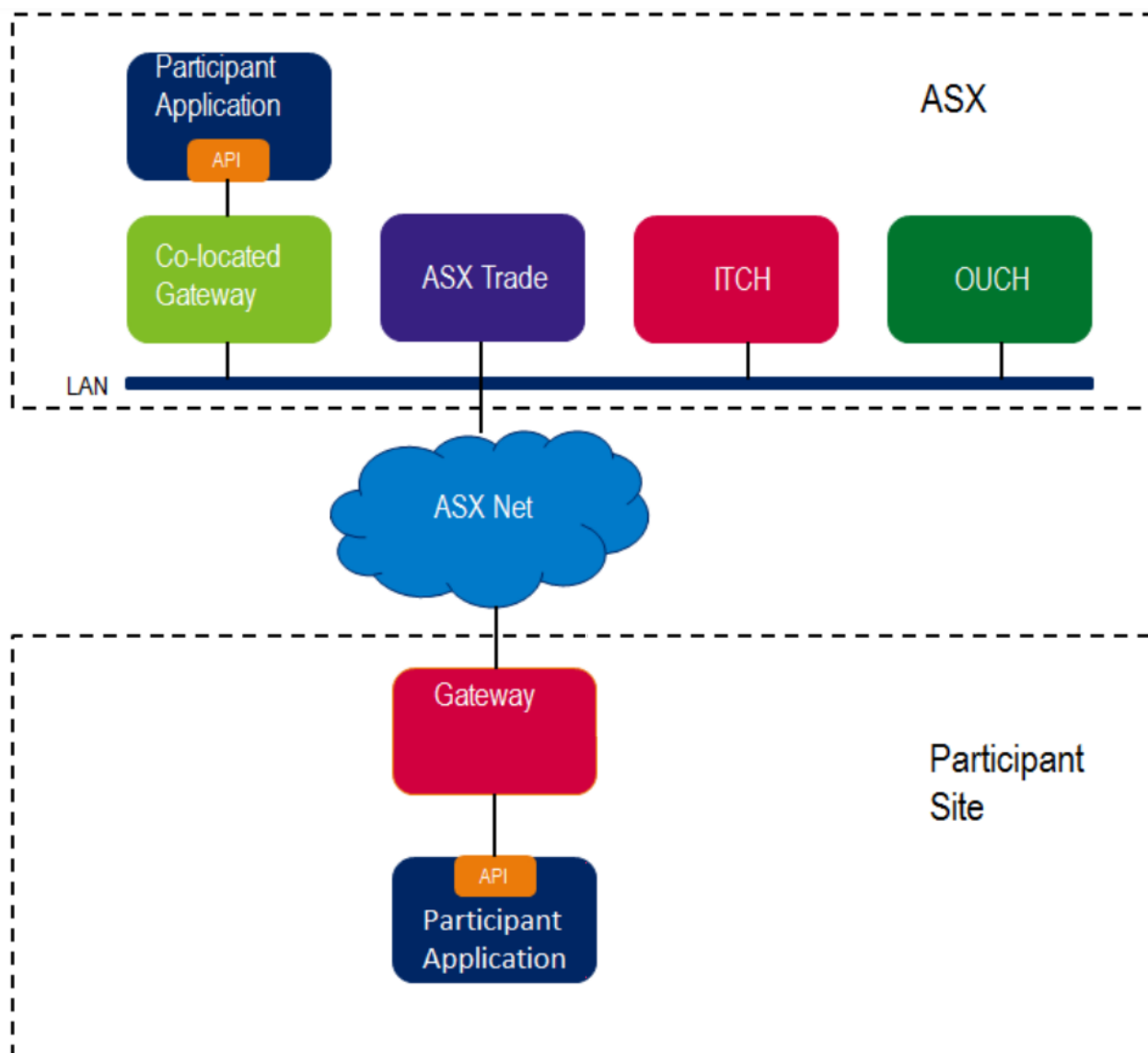
<https://www2.asx.com.au/connectivity-and-data/connectivity-services/alternative-liquidity-venues/asx-net>.

- **ASX Trade Gateway**

The ASX Trade Gateway contains both hardware and software and provides the communications interface between ASX and the user's own network. The gateway may reside on the participant's premises and connect to ASX Trade via ASX Net, or it may be co-located gateways situated on ASX premises. The gateway however, remains the property of ASX.

- **Participant Application**

A participant application is any application that uses the OMnet OI, ASX OUCH or ASX ITCH to communicate or receive data from ASX Trade.



4 ASX Trade Setup Requirements

Before being able to connect to ASX Trade, the following tasks need to be performed:

1. Successfully complete mandatory conformance tests
2. Obtain written confirmation from ASX that the mandatory testing is complete
3. Arrange a connection to the production system with CTS
4. Check regulatory considerations.

4.1 Mandatory Testing

The participant test environment provides two systems for the testing of OI applications:

- Customer Development Environment (CDE) – this is the current production version
- Enhanced Customer Development Environment (CDE+) – this is the future production version

Participants test their own systems against CDE and CDE+.

CDE includes:

- Current production environment functionalities release
- Full range of markets and comprehensive list of securities
- Some background order and trade traffic
- Simulated market events (trading sessions, company announcements)
- Connection via ASX Net E2, IPsec or directly in ALC.

CDE+ is similar to CDE; however it includes current and future production environment functionality releases.

The mandatory qualification tests are designed to test complete functionality of an application based on a customer's intent for the application. They aim to ensure that users:

- Can communicate with the production system in the correct manner
- Do not adversely affect the production system.

Please contact Customer Technical Support for the *ASX Trade OI Application Qualification Test Procedures*.

These tests do not replace the participant's obligation to test their own environment, and ensure that their applications conform to *ASX Operating Rules* (see <http://www.asx.com.au/regulation/rules/asx-operating-rules.htm>).

4.2 ASX Confirmation of Completed Tests

To obtain confirmation that the required qualification testing has been completed, the participant is required to provide the following information:

- A completed *General Application and Participant Details* form. This is located in the *ASX Trade OI Application Qualification Test Procedures* document provided by CTS.
- Confirmation of the username that is going to be used for testing.

Confirmation is provided to the participant with a return copy of the *ASX Trade OI Application Qualification Test* document. This document indicates that ASX accepts the application as qualified.



Note:

Contact CTS to ensure that the latest test procedure is used.

4.3 Arrange Connection to ASX Trade

Once the participant receives the approved *ASX Trade OI Application Qualification Test Procedures* document they can contact CTS on cts@asx.com.au or phone 1800 663 053 (or on +61 2 9227 0372 from outside Australia) to enable connection. Once connected to the production system, participants will now be able to trade on ASX Trade.

4.4 Change Implementation

Regulatory considerations may require that the OI Connectivity standards change. This may require users to change aspects of their proposed applications. ASX cannot provide any assurance that changes will not be required, nor accept any liability for the consequences of such changes.

In general, changes to OI messages and values are implemented by releasing a new software version on the implementation date.

Users are required to cut over to the new version on the implementation date, and the old version is not supported after that date.

New versions of the OI messages and values are available on the participant test environment prior to release so that system testing can be performed.

5 Working with an Open Interface

Users communicate with ASX Trade by sending and receiving messages to and from a gateway. These messages include broadcasts, queries and transactions. In order to create and transmit these messages, users utilise the OI provided by ASX.

The OI provides a C programming language interface and contains two parts:

- **Function Calls** – This relates to how messages are sent to the gateway and includes a set of function calls that can be used (referred to as the OMNet API).
- **Fixed Structures** - This relates to what is contained in the messages and includes a set of sub structures (referred to as the OMex OI). Both the OMNet API and the OMex OI remain the property of Nasdaq.

5.1 Types of Messages

There are three types of messages used in the OI. This includes:

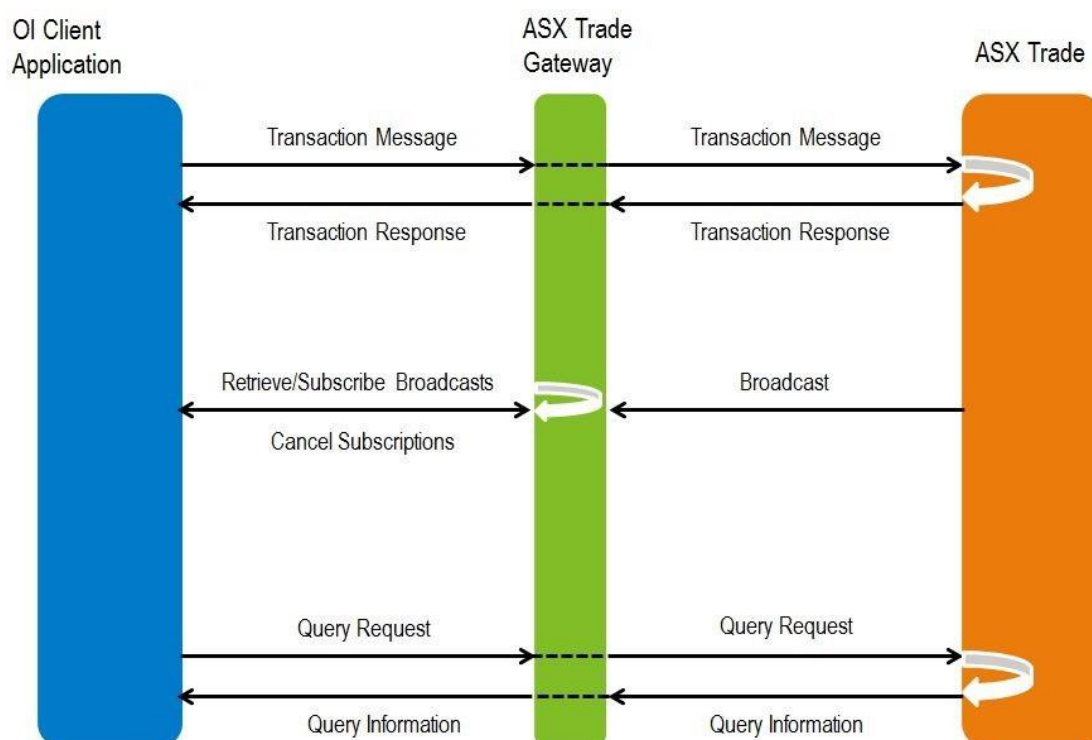
- **Transactions** – When transactions are sent by a user, the gateway dispatches the message to the Trading Processor where it is processed. A transaction status message is returned to the user as to whether the transaction was successful or failed.
- **Queries** - Queries are sent to the gateway from the user to request information from the Trading Processor. The answers returned can contain large amounts of information, spread across several sequences of messages.
- **Broadcasts** – Broadcasts are messages sent from ASX Trade to the client. Users have the ability to subscribe to broadcasts, cancel subscriptions to broadcasts or retrieve broadcasts from the gateway. Some broadcasts are issued as the direct result of transactions being sent. Broadcasts are sent from the gateway to the client library. Polling for broadcasts (read_event API call) is done locally within the client process.



Note:

In a previous version of ASX Trade broadcasts were stored in the gateway process rather than being pushed to the client library.

Transactions, queries and broadcasts are identified by a unique message identifier, or name of the message. Each message corresponds to a particular message structure, or content of the message. For more information on message structures see *ASX Trade Transactions*, *ASX Trade Queries* and *ASX Trade Broadcasts*.



5.2 Message Identifiers

The message identifiers follow a loose naming convention that relates to modules and servers within ASX Trade. They follow a pattern of two letters followed by a number.

Message identifiers contain three main naming convention components:

- **Module Letter** - If the first letter is a 'B' it indicates that the message is a broadcast. For transactions and queries, the first letter indicates the module for which it is destined.
- **Server Letter** - The second letter indicates the type of server that the message is either issued from or sent to.
- **Unique Number** - The number is a unique identifier to distinguish between messages. Message identifiers can be represented as:



Naming conventions for the letters are listed in the table below.

Module		Server	
B	Broadcast	A	Answer
C	Clearing Transaction	B	Broadcast
D	Database Transaction	C	Command
I	Information Transaction	D	Deal/Trade
M	Matching Engine Transaction	I	Information
N	Network Transaction	O	Order
U	Supervisor Transaction	Q	Query

Examples of some message identifiers include:

- Message Identifier BI63 – Uniquely identifies a broadcast (B) from the information (I) server, with a unique identifier of 63.
- Message Identifier MO1 - Uniquely identifies a Matching (M) Engine Transaction that is sent to the Order (O) server, with a unique identifier of 1.

5.3 Instrument Series Structure

An instrument series is a financial instrument that can be traded at ASX. The OI uses a structure to uniquely define a particular series.

For information on the fields in the series structure, see *ASX Trade Transactions*, *ASX Trade Queries* and *ASX Trade Broadcasts*.

5.3.1 Market Hierarchy

The instrument series structure is made up of the following fields:

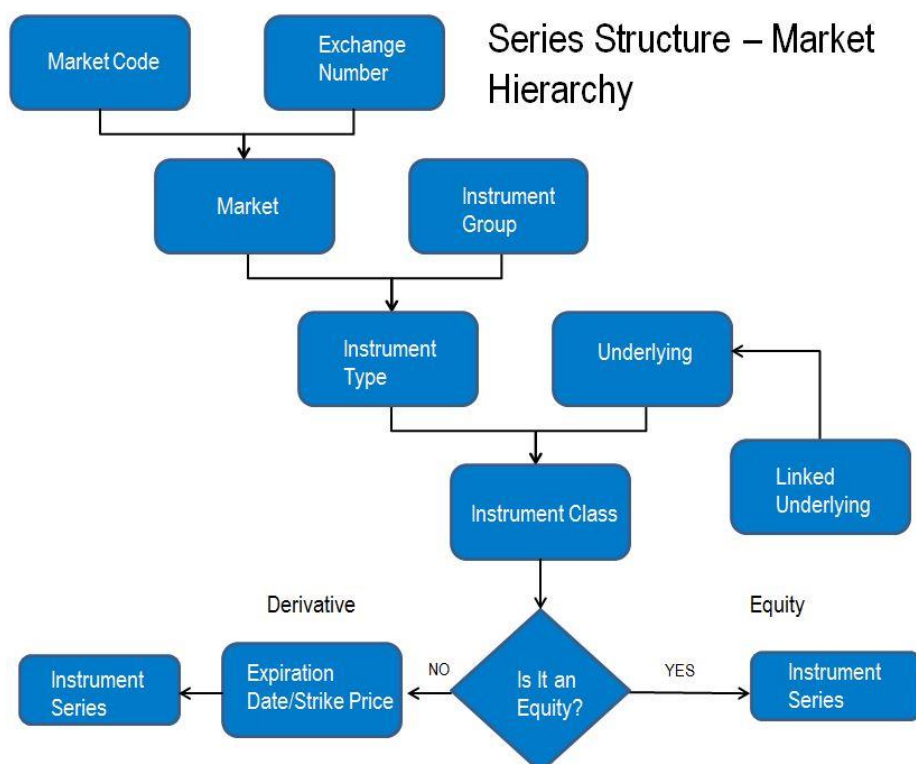
- **Exchange Number (Country Number)** - It is possible for ASX Trade to cater for several exchanges, each with one or several markets. A user can issue the query DQ24, (refer to *ASX Trade Queries* for more information) to discover all the exchanges available on ASX Trade and their corresponding exchange identifier for the instrument series structure. Currently ASX Trade only has one exchange, the “Australian Stock Exchange” with assigned numeric code 15. This number can be safely regarded as constant.
- **Market Code** - There are numerous markets within ASX Trade. The user can discover these by issuing a further query to the system (DQ7, refer to *ASX Trade Queries*). The identifier, names and types of each market returned provide the necessary information for users to focus their trading or information gathering activities. For a list of all the markets currently available in ASX Trade, see *Market Structures in ASX Trade*.



Note:

The combination of the exchange number and the market code uniquely defines a market.

- **Instrument Group/Type** - An instrument group is a classification of different categories of instruments. For the entire set of instrument groups see *Market Structures in ASX Trade*. Combine an instrument group with a market and the user can uniquely define an instrument type. For example, the instrument group for an American Call Option has a numeric code of six. The combination of setting the exchange number field to 15, the market code field to two and the instrument group to six defines the instrument type of American Call options on the derivatives market at the ASX.
- **Underlying** - An underlying represents the primary tradeable instrument. For example, a specific stock, bond or currency. Where appropriate, an underlying can have an attribute of a "linked underlying". For example a Macquarie issued Telstra warrant would be the underlying containing a linked underlying of the Telstra share. Underlyings are identified by their commodity code.
- **Instrument Class** - When an underlying, such as BHP for instance, is combined with an instrument type an instrument class is defined. For an equity, this combination of fields uniquely defines the tradable instrument. For derivatives however, users must add the year, month and day of expiry and the strike price.
- **Expiration Date/Strike Price** - For derivatives, users must add the Year, Month and Day of expiry and the Strike Price.
- **Modifier** - An extra field called the “Modifier” is used to cater for non-standard contract sizes/price quotation factors in derivatives due to adjustments and the like. Also it will be used to distinguish between an equity that is trading ex-dividend and cum-dividend at the same time. The general rule is that the modifier is set to 0 when the series is new, but may be changed for adjustments and other reconstructions to maintain unique identification of trading instruments.



The following table summarises the fields in the series structure and how they are used.

Exchange Number	Market Code	Instrument Group	Modifier	Underlying	Year	Month	Day	Strike Price
Market								
Instrument Type								
Instrument Class								
					Expiration Date			
				Series				

5.3.2 Examples

- The system represents the BHP share as 15.101.200.0.5080.0.0 where 15 is the exchange, 101 is the TradeMatch Equity Market Group 1 (A-B), 200 is the equity security instrument group, and 5080 is the commodity code of the underlying BHP. There is neither expiry date nor a strike price in this example, and the modifier field is not set.
- For a BHP option the series code could be 15.2.6.0.5080.16784.4000. This is made up of 15 being the exchange, two being the stock derivatives market, six being the American Call option instrument group, 5080 for the BHP commodity code, 16784 indicating an expiry date of 21 December 2021 (refer to *ASX Trade Transactions*, *ASX Trade Queries* and *ASX Trade Broadcasts*) and \$40.00 being the strike price (the decimal places that should be used in the strike price are configured as an attribute with the associated instrument class). The modifier field is not set.

- For a BHP warrant the series code could be 15.50.168.0.5665.20895.284927. Here, 15 indicates the exchange, 50 the warrants market, 168 indicates the Barrier Equity Call instrument group, there is no modifier, 5665 is the commodity code for the underlying of CTW issued BHP warrants (containing a linked underlying of 5080 - the BHP stock), 20895 indicates an expiry of 31 December 2019, with a strike price of 2849.27 cents.

5.4 Facilities

The connection between the gateway and the trading server contains a middleware product called Enhanced Transaction Router (ETR). Messages sent to the gateway must indicate on which ETR facility it is to be directed. ETR facilities are like pathways across the network for messages. They allow the ETR to grant and restrict access to messages, and ensure that they arrive at the appropriate module in ASX Trade. A message sent with an incorrect facility will return an error to the user.

In ASX Trade, a unique number identifies each facility. There are common facilities and exchange specific facilities.

For exchange specific facilities, the user is required to use the `omniapi_get_info_ex` function (refer to *ASX Trade Open Interface Function Calls* for more information) to query ASX Trade and find out what number identifies the base facility. This base facility is denoted as EP0 (EP stands for External Production Facility). The user only has to do this once during a trading day – the number will not change midway through a day.

Having found the assigned EP0 the user merely increments this number to get any other allowed facilities, i.e., $EP1 = EP0 + 1$; and $EP2 = EP0 + 2$, and so forth. Each transaction and query is assigned a facility. Along with the message structure, the user is required to provide the appropriate facility number as a parameter in the OI function calls. See *ASX Trade Transactions*, *ASX Trade Queries* and *ASX Trade Broadcasts* for more information on message structures.

5.5 Partitions

In order to enhance system performance, ASX Trade has the capacity to “partition” the list of instrument series in the market place. Doing this means that each partition can be run on different servers. For the user, the gateway hides the network specification of these partitioned servers; however there are some factors that need to be taken into consideration.

In the definition of some messages, partitioning needs to be considered (for example, refer to *ASX Trade Queries > MQ78 Query Trade Reports*). This means that to retrieve all the information associated with the query, several requests need to be issued. On the initial request the user is required to zero fill the instrument series field in the query. The immediate response returns only the relevant information from the first partition. It also indicates what series to use so as to get the set of information from the next partition. The user will resend the query, but with the appropriate series set so as to retrieve the next partition’s information. This continues until the reply returns a zero-filled series, indicating that the last partition has been reached.

There are some exceptions to these rules, for example the CQ27 and MQ151 queries (refer to *ASX Trade Queries > CQ27 Missing Deals Query* and *MQ151 Query Order Broadcast* for more information). These queries require their answers to be returned in a different order, not in series order. So, instead of using the series field in the query, these messages use an instance field instead. The user is required to set the instance field to 1 to receive the first partition of information, and then use the value of the “next instance” field in the reply to determine the next partition. A zero value would indicate that there are no more partitions for this query to retrieve.

There are some processes in ASX Trade that are partitioned e.g. Matching Engine, ITCH. Other processes have a single instance to service queries and generate broadcasts for OI users. Processes that only have a single instance will produce broadcasts and answers with an `instance_c` value of one, while partitioned processes will return `instance_c` equal to the matching engine partition.

Query	instance_c (broadcast or query)	instance_next_c (response)
Trade History e.g. CQ111	set to one	set to one if more data or zero if no more data to query
Order History e.g. MQ151	set to ME partition starting with one	set to ME partition if more data or zero if no more data to query
Volume and Prices e.g. IQ18	set to one	set to one if more data or zero if no more data to query

Partitioning allows the system to better utilise available hardware and provide fast turnaround and high throughput to meet the needs of expanding ASX markets. A limitation of this partitioning is that it restricts the execution of combinations and bulk transactions to securities within the same partition.

In order to minimise the impact of this limitation, ASX has configured the system so that all instruments relating to a particular underlying security are located in the same partition. All underlyings within the same Global Industry Classification Standard (GICS) sector at the time of quotation are located in the same partition.

This configuration allows trading of derivative/equity combinations for the one underlying (e.g. BHP equity, BHP warrants and all BHP options will all be in the same partition). Having securities from the one industry sector together allows equity combinations within industry sectors.

The GICS sectors have been balanced across four partitions to provide a balanced system load. The current partitioning can be seen in the table below.

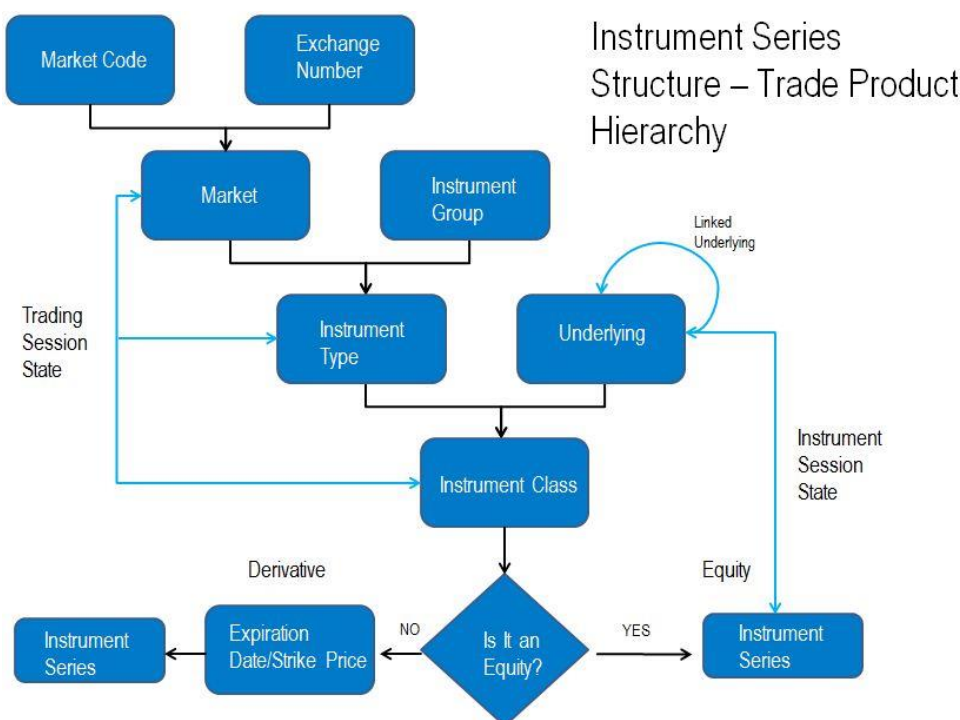
Partition	GICS Sector
1	Material
2	Financials
3	Industrials Energy Index Other
4	Consumer Discretionary Consumer Staple Health Care Telecommunication Services Utilities Information Technology Agriculture

The following table lists the underlying commodity code (commodity_n) ranges by partition. The reserved partition has been set aside by ASX for future use. Partition information should be obtained via the UQ1 query (refer to *ASX Trade Queries* for more information).

Partition	From	To	Entries
Reserved	0	4,999	4,999
1	5,000	19,999	15,000
2	20,000	34,999	15,000
3	35,000	49,999	15,000
4	50,000	62,999	13,000

5.6 Trading, Instrument and Active Session States

The following diagram shows ASX Trade the product relationship hierarchy and how the Trading Session State and Instrument Session State relates to this hierarchy.



5.6.1 Trading Session State

A Trading Session State (TSS) is a sequence of trading states used by the system to schedule the trading day.

A TSS can be applied to the product structure at the:

- Market level
- Instrument type level
- Instrument class level.

The TSS for an instrument is determined as the TSS specified at the lowest level within the product structure. For example, if the TSS is specified at the instrument class level this would override any TSS specified at the market or instrument type levels. Typically the TSS will only be specified at the market level, however, in certain circumstances the market TSS may be overridden at the instrument type or class levels (for instance there are some warrants that trade outside the normal trading hours of the market).

The following table provides an example of a typical Equities, Interest Rate Market (IRM) and Warrant markets trading day schedule.

Trading Session State	Time
PRE_OPEN	7:00:00
OPEN	10:00:00 +/- random 15 seconds
PRE_CSPA	16:00:00
CSPA	16:10:30 +/- random 30 seconds

Trading Session State	Time
ADJUST	16:12:00
ADJUST_ON	16:42:00
PURGE_ORDERS	18:50:00
SYSTEM_MAINTENANCE	18:59:00
CLOSE	19:00:00

5.6.2 Instrument Session State

An Instrument Session State (ISS) is used to handle exceptions to the trading session and can be applied to the:

- Linked Underlying Level
- Underlying Level
- Instrument Series Level.

The ISS for an instrument is determined as the state with the highest priority specified within the product structure regardless of the product hierarchy. I.e., if an ISS with a higher priority is set at the underlying level it will override the ISS with the lower priority at the series level. Conversely, if an ISS with a higher priority is set at the series level it will override the ISS with the lower priority at the underlying level. ISS changes are for example used to halt trading when a price sensitive company announcement is made.

5.6.3 Active Session State

The Active Session State for an instrument series is determined as being the state with the highest priority of the TSS and ISS. The combination of both TSS and ISS allow the user to determine the current or active state of an instrument series.

To determine the Active Session State, the following algorithm is used:

1. Determine the TSS and its priority (UQ15 and BI41 for Trading State and DQ29 for State Priority)
2. Determine the ISS and its priority (UQ15 and BI41 for Trading State and DQ29 for State Priority)
3. Compare the priorities. If the priority of the ISS is higher than or equal to the priority of the TSS, then the Active Session State equals the ISS. If the priority of the ISS is lower than the priority of the TSS, then the Active Session State equals the TSS.

The following pseudo code implements the algorithm:

```

TSS: (strictly hierarchical)
Active_TSS := (TSS of the Market of the Series);

If (TSS of Instrument Type of Series) != nil
    Active_TSS := (TSS of Instrument Type of Series);

If (TSS of Instrument Class of Series) != nil
    Active_TSS := (TSS of Instrument Class of Series);

ISS: (priority based)
Active_ISS := (ISS of Series);
If (ISS of Underlying of Series) > Active_ISS
    Active_ISS := (ISS of Underlying of Series);

If (ISS of LinkedUnderlying of Series) > Active_ISS
    Active_ISS := (ISS of LinkedUnderlying of Series);

TSS_and_ISS: (priority based)
If Active_ISS >= Active_TSS
    ActiveState := Active_ISS;
  
```

```
Else
    ActiveState := Active_TSS;
```

In summary, if the:

ISS Priority \geq TSS Priority, then the Active State = ISS

ISS Priority < TSS Priority, then the Active State = TSS.

The Active Session State is also disseminated in the BI741 broadcast, per instrument series. The above logic can be used to determine the Active Session State of an instrument series after logging on. Users can then subscribe to the BI741 broadcast to receive updates to the Active Session States (refer to *ASX Trade Broadcasts* for more information).

Example

The example below has the following priorities defined for the ISS.

Session State	Priority
CLOSE	120
PRE_NR	42
OPEN	10

The TSS based on the Market level, changes from CLOSE to OPEN to CLOSE. A sensitive Company Announcement is received at 11:30; Trading Operations set the Underlying to PRE_NR, with end time 11:40.

The table below lists the **TSS**.

Time	Startup	10:00	11:30	11:40	19:00
Market	CLOSE	OPEN	OPEN	OPEN	CLOSE
Instrument Type					
Instrument Class					
TSS	CLOSE	OPEN	OPEN	OPEN	CLOSE

The table below lists the **ISS**.

Time	Startup	10:00	11:30	11:40	19:00
Linked Underlying					
Underlying			PRE_NR		
Series					
Instrument Session State			PRE_NR		

The table below lists the **Active Session State**.

Time	Startup	8:00	11:30	11:40	19:00
Active Session State	CLOSE	OPEN	PRE_NR	OPEN	CLOSE

Active Session State for Combinations

Because each leg of a Combination (refer to *Combination Trading*) could have a different Active Session State, the Combination's Active State is the Active State of the instrument with highest priority among the individual legs of the Combination.

If more than one leg of the Combination has states with the same highest priority, the Combination gets the first of these states, counted in the order the legs of the Combination appear in the queries and broadcasts from ASX Trade.

ASX Trade and its clients should use the following algorithm to decide the Active Session State.

```
ActiveStateCombo:= ComboLegs(1).ActiveState;  
For i:= 2 to NumberOfLegs  
    If ComboLegs(i).ActiveState.Priority > ActiveStateCombo.Priority  
        ActiveStateCombo:= ComboLegs(i).ActiveState
```

The Active Session State of the Combination may change any time the Active Session State of one of its legs changes.

5.7 User Types

Users are assigned to different categories of user types. The major user types are:

- **Trading**

These users have trading privileges, i.e. they can enter, amend and cancel orders and report trades. They may have restrictions concerning which products they are allowed to trade on. They can also request and receive information concerning their assigned markets. Only accredited participating organisations can have users belonging to this user type.

Certain users within an organisation can be authorised to perform order management functions on any orders within the organisation.

- **Trading Enquiry**

These users can request and receive information about the markets to which they have been given access, but cannot enter, amend and cancel order or report trades. They must belong to accredited participating organisations.

- **Market Makers**

These users are trading participants who have assumed additional obligations to make markets either on a continuous basis and/or in response to Quote Requests. In return, Market Makers are entitled to use the MO36 Two-Sided Price Quotation Block Entry and MO37 Two-Sided Price Quotation transactions. Market Makers may receive Quote Request broadcasts.

- **Training**

These users can only enter orders and report trades on the practice market. They can also request and receive information concerning other assigned markets. Only accredited participating organisations can have users belonging to this category.

- **Broker Service Provider**

These users cannot enter orders or report trades, but can request and receive information about their assigned markets. All BSP users receive public market information. In addition, BSPs receive trading participant specific information for trading participants specified in the BSP's list of member obligations. The Member Obligations query (DQ57) returns the list of trading participants that have nominated the BSP to carry their broker specific information.

- **Information Vendor**

These users can request and receive public information about the markets to which they have been given access. These users cannot enter orders or report trades. Certain broadcasts (which are transmitted to trading users and BSPs) are not received.

- **Index**

Index users can update index prices and request and receive public information about the markets to which they have been given access. These users cannot enter orders or report trades. Certain broadcasts (which are transmitted to trading users and BSPs) are not received.

In addition, within these types users may be restricted so that they can only act in or receive data from specific markets and instruments. In these cases they will only be able to receive information and act on the particular instrument types for which they have been allowed.

For example, a trading user may be assigned to act in one of the following groups of instrument types:

- Equities, interest rates, listed funds, structured products and warrants
- Options only
- Futures only
- Options and Futures
- All tradeable instrument types.

5.8 Conducting a Standard Session

There is a standard procedure that is recommended for users issuing transactions to the market using ASX Trade. To conduct a standard session:

1. Create an OI session and login.

To interact with the system, create an OI session, and login. This is achieved by using the two OI functions `omniapi_create_session()` and `omniapi_login_ex(...)`. For login, a username and password must be provided, and the result of the function call needs to be checked to determine if it was successful or not.

Following login, it is strongly recommended that the base external facility type is retrieved using the function `omniapi_get_info_ex(...)`. Once this is retrieved, the other allowable facilities can be calculated as they will be used for all other messages. Another good practice is to retrieve the unique code issued by the system using `omniapi_get_info_ex(...)`.

2. Subscribe to broadcasts.

Once logged in, it is vital to subscribe to broadcasts, retrieve them and then hold them in chronological order in an internal queue. Then the system can be queried to gain a baseline of information – a snapshot of the market. After this, the broadcasts saved in their internal queue can be applied to this “saved” picture. The internal queue can then be abandoned, and any future broadcasts can be retrieved and applied straight from the gateway. Following this procedure ensures that an accurate picture of the market is achieved.

Each different type of user is allocated a certain set of broadcasts. Typically users would retrieve the broadcasts to which they are allowed to subscribe. Having done this they would then iterate through those broadcasts, and subscribe to each. This effectively informs the gateway that the user is interested in those broadcasts and that if they occur, the gateway should place the broadcast in the user’s allocated buffer. It is up to the user then to regularly poll the buffer for the broadcasts using the `omniapi_read_event_ext_ex(...)` or `omniapi_read_block(...)` functions. Failure to do so can cause the gateway’s buffer to overflow. This would mean that the user would miss broadcasts and potentially have an inaccurate picture of the market. For multi-threaded OI applications it is possible to poll for broadcasts in one thread while also executing transactions and queries in another.



Note:

It is important that the API client calls `omniapi_read_event_ext_ex()` (read event) with sufficient frequency to avoid broadcasts being buffered in the Gateway. Clients not reading their broadcasts sufficiently will be disconnected.

3. Query for instruments available for trading.

While temporarily holding broadcasts, the user would typically query the market for the instruments that are available for trading. The user needs to call the function `omniapi_query_ex(...)`, providing various messages

structures as a parameter, and then parse the response. Alongside this, the user would also query the system for the trading session states and any instrument session states, so as to be in a position to quickly calculate the appropriate active state of any instrument series.

4. Query market prices.

In order to get the current market prices, and for a derivatives type market, a certain level of order depth, users should use the IQ18/19 query.

5. Query participant orders.

Often applications need to be written to display the state of their own participant's order book. This is done using the MQ92 message structure.

6. Inform the system of a ready state.

After subscribing to broadcasts, retrieving them, holding them in an internal queue, querying the system for a market snapshot, then applying the held broadcasts, the user is now ready to begin trading or gathering information on the market. At this stage, ASX Trade requires the user to inform the system their ready state by issuing a UI1 transaction.

7. Query order books.

Typically users want to keep their own copy of the market's order book for securities in which they are interested. In order to get a baseline for the order book, the user needs to query the system using the `omniapi_query_ex(...)` function with the MQ7 message structure.

8. Recover historical order and trade information.

In order to maintain a historical record of order and trade transactions, it may be necessary to recover any order and trade BO5 and CB15 broadcasts that were sent while the user was not signed on. This can be done as a background task after other recovery processes have been completed.

Recovery of the BO5 order broadcast stream is done using `omniapi_query_ex(...)` function with the MQ151 query. Recovery of CB15 is done with the CQ110 query for the current day and CQ111 for the previous trading day.

Likewise, public trade broadcasts (CB16) that occurred whilst the user was not signed on can be recovered using the `omniapi_query_ex(...)` function with the CQ27 query.

For the MQ151, MQ154 queries, users can specify the range of the broadcasts that need to be recovered by stipulating the required broadcast sequence number ranges within these queries. The Matching Engine (ME) is partitioned. To aid recovery following a loss of connection (or intended re-login) it is recommended to maintain a "Highest Sequence Number Seen" per partition for BO5 broadcasts. ME partition information is provided by the UQ1 Partition query. Recovery would then involve only querying from the appropriate Sequence Number.

When performing trade history recovery using CQ110, CQ111 and CQ27 queries, it is recommended to maintain the highest sequence number seen for CB15 and CB16 broadcasts for the current day. As the Trade Handler process answering these queries has a single instance, there is only one sequence number range for trades across all partitions.

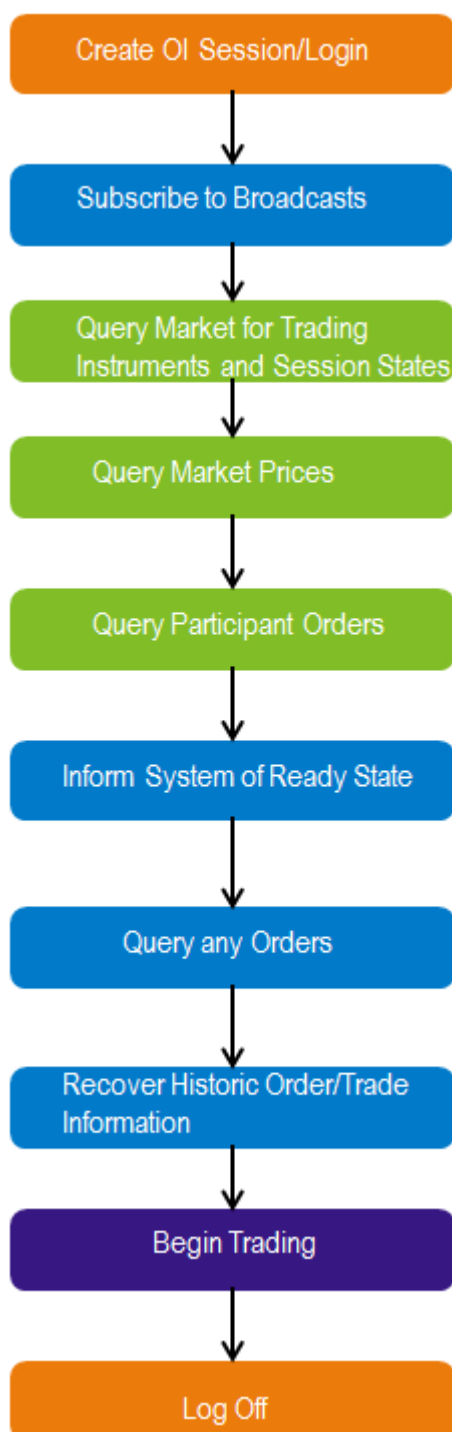
9. Begin trading.

Once the user has managed to get an accurate market snapshot and is constantly retrieving broadcasts to update that picture, they are then able to start issuing transactions to the market. Orders can be added, amended and deleted in the market, or market information can be gathered by listening out for broadcasts.

10. Log off.

Once the day's activities are complete, log off the system using the function call `omniapi_tx_ex(...)`. Close the OI session using `omniapi_close_session(...)`. Failure to do so may leak memory resources at the OI level.

5.8.1 Conducting a Standard Session



5.9 Application Design Considerations

The following design features should be considered:

5.9.1 Market Picture of Order Information

It is important to note that the gateway does not keep a picture of the market.

Users connecting to ASX Trade must:

- Download the market picture as soon as practical after logging in each trading day and store it on their system
- Maintain the locally stored market picture from the broadcasts issued throughout the day to ensure they always have an up-to-date market picture
- Answer user queries from the locally stored market picture.

If all client queries were passed to ASX Trade it would cause an unsustainable load on the system.

5.9.2 Multiple Threads - Concurrent Broadcasts

ASX Trade Refresh OMNet API libraries no longer establish two separate TCP connections to the gateway for utilising the concurrent broadcast feature. Instead, the library uses a single connection with a different thread to read the broadcast. This allows a multi-threaded application to use a blocking call for reading broadcasts (one which will not return until there is at least one broadcast) whilst still being able to send in transactions and queries all under the same session. In effect this allows the application to be continually polling for broadcasts without needing to interrupt other tasks. Broadcasts are pushed directly to a buffer in the local client API library unlike in the previous generation of the platform where they were cached in the gateway. The API buffer is allocated from the virtual memory of the client application and the buffer size is measured by the number of broadcasts it can hold. The size can be increased by setting the OMNI_API_BDX_BUFFER_SIZE environment variable. A setting of 300,000 has been used by clients.

The applications utilising this enhancement are no longer required to poll for broadcasts.



Note:

This enhancement is optional, however it is highly recommended for all latency dependant applications. For more information on the concurrent broadcast feature, see *ASX Trade Open Interface Function Calls*.

5.9.3 Single Threaded – Poll for Broadcasts

When retrieving large amounts of information from ASX Trade using a query, it is important that participants remember to continue to poll for broadcasts.

On very large queries, these single purpose loops cause a single threaded application to have a large gap in time between polling for broadcasts. This causes the gateway's buffer to overflow, and therefore the user misses out on some broadcasts.

This in turn could mean that the participant is required to retrieve the query's data again as they cannot guarantee an up-to-date market picture.

Participants should also note that a very high polling frequency can cause a detrimental effect on the performance of the gateway.

5.9.4 Multiple Logins

ASX Trade is configured such that it will only allow one instance of a user to access the trading system at the one time.

ASX Trade enforces this rule whereby if a user logs in the system via a new session whilst still connected on another, then the older session will be disconnected.

5.9.5 OMNet Throttling

Throttling is used in ASX Trade to intentionally regulate network traffic and minimise bandwidth congestion. The load is spread over a wider network to avoid the overloading of individual servers.

Throttling is implemented at the gateway when the throttle limit has been reached for the current interval. When the limit is reached, the gateway holds back inbound transactions.

There are several configuration settings that affect transaction throughput. These factors include:

- **Transaction Rate per Second**

The transaction rate applies to each session and controls the number of transactions per second that can be entered through each individual session. Note that this setting is not configured as a single throttle across one gateway but can be finely tuned for different transaction categories per user session. For 50 TPS OI uses, different transactions in ASX Trade are assigned a category. Throttles are assigned to user types for these categories.

There can be one Transaction per Second (TPS) setting for order placement, and another for market queries for example.

Currently the limit for users is either:

- 10 TPS for all categories – this is the standard offering.
- 50 TPS for short transactions – for example MO1, MO3, MO4, MO36. This only applies to some transaction categories and allows faster order placement. This is a premium service.

- **Throttling Algorithm**

In addition to the transaction rate for the session, the OI controls how that transaction rate is applied.

The throttling algorithm determines how these transactions are distributed across the period. Note that this behaviour is controlled by the gateway within the OI.

When the throttle is exceeded and the transaction is received before the throttle period has expired, the gateway holds the transaction.

- **Block Quote Transaction**

Market Makers are able to utilise the MO36 Block Quote transaction to enable the entering of multiple quotes within the one transaction. The MO36 transaction can also act as an amend quote to change existing quotes to further improve throughput.

5.9.6 OUCH Throttling

ASX OUCH throttling is configured in accordance with the pre-purchased transaction per second (TPS) rate. OUCH capacity may be pre-purchased in blocks of 50 TPS, with a minimum of 50 and increments of 50. Each block of 50 TPS may be assigned to a single OUCH session up to a maximum of 750 TPS for a single OUCH session. ASX also allows post-purchased capacity for OUCH by request. Please refer to the ASX Trade OUCH TPS Policy available on ASX Online for further information.

OUCH Messages

The following OUCH messages are subject to throttling:

- Enter Order Message
- Replace Order Message
- Cancel Order Message
- Cancel Order By Order ID Message
- Heartbeats and debug packets

Messages in excess of the configured throttle rate will be queued in the gateway.



Note:

Throttling can result in orders entering the market at stale prices. Sending cancel messages for orders that are already queued in the gateway due to throttling will themselves be queued and may not be successful.

In order to accommodate one heartbeat per second, ASX will allow one additional TPS in addition to the throttling limit.

Throttling Algorithm

The OUCH gateway uses a token bucket throttling algorithm, which can be described as follows:

1. Each OUCH session has a bucket assigned to it with the TPS rate defined for each user corresponding to the maximum number of tokens in the bucket i.e. 100 TPS = 100 tokens.
2. When a message arrives in the OUCH gateway the bucket is reduced by one token.
 - a. The bucket first gets the current time in milliseconds and calculates the number of milliseconds since last refill.
 - b. Check if the bucket should be refilled since first token was reduced (e.g. if 70 milliseconds have passed, then another 930 milliseconds must be passed before tokens are added).
 - c. The bucket may have been refilled with new tokens or there may already have been enough tokens.
 - i. If there are zero tokens available the gateway queues the message.
 - ii. If there are tokens available then process the message route to the matching engine.
3. Process next message in queue and repeat from step 2.

If a session has 100 TPS as the rate limit and sends 100 messages within the first 500 milliseconds, the processing of subsequent messages will be paused for the next 500 milliseconds until new tokens are added to the bucket.

Gateway Buffer size and throttling

If the number of queued messages exceeds a maximum buffer for the user in the OUCH gateway, the OUCH session will be disconnected. This could occur due to throttling as the buffer starts to fill up as messages are queued. The maximum buffer size is 64,000 bytes. This equates to approximately 400 new order messages or 1200 cancel order messages.

5.9.7 System Event Timestamping

In each messaging protocol, it can occur that messages resulting from separate events may carry the same timestamp. In these cases, although timestamps may be identical, the sequence in which the messages are delivered is preserved and correct.

5.10 Programming Considerations

5.10.1 Data Types

The coding standard within the OI highlights the common problem of different platforms having different ways of storing integral types.

Data can be stored in the following formats:

- Big endian – the most significant bytes are stored in the low address and read first
- Little endian – the least significant bytes are stored in the high address and read first
- Native – default method on the default platform.

The OI overcomes this by defining specific data types that map to the appropriate integral type: `int8_t`; `int16_t`; `int32_t`; `uint8_t`; `uint16_t`; `uint32_t`; etc. ASX recommends that users apply these in their applications.

5.10.2 Endianness of Data

Different platforms store data in different ways. For example, on an Intel style processor (80x86/Pentium), the bytes used to store numerical values are in little endian format. This means that the 16 bit number 96050 in decimal (which is expressed in hexadecimal as 7732) may be represented as:

Low Address → High Address



Whereas on a Motorola/Sun processor the most significant byte precedes the least significant byte, and the number is represented in big endian format:

High Address → Low Address



In a message passing system this byte ordering can pose a problem. For ASX Trade, the problem manifests itself when structures returned from the trading processor contain integers formatted in little endian as per the current platform of the trading server. Those using a big endian system will have to convert them. However, integers that have been generated at the gateway through the OI will be in native endian and do not need to be converted.

In order to convert integers from a little endian format (could be shorts = two bytes, or doubles = eight bytes) to native endian format, the OI has two macros: PUTLONG and PUTSHORT (defined in omniapi.h) that handle the conversion of byte ordering. ASX recommends that users take advantage of these macros even if they know the platform of their application and the gateway are equivalent, in case the trading server platform changes in the future. Users working on a big endian architecture processor must use these macros.

There is another endian formatting macro that specifically handles the conversion of order identifiers. The order number, together with the series and bid or ask flag, uniquely define an order or a quote in the market. The order number is eight bytes of data. The length of the number may make it difficult to read, so consider displaying it as two 32-bit integers.

To handle the endian formatting, all OI users should take advantage of the PUTORDERID macro. For instance, assuming the user issues a query to retrieve their current orders in the market (i.e. MQ92 or MQ8). When parsing the answer, users would use the following command to swap the order number bytes:

```
PUTORDERID(orderBookAnswer->order_number_u, orderBookAnswer->order_number_u);
```

Another way to do this would be to swap the two 32-bit integers within the order number:

```
uint32_t *orderPtr;
orderPtr = &orderBookAnswer->order_number_u;
PUTLONG(orderPtr[0], orderPtr[0]);
PUTLONG(orderPtr[1], orderPtr[1]);
```

Users do not need to use the macros when they receive integers that have been generated at the gateway through the OI itself. The most important of these instances is the omniapi_tx_ex(...) function (refer to *ASX Trade Open Interface Function Calls > omniapi_tx_ex – Issue a Transaction*) where the order identifier returned is in native endian format. This means that in this instance the macro need not be applied.

5.10.3 Byte Alignment

All of the data is composed of C type structs. For more information see *ASX Trade Transactions*, *ASX Trade Queries* and *ASX Trade Broadcasts*.

One of the major factors to consider in programming structs is byte alignment. Each C compiler has a default byte alignment requirement, which means that when storing the contents of integral types the computer will allocate them as starting at a certain point in the grid of memory.

Consider the following simple struct:

```
typedef struct
{
    int32_t field1;           // Takes up four bytes
    int8_t field2;           // Takes up one byte
    int32_t field3;           // Takes up four bytes
} byte_align_test_t;
```

Each field of the struct will be stored sequentially in memory, with the first member having the lowest memory address and the last having the highest. In a compiler that has a default alignment of four bytes, the above struct would look like:



where f1 is the space used for field1, f2 for field2 and f3 for field3. There is a three byte gap in memory between field2 and field3. By default the compiler is storing the int type at the beginning of a four byte boundary and so field3 does

not immediately follow field2. These characteristics are pronounced when the user sees that size of (byte_align_test_t) produces 12 – the total number of bytes covered in memory by the structure.

A byte alignment problem can occur when programs residing on different platforms interact with each other over a network. Different byte alignments within structs can cause memory corruption and the misreading of information held within messages sent from one system to the other.

In order to solve this problem, ASX Trade mandates that all structs have no space between fields, i.e. that all types be aligned on single byte boundaries.

This would cause the above struct to be stored as such:



and the size of (byte_align_test_t) statement to result in nine.

ASX Trade provides a header file entitled oal_align_packed.h that provides the appropriate alignment option for each platform. Users should consider including this file in programs that declare structs, particularly if those structs are to interact with ASX Trade. Another header file – oal_align_reset.h – clears the byte alignment to the platform-default value.

5.10.4 String Handling

All strings used by the OI, with the exception of the login and password strings and queries using the whose_t struct, should be padded by spaces (ASCII 0x20). Only a few strings that are an exception to this rule can be NULL (ASCII 0x0) terminated.

Strings returned by the OI are not NULL terminated. It is possible to use null terminated strings and still receive correct results, however it is more likely that a transaction or a query will not work because a string is null terminated.

Therefore ASX recommends that users:

- Do not assume that the strings are null terminated
- Do not supply null terminated strings – pad them with spaces instead.

5.10.5 Logout Timer

ASX Trade monitors the status of every OI user. In order to maintain connectivity a user must perform at least one ...ex() function call within the monitoring interval.

For example:

- omniapi_tx_ex(...)
- omniapi_query_ex(...)
- omniapi_set_event_ex(...)
- omniapi_read_event_ext_ex(...) etc.

Currently the monitoring is based on a one minute interval. ASX Trade checks that at least one function was called by the user within the previous four minute interval.

The logout timer is set to two intervals and each interval is 60 seconds.

5.10.6 Segmented Queries

Some ASX Trade queries may result in segmented responses where the response contains more data than fits into one response transaction. These are referred to as segmented queries. For more information, refer to *ASX Trade Queries*.

Segmented queries have a segment number field which has to be filled in with a value greater than zero, to receive the corresponding segment of data in the response. For instance, setting the number to six would return the sixth segment of data.

**Note:**

If a number is used that is outside the segmentation limits then the response may contain invalid data rather than return an error message. Therefore, each segment must be checked to see if it is the last.

Typically the segment number field is set to one in the first query message structure. This will result in the first segment of data being returned, which in itself contains a segment number field. If the segment field in the response is not zero, the user then increments the segment number and re-issues the query with the new figure, receiving the next segment of data. This continues until the value in the segment field in the response is zero, indicating that the last segment has been reached.

Where a query involves partitions and segments, users are required to know that segments can be within partitions but partitions are never within segments. This simply means that where queries involve partitions and segments, two loops are required to process the response. The outer one will loop through the partitions while the inner one will loop through the segments.

5.10.7 Coupled Queries

Coupled queries are similar to segmented ones where large amounts of data are returned to the user in separate portions. Coupled queries are like linked lists, where each portion of data has a reference to the next. However, segmented queries are like arrays, where each portion of data has an index.

The initial query sets the appropriate fields to zero. The response indicates what to set those same fields for the subsequent query. If the response has the appropriate fields set to zero then this indicates that all the data has been retrieved. This is exactly the same principle for partitioned queries (i.e. where one query per partition has to be sent to retrieve data for all partitions), but for partitioned queries only the series field is used. For coupled queries the series field plus others are used, such as the order number, or the bid and ask field.

The following example illustrates retrieving all order books, for all the series, in the system (MQ7):

First Query:

Series: 0 filled, Order Number: 0, Bid or Ask: 0

First response contains, among others:

Series: 15.2.6.155.5685.0.10500, Order Number: 12345: Bid or Ask: 1

Second Query:

Series: 15.2.6.155.5685.0.10500, Order Number: 12345: Bid or Ask: 1

The second query is sent using the details returned in the first query.

Second response contains, among others:

Series: 0 filled, Order Number: 0, Bid or Ask: 0

If all of the data is returned as 0, it indicates that no more information is outstanding.

Coupled queries are generally used for large amounts of dynamic data, whereas segmented queries are used for large amounts of static data. Static data within the database can be easily broken up into sequential portions whereas dynamic data is usually stored in diverse locations and has no obvious sequential divisions.

5.10.8 Delta Queries

Delta queries such as DQ120 Delta Underlying, DQ122 Delta Instrument Class, DQ124 Delta Instrument Series and DQ126 Delta Combination series, allow the user to request only the data that has changed since the last time they received this information.

The user must keep track of the latest received Download Reference Number (DRN) from the response and also the DRN from any associated broadcasts. The number should be stored with the data from these queries and broadcasts. Then by incrementing the DRN by one and setting it in the next query, ASX Trade only sends the changes since that time, i.e. the delta.

The first time a delta query is sent, the DRN needs to be set to -1. This indicates to ASX Trade that the application requires a full answer. In subsequent queries, even after having logged out and logged back in again, as long as the data from the full answer was stored locally, when the appropriate DRN is provided for the query, only the delta information will be returned.



Note:

After seven consecutive days the DRN expires. If a user sends a query containing a DRN that is older than seven days, ASX Trade will send a full answer. OI applications must handle this situation.



Note:

Although unlikely, it is possible that no changes are made to any instruments within seven consecutive trading days. In this case the DRN contained by the system will be rendered as expired. In this situation users will have no alternative but to supply the expired DRN and be returned a full answer. OI applications must also handle this situation.

It is possible for ASX Trading Operations to grant or deny a user's access to certain instruments. In practice, this permission change would happen overnight, not intra-day. If it does occur then the DRN that the user persisted in their OI application may be current, but the instruments they have stored with that DRN are not. They may have been granted access to more instruments, or have been denied the ones they have already stored.

To cater for this situation a timestamp is provided along with the DRN which indicates the time the instrument information was received. The timestamp of when a full answer was last received in the delta query has to be included. This allows ASX Trade to ensure that the full answer was received after any user permission changes. If the user indicates in their query that the last full answer they received was before an access change, then, even though a current DRN was provided in the query, a new full answer is returned. OI applications must handle this situation.

The following example may help to clarify. Assume that the highest DRN on ASX Trade and the user's OI application is both 10.

- ASX Trading Operations change the user's access permissions at time T1.
- User sends a delta query with DRN set to 11 ($10 + 1$), and the last time they received a full answer of T0, where T0 was before T1.
- ASX Trade compares T0 and T1 and returns a full answer with DRN of 10 and a new time stamp of T2.
- Next day the user logs on with DRN set to 11 ($10 + 1$) and timestamp of T2.
- ASX Trade returns no changes with DRN set to 10 and timestamp of T3.
- ASX Trading Operations change an instrument overnight; ASX Trade's DRN is set to 11.
- Next day the user logs on with DRN set to 11 ($10 + 1$) and timestamp of T2 (the timestamp of the last full answer received).
- ASX Trade compares T2 and T1 and notes that a full answer due to access changes is not required. ASX Trade compares DRNs and sends the delta only, returning a DRN of 11 and a timestamp value of T4.
- Next day the user logs on with DRN set to 12 ($11 + 1$) and timestamp of T2.
- ASX Trade returns no changes with DRN set to 11 and timestamp of T5.

Example

The following provides an example of delta queries. A typical login procedure for a user on the first login (ever), or when the user hasn't logged on in the past seven consecutive days could be as follows:

- Create session, login and query Facility Types.
- Subscribe to relevant broadcasts, start polling, store broadcasts in an internal queue.
- Query markets (DQ7) – retrieve all markets.
- Query groups (DQ8) – retrieve all instrument groups.
- Query types (DQ17) – retrieve all instrument types.
- Query underlyings (DQ120), a delta query with DRN set to -1 - Persist this data and the DRN/timestamp values returned.
- Query instrument classes (DQ122), a delta query with DRN set to -1 - Persist this data and the DRN/timestamp values returned.
- Query instrument series (DQ124), a delta query with DRN set to -1 - Persist this data and the DRN/timestamp values returned.
- Query combination series (DQ126), a delta query with DRN set to -1 - Persist this data and the DRN/timestamp values returned.
- Query own orders and order books (if needed).
- Apply broadcasts from internal queue and abandon queue.
- Signal "Ready State" transaction UI1 to ASX Trade.

On subsequent logins:

- Create session, login and query Facility Types.
- Subscribe to relevant broadcasts, start polling, store broadcasts in an internal queue.
- Query markets (DQ7) – retrieve all markets.
- Query groups (DQ8) – retrieve all instrument groups.
- Query types (DQ17) – retrieve all instrument types.
- Query underlyings (DQ120) - a delta query with incremented DRN and last full answer timestamp as per persisted value. If the response is only the delta then update persisted data with the changes and keep the new DRN value. If the response is a full answer then reset all data and keep the new DRN value and timestamp.
- Query classes (DQ122) - a delta query with incremented DRN and last full answer timestamp as per persisted value. If the response is only the delta then update persisted data with the changes and keep the new DRN value. If the response is a full answer then reset all data and keep the new DRN value and timestamp.
- Query series (DQ124) - a delta query with incremented DRN and last full answer timestamp as per persisted value. If the response is only the delta then update persisted data with the changes and keep the new DRN value. If the response is a full answer then reset all data and keep the new DRN value and timestamp.
- Query combination series (DQ126) - a delta query with incremented DRN and last full answer timestamp as per persisted value. If the response is only the delta then update persisted data with the changes and keep the new DRN value. If the response is a full answer then reset all data and keep the new DRN value and timestamp.
- Query own orders and order books (if needed).
- Apply broadcasts from internal queue and abandon queue.
- Signal "Ready State" transaction UI1 to ASX Trade.

5.10.9 Variable Information Messages

A Variable Information Message (VIM) contains a header and a body and is used for some broadcasts and responses to certain queries. The header contains the message identifier (e.g. BO5), the number of items in the body, and the total size of the message. The body contains one or more items as indicated by the header, the ordering of which cannot be guaranteed. Each item has its own sub-item header and an associated structure that follows. The sub-item header is uniform for every item. It contains two integers: the first is the unique identifier of the fixed structure that immediately follows and the second is the size of that structure and the sub-item header.

The sub-item header's definition can be found in omex_asx.h:

```
typedef struct sub_item_hdr
{
    uint16_t named_struct_n;
    uint16_t size_n;
} sub_item_hdr_t;
```

The VIM contains the following structure:

Header	Message Identifier	BO14
	Number of Items	2
	Size of Message (includes this message header's size)	xxxx
Sub Item Header	Named Structure	33001
	Size of Structure (includes this sub-item header's size)	yyyy
Item	Structure 33001	
	{ ... }	
Sub Item Header	Named Structure	33002
	Size of Structure (includes this sub-item header's size)	zzzz
Item	Structure 33002	
	{ ... }	

Users then can easily parse VIMs by reading the header to find the number of items in the structure, then looping through each item; check the sub-item header of each one to find out the value of the structure number and the structure's size. If the structure is of interest then it should be parsed as per normal. If it is not of interest then it should be skipped and the next sub-item header parsed.

It is important for users to skip items that are not of interest to them and continue to parse the rest of the message, rather than simply exit out of the procedure. This ensures that their application will be forward compatible if new items are added for which they have yet to cater. Also it means that users are not dependent on the ordering of items.

Some messages have been subjected to a second way of structuring VIMs (see *ASX Trade Queries* and *ASX Trade Broadcasts* for more information). This is where an item header is inserted among the items to signify a grouping of items. An item header structure consists of two integers indicating the number of sub-items and their size.

The definition can be found in omex_asx.h:

```
typedef struct sub_item_hdr
{
    uint16_t named_struct_n;
    uint16_t size_n;
} sub_item_hdr_t;
```

Header	Message Identifier	DA120
	Number of Items	2
	Size of Message (includes this message header's size)	aaaa
Item Header	Number of Items	1
	Size of Items (includes this item's headers size)	bbbb

Sub Item Header	Named Structure	37001
	Size of Structure (includes this sub-item header's size)	cccc
Item	Structure 37001	
	{ ... }	
Item Header	Number of Items	2
	Size of Items (Include this items header size)	dddd
Sub Item Header	Named Structure	37201
	Size of Structure (includes this sub-item header's size)	eeee
Item	Structure 37201	
	{ ... }	
Sub Item Header	Named Structure	3702
	Size of Structure (includes this sub-item header's size)	ffff
Item	Structure 37202	
	{ ... }	

5.10.10 Variable Information Transactions

A Variable Information Transaction (VIT) is based on the same concept as VIM. A VIT contains a header and a body. The header contains the transaction identifier (e.g. MO1), the number of items in the body, and the total size of the transaction. The body contains one or more items as indicated by the header. Each item has its own sub-item header and an associated structure that follows. The sub-item header is uniform for every item. It contains two integers: the first is the unique identifier of the fixed structure that immediately follows and the second is the size of that structure and the sub-item header.

The sub-item header's definition can be found in omex_asx.h:

```
typedef struct sub_item_hdr
{
    uint16_t named_struct_n;
    uint16_t size_n;
} sub_item_hdr_t;
```

The VIT contains the following structure:

Header	Message Identifier	MO1
	Number of Items	2
	Size of Message (includes this message header's size)	xxxx
Sub Item Header	Named Structure	34810
	Size of Structure (includes this sub-item header's size)	yyyy
Item	Structure 34810	
	{ ... }	
Sub Item Header	Named Structure	34802
	Size of Structure (includes this sub-item header's size)	zzzz
Item	Structure 34802	
	{ ... }	

Non-mandatory sub-structures do not have to be included into a transaction if they are not required. The sequence of sub-structures within a VIT is not fixed, i.e. sub-structures can be provided in any sequence.

6 ASX ITCH and Glimpse

ASX ITCH is the premium low latency protocol for accessing ASX market information, delivered via a multicast connection directly from ASX Trade. ASX ITCH features the following data elements:

- Market by Order for all asset classes available in ASX Trade.
- Order level data with Broker ID for equity derivatives, index options and investment products.
- Trade messages - ASX ITCH supports trade messages to reflect matches in lit, auctions and dark order books, with the exception of trade reports.
- Order Book Directory messages provide basic security data such as the ISIN code and financial product
- Tick Size Table Entry messages to convey tick sizes for order books.
- Order Book State message to inform receivers of state changes.
- Internationally recognised and standardised protocol
- Timestamping accuracy to the nearest 100 nanoseconds.

A complement to the ITCH real-time data feed product, Glimpse is a point-to-point data feed connection that provides direct data feed customers with a snapshot of the current state of the order books traded in ASX Trade. Glimpse uses the same message formats as ITCH. Glimpse can be used to quickly sync up with the ITCH feed. At the end of the Glimpse snapshot a sequence number is provided that can be used to connect and sync up with the real-time ITCH feed.

Further information is available in the ASX ITCH and Glimpse manual which is located at <https://www.asxonline.com/public/documents/asx-trade-refresh-manuals.html>.

6.1 ASX Trade OMNet API and ITCH Market Data Features Comparison

The table below provides a comparison of the two market data feeds available on ASX Trade.

Features	OMNet API	ITCH
Connectivity	LCC, Gateway in Cabinet, ASX Net Gateway	LCC Ultra-low latency market information access Multicast Data
Max Order depth	For Equities and IRM instruments - unlimited levels of order depth (via BO2) and 1 level of price depth (via BO15) For Warrants and Options, 5 levels of aggregated price depth (via BO14)	Unlimited levels of order depth for all instruments
Instrument identifier	series_t and the ins_id_s	Order Book ID
Order ID	order_number_u	Order ID
Trade identifier	trade_number_i	Match ID (can be cross referenced with OUCH)
Deal Source	deal_source_c	Occurred at Cross

Features	OMNet API	ITCH
Access to basic Reference Data	ISIN code Financial product Tick Size Session state messages Timestamp – Nanoseconds Prices to one decimal place Extended price to 4 decimal places Order book details Own Firm Order Book Trade data for whole market DQ120, DQ122, DQ124, DQ126 UQ1 (Query Partition) BI41, BI741 (Instrument State change) DQ53, BU53 (Corporate action) BI81 (Market Announcement) BL51 (Price Limit Update) BO10 (Equilibrium price Update) II17, BI63 (Settlement Price) BD2 (Edited Price OHLL Information)	ISIN code Financial product Tick Size Session state messages Timestamp – Nanoseconds Prices to 2 decimal places - Order book details - Trade data for whole market R (Order Book Directory), M (Combination Order Book Directory), L (Tick Size Message) - O (Order Book State Message) - - - Z (Equilibrium Price Update message) - -
Order messages	BO2, BO5 (Orderbook Change) BO14, BO15 (Price Depth) IQ18, IQ19 (Price Depth Query)	A (Add Order – No Participant ID), F (Add Order With Participant ID), U (Order Replace), D (Order Delete) - -
Trade messages	CQ110*, CQ111* (Dedicated Trade) CB15*, CB16 (Trade Update)	E (Order Executed message), C (Order Executed with Price Message), P (Trade message identifier) Off-market trade reports are not available in ITCH

- Message not available in ITCH

* Dedicated trades for the specific participant.

7 ASX OUCH

ASX OUCH is a streamlined native protocol for order management on ASX Trade. It is designed to offer the maximum possible performance for the essential order management actions - entering orders, replacing and cancelling existing orders as well as receiving executions from ASX Trade.

The ASX OUCH protocol provides:

- Ultra-low latency order entry and updates for those orders
- Asynchronous protocol, no need to wait for order acknowledgment
- Entry of orders with Day, FaK or FoK validity
- Amendment and cancellation of orders entered with ASX OUCH
- Notification of executions of orders entered with ASX OUCH
- Access to all asset classes available in ASX Trade
- Internationally recognised and standardised protocol
- Nanosecond time-stamping

Further information is available in the ASX OUCH Message Specification manual which is located at:

<https://www.asxonline.com/public/documents/asx-trade-refresh-manuals.html>.

7.1 ASX Trade OMNet API and OUCH Features Comparison

The table below provides a comparison of the two trading interfaces available on ASX Trade.

Features	OMNet API	OUCH
Connectivity	LCC, Gateway in Cabinet, ASX Net Gateway	ALC and SDC gateways via LCC Improved latency
API Transactions	Enter Single order (MO1) Amend order (MO3) Delete order (MO4) Bulk Quote (MO36) Enter Trade Report (MO76,77) Create TMC (DC3) Quote Requests (MC2,MC4) Mass Cancel Cancel on disconnect	Enter Single order Replace order Delete order - - - - - - Cancel on disconnect
Order Types	Limit Short Sell Market To Limit (MTL) Centre Point (include Dark Limit) Sweep Best Limit Undisclosed Auction Imbalance Icebergs (shown Qty) Short Sell Qty Price Stabilisation (PST)	Limit Short Sell - Centre Point (include Dark Limit) Sweep - - - - Short Sell Qty -

Features	OMNet API	OUCH
Order Validities and Execution Instruction	Day	Day
	GTC	-
	GTD	-
	FoK	FoK
	FaK	FaK
	MAQ	MAQ
	Single fill MAQ	Single fill MAQ
	Mid_tick_c	Half tick prices accepted
	Crossing Key (UCP)	Crossing Key (UCP)
	Clearing Participant ID	Clearing Participant ID
	Regulatory Data	Regulatory Data

- Function not available in OUCH

8 Market Structure in ASX Trade

Numerous types of products are traded on ASX Trade within separate markets. The product types, also referred to as instrument groups, can be loosely grouped into different categories. These are Equity, Warrant and Structured Product, Index, Derivative, and Practice. New markets and products may be added at different times.

The combination of a market and an instrument group defines an instrument type (refer to *Market Hierarchy* for information on Instrument Structure). Different instrument types are available in the different product categories and are identified below.

8.1 Equity Products

In ASX Trade there are five equity markets grouped by instrument names. For example, if an instrument name begins with B, for example BHP, it is traded in Equity Market Group 1.

Market	Description	Internal ID
EQTY1	EQUITY MARKET GROUP 1 (A-B)	101
EQTY2	EQUITY MARKET GROUP 2 (C-F)	102
EQTY3	EQUITY MARKET GROUP 3 (G-M)	103
EQTY4	EQUITY MARKET GROUP 4 (N-R)	104
EQTY5	EQUITY MARKET GROUP 5 (S-Z)	105

8.1.1 Equity Market Groups

The five equity markets each have their own defined opening times to allow the opening auctions to be staggered to reduce the impact on the network.

The respective markets define the following instrument types.

Inst. Type	Description	Market	Inst. Group
Q1EQ	EQUITY MARKET GROUP 1 (A-B) EQTY	EQTY1	EQT
Q2EQ	EQUITY MARKET GROUP 2 (C-F) EQTY	EQTY2	EQT
Q3EQ	EQUITY MARKET GROUP 3 (G-M) EQTY	EQTY3	EQT
Q4EQ	EQUITY MARKET GROUP 4 (N-R) EQTY	EQTY4	EQT
Q5EQ	EQUITY MARKET GROUP 5 (S-Z) EQTY	EQTY5	EQT
E1TM	EQUITY 1 TAILOR MADE COMBINATION	EQTY1	TMC
E2TM	EQUITY 2 TAILOR MADE COMBINATION	EQTY2	TMC
E3TM	EQUITY 3 TAILOR MADE COMBINATION	EQTY3	TMC
E4TM	EQUITY 4 TAILOR MADE COMBINATION	EQTY4	TMC
E5TM	EQUITY 5 TAILOR MADE COMBINATION	EQTY5	TMC

8.2 Listed Funds, Warrants and Structured Products

A listed fund, warrant or structured product is a financial instrument issued by a financial institution and traded on ASX Trade. These products may be issued over underlying assets including domestic and international shares, basket of shares, index or commodities.

The Listed Funds, Warrants and Structured Products market provides for the trading of the instrument types listed below.

Market	Description	Internal ID
WAR	LISTED FUNDS, WARRANTS & PRODS	50

This market defines the following instrument types:

Inst. Type	Description	Market	Inst. Group
WCOA	STRUCT PROD COMMODITY AMER CALL	WAR	COA
WCOB	STRUCT PROD COMMODITY EURO CALL	WAR	COB
WCOV	STRUCT PROD COMMODITY AVISTA	WAR	COV
WCOY	STRUCT PROD COMMODITY AMER PUT	WAR	COY
WCOZ	STRUCT PROD COMMODITY EURO PUT	WAR	COZ
WCPA	ST PRD CAP & NON PROTECT AMER CALL	WAR	CPA
WCPB	ST PRD CAP & NON PROTECT EURO CALL	WAR	CPB
WCUA	STRUCT PROD CURRENCY AMER CALL	WAR	CUA
WCUB	STRUCT PROD CURRENCY EURO CALL	WAR	CUB
WCUV	STRUCT PROD CURRENCY AVISTA	WAR	CUV
WCUY	STRUCT PROD CURRENCY AMER PUT	WAR	CUY
WCUZ	STRUCT PROD CURRENCY EURO PUT	WAR	CUZ
WEBA	ST PROD EQUITY BARRIER AMER CALL	WAR	EBA
WEBB	ST PROD EQUITY BARRIER EURO CALL	WAR	EBB
WEBY	STR PROD EQUITY BARRIER AMER PUT	WAR	EBY
WEBZ	ST PROD EQUITY BARRIER EURO PUT	WAR	EBZ
WECA	ST PRD EQTY INSTAL CPD AMER CALL	WAR	ECA
WECB	ST PRD EQTY INSTAL CPD EURO CALL	WAR	ECB
WENA	ST PROD ENDOWMENT AMER CALL	WAR	ENA
WENB	ST PROD ENDOWMENT EURO CALL	WAR	ENB
WEQA	ST PROD EQUITY AMER CALL	WAR	EQA
WEQB	ST PROD EQUITY EURO CALL	WAR	EQB
WEQY	ST PROD EQUITY AMER PUT	WAR	EQY
WEQZ	ST PROD EQUITY EURO PUT	WAR	EQZ
WETF	ST PROD EXCHANGE TRADED FUND	WAR	ETF
WIBA	ST PROD INDEX BARRIER AMER CALL	WAR	IBA
WIBB	ST PROD INDEX BARRIER EURO CALL	WAR	IBB
WIBY	ST PROD INDEX BARRIER AMER PUT	WAR	IBY
WIBZ	ST PROD INDEX BARRIER EURO PUT	WAR	IBZ
WICY	ST PROD INSTAL ROLLING AMER CALL	WAR	ICY
WICZ	ST PROD INSTAL ROLLING EURO CALL	WAR	ICZ
WINA	ST PROD INDEX AMER CALL	WAR	INA
WINB	ST PROD INDEX EURO CALL	WAR	INB
WINY	ST PROD INDEX AMER PUT	WAR	INY
WINZ	STRUCT PRODUCT INDEX EURO PUT	WAR	INZ
WIRA	ST PROD INSTAL ROL BAR AMER CALL	WAR	IRA
WIRB	ST PROD INSTAL ROL BAR EURO CALL	WAR	IRB
WISA	ST PROD INSTALMENT AMER CALL	WAR	ISA
WISB	ST PROD INSTALMENT EURO CALL	WAR	ISB
WISY	ST PROD INSTAL BARRIER AMER CALL	WAR	ISY
WISZ	ST PROD INSTAL BARRIER EURO CALL	WAR	ISZ
WIXA	STRUCT PROD INDEX AVISTA	WAR	IXA
WMIU	ST PROD MANAGED INVESTMENT UNIT	WAR	MIU
WMLA	ST PRD MINI LONG EXP AMER CALL	WAR	MLA
WMLB	ST PRD MINI LONG EXP EURO CALL	WAR	MLB
WMLY	ST PRD MINI IDX LG EXP AMER CALL	WAR	MLY
WMLZ	ST PRD MINI IDX LG EXP EURO CALL	WAR	MLZ

Inst. Type	Description	Market	Inst. Group
WMSA	ST PRD MINI SHORT EXP AMER PUT	WAR	MSA
WMSB	ST PRD MINI SHORT EXP EURO PUT	WAR	MSB
WMSY	ST PRD MINI IDX SH EXP AMER PUT	WAR	MSY
WMSZ	ST PRD MINI IDX SH EXP EURO PUT	WAR	MSZ
WRRRA	ST PRO RLG RST BSK INS AMER CALL	WAR	RRA
WRRB	ST PRO RLG RST BSK INS EURO CALL	WAR	RRB
WSIA	ST PROD SELF FD INSTAL AMER CALL	WAR	SIA
WSIB	ST PROD SELF FD INSTAL EURO CALL	WAR	SIB
WSLX	ST PROD TRADING LONG EXPOSURE	WAR	SLX
WSSX	ST PROD TRADING SHORT EXPOSURE	WAR	SSX
WTMC	WARRANT TAILOR MADE COMBO	WAR	TMC

8.3 Quote Display Board

The Quote Display Board presents the market where Managed Funds, Exchange Traded Funds (ETFs), Hedge Funds and Structured Products are presented on ASX Trade providing visibility of product and indicative pricing on screen. These products may be issued over underlying assets including domestic and international shares, basket of shares, index or commodities and other structured products.

The Quote Display Board provides a mechanism for issuers to present their products allowing counterparties to effect matching through trade reports rather than the continuous matching of orders.

Market	Description	Internal ID
QDB	QUOTE DISPLAY BOARD	57

This market defines the following Instrument types:

Inst. Type	Description	Market	Inst. Group
UCOA	QDB COMMODITY AMER CALL	QDB	COA
UCOB	QDB COMMODITY EURO CALL	QDB	COB
UCOV	QDB COMMODITY AVISTA	QDB	COV
UCOY	QDB COMMODITY AMER PUT	QDB	COY
UCOZ	QDB COMMODITY EURO PUT	QDB	COZ
UCPA	QDB CAP & NON PROTECT AMER CALL	QDB	CPA
UCPB	QDB CAP & NON PROTECT EURO CALL	QDB	CPB
UCUA	QDB CURRENCY AMER CALL	QDB	CUA
UCUB	QDB CURRENCY EURO CALL	QDB	CUB
UCUV	QDB CURRENCY AVISTA	QDB	CUV
UCUY	QDB CURRENCY AMER PUT	QDB	CUY
UCUZ	QDB CURRENCY EURO PUT	QDB	CUZ
UEBA	QDB EQUITY BARRIER AMER CALL	QDB	EBA
UEBB	QDB EQUITY BARRIER EURO CALL	QDB	EBB
UEBY	QDB EQUITY BARRIER AMER PUT	QDB	EBY
UEBZ	QDB EQUITY BARRIER EURO PUT	QDB	EBZ
UECA	QDB EQUITY CAPPED AMER CALL	QDB	ECA
UECB	QDB EQUITY CAPPED EURO CALL	QDB	ECB
UENA	QDB ENDOWMENT AMER CALL	QDB	ENA
UENB	QDB ENDOWMENT EURO CALL	QDB	ENB
UEQA	QDB EQUITY AMER CALL	QDB	EQA
UEQB	QDB EQUITY EURO CALL	QDB	EQB

Inst. Type	Description	Market	Inst. Group
UEQY	QDB EQUITY AMER PUT	QDB	EQY
UEQZ	QDB EQUITY EURO PUT	QDB	EQZ
UIBA	QDB INDEX BARRIER AMER CALL	QDB	IBA
UIBB	QDB INDEX BARRIER EURO CALL	QDB	IBB
UIBY	QDB INDEX BARRIER AMER PUT	QDB	IBY
UIBZ	QDB INDEX BARRIER EURO PUT	QDB	IBZ
UICY	QDB INSTAL ROLLING AMER CALL	QDB	ICY
UICZ	QDB INSTAL ROLLING EURO CALL	QDB	ICZ
UINA	QDB INDEX AMER CALL	QDB	INA
UINB	QDB INDEX EURO CALL	QDB	INB
UINY	QDB INDEX AMER PUT	QDB	INY
UINZ	QDB INDEX EURO PUT	QDB	INZ
UIRA	QDB INSTAL ROL BAR AMER CALL	QDB	IRA
UIRB	QDB INSTAL ROL BAR EURO CALL	QDB	IRB
UISA	QDB INSTALMENT AMER CALL	QDB	ISA
UISB	QDB INSTALMENT EURO CALL	QDB	ISB
UISY	QDB INSTAL BARRIER AMER CALL	QDB	ISY
UISZ	QDB INSTAL BARRIER EURO CALL	QDB	ISZ
UIXA	QDB INDEX AVISTA	QDB	IXA
UMIU	QDB MANAGED INVESTMENT UNIT	QDB	MIU
UMLA	QDB MINI LONG EXP AMER CALL	QDB	MLA
UMLB	QDB MINI LONG EXP EURO CALL	QDB	MLB
UMLY	QDB MINI IDX LG EXP AMER CALL	QDB	MLY
UMLZ	QDB MINI IDX LG EXP EURO CALL	QDB	MLZ
UMSA	QDB MINI SHORT EXP AMER PUT	QDB	MSA
UMSB	QDB MINI SHORT EXP EURO PUT	QDB	MSB
UMSY	QDB MINI IDX SH EXP AMER PUT	QDB	MSY
UMSZ	QDB MINI IDX SH EXP EURO PUT	QDB	MSZ
URRA	QDB RLG RST BSK INS AMER CALL	QDB	RRA
URRB	QDB RLG RST BSK INS EURO CALL	QDB	RRB
USIA	QDB SELF FD INSTAL AMER CALL	QDB	SIA
USIB	QDB SELF FD INSTAL EURO CALL	QDB	SIB
USLX	QDB LONG EXPOSURE	QDB	SLX
USSX	QDB SHORT EXPOSURE	QDB	SSX
QTMC	QDB TAILOR MADE COMBO	QDB	TMC

8.4 Interest Rate Products

An interest rate security is a security that pays a fixed or floating rate of return. This return can be in the form of interest or dividends. The issuer usually promises to pay a specified rate of interest (a coupon) during the life of the interest rate security and to repay the face value (issue price or principal) of the interest rate security at a predefined time (maturity date). An interest rate security has the following characteristics:

- Issuer (borrower)
- Face value (repayment amount)
- Coupon (the income stream)
- Coupon frequency (the payment of the income)
- Yield (return on investment)
- Maturity date (expiry date)

- Purchase price (cost of investment)
- Accrued interest.

Markets	Description	Internal ID
IRM	INTEREST RATE MARKET	120

This market defines the following instrument types.

Inst. Type	Description	Market	Inst. Group
RCNV	IRM CONVERTIBLE NOTES	IRM	CNV
RFIX	IRM FIXED RATE NOTES	IRM	FIX
RFRN	IRM FLOATING RATE NOTES	IRM	FRN
RGL	IRM GOVERNMENT LOANS	IRM	GL
RHYB	IRM HYBRID SECURITIES	IRM	HYB
RWHL	IRM WHOLESALE INT RATE SECURITIES	IRM	WHL
RTMC	IRM TAILOR MADE COMBINATION	IRM	TMC

8.5 Derivative Products

A derivative is a financial instrument that derives its value from an underlying instrument such as a share, a share price index or commodity etc. ASX Trade currently has three different types of Derivative Markets containing instruments relating to exchange traded options and futures.

Market	Description	Internal ID
AUS	STOCK DERIVATIVES MARKET	2
INDEX	INDEX DERIVATIVES MARKET	1

8.5.1 Options

Options are contracts for the right to buy or sell a particular asset at a predetermined price (exercise or strike price) by or on a specified future date (expiry date). ASX has the following equities, index and commodities options and instrument types defined for each derivative market.

Inst. Type	Description	Market	Inst. Group
AACO	AUST AMER CALL OPT	AUS	ACO
AEPO	AUST EURO PUT OPT	AUS	EPO
AEFC	AUST LEPO	AUS	EFC
AECO	AUST EURO CALL OPT	AUS	ECO
AAPO	AUST AMER PUT OPT	AUS	APO
IECO	INDEX EURO CALL OPT	INDEX	ECO
IEPO	INDEX EURO PUT OPT	INDEX	EPO
IEFC	INDEX LEPO	INDEX	EFC
CFAP	AGRIC AMER FUTURE PUT OPTION	AGRIC	FAP
CFAC	AGRIC AMER FUTURE CALL OPTION	AGRIC	FAC

8.5.2 Futures

Futures are contracts to buy or sell a particular asset at the traded price on a specified future date. ASX has the following equities, index and commodities futures and instrument types defined for each derivative market.

Inst. Type	Description	Market	Inst. Group
IFUT	INDEX FUTURE	INDEX	FUT
AFUT	STOCK FUTURE	AUS	FUT

8.5.3 Derivatives Combinations

The following Combination instrument types exist for the derivatives markets.

Inst. Type	Description	Market	Inst. Group
ITMC	INDEX TAILOR MADE COMBINATION	INDEX	TMC
SPC2	STOCK PRICE SPREAD CALL 2-STEP	AUS	PC2
SPP2	STOCK PRICE SPREAD PUT 2-STEP	AUS	PP2
SPSC	STOCK PRICE SPREAD CALL	AUS	PSC
SPSP	STOCK PRICE SPREAD PUT	AUS	PSP
SSG2	STOCK STRANGLE 2-STEP	AUS	SG2
SSTD	STOCK STRADDLE	AUS	STD
SSYN	STOCK SYNTHETIC	AUS	SYN
STMC	STOCK DERIV TAILOR MADE COMBO	AUS	TMC
STSC	STOCK TIME SPREAD CALL	AUS	TSC
STSP	STOCK TIME SPREAD PUT	AUS	TSP

8.6 Indices

The INDX market is a placeholder for Indices and Estimated Intraday Net Asset Values (EINs).

Market	Description	Internal ID
INDX	STOCK INDICES	110

Index values are updated regularly through on-market trading of the constituent securities and disseminated to users through the BD2 broadcast (refer to *ASX Trade Broadcasts* for more information). This market defines the following instrument types.

Inst. Type	Description	Market	Inst. Group
DEIN	INDICES EIN	INDEX	EIN
DIDX	INDICES	INDEX	IDX

8.7 Avistas

Avistas are placeholder underlyings for instruments that are not traded through ASX Trade. The following Avista instrument types exist.

Inst. Type	Description	Market	Inst. Group
AUSA	AUST AVISTA	AUS	AVI
DIAV	INDICES AVISTA	INDX	AVI
INXA	INDEX AVISTA	INDEX	AVI
Q1AV	EQUITY MARKET GROUP 1 (A-B) AVIS	EQTY1	AVI
Q2AV	EQUITY MARKET GROUP 2 (C-F) AVIS	EQTY2	AVI
Q3AV	EQUITY MARKET GROUP 3 (G-M) AVIS	EQTY3	AVI
Q4AV	EQUITY MARKET GROUP 4 (N-R) AVIS	EQTY4	AVI
Q5AV	EQUITY MARKET GROUP 5 (S-Z) AVIS	EQTY5	AVI

8.8 Practice Market

The practice market allows users to practice and train in accordance with ASX Operating Rules. This market must not be used for general testing of the OI as it has an impact on network traffic. Practice instruments should be used only for connectivity testing and training purposes.

In the practice market:

- Orders can be entered for practice, and trades may be executed without the daily totals being affected.
- Orders and trades for practice securities are deleted nightly.

Market	Description	Internal ID
PRAC	PRACTICE MARKET	250

This market defines the following instrument types.

Inst. Type	Description	Market	Inst. Group
PACO	PRACTICE AMER CALL OPT	PRAC	ACO
PAPO	PRACTICE AMER PUT OPT	PRAC	APO
PCB	PRACTICE FIXED RATE NOTES	PRAC	FIX
PCNV	PRACTICE CONVERTIBLE NOTES	PRAC	CNV
PEBA	PRAC EQUITY BARR AMER CALL WAR	PRAC	EBA
PEBB	PRAC EQUITY BARR EURO CALL WAR	PRAC	EBB
PEBY	PRAC EQUITY BARR AMER PUT WAR	PRAC	EBY
PEBZ	PRAC EQUITY BARR EURO PUT WAR	PRAC	EBZ
PECO	PRACTICE EURO CALL OPT	PRAC	ECO
PEFC	PRACTICE LEPO	PRAC	EFC
PEPO	PRACTICE EURO PUT OPT	PRAC	EPO
PEQA	PRACTICE AMER CALL WARRANT	PRAC	EQA
PEQB	PRAC EQUITY EURO CALL WAR	PRAC	EQB
PEQT	PRACTICE EQUITY SECURITY	PRAC	EQT
PEQY	PRAC WARRANT EQUITY AMER PUT	PRAC	EQY
PEQZ	PRAC EQUITY EURO PUT WAR	PRAC	EQZ
PFAC	PRAC AMER FUTURE CALL OPTION	PRAC	FAC
PFAP	PRAC AMER FUTURE PUT OPTION	PRAC	FAP
PFRN	PRACTICE FLOATING RATE NOTES	PRAC	FRN
PFUT	PRACTICE FUTURE	PRAC	FUT
PGL	PRACTICE GOVERNMENT LOANS	PRAC	GL
PHYB	PRACTICE HYBRID SECURITIES	PRAC	HYB
PICY	PRAC INSTAL ROLL AMER CALL WAR	PRAC	ICY
PINA	PRAC INDEX AMER CALL WAR	PRAC	INA
PINB	PRAC INDEX EURO CALL WAR	PRAC	INB
PINY	PRAC INDEX AMER PUT WAR	PRAC	INY
PINZ	PRAC INDEX EURO PUT WAR	PRAC	INZ
PISA	PRAC INSTAL AMER CALL WAR	PRAC	ISA
PISB	PRAC INSTAL EURO CALL WAR	PRAC	ISB
PIXA	PRAC INDEX AVISTA WAR	PRAC	IXA
PSIA	PRAC SLF/FD INSTAL AMER CALL WAR	PRAC	SIA
PWHL	PRAC WHOLESALE INT RATE SECURITIE	PRAC	WHL
PDTM	PRACTICE GENERIC TAILOR MADE	PRAC	TMC

9 Trading Cycles

The trading cycles include three session states where orders are matched automatically by ASX Trade. They are:

- Open
- Open Night Trading
- Closing Single Price Auction (CSPA). For more information on a list of currently configured session states, refer to *Appendix 1 –Session States*.

9.1 System Availability

The system is available on trading days (Monday to Friday) at the following times:

System Status	System Availability	Description
System Start Up	Approximately 02:25	System is available for users to login. Users should not attempt to login before this time.
Night Processing and System Shutdown	Approximately 20:30	Users are logged out for Night Processing. Users may not log in until system restarts at 02:25.

The system is not available on non-business days.

9.2 Market Trading Cycles

Different markets follow different trading cycles. New sessions and times may be introduced.

The trading cycles for normal trading days are listed below. Trading cycles however do differ for scheduled half days, for example, Christmas Eve, Easter, etc.

For times indicated with a random second component, the status change may happen any time on or after the specified time within the given number of random seconds.

9.2.1 Equities, Interest Rate Products and Listed Funds, Warrants and Structured Products

Interest Rate products that are not included are Wholesale Interest Securities and Government Loans. Structured products not included are Index, Currency and Commodity Warrants.

System Status	Time	Description Order/Transaction Behaviour
CLOSE	(Logins enabled) 02:25	Enquiry only.
PRE_OPEN	07:00	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. The market may overlap; there is no matching of orders.
OPEN	<ul style="list-style-type: none"> • Equity Mkt Group 1 - 09:59:45 • Interest Rate Mkt - 09:59:45 • Listed Funds, Warrants and St Products - 09:59:45 • Equity Mkt Group 2 - 10:02:00 • Equity Mkt Group 3 - 10:04:15 	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting

System Status	Time	Description Order/Transaction Behaviour
	<ul style="list-style-type: none"> Equity Mkt Group 4 - 10:06:30 Equity Mkt Group 5 - 10:08:45 Random +30 sec. 	<ul style="list-style-type: none"> Trade Cancellation. <p>Phase starts with an auction of overlapping orders, and then continuous matching of orders occurs.</p>
PRE_CSPA	16:00	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> Enquiry Order Entry Order Cancellation Order Amend Trade Reporting Trade Cancellation. <p>The market may overlap; there is no matching of orders.</p>
CSPA	16:10 Random +60 sec	<p>Phase starts with an auction of overlapping orders, then no trading functions allowed.</p>
ADJUST	16:12	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> Enquiry Order Cancellation Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price) Trade Reporting Trade Cancellation. <p>No matching of orders occurs.</p>
ADJUST_ON	16:42	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> Enquiry Order Cancellation Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price) Trade Reporting Trade Cancellation Commencement of overnight trading. <p>No matching of orders occurs.</p>
PURGE_ORDERS	18:50	<p>Orders meeting the purge criteria (too far from market, day only, expiry, ISS changes) are centrally inactivated. The order is then deleted from the system the following day.</p> <p>ASX Trade allows:</p> <ul style="list-style-type: none"> Enquiry Trade Cancellation.
SYSTEM_MAINTENANCE	18:59	Enquiry only.
CLOSE	19:00	Enquiry only.

9.2.2 Quote Display Board and Wholesale Interest Rate Securities and Government Loans

System Status	Time	Description Order/Transaction Behaviour
CLOSE	(Logins enabled) 02:25	Enquiry only.
OPEN_QUOTE-DISPLAY	07:00	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Entry, Cancellation and Amendment by issuers presenting indicative Bids and Offers only by permissioned users of the issuers of the quoted instrument. • Trade Reporting, representing manual matching between the issuer of the quoted instrument and counterparty. Applicable Trade Report Code detailed in ASX Trade Markets, Instrument Groups and Trade Condition Codes. • Trade Cancellation. <p>There is no continuous matching of orders in this session state.</p>
ADJUST	18:45	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Cancellation • Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price). • Only available to permissioned users. • Trade Reporting • Trade Cancellation. <p>No matching of orders occurs.</p>
PURGE_ORDERS	18:50	<p>Orders meeting the purge criteria (too far from market, day only, expiry, ISS changes) are centrally inactivated. The order is deleted from the system the following day. ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Trade Cancellation.
SYSTEM_MAINTENANCE	18:59	Enquiry only.
CLOSE	19:00	Enquiry only.

9.2.3 Index, Currency and Commodity Warrants

Index, Currency and Commodity Warrants trade within the Listed Funds, Warrants and Structured Products Market but follow a slightly different trading cycle.

System Status	Time	Description Order/Transaction Behaviour
CLOSE	(Logins enabled) 02:25	Enquiry only.
PRE_OPEN	07:00	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend

System Status	Time	Description Order/Transaction Behaviour
		<ul style="list-style-type: none"> • Trade Reporting • Trade Cancellation. <p>The markets may overlap; there is no matching of orders.</p>
OPEN	09:49:45 Random +30 sec	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. <p>Phase starts with an auction of overlapping orders then continuous matching of orders occurs.</p>
PRE_CSPA	16:00	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. <p>The market may overlap; there is no matching of orders.</p>
CSPA	16:10 Random +60 secs	<p>Phase starts with an auction of overlapping orders, then no trading functions allowed.</p>
ADJUST	16:12	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Cancellation • Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price) • Trade Reporting • Trade Cancellation. <p>No matching of orders occurs.</p>
ADJUST_ON	16:42	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Order Cancellation • Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price) • Trade Reporting • Trade Cancellation • Commencement of overnight trading. <p>No matching of orders occurs.</p>
PURGE_ORDERS	18:50	<p>Orders meeting the purge criteria (too far from market, day only, expiry, ISS changes) are centrally inactivated. The order is deleted from the system the following day. ASX Trade allows:</p> <ul style="list-style-type: none"> • Enquiry • Trade Cancellation.
SYSTEM_MAINTENANCE	18:59	<p>Enquiry only.</p>
CLOSE	19:00	<p>Enquiry only.</p>

9.2.4 Stock Derivatives

System Status	Time	Description Order/Transaction Behaviour
CLOSE	(Logins enabled) 02:25	Enquiry only.
PRE_OPEN	07:00	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. The market may overlap; there is no matching of orders.
OPEN	09:59:45 Random +30 sec	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. Phase starts with an auction of overlapping orders then continuous matching of orders occurs.
LATE_TRADING	16:20	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Cancellation • Order Amend (cannot improve position in market, e.g. cannot increase quantities or improve price) • Trade Reporting • Trade Cancellation. No matching of orders occurs.
PURGE_ORDERS	17:00	Orders meeting the purge criteria (too far from market, day only, expiry, ISS changes) are centrally inactivated. The order is deleted from the system the following day. ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Trade Cancellation.
CLOSE	19:00	Enquiry only.

9.2.5 Index Derivatives

System Status	Time	Description Order/Transaction Behaviour
CLOSE	(Logins enabled) 02:25	Enquiry only.
PRE_OPEN	07:00	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation.

System Status	Time	Description Order/Transaction Behaviour
		The markets may overlap; there is no matching of orders.
OPEN	09:49:45 Random +30 sec	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. Phase starts with an auction of overlapping orders then continuous matching of orders occurs.
PRE_NIGHT -TRADING	17:00	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. The market may overlap; there is no matching of orders.
OPEN_NIGHT -TRADING	17:29:45 Random +30 sec	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Entry • Order Cancellation • Order Amend • Trade Reporting • Trade Cancellation. Phase starts with an auction of overlapping orders then continuous matching of orders occurs.
PURGE_ORDERS	18:50	Orders meeting the purge criteria (too far from market, day only, expiry, Instrument Session States (ISS) changes) are centrally inactivated. The order is deleted from the system the following day. ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Trade Cancellation.
CLOSE	19:00	Enquiry only.

9.2.6 Other Session States

There are other session states that can be applied to individual series or to all markets. See *Appendix 1 –Session States* for more information. These are listed below.

System Status	Time	Description Order/Transaction Behaviour
SUSPEND	Any time during the trading day.	ASX Trade allows: <ul style="list-style-type: none"> • Enquiry • Order Cancellation • Trade Reporting (reporting of allowable trade reports, those that were consummated prior to the suspend session state and have previously been submitted to ASX)

System Status	Time	Description Order/Transaction Behaviour
		<p>Trading Operations as a consummated trade. ASX Trading Operations report these trades on behalf of participants)</p> <ul style="list-style-type: none"> Trade Cancellation. <p>No matching of orders occurs.</p>
PRE_NR	ASX Trading Operations may use this before a price sensitive announcement is issued.	<p>ASX Trade allows the same order functionality as the PRE_OPEN session state.</p> <p>Note that Fill and Kill orders are not allowed during TRADING_HALT.</p>
TRADING_HALT	Any time during the trading day.	<p>ASX Trade allows the same order functionality as the PRE_OPEN session state. This includes:</p> <ul style="list-style-type: none"> Enquiry Order Entry Order Cancellation Order Amend Trade Cancellation Trade Reporting (reporting of allowable trade reports that were executed before the trading suspension was imposed). <p>Note that Fill and Kill orders are not allowed during TRADING_HALT.</p>
REG_HALT	Any time during the trading day. Used to refresh (via an auction) the Extreme Trade Range (ETR) Reference Price of an instrument where an instrument's price limit threshold or recent traded prices approach or meet the ETR.	<p>ASX Trade allows the same order functionality as the PRE_OPEN session state.</p> <p>Note that Fill and Kill orders are not allowed during REG_HALT.</p>
CANCEL_ONLY	CANCEL_ONLY will only be invoked where it has been determined the market will not be re-opened for the day.	<p>ASX Trade allows:</p> <ul style="list-style-type: none"> Enquiry Order Cancellation <p>For use in market outage scenarios (see Appendix 2).</p>

9.3 All Securities Closed

All Securities Closed is indicated in each of the Equity Markets and for Interest Rate and Listed Funds, Warrants and Structured Products Markets by sending an All Securities Closed (ASC) flag (for more information, see *BI7 Information Ready Broadcast with Information Type set to 13* in *ASX Trade Broadcasts*). This is sent after the Closing Single Price Auction (CSPA).



Note:

There is an All Securities Closed Flag sent out for each of the five ASX TradeMatch Equity Markets.

9.4 Settlement Prices Available

Availability of settlement prices following the end of trading is indicated in each of the Derivative markets by sending a Settlement Prices available flag (BI7) Info Ready Broadcast with Information Type 4 – Settlement Prices Ready. See *ASX Trade Broadcasts* for more information.

9.5 Open Interest Prices Available

Open Interest prices are available on the following trading day.

10 Special Markets

When ASX Trade does not associate a corporate action (basis of quotation) code with a security, the security is deemed to be trading on a cum basis. This means that shares are being traded with the current entitlement, e.g. dividend attached and thus the buyer rather than the seller receives the relevant entitlement declared.

Participating organisations may request ASX to list a security for trading on a different basis of quotation as provided for under *ASX Operating Rules*. To facilitate this, a “special market” that trades separately and in addition to the normal market may be created for the day.

There are two circumstances in which trading in a special market is allowed. This includes:

- When there is a special market created to trade the different basis of quotation.
- A special or portfolio special crossing may be performed using a different basis of quotation. These trades are reported manually.

A change in the basis of quotation can be a result of diary events (for example, the declaration of dividend, interest and call payments), non-standard settlement (where the settlement date is not the trade date plus three business days) or for combinations of these. A special market (as a new instrument series) may be created to facilitate this and may have more than one corporate action (basis of quotation). A security may have more than one special market at any time, in addition to the normal market.

On ASX Trade, special market instrument series are created intraday giving an indication of the type of special market. For example, a special market for BHP (e.g. binary instrument series code 15.101.200.0.5080.0.0) may be created as a cum dividend security where BHP is trading normally as ex dividend. This is created with a series name BHPCD and a modifier added (e.g. binary instrument series code 15.101.200.200.5080.0.0) and will have CD as the associated corporate action codes.

Special markets are not created for a single special or a portfolio special crossing. The security’s normal market instrument series is used for these.

For special markets (whether trading with a special or normal instrument series), the corporate action codes associated with the instrument can be determined from the DQ53 Query Corporate Action (refer to *ASX Trade Queries* for more information).

The following table shows the binary code for a security traded in a normal market (both ‘cum’ and ‘ex’ dividend) and in a special market (‘cum’ in an ‘ex dividend’ market).

Type of Market	Trading Code	Binary Code	Corp Act
Normal (cum-dividend)	BHP	15.101.200.0.5080.0.0	None, deemed to be trading on a cum basis.
Normal (ex-dividend)	BHP	15.101.200.0.5080.0.0	XD
Special (cum in an ex-dividend market)	BHPCD	15.101.200.200.5080.0.0	CD



Note:

ASX Trading Operations current practice is to use a modifier of 200 or greater to indicate that the series is a special market.

The special market series and normal market series volume and value figures are sent separately via the OI.

Example: BHP’s volume is 1,000,000 units and BHPCD’s volume is 500,000 units. The total volume for BHP for the trading day can be calculated to give 1,500,000 units.

The price for a special market is likely to deviate from the normal market prices. Care must be taken when using and reporting special market prices. The special market series are sent using the BU124 Delta Series Update broadcast (refer to *BU124, Delta Instrument Series Update* in *ASX Trade Broadcasts* for more information), or is retrieved using the DQ124 Delta Instrument Series query (refer to *DQ124 - Delta Instrument Series* in *ASX Trade Queries*).



Note:

During the PURGE_ORDERS session state the orders for all special market series are purged as the series is placed into SUSPEND. It is kept in this state for the following business day (unless its use is requested again), then delisted on the next business day.

11 Corporate Actions

The following table provides a list of the possible corporate action codes and status notes that exist in ASX Trade.

Status Note Indication	Description	Type
CB	Cum Bonus	Basis of quotation
CC	Cum Capital Return	Basis of quotation
CD	Cum Dividend Stock	Basis of quotation
CE	Cum Entitlement	Basis of quotation
CF	Cum Takeover Offer	Basis of quotation
CI	Cum Interest	Basis of quotation
CL	Call Due	Basis of quotation
CP	Call Paid	Basis of quotation
CQ	Cum Equal Access Buyback	Basis of quotation
CR	Cum Rights	Basis of quotation
CT	Conditional Trading	Basis of quotation
CZ	Cum Priority	Basis of quotation
IN	Interest Only	Status note
NL	Notice Late	Status note
NR	Notice Received	Status note
NS	Under Offer of Takeover	Status note
NX	New Ex Interest	Basis of quotation
PA	Protection Available	Basis of quotation
PU	Protection Unavailable	Basis of quotation
RA	Receiver Appointed	Basis of quotation
RC	Rollover Complete	Status note
RD	Currently Under Reconstruction	Status note
RE	Reconstructed	Basis of quotation
RP	Rollover Pending	Status note
S1	1 Tenth of a Price Step	Status note
SC	Special Condition	Status note
SD	Special Distribution	Status note
SH	Covered Short Selling Prohibited	Status note
UA	Under Adjustment	Status note
XB	Ex Bonus Issue	Basis of quotation
XC	Ex Return of Capital	Basis of quotation
XD	Ex Dividend	Basis of quotation
XE	Ex Entitlement	Basis of quotation
XF	Ex Takeover Offer	Basis of quotation
XI	Ex Interest	Basis of quotation
XQ	Ex Equal Access Buyback	Basis of quotation
XR	Ex Rights Issues	Basis of quotation
XZ	Ex Priority	Basis of quotation

12 Exchange Traded Funds

An ETF is a listed security that is based on the performance of an established index or predetermined basket of securities. An index-linked ETF provides exposure to an index or basket but trades like a single security.

ETFs trade in the Listed Funds, Warrants and Structured Products market. An underlying price feed is provided for each ETF. This price feed represents the EIN Asset Value of the basket of securities, and is updated approximately every 30 seconds during on-market trading.

Values for the EINs are disseminated using the BD2 broadcast (refer to *BD2 Edited Price Information* in *ASX Trade Broadcasts*).

12.1 ETF and EIN Structure under ASX Trade

EINs can be identified because they belong to the specific instrument Type – DEIN (Market: INDX(110), Group EIN(210)) and their Trading Code contains the Trading Code of the associated ETF, prefixed with a “Y”.

To illustrate the EFT and EIN instrument setup, StreetTracks S&P/ASX 50 Fund has been provided as an example below.

EIN		ETF	
Trading Code	Binary Code	Trading Code	Binary Code
YSFY	15.110.210.0.35027.0.0	SFY	15.50.207.0.42011.0.0

	EIN		ETF	
Exchange	ASX	15	ASX	15
Market	INDX	110	WAR	50
Group	EIN	210	ETF	207
Underlying/Commodity	YSFY	35027	SFY	42011

13 Price Units

ASX Trade uses Price Tick Tables to define the allowable price steps that can be entered for an order. These tables define the minimum and maximum prices, the valid price steps and number of decimal places in the price.

Price Tick Tables are assigned to each instrument class. Instrument series defined under an instrument class inherit the Price Tick Table from the class.

It is important to note that all the price fields relating to the instrument series assume the number of decimals defined in the instrument class' Price Tick Table. The instrument class also indicates the trading currency unit which indicates whether the instrument is trading in dollars or cents (for Australian currency).

For example, the equity instrument series BHP has an instrument class of BHPQ1EQ and this has the following Price Tick Table.

Decimals 1

StepSize	LowerLim	UpperLim
0.1	0.1	10.0
0.5	10.5	199.5
1.0	200.0	21,474,836

This means that for all instrument series belonging to instrument class BHPQ1EQ:

- The allowable price range is 0.1 cents to 21,474,836 cents (\$214,748.36)
- For prices between 0.1 cents and 10.0 cents inclusive, the valid price step increment is 0.1 cent
- For prices between 10.5 cents and 199.5 cents inclusive, the valid price step increment is 0.5 cent.
- For prices between 200.0 cents and 21,474,836 cents inclusive, the valid price step increment is 1.0 cent.
- All prices for instrument series that use this Price Tick Table have one decimal place in them. For an instrument class with a price unit of "Price" or "Price, Dirty" (price_unit_premium_c = 1 or 9), a currency of AUS (base_cur_s = AUS) and a traded currency unit of "cents" (trd_cur_unit_c = 2), an order entered with a value of 1200 in the premium_i field means entering an order with a price of 120.0 cents or \$1.20.

For an index derivative series with a price unit of "Points" (price_unit_premium_c = 3), currency of AUS (base_cur_s = AUS) and a traded currency unit of "primary" (trd_cur_unit_c = 1), an order entered with a value of 1200 in the premium_i field means entering an order with a price of 120.0 points.



Note:

Prices for some security types (for example, combinations) can be negative or zero and this is reflected in the appropriate Price Tick Tables on these instrument classes.

The Price Tick Tables are downloaded as part of the instrument class information in the response to the DQ122 Delta Instrument Class in variable information structure 37102 (refer to *ASX Trade Queries* for more information).



Note:

Applications should use the Price Tick Table values returned from the DQ122 Delta Instrument Class query, not the ones listed in the examples above, as they may change.

14 Combination Trading

ASX Trade provides the following mechanisms for trading strategies where multiple series can be bought and/or sold on a contingent or package basis for a net price. This includes:

- Tailor Made Combinations (TMC)
- Standard Combinations.

ASX Operating Rules define which combination trading functionality must be used to transact a particular combination strategy with the underlying principle being that the same strategy may only be traded in the one order book as one type of combination, e.g. either as a TMC or Standard Combination.

14.1 Tailor Made Combinations

TMC functionality provides the primary combination trading mechanism. TMCs allow for the entry and continuous integrated matching of combination orders with other single series orders and/or other combination orders involving the same components for the specified net price. As part of the integrated matching process, ASX Trade continuously monitors the individual components of a TMC. Where possible in terms of ensuring simultaneous execution of a TMC order, ASX Trade automatically generates derived or bait orders for the component single series on behalf of a TMC order. The price and quantity of derived/bait orders are automatically adjusted in response to changes in opposing orders for the component series to ensure that at all times simultaneous execution of a TMC order. Where a derived/bait order is traded against ASX Trade simultaneously, it executes the other component orders thereby satisfying the TMC order and amends the quantity of the TMC order accordingly.

TMC functionality offers traders the flexibility to define the legs or component series of a combination at the time of placing a combination order. Subject to satisfying Market Rules such as being a prescribed strategy, TMCs are permitted to have a maximum number of four components on a 4:1 ratio. The limit price on the order is to be set to the net price limit with zero and negative prices permitted.

The contract size/price quotation factor for each component series must be the same except for TMCs involving equity and derivative series where the contract size/price quotation factor for the equity series is implied by ASX Trade as being equal to the derivative component series.

TMCs can be defined or created using the DC3 transaction (see *DC3 Add Tailor Made Combination* in *ASX Trade Transactions* for more information). Once defined, ASX Trade issues a broadcast indicating that a new TMC series has been added and provides key details for each component (see *BU126 Combination Series Update* in *ASX Trade Broadcasts* for more information). Each TMC is identified by a unique trading code, e.g. TMC_ANZ_D_001, automatically assigned for a trading day. All orders for the same strategy must be entered under the same TMC trading code while it remains active.

After a TMC has been created, trading participants can then use the normal order entry transactions (see *MO1 Order Entry*, *MO3 Alteration* and *MO4 Order Deletion* in *ASX Trade Transactions* for more information).



Note:

Combinations do not support all of the single series order functionality. For example, iceberg orders and Centre Point orders are not supported.

When a TMC order is matched, ASX Trade automatically assigns individual prices to each component trade that together match the net traded price of the combination. The details for each component trade are disseminated as single series trades in the usual way but with a specific deal source code and/or condition code indicating a combination trade. The resulting trades for an equity leg of an equity/derivative TMC are multiplied with the multiplication factor (i.e. implied multiplier) determined by the contract size/price quotation factor of the other derivative components or legs.

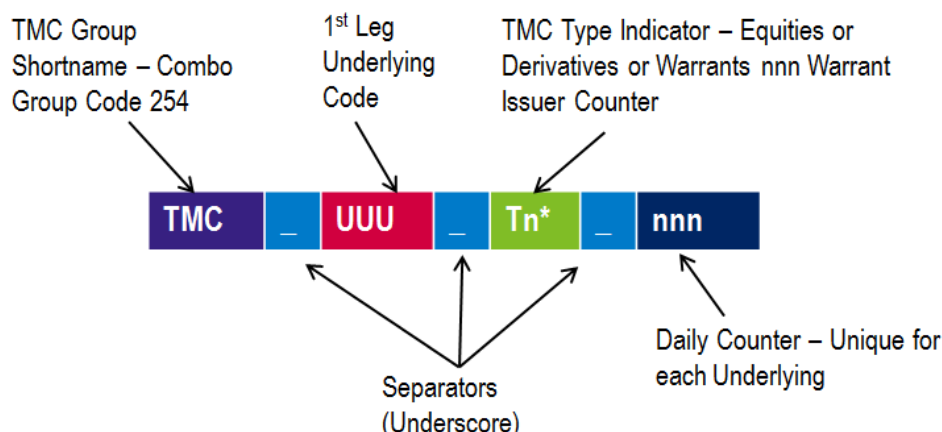


Note:

The equity leg of an equity/derivative combination trade is disseminated in the same CB15 and CB16 trade broadcast as the first derivative leg.

14.1.1 TMC Naming Conventions

The following naming conventions are used for naming TMCs.



14.2 TMC Programming Guidelines

ASX Trade directly enforces a number of the key Market Rules and Procedures relating to combination trading with the onus on trading participants to ensure that they adhere to remaining requirements. For example, the ratio requirements are enforced by ASX Trade and under normal trading circumstances; ASX Trade blocks the creation of TMCs where the strategy has already been defined as a Standard Combination.

Furthermore, in providing the flexibility for traders to create the combination, the number of possible TMCs increases exponentially with the number of individual series listed. This places technical constraints on the total number that can be entered into ASX Trade. A number of circuit breakers have been built into ASX Trade to prevent an excessive number of TMCs being created and to manage the load associated with the integrated matching process. Trading participants need to be aware that the functionality relies heavily on them acting responsibly and in the interests of the market as a whole. For this reason, participants are required to ensure that TMCs are only created at the time of placing a TMC order, and that they do not create an unnecessary number of TMCs.

The Market Rules and Procedures provide guidelines on how many TMCs can be created. This allows ASX to take action if an excessive number of combinations are created and/or a mistake is made when creating/defining the combination. The rules also define whether a particular combination strategy can be traded in either the central order book as a TMC, or whether other combination trading functionality must be used. The underlying principle is that the same strategy may only be traded in the one order book. If a particular strategy has been prescribed as a TMC, then all orders for this specific combination may only be entered and traded as a TMC in the trading order book under the unique TMC trading code.

The following TMC rules must be taken into consideration:

- When a TMC is created, the “operation if Buy/Sell” for the TMC relative to each leg must be correctly defined according to market convention. For the majority of allowable strategies, this involves defining the Buy/Sell actions for each component. This includes:
 - On the Buy/Bid side, a Bid/Buy order for the combination involves paying money
 - On the Ask/Sell side, an Ask/Sell order for the combination involves receiving money.

- In cases where the market bid/ask spread for a combination/strategy is around zero, the market convention is not clear cut. Therefore participants must be able to exercise judgment in deciding whether it is more appropriate to define the combination order on the Buy/Bid side or Sell/Ask side. This is because bidding a negative net price has the same result as offering a positive net price and vice versa.

TMC orders are sent to ASX Trade under the unique TMC identifier provided by the BU126 broadcast as a total quantity and at a net price for the package. They are not sent as a total quantity times a ratio for each leg. This means that the OI user must listen to each BU126 broadcast to obtain the unique TMC identifier, together with the individual component/leg details, their ratio relationship and “Operation if Buy/Sell” for each leg.

Once a TMC has been created, orders can be entered in a similar way to single series and Standard Combinations with the main difference being that the unique TMC trading code is not available until a trader has created a particular TMC.



Note:

ASX Trading Operations may at any time remove previously created TMCs, and in this event, a BU126 broadcast is sent. This possibility must be catered for.

When creating/defining a TMC, the ratio between each leg must be reduced to the lowest common denominator before sending the create transaction.

For example:

- 20 of series A
- 40 of series B
- for Qty 1

must be reduced to:

- 1 of series A
- 2 of series B
- for Qty 20.

The ratios between any of the legs cannot exceed that specified in the procedures, presently 4:1. For example, a combination of three legs, with ratios between the legs of 9:5:3 is allowed, while a combination with ratios 9:5:2 is not allowed, as the ratio 9:2 is greater than the ratio of 4:1.

The maximum value of the ratio against any series cannot exceed the parameter specified in the procedures, presently 100. For example, a ratio of 300 of Series A to 299 of Series B is not allowed even though it is within the maximum allowable absolute ratio of 4:1.

The TMC creation and order entry transactions must be linked into the one function to ensure TMCs are only created for the purpose of entering an order and that the correct “Buy/Sell operation” is defined. While automated TMC order entry is permitted, the creation process is not to be automated.

As the implied multiplier of an equity/derivative is applied to an equity series for TMCs, it is recommended that OI applications implement a visual notification in the GUI. This is to show the correct implied multiplier for equity/derivative TMCs.

14.3 Example

In this example, buy 1 series A and sell 1 series B for quantity 10, at net price 25 cents debit (i.e. paying).

As buying A and selling B involves paying net 25 cents, the TMC should be created with “Operation if Buy” set as “Buy” (op_if_buy_c = B) for series A and set as “Sell” for series B (op_if_buy_c = S). The “Operation if Sell” would be the inverse for each leg. This means a “Bid/Buy” order for the TMC would result in buying 1 series A and selling 1 series B.

An “Ask/Sell” order for the TMC would result in selling 1 series A and buying 1 series B, multiplied by the total quantity and the net price specified for the combination.

As with all other combinations, a zero or negative net price for a TMC is permitted. The meaning of positive and negative net prices depends on whether a TMC order is entered as a Bid/Buy or Ask/Sell. For example, a Bid/Buy for a TMC involving a negative net price results in Receiving/Credit while an Ask/Sell involving a negative net price results in Paying/Debit.

14.4 Standard Combinations

Standard Combinations are created by ASX Trade for each trading day. Standard Combinations are limited to representing some of the more commonly traded derivative strategies, known as price spread, time spread, synthetics, straddles and strangles. ASX Trade automatically creates Standard Combinations overnight for each of these strategies. It covers a limited component series based on a number of predefined parameters such as maturity, number of strikes around the money, and interval between strike prices. Standard Combinations are only available for a limited range of strategies in selected underlying classes.



Note:

In ASX Trade, Standard Combinations are currently not used.

Standard Combination functionality is integrated with TMCs. Where a strategy is designated as a Standard Combination, ASX Trade prevents it from being duplicated as a TMC. Standard Combination orders may be submitted and matched in the central order book in the same way as TMCs. When entering a Standard Combination order, the unique combination series code, net price and number of units for the package must be specified in the same way as a TMC. In addition to matching orders directly in the central order book under the specifically assigned Standard Combination code, ASX Trade continues to attempt to trade the Standard Combination against orders for the specific components including the generation of derived/bait orders.

When a Standard Combination order is matched, ASX Trade automatically assigns individual prices to each component trade that together match the net traded price of the combination. The details for each component trade are disseminated as single series trades in the usual way, but with a specific deal source code and/or condition code indicating a combination trade.

14.5 Optimised Bait Generation

Bait generation was optimised with the ASX Trade Refresh upgrade of the platform. The new algorithm is more efficient as it performs fewer bait re-calculations and maintains time priority for baits from different combination order books.

The algorithm monitors changes in order books connected through a combination.

If the best bid and/or offer prices have changed in base order book, the side affected by bait calculation will have all baits re-calculated. The re-calculation will result in that a new timestamp is given for any bait which has been updated.

If the quantity has increased in the base order book, only the last bait in the bait order book referencing the base order book is checked for the side affected by bait calculation and can receive more quantity, if it doesn't already have the maximum relative to the quantity of the combination order. Combination orders not having baits due to that the quantity from the base order book was already used are also considered for being able to generate baits.

If the quantity has decreased in the base order book, all baits for the affected side in the bait order book referencing the base order book are reduced and/or cancelled in reverse priority order.

When all baits have been re-calculated for a bait order book it is checked if the order book is locked or crossed and if matching can occur.

Trade Reporting

Generally electronically matched trades update open, high, low and last price statistics as well as trade volume and value totals.

Trades must be manually reported on ASX Trade to reflect trading that has occurred outside of the normal automated matching process. Reported trades generally do not update the open, high, low, or last price statistics. Only Accounting Trade Reports do not update trade volume and value totals. Refer to *Trade Report Types* below for more information.

To create a trade report:

1. Select the required reporting transaction.

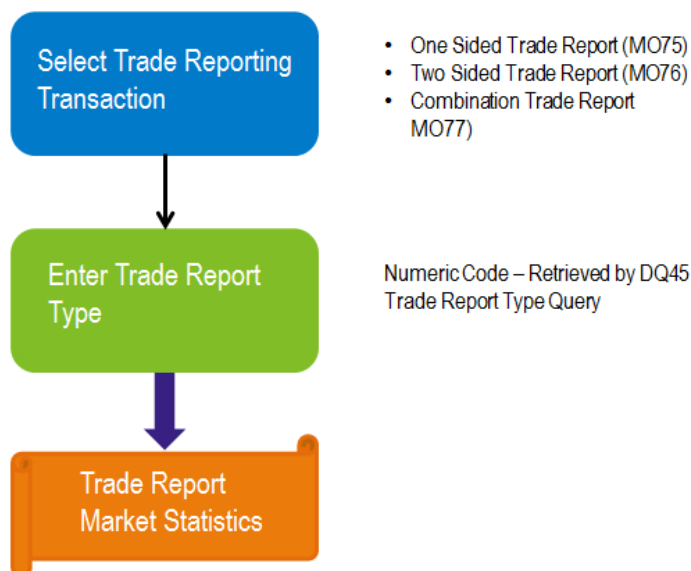
ASX Trade provides three types of transactions for reporting trades. This includes:

- One Sided Trade Report (MO75) – Used to report a trade between two different participants.
- Two Sided Trade Report (MO76) – Used to report crossing trades, including Special Crossings and Facilitated Specified Size Block Special Crossings. See below for more details.
- Combination Trade Report (MO77) - Used for reporting component single series trades of a combination in a single transaction.

Trade Reports may also be effected by ASX on behalf of a Trading Participant e.g. Options Exercises, Trade correction/rebookings.

2. Enter the Trade Report Type.

In order to create a trade report, the Trade Report Type (ext_t_state_c) must be entered.



Note:

ASX Trading Operations can also report trades on behalf of participants, for example for re-bookings and reporting of exercised options. The equivalent transactions by ASX Trading Operations are MO331 (equivalent of MO75), MO332 (equivalent of MO76) and MO333 (equivalent of MO77).

14.6 Selecting the Trade Reporting Transaction

14.6.1 The One Sided Trade Report (MO75)

The One Side Trade Report (MO75) is used to report trades between two different participants. Each party to the trade must enter the details for their side of the trade, and the trade is reported to the market once ASX Trade receives the reports from each side.

Two reported sides are considered to belong to the same trade if:

- The transaction type is equal
- The series is equal
- The quantity is equal
- The price is equal
- The Trade Report Type is equal
- The As Of date is equal
- The Settlement date is equal
- The Basis of Quotation is equal
- The extended price is equal
- One is a buy and the other is a sell
- Both have the other participant as its counterpart.

The full sequence for a One Sided Trade Report is:

1. Participant A submits a one-sided trade report (MO75) with participant B as the declared counterparty.
2. A directed Firm Order Book broadcast (BO5) is sent to participant A. The BO5 shows all details of the unmatched trade report.
3. Participant B submits a one-sided trade report (MO75) with participant A as the declared counterparty. A trade is created when the two trade reports match.
4. A relevant BO5 message is sent to both parties to indicate that the original trade reports are matched and a trade is created.
5. Each participant receives a CB15 Directed Trade broadcast for their side of the trade.
6. A CB16 is disseminated to inform the market about the trade.

14.6.2 The Two Sided Trade Report (MO76)

There are two different uses of the MO76 Two Sided Trade Report. This includes the ability to report trades between a trading participant and their client, or between clients of the same trading participant (a Crossing Trade Report). This includes NBBO Crossing Trade Reporting, Block Special Crossing Trade Reporting and Facilitated Specified Size Block Special Crossing (FSSBSC) Trade Reporting.

Crossing Trade Reporting

The full sequence for Crossing Trade Reporting is:

1. Participant A submits a two sided trade report (MO76) with themselves as the declared counterparty. A trade is created.
2. One directed Firm Order Book broadcast (BO5) and two directed Trade broadcasts (CB15) are sent to the participant showing relevant information of the trade report. All fields of the submitted trade report are available in these BO5 and CB15s.
3. A CB16 is disseminated to inform the market about the trade.

National Best Bid and Offer Crossing

When receiving a trade report relying on the Trades with Price Improvement exception under Part 4.2.3 of the ASIC Market Integrity Rules (Competition in Exchange Markets - a NX (NBBO) Crossing Trade Report), ASX as a Market Operator must validate against its own calculation of the consolidated best available bid. It must offer data across all pre-trade transparent markets that at the time the trade is received the price is:

Higher than the best available bid or lower than the best available offer by one or more price steps; or

At the best midpoint.

Where the trade is outside the points above, ASX will reject the transaction and inform the participant in real-time that the trade report has not been accepted for reporting purposes.

If the NBBO is crossed, ASX will also reject attempts to report an NX (NBBO) Crossing.

The trade report code (condition code) – NX is provided to allow for NBBO crossings at on-tick prices that are better than the National Best Bid and Offer (NBBO) or at the NBBO mid-point to be reported using the Two Sided Trade Report Transaction (MO76).

The NBBO takes into consideration the BBO from ASX TradeMatch and any external market operator. As a result, for instruments only traded in ASX TradeMatch, the NBBO will equal ASX TradeMatch BBO.

Under the ASIC Market Integrity Rules (Competition in Exchange Markets) the obligation is on participants to ensure that, at the time an NX (NBBO) Crossing was executed, the agreed price was in accordance with MIR Part 4.2.3 Exception – Trades with Price Improvement. While the ASX Trade validation is aimed at facilitating the reporting of valid trade reports only, due to latency and complexities in compiling consolidated bid/offer data there may be instances where the best available bid and offer may have moved between the times when the off-market trade was executed and when it was reported to ASX or, different prices were determined by ASX and a participant. Therefore participants should not rely on ASX Trade validation to satisfy their obligations under MIR 4.2.3.

Facilitated Specified Size Block Special Crossing Trade Reporting

FSSBSC Trade Reporting are Block Special Crossings in Cash Market Products that involve a Principal position and a client position and meet minimum size requirements (specified size). The reporting of Special Crossings that meet the FSSBSC criteria are allowed to be delayed.

Initial Trade Notifications are displayed to ASX and all users of the reporting participant only.

Initial Trade Notifications do not update official prices or daily trade statistics; that is, they do not update open, high, low, last or closing prices, number of trades, volume or value traded. However, once the FSSBSC has been reported to the market, it is treated like any other Special Crossing where official prices such as open, high, low, last or closing prices are not updated but the daily trade statistics including the number of trades, volume and value traded are updated.

There are two steps in the process of delayed dissemination. This includes:

1. Submit a trade report denoted as 'Initial' – Initial Trade Reporting.
2. When doing this, the reporting participant and ASX Trading Operations are informed that a trade has taken place. Other users are informed with a CB16 message but the quantity and the price are set to zero.
3. Report the delayed trade (the "real trade") - Delayed Trade Reporting.
4. This delayed trade, including the actual price and quantity, is disseminated to all users.



Note:

Delayed dissemination is only allowed for a two-sided trade report, and where the selling and buying participant are the same.

Initial Trade Reporting

The following sequence of events takes place:

- Trades can be specified as an initial report by using the applicable Trade Report Type from the table below and setting the `initial_trd_report_c` field to "True" in the `asx_exchange_info_t` structure of the MO76 Two-Sided Trade Report.
- Upon receipt of an initial trade report, ASX Trade validates that the trade meets the FSSBSC Market Rule requirements.
- One directed Firm Order Book broadcast (BO5) and two directed Trade broadcasts (CB15) are sent to the reporting participant showing all details of the trade report. The initial trade is kept in ASX Trade and marked as a "Pending Trade".
- All users are sent a placeholder trade using the CB16 Trade Broadcast. This broadcast contains the series, price and quantity of zero, the order number and the Trade Slip Number (TSN).



Note:

The trader or ASX Trading Operations may cancel the initial trade using the CC87 Initial Trade Report Cancellation transaction. When cancelling the initial trade, the TSN is required.

The initial trade does not update any trade statistics, such as open, high, low, last, volume or value information, nor will it be sent through to the clearing system.

- Pending Initial Trade Notifications that have not yet been finalised can be retrieved using the CQ114 query.

Delayed Trade Reporting

Reporting the delayed trade may take place on the same day if convenient or otherwise by no later than the time specified under the market rules on the first trading day after the initial trade was reported. The following sequence of events takes place:

- By the required time, the user must confirm the trade and report it to the market using the CC86 Delayed Trade Report Entry transaction. The user cannot change any attributes of the pending trade. This releases the pending trade and creates the real trade, which gets a new TSN.
- The released pending trade is disseminated via a CB16 Trade broadcast showing only series, order number, and TSN of the initial trade report. The released pending trade is marked as "reversed" (i.e. cancelled).



Note:

No BO5 broadcast is sent to the participant entering the delayed reporting trade, but two CB15 directed trade broadcasts are sent.

- A public trade (CB16) is disseminated with the public details of the delayed report.



Note:

If the trader has not reported the delayed report within the specified time, the system automatically creates the delayed report, triggering the rest of the steps. A system-wide parameter toggles the automatic reporting at the cut-off time.

14.6.3 The Combination Trade Report (MO77)

The Combination Trade Report is used for reporting trades in a combination (i.e. used for reporting component single series trades of a combination in a single transaction).

Currently only Crossing Combination Trade Reports are permitted to be reported by external trading users (i.e. where the same trading participant is both the buyer and seller for each component), while ASX Trading Operations may also report a Combination Trade between different participants for rebooking purposes.

14.7 Trade Report Types

When submitting trade reports, a Trade Report Type (numeric code) must be specified. Allowable Trade Report Types can be retrieved using the DQ45 Trade Report Type Query (see *DQ45 Trade Report Types* in *ASX Trade Queries*). The numeric code is listed in the ext_t_state_c field and the name of the associated trade report class that is assigned to applicable instruments in the trc_id_s field.

Codes that have an associated accounting trade report type (indicated by a tick in the table) do **not** update the series' totals for trades, volume or value as well as not updating the price statistics. Note that in the CB16 Trade broadcast, the price, quantity and ext_t_state_c fields are set to zero for these types of trades, as they act as placeholder trades for the relevant user. The details of those fields can only be filled in by the participant of the trade finding the information in the associated BO5 and CB15 broadcasts.

The current list of available Trade Report Types is listed below.

Trade Report Type	Code	Description	Accounting Trade Report Type
BK	40	Buy Back	
BP	41	Booking Purposes	✓
CX	90	Centre Point Trade Report	
DR	43	Directed Reporting	
EC	44	Exercise Call	
EP	45	Exercise Put	
EQ	30	Equity/Option Combination	
ET	46	ETF Special Trade	
FD	47	Forward Delivery	
GL	52	Non-Scr Traded Govt Instrument	
L1	13	Late Trade Report – Reason Code A	
L2	14	Late Trade Report – Reason Code B	
L3	15	Late Trade Report – Reason Code C	
L4	16	Late Trade Report – Reason Code D	
L5	17	Late Trade Report – Reason Code E	
LN	50	Loan	✓
LR	51	Loan Return	✓
LT	4	Late Trade Derivative Market Products Cash Market Products post 16:42	
LTCT	33	Late Combination Trade	
NORM	0	Normal Trade Used by ASX Trading Operations for re-bookings.	
NX	100	NBBO Crossing Trade report	
OC	35	OTC Contingent Equity Trade	
OR	54	Foreign to Foreign	
OS	5	Overseas Trade	
P1	66	Put-Through Special Crossing (\$1.0m)	
P2	67	Put-Through Special Crossing (\$0.5m) This is no longer used	
QB	70	Quote Display Board Trade Report	
S1	10	Special Crossing Tier 1 Equity Market products	
S2	11	Special Crossing Tier 2 Equity Market products	

S3	12	Special Crossing Tier 3 Equity market Products and all other Cash market products
SP	3	Special Crossing (Derivative Market Products Only) - same broker
SPCT	9	Special Combo, Contingent
ST	58	Price Stabilisation
STL1	61	Price Stab Late Trade – Reason Code A
STL2	62	Price Stab Late Trade – Reason Code B
STL3	63	Price Stab Late Trade – Reason Code C
STL4	64	Price Stab Late Trade – Reason Code D
STL5	65	Price Stab Late Trade – Reason Code E
STLT	59	Price Stabilisation Late Trade
SX	60	Portfolio Special Crossing
TM	31	Tailor Made Combination
WH	53	Non-Scr Traded Wholesale Instr.
XT	2	Crossing (Normal) Trade
XTTM	32	Tailor Made Combination Crossing

14.8 Trade Source

When releasing trade information, the OI provides the user with an indication of the source of the trade. Each side of a trade is assigned a value known as the trade source that reflects how the trade occurred. For example:

- Automatic continuous matching in the order book
- Automatic matching as a result of an auction in the order book
- A Trade Report reported directly to ASX Trade.

In the message definitions this can be found in the deal_source_c field for the buy and sell side. The field contains a numeric code that signifies how the trade took place.

The following table provides a list of all the possible trade source codes in ASX Trade.

Code	Description
0	Disseminated in the CB16 Public Trade Broadcast for transactions matched outside the exchange to indicate a placeholder trade. This is an “accounting” type trade report as per the table in <i>Trade Report Types</i> , an Initial Trade Report Notification or a booked transaction resulting from Unintentional Crossing Prevention.
1	Matched by system automatically.
3	Matched outside exchange, different brokers, trade report.
5	Matched outside exchange, one broker, trade report, crossing.
7	Standard Combination order matched against another combination order or against a single order by the exchange electronically.
20	Trade matched in an auction.
36	TMC order matched against another combination order or against a single order by the exchange electronically.
43	Combination order matched against outright legs.
44	Booked transaction, resulting from Unintentional Crossing Prevention.
45	Booked transaction, resulting from Unintentional Crossing Prevention during an auction.
46	Centre Point Preference Matching.
47	Executions in Centre Point.
48	Booked transaction in Centre Point, resulting from Unintentional Crossing Prevention.

50	Centre Point Any Price Block Trade.
51	Preference Centre Point Any Price Block Trade.

14.9 Updating Market Statistics

Condition codes for trades are determined by the combined values of the deal_source_c, trade_condition_n, ext_t_state_c and excl_order_type_n fields in the CB15 and CB16 broadcasts.

The condition code is calculated and disseminated on ASX ReferencePoint/Signals.

The way in which a trade is matched together with its condition code (if applicable) determines how market statistics are updated (Open, High, Low, Last, Trade Volume and Trade Value). This information is disseminated over the BD2 Edited Price Info broadcast and the response to the IQ18/19 query.

See [ASX Trade Markets, Instrument Groups and Trade Condition Codes](#) for details of the values for each relevant field. It shows how values are translated to ASX Signal values and how market statistics are updated.

16 Reconstructions

The following applies for reconstructions on ASX Trade:

- For equities and interest rate securities, the Trading Code (series identifier) does **not** change during the period of the reconstruction. In other words, XYZ does not change to XYZDA (the reconstructed code), but will remain XYZ throughout.
- The instrument series query DQ124 provides both the Trading Code (XYZ) and the reconstructed code (XYZDA) for each security. Therefore when downloading XYZ, XYZDA can be easily extracted and displayed (refer to *Mapping from Trading Code to ASX Code* below).
- XYZ displays an 'RE' Basis of Quotation throughout the period of reconstruction and for 12 months afterwards.
- In addition a Status Note 'RD' (reconstructed) is added to XYZ during the period of reconstruction to further signify that the security is under reconstruction.



Note:

Where the underlying equity is under reconstruction, any warrants over the equity can change their Trading Code (e.g. XYZWMA to XYZDMA). Since the warrant is a financial product of the issuer, there is no fixed rule regarding this. The issuer can decide not to issue a warrant over the deferred settlement equity. ASX considers each case as per the instructions of the issuer.

ASX internal systems that take data from ASX Trade, translate orders and trades in XYZ to XYZDA for CHES and ReferencePoint/Signals. Signal E disseminate security details and corporate actions for XYZDA. The ASX website displays XYZDA, and CHES processes and disseminates XYZDA.

Participants should consider which code to display or utilise in their systems. This depends on a number of factors including the function of the system, the system users, and any interfacing systems. Participants also need to consider what codes are displayed to users of Automated Order Processing (AOP) or Automated Client Order Processing (ACOP) systems, especially having regard to the reduction of pricing errors in the days immediately following the reconstruction.

17 Mapping from Trading Code to ASX Code

In the examples given below, users should note that ASX Code is provided in square brackets in the series description field (long_ins_id_s) of the response to the DQ124 Instrument Series query. This is part of the daily securities download which all users are required to execute in order to be able to map the series binary code to the Trading Code and ASX Code.

17.1.1 Reconstructions

A hypothetical example is given below.

Instrument	Example Binary Code	Trading Code	Description
XYZ under reconstruction	15.105.200.0.11.0.0	XYZ	XYZ Co DEF SET [XYZDA]

This can be used to derive a mapping table using the code within the []:

ASX Code	Example Binary Code	Trading Code	Description
XYZDA	15.105.200.0.11.0.0	XYZ	XYZ Co DEF SET [XYZDA]

17.1.2 Special Markets

The Trading Code of a Special Market security incorporates the Special Market Basis of Quotation, which is not part of the ASX Code. For example, XYZ trading Cum Dividend (CD) special market currently would have a Trading Code of XYZCD, but an ASX Code of XYZ (refer to *Special Markets*). Similarly XYZ trading Cum Dividend (CD) and Cum Bonus (CB) special market would also have a Trading Code of XYZCD but an ASX Code of XYZ.

A hypothetical example is given below.

Instrument	Example Binary Code	Trading Code	Description
XYZ CD Special Market	15.105.200.200.11.0.0	XYZCD with a corporate action of CD.	XYZ Co FPO SPECIAL [XYZ]
XYZ CD and CB Special Market	15.105.200.201.11.0.0	XYZCDCB or XYZCBCD with two corporate actions of CD and CB.	XYZ Co FPO SPECIAL [XYZ]

This can be used to derive a mapping table using the code within the []:

ASX Code	Example Binary Code	Trading Code	Description
XYZ	15.105.200.200.11.0.0	XYZCD with a corporate. action of CD	XYZ Co FPO SPECIAL [XYZ]
XYZ	15.105.200.201.11.0.0	XYZCDCB or XYZCBCD with 2 corporate. actions of CD and CB	XYZ Co FPO SPECIAL [XYZ]

17.1.3 Exchange Traded Options

Exchange Traded Options have a maximum 32 character Trading Code and a six character ASX Code.

A hypothetical example:

Instrument	Example Binary Code	Trading Code	Description
XYZ ETO	15.2.6.0.11.1320.1050	XYZ14DEC1050C.PK9	DEC-14 CALL OPT 1050 [XYZPK9]

This can be used to derive a mapping table using the code within the []:

ASX Code	Example Binary Code	Trading Code	Description
XYZPK9	15.2.6.0.11.1320.1050	XYZ14DEC1050C.PK9	DEC-14 CALL OPT 1050 [XYZPK9]



Note:

An ASX code for an Exchange Traded Option can never have a clearing code of “DA” or “CD”. Therefore users should never see an ASX Code for an option of XYZDA or XYZCD or a corresponding trading code of XYZ14DEC1050C.DA or XYZ14DEC1050C.CD.

17.1.4 Exchange Traded Futures

Exchange Traded Futures have a maximum 32 character Trading Code and a five character ASX Code where the fourth character indicates the year and the fifth character the month.

A hypothetical example:

Instrument	Example Binary Code	Trading Code	Description
XYZ Future	15.1.4.0.11.13202.0	XYZ14DECF.4Z	XYZ FUT DEC-14 [XYZ4Z]

This can be used to derive a mapping table using the code within the [].

ASX Code	Example Binary Code	Trading Code	Description
XYZ4Z	15.1.4.0.11.13202.0	XYZ14DECF.4Z	XYZ FUT DEC-14 [XYZ4Z]



Note:

An ASX code for an Exchange Traded Future can never have a clearing code of “DA” or “CD”. Therefore users should never see an ASX Code for a future of XYZDA or XYZCD or corresponding trading code of XYZ14DECF.DA or XYZ14DECF.CD.

17.1.5 Modifiers in Warrants

When a warrant is modified, several changes may occur. Firstly the Trading Code may change. If the modified warrant does not have a suffix, one is added. The convention used is the addition of “.N” where “N” is a number between one and 99. The number is incremented every time a change is made. For instance, if XYZWMA was to be modified, then the Trading Code would change to XYZWMA.1. If it was to be modified again, the Trading Code would become XYZWMA.2, and so on until XYZWMA.99. If there was to be a further modification after “.99”, the suffix is removed altogether, making the Trading Code XYZWMA, and the whole process started again. However, in each adjustment the ASX Code remains the same. In the above example it would be XYZWMA.



Note:

For an adjusted warrant, the modifier on the binary series code changes only if required. The binary series modifier does **not** need to change if the warrant's strike price or expiry date is being adjusted. In that case, the actual binary series code remains unique. Where either the strike price or the expiry date is not adjusted, the modifier needs to change and the lowest available number is used. This means that more often than not, the binary series modifier is not the same number as the modifier in the series name.

For example, when a warrant is adjusted, the system checks to see if another warrant exists with the same basic binary code (country, market, type, underlying, expiry date, and strike price). If not, then the warrant is added and the binary series modifier set to zero. Note that the suffix rule mentioned above would be applied to the Trading Code. If however other warrants exist with the same binary code, then they are sorted by the binary series modifier and the first available number is assigned to the adjusted warrant. So if there were two existing warrants that matched the binary code and one had a binary series modifier of one and the other five, then the next available number is two. So this is used for the adjusted warrant's binary series modifier. Note also that the Trading Code modifier number could be vastly different to this figure.

As background information to the situation above, two or more warrants can exist with the same basic binary code (country, market, type, underlying, expiry date, and strike price) as previously modified warrants are not automatically deleted from the system. Instead they are firstly changed to be "not traded" in the system. This means users are not able to see them, but they still exist and need to do so as order and trade history can refer to these instruments. It is only after several days that a series is actually deleted, thereby releasing an available number for the binary series modifier.

A hypothetical example is in the table below.

Instrument	Example Binary Code	Trading Code	Description
Warrant over XYZ	15.50.166.0.51243. 9079.170000	XYZWMD	XYZ MQBNV 06CW [XYZWMD]
Warrant with adjusted strike price	15.50.166.0.51243. 9079. 175000	XYZWMD.1	XYZ MQBNV 06CW [XYZWMD]
Warrant adjusted again but not strike price or expiry date, e.g. contract size	15.50.166. 1 .51243. 9079. 175000	XYZWMD.2	XYZ MQBNV 06CW [XYZWMD]

This can be used to derive a mapping table using the code within the [].

ASX Code	Example Binary Code	Trading Code	Description
XYZWMD	15.50.166.0.51243. 9079.170000	XYZWMD	XYZ MQBNV 06CW [XYZWMD]
XYZWMD	15.50.166.0.51243. 9079. 175000	XYZWMD.1	XYZ MQBNV 06CW [XYZWMD]
XYZWMD	15.50.166. 1 .51243. 9079. 175000	XYZWMD.2	XYZ MQBNV 06CW [XYZWMD]



Note:

In the above case concerning the same warrant being modified, only one of the above instruments is visible to users at the one time.

18 Price Limits

18.1 Background

The Competition Market Integrity Rules require Approved Market Operators to have appropriate processes and controls in place that restrict and control the entry and matching of anomalous or erroneously priced orders, as a large order for example can have a significant impact on the prices of instruments traded on ASX Trade. Price Limits restrictions are only enabled during session states where continuous matching is enabled and will apply to those instruments which are the subject of market competition.

A practical outcome of the price limits is that aggressive orders that fall outside the relevant price band (Anomalous Order Threshold (AOT)) will be rejected. Participants will need to have adequate arrangements to manage these orders.

18.2 Functionality Overview

With Order Price Limit functionality, upper and lower price limits are set per applicable instrument series and ASX Trade will automatically reject aggressive orders that are outside the defined price limit for that series. Orders entered at the same price as the prevailing upper or lower price limit prices will be accepted. Both order and quote transactions are validated against these Price Limits.

Order Price Limits are intended to prevent unwanted trades due to erroneously priced orders. The functionality is the same for validating a new order or an order amendment. The validation is made on incoming transactions only. System controlled order updates, such as refreshing shown quantity of an iceberg order, are not validated against Price Limits.

18.3 Price Limit Broadcast and Query

The BL51 broadcast contains the Price Limit Reference Price and the actual Price Limits per instrument.

The answer to the ML1 query (MA1) contains the most recently published Price Limit Reference Price and Price Limits.

18.4 Price Limit Range and Price Limit Reference Price

The Order Price Limit range is based on a dynamic Reference Price. A buy order's price cannot be higher than the highest order limit price; a sell order's price cannot be lower than the lowest order limit price in the price limit range.

The Price Limit Reference Price is maintained by ASX Trade for each applicable instrument series (i.e. those instruments which are the subject of market competition).

The Price Limit Reference Price is not validated to be on a valid price tick/step.

The Price Limits are calculated by ASX Trade on allowed upper and lower price limits and a selected Reference Price.

The allowed upper and lower price limits can be expressed in percentages, number of ticks, or in absolute values.

If the price limits are expressed in absolute value or number of ticks, the price limits are calculated by ASX Trade as:

- Upper Price Limit = Reference Price + configured upper price limit
- Lower Price Limit = Reference Price - configured lower price limit.

If the price limits are expressed in percentage, the price limits are calculated by ASX Trade as:

- Upper Price Limit = Reference Price + configured upper price limit (%) * Reference Price
- Lower Price Limit = Reference Price - configured lower price limit (%) * Reference Price.

Upper Price Limits are rounded down to the closest valid price tick, whereas Lower Price Limits are rounded up to closest valid price tick.

19 Order Purging

ASX Trade has a trading session state of "PURGE_ORDERS". At the beginning of this session state all orders are examined to see whether they should be purged. The system checks to see if the order has expired in terms of its time validity, be it day only, until series expiry or a specified number of days. For some types of securities it also checks if the price of the order is more than 60% away from the best bid or best ask, or where the market is overlapping from the equilibrium price. The exception to this rule is when the calculated purge price is at or below one or 20 cents (depending on the type of security).

The orders are centrally inactivated and flagged with a reason code indicating the purge reason. Orders remain in the system (but not actively in the market) as central inactive orders. Following system start-up for the next business day, BO5s are sent to users of the participant owning each order, informing them that the order has been cancelled.

When a security is placed into an Instrument Session State during the day, ASX Trading Operations can set the orders to be purged. In this case, the orders are centrally inactivated and users receive a BO5 broadcast giving the reason code "21 - Inactivated by system due to Instrument Session change".

For combinations, the entire combination order is purged if any of its legs meet the criteria to be purged.



Note:

The purging of orders due to corporate actions occurs during night batch processing when users are not connected. Users can retrieve the details of the purges by executing an MQ151 the following morning. This provides the details produced when the users were not connected.

19.1 Reason Codes for Order Purging

The following table shows the reasons why orders may be purged, and the associated code applied to the order.

Condition for Order Purge	Change Reason Code
Orders with validity set to "until rest of day".	24 - Inactivated day orders
Orders with validity set to "until expiration" that will expire at the end of the current trading day or during any of the calendar days before the next trading day.	26 - Inactivated due to expiry
Orders with validity set to "no. of days" that will expire at the end of the current trading day or during any of the calendar days before the next trading day.	26 - Inactivated due to expiry
Orders for a series that will expire at the end of the current trading day or during any of the calendar days before the next trading day.	26 - Inactivated due to expiry
Corporate action submitted for a security (e.g. XD).	23 - Inactivated due to purge
Corporate action submitted with code "RE" (reconstruction).	23 - Inactivated due to purge
Purge of orders when the price is too far away from the market.	27 - Inactivated due to price away from the market
Orders that are centrally inactivated as a result of an Instrument Session State change.	21 - Inactivated by system due to Instrument Session change.

19.2 Schedule for Order Purging

The following table shows the actions that are taken around the time of order purging.

Day	Time	Action
T	PURGE_ORDERS session state	Orders are purged in the following sequence: <ul style="list-style-type: none"> Day (highest priority)

Day	Time	Action
		<ul style="list-style-type: none"> • Expiry • Price (lowest priority). A BO5 is sent to users of the participant owning each order, informing them that the order has been centrally inactivated along with the reason.
T	Any time during the day Security put into ISS with order purging.	Orders are centrally inactivated with reason code 21. A BO5 is sent to users of the participant owning each order, informing them that the order has been centrally inactivated along with the reason.
T	Night Processing	Purging of orders due to corporate actions. Users can retrieve the details of the purges by executing an MQ151 the following morning.
T+1	System Start-up	Orders that were inactivated during night processing on day T are reloaded and immediately cancelled. BO5s are sent to users of the participant owning each order, informing them that the order has been cancelled.
T+1	OPEN session state, and other session states that permit order entry.	Users can query for active orders and for order history.

20.3 Purge Examples

Example 1. Orders Inactivated by Purge Session State

The following orders are active in order book A on T:

Order No	Time Validity	Buy/Sell	Price
00001	Day	B	99
00002	GTC	S	101
00003	GTD (Date = T)	B	97

When the Purge session state is initiated by the central system, the following orders are inactivated:

00001 - purged due to Day validity.

BO5 is issued with change reason = 24 (Inactivated Day Orders), Order State = 11 (Order_inactive)

Order 00002 is not purged.

00003 - purged due to expiry of time validity.

BO5 is issue with change reason = 26 (Inactivated Due to Expiry), Order State = 11 (Order_inactive)

As the system is started for the next business day, the long order reload process shall include the inactivated purged orders when reloading long orders into the order book.

BO5 is issued for all reloaded orders with change reason = 30 (Order reload at normal system start), Order State = 11 (Order_inactive). Immediately following the reload, the inactive orders will be deleted. BO5 is issued for the deleted orders with change reason = 9 (Order deleted by central system), Order State = 9 (Deleted).

Example 2. Orders Inactivated by Corporate Action

The following orders are active in order book B on T:

Order No	Time Validity	Buy/Sell	Price
00005	GTC	B	99.5
00006	GTC	S	100
00007	GTD (Date = T)	B	99

A corporate action is set on order book B, with Long Order Action = Purge, Start Date = T + 1.

During the night batch processing between T and T + 1 the following will take place:

The corporate action is processed and all long orders in order book B will be flagged for inactivation on T + 1.

During system start, the long order reload process shall include the purged long orders when reloading long orders into the order book. BO5 is issued for all reloaded orders with change reason = 6 (new/activated)

Immediately following the reload, a second update is issued showing the inactivation of order book B orders due to the Corporate Action.

BO5 is issued with change reason = 23 (inactivated due to purge)

During the night batch processing between T + 1 and T + 2 the following will take place:

During system start, the long order reload process shall include the inactivated long orders when reloading long orders into the order book.

BO5 is issued for the reloaded inactivated orders with change reason = 30 (Order reload at normal system start)

Immediately following the reload, the orders inactivated on T + 1 by the Corporate Action will be deleted.

BO5 is issued for the deleted orders with change reason = 9 (Order deleted by central system)

20 Inactive Order Entry and Activation

Inactive order entry and activation of centrally inactivated orders is no longer supported.

21 Querying for Central Inactive Orders

A user can query the system for all their participant's central inactive orders by issuing the MQ92 Orders query with `order_filter_i = 16` or use the legacy MQ9 Total Inactive Order query.

Both provide all central inactive orders.

22 Derivatives Crossings

Trading between a trading participant and their client or between clients of the same trading participant (a crossing) is regulated with different rule procedures applying depending on the product type. The following provides an overview of the different crossing procedures (for non- Special Size parcels) that apply to derivative products including derivative only and derivative/cash combinations.

22.1 Derivatives Crossing Procedures

There are two methods of performing a crossing with the onus on the trading participant to comply with the relevant rule procedures for each:

- Method 1 - Two Sided Crossing
- Method 2 - Cross With Book.

The two sided crossing applies when a participant has two orders to cross, which are not in the book. The cross with book method applies when a participant has an order in the book and then wishes to trade against the book with another client order.

22.1.1 Two Sided Crossing

Derivatives Two Sided Crossing	
Applicable ASX Trade Derivatives Two Sided Crossing Steps/Rules	
1	<p>Single Instrument Series: Send a Bid/Ask Crossing Quote Request (MC2 transaction) with the quantity set to the total quantity being crossed.</p> <p>Combination Instrument Series: Create the combination series if it does not already exist using DC3 Add Tailor Made Combination transaction. Then send a Bid/Ask Crossing Quote Request (MC2 transaction) with the quantity set to the total combination order quantity for the combination series being crossed.</p>
2	<p>Wait for the period defined in "Maximum hold time in order book if market is not established" - 15 seconds. This is returned in the variable max_wait_time_i in the response to the DQ17 Instrument Type or DQ122 Instrument Class query. This is a fixed wait period of 15 seconds, regardless of whether a market is established or not.</p>
3	<p>Complete the following steps within the period defined in "Max time before confirmation" - 15 seconds. This is returned in the variable max_time_span_i in the response to the DQ17 Instrument Type or DQ122 Instrument Class query.</p> <ul style="list-style-type: none"> • Enter a fully disclosed bid (or ask) order (for single series or combination series, as applicable) for at least 100% of the crossing quantity specified under step 1, at the crossing price, using the normal Enter Order transaction (MO1 or MO31). • Then enter an opposing ask (or bid) for at least 100% of the crossing quantity specified under step 1, at the crossing price, using the normal Enter Order Transaction (MO1 or MO31). <p>Notes:</p> <ul style="list-style-type: none"> • The quantity of the bid and ask orders must be fully disclosed. That means iceberg or undisclosed orders cannot be used. • Amendments of the initial bid (or ask) order quantity and price are permitted prior to the opposing order being entered, as long as the resulting crossed quantity does not exceed the quantity specified in the Crossing Quote Request under step 1. • The crossed quantity must not exceed the quantity specified in the Crossing Quote Request in step 1. • Crossing price = bid (or ask) and ask (or bid) orders price entered, subject to auto matching in price time priority.

A trading participant is not to commence a crossing in the same instrument series (single or combination) until any previous crossing by that trading participant in that series has been effected, and:

- If a Method 1 Crossing (Two Sided Crossing) is not completed, the participant must wait five minutes before proceeding with a Method 2 Crossing (Cross with Book), and
- If a Method 1 Crossing (Two Sided Crossing) is not completed after two consecutive attempts then the participant must wait five minutes before proceeding with either a Method 1 (Two Sided Crossing) or Method 2 Crossing (Cross with Book).

22.1.2 Cross with Book

Derivatives Cross with Book Crossing	
Applicable ASX Trade Derivatives Cross with Book Crossing Steps/Rules	
1a	<p>Single Instrument Series: Send a Bid/Ask Crossing Quote Request (MC2 transaction) with the quantity set to the total quantity being crossed.</p> <p>Combination Instrument Series: Create the combination series if it does not already exist using DC3 Add Tailor Made Combination transaction. Then send a Bid/Ask Crossing Quote Request (MC2 transaction) with the quantity set to the total combination order quantity for the combination series being crossed.</p>
1b	Amendments of the initial bid (or ask) order that is already in the book are permitted on the condition that the resulting crossed quantity does not exceed the quantity specified in the Crossing Quote Request under step 1a.
2	<p>Wait for the period defined in "Maximum hold time in order book if market is not established" - 15 seconds. This is returned in the variable max_wait_time_i in the response to the DQ17 Instrument Type or DQ122 Instrument Class query.</p> <p>This is a fixed wait period of 15 seconds, regardless of whether a market is established or not.</p>
3	<p>Proceed to attempt to cross against the existing order in the order book by sending an opposing bid or ask order using an Enter Order transaction (MO1 or MO31) to auto match in price time priority.</p> <p>This must be done within the period defined in "Max time before confirmation" - 15 seconds. This is returned in the variable max_time_span_i in the response to the DQ17 Instrument Type or DQ122 Instrument Class query.</p>

A trading participant is not to commence a crossing in the same instrument series (single or combination) until any previous crossing by that trading participant in that series has been effected, and:

- If a Method 2 Crossing (Cross with Book) is not completed, the participant must wait five minutes before proceeding with another Method 2 Crossing, and
- If a Method 2 Crossing (Cross with Book) is not completed, then the participant may proceed with either a Method 1 (Two Sided Crossing) Crossing.

23 Unintentional Crossing Prevention

Unintentional Crossing Prevention (UCP) provides functionality that prevents unintentional crossings in Cash products from matching on market, creating booking reports for participants. UCP functionality allows participants to specify a unique UCP key for orders entered into ASX Trade for applicable instruments. UCP functionality is available by default for both OI and OUCH sessions.

23.1 Applicable Instruments

The following instruments support UCP:

- Equities traded in ASX TradeMatch Equity Markets Group 1-5
- Interest Market (with the exception of the wholesale and government loan instruments)
- Instruments located in the Listed Funds Warrants & Structured Products

All other instruments types including Options & Tailor Made Combinations do not support UCP.

Order Entry and Amendment

Orders can be entered via OI with an optional field called `crossing_key_i`, using the MO1 order entry transaction.

Orders can be entered in OUCH with the Crossing Key field using the enter order message.

Orders from the same participant with the same Crossing Key will result in a booked transaction that is not disseminated to the market as a trade.

A Crossing Key of zero means “No UCP” for this order.

The Crossing Key can be amended and also removed from an order by setting it to zero.

23.2 Post Trade Disclosure

Booking reports, resulting from two orders from the same participant with the same Crossing Key, are disseminated to all users as an accounting transaction in the CB16 Public Trade Broadcast. The CB16 contains only the sequence number and instrument ID of the booking reports i.e. no information about quantity and price is revealed.

The CB15 Dedicated Trade broadcast contains the full details of the booking report, including a deal source to indicate that the trade resulted from Unintentional Crossing Prevention in continuous matching or an auction.

Booking reports resulting from Unintentional Crossing Prevention do not update any trade statistics.

24 Centre Point Orders

Centre Point is the most liquid source of dark liquidity for trading in Australian equities.

24.1 Centre Point Order Types

Centre Point is designed for institutional investors offering flexible execution price and volume controls.

Execution price controls allow a user to transact at the mid-point, dark limit or Any Price Block. Volume controls allow users to enter an optional Minimum Acceptable Quantity and Single-Fill instructions.

Mid-point only Centre Point orders trade at the mid-point of the National Best Bid and Offer (NBBO). Dark limit Centre Point orders support additional execution against other dark limit orders at on-tick prices that provide improvements over the NBBO. Any Price Block orders support block trading at or outside the NBBO.

The mid-point price is calculated by ASX Trade as the average of the NBBO ($[\text{Best National Bid Price} + \text{Best National Offer Price}] / 2$). The mid-point price is calculated by ASX Trade when Centre Point orders are entered and when ASX Trade checks if Centre Point orders can match. As the NBBO changes the mid-point price changes with it.

Centre Point orders can be entered with a limit price. The limit price indicates the worst matching limit for the order. When entering a limit price, users can also specify a mid-tick flag, which when set to “true” improves the entered limit price by half a tick. This means for buy orders, the limit price is half a tick higher than the entered limit price and for sell orders, the limit price is half a tick lower than the entered limit price.

Centre Point orders only trade against other Centre Point orders and Sweep orders.

24.1.1 Mid-point Only

Centre Point orders at the mid-point can be entered with a limit or market price, but will only execute at the mid-point of the NBBO if this price achieves or improves the limit defined on the order.

Entering a CPL or CBL order with `mid_tick_c` set to “0” or “2” defines it as a mid-point only order. Setting `mid_tick_c` to “1” defines a mid-point only order with an additional half-tick price improvement.

CPM and CBM orders are mid-point only by default and will trade at the current mid-point price.

Execution Example

An execution example for mid-point only is as follows:

- The NBBO is 100 – 100.5 cents, making the mid-point price 100.25 cents
- A CPL Buy order is entered for 1T @ 100 with `mid_tick_c` = 1
- A CPL Sell order is entered for 750 @ 100 with `mid_tick_c` = 2
- The orders will trade out for 750 @ 100.25. The Buy order has achieved its limit of 100 cents plus half-tick improvement. The Sell order has traded at a price better than its limit.

24.1.2 Dark Limit

CPL and CBL orders entered as dark limit support additional execution against other dark limit orders at on-tick prices that provide improvements over the NBBO, in addition to at the mid-point price against other dark limit and mid-point only orders, up to the limit defined on the order.

Resting dark limit orders that are priced at, above or below the NBBO will execute at the first allowable on-tick price within the NBBO spread, or at the mid-point of the NBBO.

Entering a CPL or CBL order with `mid_tick_c` set to “3” defines it as a dark limit order. Setting `mid_tick_c` to “4” defines a dark limit order with an additional half-tick price improvement.

Execution Example

The following example illustrates the execution sequence for an incoming dark limit order.

NBBO is 430 – 433 cents; mid-point price is 431.5 cents.

Centre Point Order Book:

Bid Orders				Ask Orders			
Order#	Quantity	Price	mid_tick_c	mid_tick_c	Price	Quantity	Order#
1	1,000	432	3	2	433	1,000	7
2	2,000	433	3				
3	3,000	431	1				
4	4,000	431	4				
5	5,000	432	4				
6	6,000	431	3				

A Sell order is entered: Order #8, Sell 25,000 at 431, Centre Point Limit, mid_tick_c = 3.

This results in the following trades – all trades are Centre Point trades:

Trade	Buy Order	Sell Order	Quantity	Price	Notes
1	1	8	1,000	432	Execution at permitted prices worse than mid-point.
2	2	8	2,000	432	Execution at permitted prices worse than mid-point. Buy Order #2 is priced at the NBBO. Execution occurs at the first allowable price tick within the NBBO. Allocations are made based on time priority at each possible execution price.
3	5	8	5,000	432	Execution at permitted prices worse than mid-point.
4	3	8	3,000	431.5	Execution at mid-point.
5	4	8	4,000	431.5	Execution at mid-point.
6	6	8	6,000	431	Execution at permitted prices better than mid-point.

Resulting Centre Point order book:

Bid Orders				Ask Orders			
Order#	Quantity	Price	mid_tick_c	mid_tick_c	Price	Quantity	Order#
				2	433	1,000	7
				3	431	4,000	8

24.1.3 Any Price Block

CBL orders entered as Any Price Block orders support additional execution against other Any Price Block orders at on-tick prices that are at or outside the NBBO, in addition to dark limit executions that provide improvements over the NBBO and mid-point price, up to the limit defined on the order.

Entering a CBL order with mid_tick_c set to “5” defines it as an Any Price Block order. Setting mid_tick_c to “6” defines an Any Price Block order with an additional half-tick improvement.

Any Price Block orders are compatible with MAQ and single fill MAQ (see Minimum Acceptable Quantity below). The mid_tick_c values “5” and “6” can only be used with Centre Point Block Limit orders (exch_order_type_n = 4096), not with Centre Point Limit orders (exch_order_type_n = 64).

For an order to be able to trade in the Block Trading phase of Centre Point matching, it needs to fulfil the following criteria:

- Centre Point Block Limit order entered with mid_tick_c = 5 or 6 or incoming ASX Sweep order at price outside or at the current NBBO
- An opposing Centre Point Block Limit order with mid_tick_c = 5 or 6 exists, priced outside or at the current NBBO, allowing a match with the order from point 1
- Both orders' MAQ can be filled
- The traded value is equal to or larger than the minimum block size.

Three deal source values exist for block trades:

- 50 – Block Trade
- 51 – Preference Block Trade (i.e. for participants using Preferencing in Centre Point)
- 52 – Reserved for future use.

Trades with deal sources 50 and 51 will update Traded Volume and Value, but not Open, High, Low and Last.

Execution Example

For a security with a Block Size tier of \$1,000,000 and NBBO 430 – 433 cents.

Centre Point Order Book:

Bid				Ask			
Order#	Quantity	Price	mid_tic_c	mid_tic_c	Price	Quantity	Order#
1	10,000	432	1				
2	5,000	431	3				
3	300,000	429	5				

A Sell order is entered: Order #4, Sell 250,000 at 429, Centre Point Block Limit, mid_tick_c = 5.

This results in the following trades:

Trade	Buy Order	Sell Order	Quantity	Price	Notes
1	1	4	10,000	431.5	Execution at mid-point. Deal source 47.
2	2	4	5,000	431	Execution at permitted prices better than mid-point. Deal source 47.
3	3	4	235,000	429	Block execution outside the NBBO. Deal source 50.

Resulting Centre Point Order Book:

Bid				Ask			
Order#	Quantity	Price	mid_tic_c	mid_tic_c	Price	Quantity	Order#
3	65,000	429	5				

24.2 Volume Controls - Minimum Acceptable Quantity and Single-Fill

CBL and CBM orders can be entered with an optional MAQ. This specifies the minimum quantity that must be filled every time the order trades. There are two types of MAQ - MAQ and Single-fill MAQ. MAQ means that the minimum acceptable quantity can be achieved through several trades whereas Single-fill MAQ means the MAQ must be achieved through a single trade, i.e. a single contra order. The flag single_fill_minimum_quantity_c determines whether a supplied MAQ is single-fill or not, with the flag set to "1" meaning "single-fill".

During a match, if the remaining quantity of an order falls below its specified MAQ, the MAQ of the order shall be reset to zero.

24.3 Order Validation

ASX Trade validates that Centre Point orders can only be entered when:

- The instrument is in a continuous matching state
- An NBBO exists in the instrument, i.e. both Bid and Ask prices exist in the instrument
- A Centre Point order may not be entered as an iceberg order or as an undisclosed order
- The mid tick flag may not be set to 1, 3, 4, 5 or 6 for CPM and CBM orders
- The mid-tick flag may not be set to 5 or 6 for CPL orders
- If an MAQ is specified, it must be equal to or smaller than the order's quantity and it is only valid for the Centre Point Block variant order types
- A CBL and CBM order can only be entered with validity Fill or Kill, if the MAQ is zero or equal to the order's quantity.

24.4 Centre Point Price and Extended Price

The Centre Point traded price that is calculated by ASX Trade and disseminated as the normal trade price (`deal_price_i`), is a truncation (not a rounding) of the extended trade price (`cl_deal_extended_price_asx_t` (named structure 34)) to the number of decimals as configured for the instrument (e.g. 191.25 is truncated to 191.2). Therefore the disseminated `deal_price_i` may not necessarily fall on a valid price tick.

When the calculated Centre Point traded price cannot be exactly expressed using the available number of decimals as configured for the applicable instrument, the extended price is expressed separately. For example, instrument is configured to one decimal, price tick is 0.5, NBBO is 191.0/191.5 and the Centre Point traded price is 191.25. The extended price is communicated in `cl_deal_extended_price_asx_t` (named structure 34) for the trade.

The extended price always has four decimals (e.g. 191.25 is expressed as 1912500, where the last four digits are interpreted as decimals). When the exact Centre Point traded price requires more than four decimals, the Centre Point traded price is truncated to four decimals. It is possible to express "no value" in the extended price field, in such cases the normal trade price is the only price used.

24.5 Order Priority

Centre Point mid-point only orders rest in the Centre Point order book in time priority.

Resting dark limit orders are queued in time priority at each possible execution price in the Centre Point order book for dark limit executions.

Any Price Block orders are queued in price-time priority for block trading executions.

24.6 Trade Broadcasts

The "extended price" field of the CB15 and CB16 broadcasts carry the exact Centre Point traded price.

The truncated Centre Point traded price (not the full extended price) is disseminated in the order update broadcast BO5.

The CB16 trade broadcast will not disclose the order numbers of the Centre Point orders involved in the trade. Instead the order numbers are disseminated as zeros. Similarly, for non-crossed Centre Point trades, the BO5 will not carry the opposing order number; instead it will be disseminated as zeros.

24.7 Equilibrium Price Calculations

Centre Point orders are not taken into account in the Equilibrium Price (EP) Calculation, or in the allocation.

24.8 Public Information Dissemination

The public order book broadcast (BO2) is not disseminated for Centre Point orders. Likewise, the public order book query (MQ7) does not include Centre Point orders in the answer, neither from the own participant nor from others.

24.9 Amending Order

It is not possible to amend a Centre Point order into a non-Centre Point (e.g. Limit) order or to amend a non-Centre Point order into a Centre Point order.

Amending the price or the mid-tick flag of a Centre Point order is allowed and results in a loss of priority. Amending the quantity up also results in a loss of priority.

MAQ can be amended, including setting it to zero and amending the single-fill flag. Because the MAQ can be amended to zero, it needs to be set to the original MAQ when amending other attributes. Otherwise ASX Trade will interpret an MAQ value of zero sent in the amend transaction as an amendment to “no MAQ”. MAQ updates do not result in a loss of priority.

24.10 Centre Point Preferencing

Centre Point supports participant’s preferencing their resting orders, allowing maximised fill rates in Centre Point for two sided order flows. Participants can opt into preferencing, meaning their incoming Centre Point orders will first match with resting orders from the same participant before matching with orders from other participants.

Participants may choose one of the following options:

- No preferencing will apply.
- Globally opt-in to preferencing in Centre Point where preferencing will subsequently apply to all incoming Centre Point orders from the participant.

24.11 Order Validity

Centre Point orders can be entered as good until Day, Fill and Kill or Fill or Kill.

Limit Sweep orders can be entered as good until Day, Date, GTC, Expiry or Fill and Kill. Limit Sweep orders with a Fill or Kill validity are not supported.

At the close of business, all remaining Centre Point orders are centrally inactivated (purged) at the end of each trading day with `change_reason_c = 24` (Inactivated Day order) regardless of the entered order validity.

The order is deleted from ASX Trade the following day.

25 ASX Sweep Orders

25.1 Sweep Order Types

Sweep orders take advantage of all liquidity available in ASX TradeMatch and Centre Point and can trade in both order books.

A Sweep order may be entered as a Limit or a Market-to-Limit order. For a Market-to-Limit Sweep order, users will enter all order details except price.

Limit Sweep orders can be entered with an optional mid-tick flag, which when set to “on” improves the entered limit price by half a tick for executions in Centre Point. This means for buy orders, the limit price is half a tick higher than the entered limit price and for sell orders, the limit price is half a tick lower than the entered limit price.

25.2 Matching Logic and Dual Posting

When a Sweep order is entered as an aggressive order (i.e. can trade immediately on entry), the following generic order flow applies:

1. ASX Trade will first check whether the Sweep order can be partially or fully filled from the Centre Point order book.
2. Any remaining balance of the Sweep order is then matched with the best price level in ASX TradeMatch.
3. For Market to Limit Sweep Orders, any remaining quantity will be converted to a normal Limit Order at this point.
4. For Limit Sweep Orders, the first two steps are repeated until the Sweep order has fully traded or can no longer trade due to its Limit price. Any remaining quantity will be placed into ASX TradeMatch.
5. Limit Sweep orders that were entered with the mid-tick flag set to “on” are able to be executed passively in Centre Point at a half-tick inside the order’s limit price and eligible to be preferenced in Centre Point by incoming orders from the same participant. A Limit Sweep order with mid-tick “on” is therefore dual-posted in ASX TradeMatch and Centre Point.
6. The mid-tick flag is ignored in auctions and in ASX TradeMatch.
7. Where the mid-tick flag is set to “off”, or the mid-tick flag is not present, the Limit Sweep order will not be eligible for passive execution in Centre Point.
8. If the duration of the Limit Sweep Order with a mid-tick flag present is longer than one day, the mid-tick flag will be set to “off” when the order is reloaded on subsequent days (this is indicated by `change_reason_c = 50` in the response to the MQ151 query).

25.3 Minimum Acceptable Quantity

Limit Sweep Orders can be entered with an optional MAQ. MAQ only applies to executions in Centre Point and does not apply to executions in ASX TradeMatch. MAQ is ignored in auctions.

MAQ specifies the minimum quantity that must be filled every time the order trades. There are two types of MAQ - MAQ and Single-fill MAQ. MAQ means that the minimum acceptable quantity can be achieved through several trades whereas Single-fill MAQ means the MAQ must be achieved through a single trade, i.e. a single contra order. The flag `single_fill_minimum_quantity_c` determines whether a supplied MAQ is single-fill or not, with the flag set to “1” meaning “single-fill”.

During a match, if the remaining quantity of an order falls below its specified MAQ, the MAQ of the order shall be reset to zero.

If the duration of the Limit Sweep Order is longer than one day, the MAQ will be removed when the order is reloaded on subsequent days (this is indicated by `change_reason_c = 50` in the response to the MQ151 query). MAQ is not supported for Market-to-Limit Sweep orders.

25.4 Iceberg

Limit Sweep Orders can be optionally entered as iceberg orders with a Shown and Total Quantity. In ASX TradeMatch they will behave and execute like normal iceberg orders.

Any Centre Point executions will result in a reduction of the Total Quantity. Where a Centre Point execution reduces the Total Quantity to below the Shown Quantity, then the Shown Quantity will also be correspondingly reduced.

Iceberg is not supported for Market-to-Limit Sweep orders.

25.5 Amendment of Sweep Order Attributes

Limit Sweep Orders can be amended following the usual amendment validations and may lose time priority, depending on what is amended.

25.5.1 Mid-tick Flag

The mid-tick flag can be amended to “off” but may not be amended to “on”.

25.5.2 Minimum Acceptable Quantity

MAQ can be amended without loss of priority, including the single-fill indicator.

25.5.3 Iceberg

As per normal iceberg order functionality, an increase of Total Quantity for Limit Sweep Iceberg orders is not allowed.

25.6 Public Information Dissemination

25.6.1 Orders

The BO2 Public Order Book Broadcast and the MQ7 Public Order Book Query disseminate Limit Sweep orders as normal Limit orders (`exch_order_type_c = 0`).

When a passive Limit Sweep Order matches with a Centre Point Order and results in a reduction of the Shown Quantity, the resulting BO2 will disseminate the reduction in the quantity as a user modification (`change_reason_c = 5`).

25.6.2 Trades

Trades resulting from Sweep orders trading in the Centre Point Order Book are disseminated as Centre Point trades. Trades resulting from Sweep orders trading in ASX TradeMatch are disseminated as normal ASX TradeMatch trades.

26 Auction Imbalance Orders

26.1 Auction Imbalance Order Entry

Auction Imbalance orders are entered with a limit price and are only accepted with time validity Fill and Kill.

They can only be entered in the non-matching session states PRE_OPEN and PRE_CSPA.

Auction Imbalance orders will only execute against any Surplus Volume from the auction and are only filled once all other orders have been filled, at the auction price, providing the auction price is not worse than the Imbalance order's limit price. Any unfilled balance not traded is then cancelled automatically.

26.2 Order Priority

Auction Imbalance orders are entered in time priority only.

26.3 Equilibrium Price Calculations

Auction Imbalance orders are not taken into account in the Equilibrium Price (EP) and Surplus Volume calculation.

26.4 Central Inactive Order

It is not possible to enter Auction Imbalance orders as central inactive.

26.5 Public Information Dissemination

The public order book broadcast (BO2) is not disseminated for Auction Imbalance orders. Likewise, the public order book query (MQ7) does not include Auction Imbalance orders in the answer, neither from the own participant or from others.

26.6 Trade Broadcasts

Trades from Auction Imbalance orders are not flagged with a special condition code. The deal source in the trade broadcast indicates that the trade happened as part of the auction.

27 Iceberg Orders

When large participants, such as institutional investors, need to buy and sell large amounts of securities for their portfolios, they can divide their large orders into smaller parts so that the public sees only a small portion of the order at a time. This is like the “tip of the iceberg” – only a small portion is visible from a huge mass of ice. By hiding its large size, the iceberg order reduces the price movements caused by substantial changes in a stock's supply and demand.



Note:

Iceberg orders require a minimum visible quantity rather than a minimum value.

Iceberg functionality within ASX Trade includes:

- The order type is available during all market phases supporting order entry.
- The order type is available for ASX TradeMatch Equities, Interest Market products and cash-like instruments in the Structured Products, Warrants and Listed Funds market.
- The minimum limit for the visible component of the order is quantity-based, with the minimum visible quantity set at 500 shares.
- The total order quantity must not be greater than 1,000 times the visible quantity.
- Upon filling the entire visible quantity of an iceberg order, the order is immediately replenished in the order book as the last order at its price.
- The replenished order displays the original visible quantity unless the total order quantity remaining is less than this amount, in which case the total remaining order quantity is made visible.
- Total quantity is included in any calculations of Equilibrium Prices (Indicative Auction Prices) and Surplus Volume.
- The total order quantity may not be increased through an amendment.

27.1 Message Fields

Iceberg orders are represented by a combination of fields in the order entry and amendment messages.

In the MO1 Order Entry transaction, these fields are *quantity_i* and *display_quantity_i*, where *quantity_i* represents the total quantity of the order, and *display_quantity_i* represents the shown quantity.

The *quantity_i* field is not disseminated to the whole market, it is only sent to the participant who entered the order.

Other order transactions have similarly named fields. See *ASX Trade Transactions* for full details of the fields.

27.2 Matching Examples Scenario

Set out below is a scenario for a number of interactions with iceberg orders during continuous trading; also known as the session state “Open”.

Step 1

The buy side contains five orders at the best bid, two with hidden quantity, all other orders have no hidden quantity.

The order at the best bid has been entered by participant AU322. The order has a total quantity of 4,000 of which 1,000 has been disclosed. 3,000 remain hidden. Participant AU322 also has a second order lower in priority for a total of 20,000 that has a disclosed quantity of 1,750 and a hidden quantity of 18,250. All other orders have been entered by other participants. Where AU322 has traded this is indicated against the resultant trades.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
AU322	LMT	4,000	1,000	100.0					
	LMT		1,500	100.0					
AU322	LMT	20,000	1,750	100.0					
	LMT		300	100.0					

Bid Orders			Ask Orders	
	LMT	6,000	99.0	

Step 2

AU110 enters a Sell order for 100 @ 100. It transacts against an iceberg order.

The resultant trading and order book is: Trade 100 @ 100 (AU322).

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
AU322	LMT	3,900	900	100.0					
	LMT		1,500	100.0					
AU322	LMT	20,000	1,750	100.0					
	LMT		300	100.0					
	LMT		6,000	99.0					

Step 3

A Sell order for 1,600 @ 100 is now entered. It removes the full visible quantity of the first iceberg order.

The resultant trading and order book is:

- Trade 900 @ 100 (AU322)
- Trade 700 @ 100.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
	LMT		800	100.0					
AU322	LMT	20,000	1,750	100.0					
	LMT		300	100.0					
AU322	LMT	3,000	1,000	100.0					
	LMT		6,000	99.0					

Step 4

A Sell order for 4,000 @ 100 is entered. It is greater than the full visible quantity at this price.

The resultant trading and order book is:

- Trade 800 @ 100
- Trade 1,750 @ 100 (AU322)
- Trade 300 @ 100
- Trade 1,000 @ 100 (AU322)
- Trade 150 @ 100 (AU322).

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
AU322	LMT	18,100	1,600	100.0					
AU322	LMT	2,000	1,000	100.0					
	LMT		6,000	99.0					

27.3 Matching as a Result of an Auction Scenario

In an auction situation, where the market moves for example from Pre-Open to Open, a similar matching process occurs whereby all visible quantity at the same price level is filled before filling any of the iceberg hidden quantity. ASX Trade will optimise the number of trades and fill the visible and hidden quantity at the same time if no other orders exist below the price level. Below are a number of scenarios that show the interaction of icebergs during an auction. As noted above, the total quantity of the order is included in the equilibrium price and surplus volume calculations.

Scenario 1

In this scenario there is one iceberg order on the ask side of the order book and surplus volume is on the bid side of the order book. The total quantity of the iceberg order is filled.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
	LMT		3,000	100.0	100.0	50		LMT	
					100.0	50		LMT	
					100.0	1,000	2,000	LMT	AU322

At the end of the auction the resultant trades are:

- Trade 50 @ 100
- Trade 50 @ 100
- Trade 2,000 @ 100 (AU322).

Scenario 2

In this scenario a single iceberg order exists on the ask side of the order book. On the bid side there is not enough quantity to fill the entire order. Thus the surplus volume is on the ask side.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
	LMT		1,600	100.0	100.0	50		LMT	
					100.0	50		LMT	
					100.0	1,000	2,000	LMT	AU322

At the end of the auction the resultant trades are:

- Trade 50 @ 100
- Trade 50 @ 100
- Trade 1,000 @ 100 (AU322)
- Trade 500 @ 100 (AU322).

As the remaining quantity of the iceberg order would be 500 this would now be displayed in the Ask Quantity field when the instrument moves to open.

Scenario 3

In this scenario there are two iceberg orders on the bid side and there is no surplus volume. Thus the iceberg orders will be completely filled.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
	LMT		4,100	100.0	100.0	50		LMT	
					100.0	50		LMT	
					100.0	1,000	2,000	LMT	AU322
					100.0	1,000	2,000	LMT	AU322

At the end of the auction the resultant trades are:

- Trade 50 @ 100
- Trade 50 @ 100
- Trade 1,000 @ 100 (AU322)
- Trade 1,000 @ 100 (AU322)

- Trade 1,000 @ 100 (AU322)
- Trade 1,000 @ 100 (AU322).

Scenario 4

In this scenario there is an iceberg order on the bid side of the order book in addition to two iceberg orders on the ask side. In this case the surplus volume is on the ask side.

Bid Orders					Ask Orders				
BPart	Type	TBQty	BQty	Bid	Ask	AQty	TAQty	Type	APart
	LMT		1,500	100.0	100.0	50		LMT	
AU322	LMT	2,000	1,000	100.0	100.0	50		LMT	
					100.0	1,000	2,000	LMT	AU322
					100.0	1,000	2,000	LMT	AU322

At the end of the auction the resultant trades are:

- Trade 50 @ 100
- Trade 50 @ 100
- Trade 1,000 @ 100 (AU322)
- Trade 400 @ 100 (AU322)
- Trade 600 @ 100 (AU322)
- Trade 1,000 @ 100 (AU322)
- Trade 400 @ 100 (AU322).

As the remaining quantity of 600 is less than the minimum visible quantity, this would now be displayed in the Ask Quantity field when the instrument moves to open.

28 Undisclosed Quantity Orders

Undisclosed order is an order type allowed for ASX TradeMatch Equities, Interest Market products and cash-like instruments in the Structured Products, Warrants and Listed Funds market. Undisclosed orders are fully disclosed in terms of execution price but undisclosed regarding execution volume.

28.1 Minimum Order Value

A minimum undisclosed order value is configured on Instrument Class level in ASX Trade.

For this purpose, the value of an undisclosed order is calculated as quantity * price * price quotation factor.

The minimum undisclosed order value configured in ASX Trade is interpreted as primary currency unit, e.g. dollar value. It is currently configured as \$500,000.

28.2 Order Validation

ASX Trade rejects an order with an undisclosed quantity if it is also a "hidden volume order"; i.e. an undisclosed order cannot be entered as an iceberg order.

When an undisclosed order is entered, ASX Trade validates that the resulting absolute order value is larger or equal to the configured minimum order value for undisclosed orders. Note that for order amendments this validation is different. See *Amending Order* below.

If the validation fails for an order entry, the transaction is rejected, and no order is entered.

28.3 Order Priority

Undisclosed quantity orders are entered and traded in price/time priority.

28.4 Trade Broadcasts

It is **not** possible to see if a trade originated from an undisclosed quantity order; i.e. the exchange order type corresponding to undisclosed order is not disseminated in CB15 and CB16 trade broadcasts and corresponding queries.

28.5 Partially Traded Undisclosed Orders

When an undisclosed quantity order is partially traded and the remaining order value is less than the configured minimum undisclosed order value for the instrument class, the order is automatically transformed into a disclosed limit order (i.e. the exchange order type is no longer set to "undisclosed order"), without losing time priority. This is indicated in the BO5 broadcast received for the partial trade by the change_reason_c field set to the value of "39".

28.6 Amending Order

It is possible to amend the exchange order type from or to an undisclosed quantity order. Order priority is not lost when the exchange order type is changed.

The same validations apply when amending as when entering an order, except when reducing the quantity of an undisclosed order. When the quantity of an undisclosed order is reduced so that the order's value is below the minimum undisclosed order value, the amendment is accepted. The undisclosed quantity exchange order type is then automatically cleared by the backend. This applies to both absolute and relative quantity amendments. This is indicated in the BO5 broadcast received for the amendment by the change_reason_c field set to the value of "39".

Because the exchange order type field can be amended from "undisclosed order" to "disclosed order", it needs to be set to the original undisclosed order type when amending other attributes, such as price or quantity, of an undisclosed

order. Otherwise ASX Trade will interpret an exchange order type value of zero sent in the amend transaction as an amendment from undisclosed to disclosed.

28.7 Private Order Book Broadcasts and Queries

The participant order book broadcasts and queries (BO5, MQ92 and MQ8) are visible to all users within the same participant. This includes the undisclosed quantity exchange order type as well as the actual quantity.

28.8 Public Information Dissemination

Public broadcasts include the undisclosed quantity flag **only**; the actual quantity is not revealed in external public broadcasts.

28.9 Price Level Flag

The price broadcasts and queries (BO14, BO15, IQ18 and IQ19) will show if a price level, on either the Buy or Sell, has an undisclosed quantity or not.

The actual undisclosed quantities are not revealed in the broadcasts and queries and therefore it is possible for a price level to have the disseminated quantity zero.

28.10 Order Book Flag

The Order Broadcast (BO2) and Total Order Book Query (MQ7) show whether an order is an undisclosed quantity order or not.

The actual undisclosed quantities are not revealed in the broadcasts and queries, therefore it is possible for an order to have the publicly disseminated quantity zero.

28.11 Derived Orders from Undisclosed Quantity

Derived orders (baits) are not generated from undisclosed quantity orders. Even though baits are not generated, combinations can still trade with undisclosed quantity orders.

28.12 Equilibrium Price Calculations

The full quantity of undisclosed quantity orders is included in the calculation of Equilibrium Price (Indicative Auction Price), Equilibrium Price Quantity and Surplus Volume.

28.13 Trade Statistics

Trades resulting from undisclosed quantity orders update trade statistics in accordance with normal practices.

29 Reporting of Short Sell Quantity

29.1 Entry and Amendment of Short Sell Orders

When entering short sell orders (`exch_order_type_n = 2`), the quantity portion of the order that is short, either whole or partial, must be specified. A variable `short_sell_quantity_i` is available in the MO1 Single Order Insert and MO3 Single Order Update transactions to support reporting of partial short sales.

If the sub-structure that contains the `short_sell_quantity_i` variable is not sent at all in the MO1 transaction, the whole quantity of the short sell order is assumed to be short.

On entry and amendment of short sell orders, short sell quantity is validated to be equal to or less than the total order quantity and greater than zero.

If an order that is not a short sell order is entered with `short_sell_quantity_i > 0`, the order is rejected.

When amending a short sell order, its total order quantity cannot be amended to be less than the short sell quantity. In this case the short sell quantity would need to be amended down accordingly.

The short sell quantity can be amended up or down without the order losing priority.

29.2 Entry of TMC Orders with Cash Legs

To support short sell tagging of Tailor Made Combination (TMC) orders that have one or several Cash sell legs, the validation on entry of TMC orders permits buy and sell orders involving selling one or more component leg(s) to carry the short sell exchange order type.

The submitted short sell quantity applies to all short sell legs of the TMC.

29.3 Short Sell Trade Reports

The trade reporting transactions MO75, MO76 and MO77 include short sell quantity to support reporting of partial short sales.

When reporting a trade that is flagged as a short sell (`exch_order_type_n = 2`), the short sell quantity must be set to the portion of the quantity that is short, either whole or partial. Short sell quantity is validated to be equal to or less than the total trade quantity and greater than zero.

If a trade that is not flagged as short sell is reported with `short_sell_quantity_i > 0`, the trade report is rejected.

29.4 Remaining Short Sell Quantity

When a short sell order that has partial short sell quantity, trades out partially, the quantity that is not short will trade first.

Example

A short sell order that has a quantity of 10,000, with 3,000 of that quantity being short, trades for 5,000. This trade will be from the 'non-short' portion of the order, leaving it with a quantity of 5,000, and a short sell quantity of 3,000. The resulting trade will be disseminated with traded short sell quantity set to zero to indicate that the short sell portion of this order has not yet traded.

For orders, updates to short sell quantity will be disseminated as follows in the BO5 broadcast:

- Specified short sell quantity when the order is first entered
- Updated short sell quantity if it is amended by the user
- Remaining short sell quantity after the order has traded.

The CB15 Dedicated Trade broadcast contains traded short sell quantity for trades where the traded short sell quantity is greater than zero.

29.5 Short Sell Quantity Example



Note:

Order Long Qty = Order Qty – Order Short Qty.

Action	Order Qty	Order Short Qty	Order Long Qty	Traded Qty	Cumulative Traded Qty	Traded Short Qty	Cumulative Traded Short Qty
New Order	100,000	40,000	60,000	-	-	-	-
Partial fill 20,000	80,000	40,000	40,000	20,000	20,000	0	0
Partial fill 40,000	40,000	40,000	0	40,000	60,000	0	0
Partial fill 15,000	25,000	25,000	0	15,000	75,000	15,000	15,000
Partial fill 10,000	15,000	15,000	0	10,000	85,000	10,000	25,000
Remainder filled 15,000	0	0	0	15,000	100,000	15,000	40,000

29.6 Short Sell Quantity Example for a Cash Only TMC Order with Different Ratios



Note:

TMC Order Long Qty = TMC Order Qty – TMC Order Short Qty.

TMC Attributes								
Leg n	Leg/Side		Ratio		Price Quotation Factor			
Leg 1	Buy		2		1			
Leg 2	Sell		3		1			

Action	TMC Order Qty	TMC Order Short Qty	TMC Order Long Qty	TMC Traded Qty	Leg Traded Qty (each leg)	Cumulative Traded Qty	Traded Short Qty	Cumulative Traded Short Qty
New Order	100,000	40,000	60,000	-	-	-	-	-
Partial Fill 20,000	80,000	40,000	40,000	20,000		20,000	0	0
				Leg 1	40,000	40,000	N/A	N/A
				Leg 2	60,000	60,000	0	0
Partial Fill 40,000	40,000	40,000	0	40,000		60,000	0	0
				Leg 1	80,000	120,000	N/A	N/A
				Leg 2	120,000	180,000	0	0
Partial Fill 15,000	25,000	25,000	0	15,000		75,000	15,000	15,000
				Leg 1	30,000	150,000	N/A	N/A
				Leg 2	45,000	225,000	45,000	45,000
Partial Fill 10,000	15,000	15,000	0	10,000		85,000	10,000	25,000
				Leg 1	20,000	170,000	N/A	N/A
				Leg 2	30,000	255,000	30,000	75,000

Action	TMC Order Qty	TMC Order Short Qty	TMC Order Long Qty	TMC Traded Qty	Leg Traded Qty (each leg)	Cumulative Traded Qty	Traded Short Qty	Cumulative Traded Short Qty
Remainder Filled	0	0	0	15,000		100,000	15,000	40,000
				<i>Leg 1</i>	30,000	200,000	N/A	N/A
15,000				<i>Leg 2</i>	45,000	300,000	45,000	120,000

30 ASX Market Maker Protection

30.1 Overview

ASX Market Maker (MM) Protection is aimed at preventing too many simultaneous trade executions on quotes provided by MMs, offering additional control of market risk.

The basic principle can be envisioned as a rolling counter, counting the number of traded contracts per underlying on the MMs quotes, within a given time frame that the MM can define.

If the counter reaches or exceeds a threshold level defined by the MMs, all remaining quotes in the underlying are automatically pulled from the market. MMs can define two threshold values in the counter:

- **Quantity** - total number of contracts traded.
- **Delta** - absolute number of [(bought future contracts + bought call option contracts + sold put option contracts) – (sold future contracts + sold call option contracts + bought put option contracts)]. It is configurable whether futures are included in the delta calculation or not.
- **"Futures"** refers to instruments classified as Instrument Group type "Futures and Forward". Correspondingly **"Options"** refers to instruments classified as Instrument Group type "Options", including LEPOs (Futures Styled Call Options) and options over futures.

30.2 ASX Market Maker Protection Parameters

"Futures" refers to instruments classified as Instrument Group type "Futures and Forward". Correspondingly "Options" refers to instruments classified as Instrument Group type "Options", including LEPOs (Futures Styled Call Options) and options over futures.

MMs are able to set the following parameters per underlying, using the DC87 transaction:

- **Exposure Time Interval** - This parameter is set in milliseconds and defines the rolling time interval for determining if a threshold value has been reached or exceeded.



Note:

The provided value when used by the system is rounded up to the nearest multiple of 1,000, therefore the practical minimum value is 1,000ms.

In practice, the length of the time interval used to determine if a threshold has been reached or breached, is never smaller than this parameter, and never more than 10% higher than this parameter. A value of zero means that MM Protection is not turned on for this underlying.

- **Quotation Frozen Time** - This parameter is set in milliseconds and defines the time period that the MM cannot enter quotes for an underlying after MM Protection has been triggered. A value of zero means that quotes are considered as frozen for the rest of the day.
- **Quantity Protection** - This parameter defines the quantity threshold, i.e. the maximum number of traded quotes for an underlying that the MM is willing to accept within the Exposure Time Interval. If the quantity threshold is reached or breached in the given Exposure Time Interval, MM Protection triggers, and all the MMs remaining quotes in the underlying are automatically pulled from the market. A value of zero means that there is no Quantity Protection set for this underlying.
- **Delta Protection** - This parameter defines the delta threshold, i.e. the maximum number of traded quotes expressed as delta for an underlying that the MM is willing to accept within the Exposure Time Interval. If the delta threshold is reached or breached in the given Exposure Time Interval, MM Protection triggers and all the MMs remaining quotes in the underlying are automatically pulled from the market. A value of zero means that there is no Delta Protection set for this underlying.

Delta is calculated as follows:

- Absolute number of [(bought future contracts + bought call option contracts + sold put option contracts) – (sold future contracts + sold call option contracts + bought put option contracts)].
- It is configurable whether futures are included in the delta calculation or not with the fifth configuration parameter.
- **Include Futures** - This parameter determines whether bought and sold futures contracts are included in the delta protection calculation or not. It can be set to “yes” or “no”.

The ASX MM Protection parameters can be changed intraday and changes will take effect immediately. When one or several parameters are changed, the calculated quantity and delta protection values for the affected underlying are re-set to zero, and the rolling calculation starts afresh.

When the ASX MM Protection parameters are changed, the new values are disseminated in the BU87 broadcast. Parameter settings can also be queried, using the DQ87 query.

30.3 Trades Included in Protection Calculation

The following trades are included into the Quantity and Delta Protection calculation:

- Trades from matched quotes provided by the MM in Derivatives instrument series. Quotes are defined as being entered by the following transactions - MO36 and MO37.
- Trades from matched quotes with own MM orders are included in the calculation.

The following trades are not included into the Quantity and Delta Protection calculation:

- Trades from matched orders entered by the MM. Orders are defined as being entered by the following transactions: MO1 and MO31.
- Trades entered by the MM using other transactions, such as trade reports (MO75 and MO76).
- Trades from matched orders and quotes entered by the MM in Combinations, such as TMCs.
- Quotes trading with own MMs quotes are not included in the calculation.
- Trades from matched quotes in auctions are not included in the calculation.

30.4 Market Maker Protection Trigger

When MM Protection is triggered by reaching or breaching the Quantity or Delta Protection threshold within the given Time Exposure Interval, all the MMs quotes in the instrument series belonging to the affected underlying are automatically deleted by the system. Quotes are defined as being entered by the following transactions: MO36 and MO37.

Orders placed by the MM in instrument series, and orders and quotes in combinations, are not automatically deleted.

The MM receives one BO5 Firm Order Book broadcast per deleted quote. The BO5 includes a change reason showing why the quote was deleted (i.e. either due to quantity protection or due to delta protection; change_reason_c 41 or 42).

The MM also receives a BO38 broadcast as a notification that the protection has been triggered. The broadcast contains the calculated Quantity or Delta Protection values.

As soon as MM Protection is triggered, the configured Quotation Frozen Time starts. During this time period, any new quotes entered by the MM for instrument series belonging to the affected underlying will be rejected. The MM can continue to enter orders in instrument series and orders and quotes in Combinations during this period.

When MM Protection has triggered and quotes have been automatically deleted, the calculated quantity and delta protection values for the affected underlying are re-set to zero and the rolling calculation starts afresh.

30.5 Market Maker Protection Trigger through Block Quotes

If a Block Quote (MO36) is sent by a MM that immediately results in trades, the Block Quote is processed as multiple single transactions instead of one transaction. This implies that if the MM Protection threshold of the MM is breached, for example by the first Block Quote item, the MM Protection is triggered after the first item has been entered. The remaining items in the Block Quote belonging to the affected underlying are rejected with a reason code of “MM Protection”. Rejected Block Quote items are reported through the BO99 broadcast.

If a Block Quote is sent by MM_A that results in hitting several quotes provided by MM_B, the Block Quote is processed as multiple single transactions instead of one transaction. This implies that if the MM Protection of MM_B is breached after processing, for example the first item in MM_A’s Block Quote, MM_B’s MM Protection is triggered. The remaining items in MM_A’s Block Quote are processed after MM_B’s quotes for the affected underlying have been deleted.

30.6 ASX Market Maker Protection Example

MM_A has the following ASX MM Protection configuration for BHP:

Exposure Time Interval	10,000 Milliseconds (10 seconds)
Quotation Frozen Period	5,000 milliseconds (5 seconds)
Quantity Protection	500
Delta Protection	0 (no delta protection)
Include Futures	“No”

MM_A has the following quotes in the market for BHP ETOs:

- June 2013 Call at strike \$41.00

Bid	Ask
20 @ 30 cents	20 @ 32 cents

- June 2013 Call at strike \$35.00

Bid	Ask
30 @ 160 cents	30 @ 165 cents

- March 2013 Put at strike \$21.00

Bid	Ask
30 @ 40 cents	30 @ 42 cents

- June 2013 Put at strike \$30.50

Bid	Ask
50 @ 300 cents	50 @ 310 cents

Within the last eight seconds, a total quantity of 460 in MM_A’s quotes across BHP ETO series has traded.

In the ninth second, a Buy order comes in for the BHP June 2013 Put at strike \$30.50 for 75 @ 310 cents.

This Buy order trades out MM_A’s Ask quote in that series completely.

The total quantity of MM_A's quotes across BHP ETO series that has traded within the last nine seconds is now 510, which exceeds the set Quantity Protection threshold of 500 in the given Exposure Time Interval of 10 seconds.

All of MM_A's remaining quotes in BHP ETO series are automatically deleted.

The Quotation Frozen Period starts and lasts five seconds. During that time, all new quotes entered by MM_A for BHP ETO series are rejected.

After five seconds, MM_A can continue to quote in BHP and the quantity protection threshold calculation starts afresh.

31 Cancel on Disconnect

ASX Trade supports Cancel on Disconnect for both OI and OUCH sessions. This functionality is configured at the session level. Customers must advise Trading Operations (tradingoperations@asx.com.au) of their preferences when ordering new sessions or when a change is required.

31.1 Cancel on Disconnect for OUCH

An OUCH session provides customers with four Cancel on Disconnect options, two heartbeat timeout variations, one immediate or disabled.

Option 1 and 2 will trigger if the session has disconnected and failed to login again to any active gateway prior to the timeout period. A graceful logout will not trigger Cancel on Disconnect functionality.

Option 3 will result in day orders immediately being cancelled upon a disconnection event which is triggered on a loss of connection for any reason, including a graceful logout. The Immediate Cancel option has a dependency on identifying a TCP RST or FIN flag or a logout message for the session. In the event where the network is down or these flags are not present, the Cancel on Disconnect trigger will fallback to the Timeout Period before determining the session is lost.

Option 4 disables all Cancel on Disconnect functionality for the session.

Option	Order Retention Option	Trigger	Maximum Timeout Period*	Time Validity: Day	Time Validity: Others**
1	Cancel – Day only	2 missed heartbeats	14 seconds	Cancelled	NA
2	Cancel – Day only	3 missed heartbeats	21 seconds	Cancelled	NA
3	Immediate Cancel – Day only	Loss of connection (including graceful logout)	Immediately	Cancelled	NA
4	Disabled (Retain All)	NA	NA	NA	NA

*Maximum Timeout Period is triggered from the point in time the system determines the user to be lost. If the network is down from the customer to the gateway the user lost determination will not be immediate (typically 15 seconds).

**OUCH only supports good for day orders.

31.2 Cancel on Disconnect for OI

An OI session provides customers with four Cancel on Disconnect options, two heartbeat timeout variations, one immediate or disabled.

Option 1 and 2 will trigger if the session has disconnected and failed to login again to any active gateway prior to the timeout period. A graceful logout will not trigger Cancel on Disconnect functionality.

Option 3 will result in day orders immediately being cancelled upon a disconnection event which is triggered on a loss of connection for any reason, including a graceful logout. The Immediate Cancel option has a dependency on identifying a TCP RST or FIN flag or a logout message for the session. In the event where the network is down or these flags are not present, the Cancel on Disconnect trigger will fallback to the Timeout Period before determining the session is lost.

Option 4 disables all Cancel on Disconnect functionality for the session.

Option	Order Retention Option	Trigger	Maximum Timeout Period*	Time Validity: Day	Time Validity: Others
1	Cancel – Day only	3 missed heartbeats	180 seconds	Cancelled	Not cancelled
2	Cancel All	3 missed heartbeats	180 seconds	Cancelled	Cancelled
3	Immediate Cancel – Day only	Loss of connection (including graceful logout)	Immediately	Cancelled	Not cancelled
4	Disabled (Retain All)	NA	NA	NA	NA

**Maximum Timeout Period is triggered from the point in time the system determines the user to be lost. If the network is down from the customer to the gateway the user lost determination will not be immediate (typically 60 seconds).*

31.3 Cancel on Disconnect during ENQUIRE session state

Cancel on Disconnect functionality will not be available during the ENQUIRE session state. ENQUIRE is reserved exclusively for use during market incidents. It is designed to create a comprehensive freeze on all participant-initiated activity.

32 Trader Authorisation

ASX Trade supports two configuration options for OMNet sessions controlling whether an OI user is able to manage orders entered by a different user within the same participant. The configuration applies at the OI user level and customers must advise Trading Operations on their preferences when ordering new sessions.

Trader Authorisation Setting	Description
Allow delete/alter firm orders	OI user is able to modify and cancel orders entered by other users within the participant
Disallow delete/alter firm orders	OI user is only able to modify and cancel orders it has entered (or owns)

33 Recovery

33.1 Gateway Connections

User connections are disabled each night from 20:30 to allow for night batch processing. Users are not able to log in to the system again until 02:25 the next trading day.

During the day if a gateway encounters network or connectivity problems, the user is notified through a series of Network Events.

If the gateway has lost its connection to ASX Trade then the data may not be current. An OI device is informed of the gateway status via a BN4 or BN1 network event.

If a user connection is not keeping up with the broadcast stream, the gateway may discard messages for that user. In this case the user is notified that their buffer has overflowed by receiving a OMNIAPI_OVERFLOW value as the return code from the read event function (refer to *omniapi_read_event_ext_ex – Read Events in ASX Trade Open Interface Function Calls*).

33.2 BN1 (OMNI_DU_DATALOST)

This message is sent when the user's buffer on the gateway has overflowed and messages have been discarded.

This usually means that the client application is not keeping up with the broadcast stream, or not polling the gateway for broadcasts often enough.

Once this message has been received, the user's data may not be up to date, as they do not know what messages have been missed.

A market data recovery should be implemented.

33.3 Market Data Recovery

Some of the events listed above require the client application to do a market data recovery. This recovery is similar to the initialisation required when an application signs on; however, there are some steps that can safely be omitted.

The queries that should be executed to recover market data are as follows:

- DQ120 Delta Underlying
- DQ122 Delta Instrument Class
- DQ124 Delta Instrument Series
- DQ126 Combination Series
- IQ12 Total Equilibrium Prices
- IQ18 Total Volumes and Prices (for derivatives – 5 levels depth)
- IQ19 Total Volumes and Prices (for equities – 1 level depth)
- UQ14 BI81 Broadcasts Sent
- UQ15 Instrument Status
- UQ20 BI73 Signals Sent.

34 Gateway Timeouts

If the communications path between a participant and a gateway is broken, the time delay before the break is detected by either end depends on the state of the systems at the time of the break. Consider the pair of systems as being in a conversation. At any instant in time each end may be talking, listening or doing something else. The conversation is more structured than a human conversation, with rules about how and when requests and responses are acknowledged, and how long it is reasonable to wait for a particular type of response or acknowledgement.

In the case of ASX Trade, most timeouts are of the order of about 10 seconds. These cover cases like sending a request and expecting an immediate, protocol level response. When reading from the network, the protocol level has no timeout. It waits forever for data to arrive – this is intentional and desirable for most applications. However, at the application level, it may make sense to impose a timeout waiting for an “answer”, which should take a finite time to determine. In the case of ASX Trade, the gateway passes some requests onto the back end system, which may then need to perform considerable processing before responding. In addition to the processing time, there may be traversals of several network links between systems.

34.1 API Call Timeout

In order for an API client application to be guaranteed not to hang in an API call, a call timeout can be used, for example all API calls are guaranteed to return within specified time. If an API call times out it will return an error code. If this occurs the session is terminated and the TCP/IP link to the Gateway is closed. An API call timeout can be set at system level. The configuration parameters are set in the command window of the machine using OMNet API. A separate timeout argument can be used in the `omniapi_read_event_block` function call to block if no broadcasts are available for retrieval.

ASX Trade does not set an application timeout by default. Previously a timeout of 300 seconds (five minutes) was applied. If no `API_TIMEOUT` is set, the API Call will not time out.

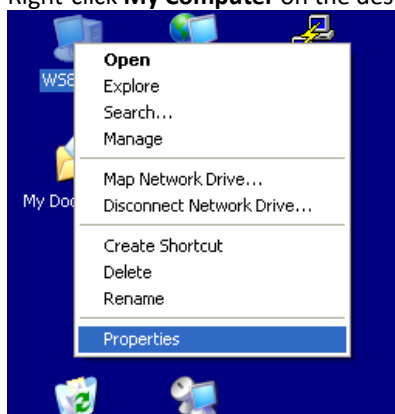
When considering using the timeout for an OMNet API application, the risk of setting it too low is that they may give false triggers for transient conditions that may have been recoverable. Setting them too high delays detection of a real network fault.

Communications failures are relatively rare, and even when they occur, the chance of it occurring at a time which will be subject to a five minute timeout delay is fairly low. This is difficult to predict, but for a busy system it's probably of the order of one in 10, for an idle or slow system it's practically zero.

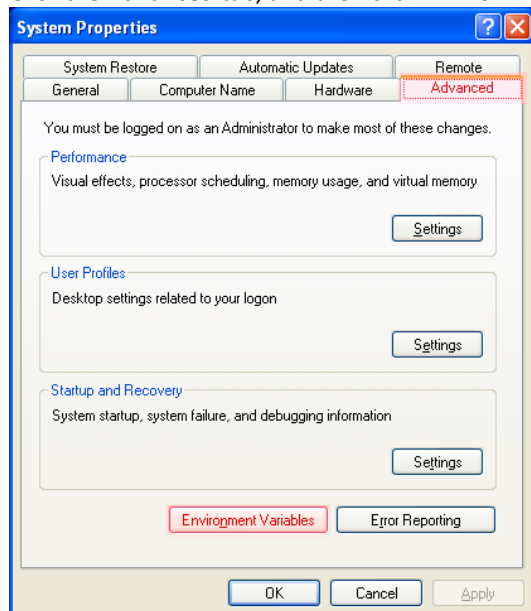
Setting the Windows environment variable `OAPI_TIMEOUT` (system wide variable/logical for other Operating Systems).

To set the value:

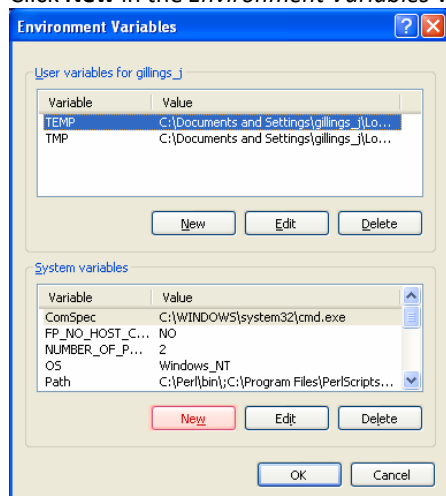
1. Right-click **My Computer** on the desktop and select **Properties**.



- Click the **Advanced** tab, and then click **Environment Variables** in the *System Properties* window.



- Click **New** in the *Environment Variables* window.



- Enter the variable name and value in the *Variable name* and *Variable value* fields.



- Click **OK** in all open windows, and reboot.



Note:

This change affects **all** programs on the system that use ASX Trade OI, and is permanent (i.e.: survives reboots).

35 Appendix 1 –Session States

The following table indicates the current session states that have been configured in ASX Trade. Certain permitted and restricted trading activities in session states as mentioned in the section on Market Trading Cycles cannot be deduced from the response of the DQ29 query (refer to DQ29 Trading State). Therefore the allowable functions of each session has to be hard coded by the user.

Identifier	Session State Name	Priority
1	PRE_NR	42
2	TRADING_HALT	60
3	SUSPEND	100
4	ADJUST	70
5	PRE_OPEN	41
6	ENQUIRE	90
8	ADJUST_ON	71
9	CLOSE	120
10	CSPA	40
11	LATE_TRADING	30
12	OPEN	10
13	OPEN_NIGHT-TRADING	10
14	PRE_CSPA	30
15	PRE_NIGHT-TRADING	80
16	PURGE_ORDERS	110
17	SYSTEM_MAINTENANCE	111
18	OPEN_QUOTE-DISPLAY	10
21	REG_HALT	25
23	CANCEL_ONLY	85

OI users are advised that ASX does not guarantee the above session state identifiers to be used in the production system. The above table represent the current configuration. Session state names will remain as shown here, but the identifiers may change. Users are to query the system with the DQ29 for a definitive list or be able to configure their OI applications easily for any potential changes in identifiers.

36 Appendix 2 – CANCEL_ONLY Session State

The CANCEL_ONLY session state is intended for use only in the event of a market outage, where broadcasted market data cannot be relied upon. In this scenario, impacted system processes may be shut down meaning that OMNet sessions cannot rely on receiving a Firm Order Book (BO5) broadcast to confirm successful cancellation of orders. In this case OMNet sessions can instead make use of the OMNet transaction acknowledgement or 'ack' to confirm the status of order cancellations. In scenarios where broadcasted market data is NOT impacted the ADJUST session state would be used. CANCEL_ONLY will only be invoked when it has been determined the market will not re-open for the remainder of the trading day.

OMNet ack to confirm cancellations

The OMNet ack provides a return code 'cstatus' and 'txstat' that offers definitive information about the success (or otherwise) of the transaction along with additional details.

MO4 used to cancel a single order

MO4 may be used to cancel a single order entered via OMNet by specifying the order identifier of the order to be deleted.

The potential cstatus and txstat values are:

- A negative value: the transaction was unsuccessful, the value indicates the reason for failure
- Zero: the transaction was successful but the order was not found
- A positive value: the transaction was successful, the value in txstat indicates the quantity deleted

Where the ASX customer wishes to confirm the quantity of a deleted order, that order should be individually deleted.

MO4 used to cancel multiple orders

MO4 may be used to cancel multiple orders including orders entered via OMNet and OUCH by specifying certain characteristics of the orders to be deleted.

The potential cstatus and txstat values are:

- A negative value: the transaction was unsuccessful, the value indicates the reason for failure
- Zero: the transaction was successful but the orders were not found
- A positive value: the transaction was successful, the value in txstat indicates the number of orders deleted

This method is the most efficient approach to cancel multiple orders. However, the ASX customer will not receive a specific response in relation to each order.

Disclaimer

This document provides general information only and may be subject to change at any time without notice. ASX Limited (ABN 98 008 624 691) and its related bodies corporate (“ASX”) makes no representation or warranty with respect to the accuracy, reliability or completeness of this information. To the extent permitted by law, ASX and its employees, officers and contractors shall not be liable for any loss or damage arising in any way, including by way of negligence, from or in connection with any information provided or omitted, or from anyone acting or refraining to act in reliance on this information. The information in this document is not a substitute for any relevant operating rules, and in the event of any inconsistency between this document and the operating rules, the operating rules prevail to the extent of the inconsistency.

ASX Trade Marks

The trademarks listed below are trademarks of ASX. Where a mark is indicated as registered it is registered in Australia and may also be registered in other countries. Nothing contained in this document should be construed as being any licence or right to use of any trade mark contained within the document.

ASX®