ASX Trade Guide to Testing Services

Version 1.6 | May 2024

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1. Readership

This document is relevant to software developers, system testers, and other technical staff who are involved in testing and developing applications for the ASX Trade system.

2. Introduction

The ASX provides a range of testing services to customers developing and testing market-facing systems.

The purpose of this document is to provide an overview of the ASX customer testing services available and how to access them.

When read in conjunction with ASX technical specifications and connectivity guides, it is intended that these documents provide all of the necessary information customers require to develop, test and trial their software before connecting to ASX Trade production services.

Please note that all times quoted are in Sydney time (AEST/AEDT).

2.1. Contacts

The Customer Technical Support (CTS) team operates a 'service desk' style support centre for ASX customers, which provides support coverage on ASX trading days, 07:00 to 18:00. After-hours support and escalation is provided via the ASX Trading Operations team.

Questions about test environments can be directed to CTS:

Email: CTS@asx.com.au

Phone: From within Australia   1800 663 053

From outside Australia   +612 9227 0372

2.2. Document History

Issue	Date	Description
1.0	March 2018	○ Draft version published for internal review
1.1	September 2020	○ ASX Trade refresh update
1.2	March 2021	○ Addition of Listed Funds Warrants and St Prods market exceptional schedule

1.3	June 2023	o Addition of CANCEL_ONLY session state on Exceptional Schedule Equity Market Group 5 o Addition of Simulation of Technical Outage
1.4	November 2023	o Updated 4.6 Outage Simulation
1.5	April 2024	o Updated 4.2.3 Exceptional Schedule
1.6	May 2024	o Updated 4.6 Outage Simulation

3. Service Overview

The test environments are for customers to test the functional interface between their software applications and the ASX Trade system. Customers can perform the following:

- Development of new software applications and/or features

- Conformance of their software applications for use on the production service

- Provide market participants with a safe training environment away from the production service

- Verify that their market data applications can successfully process messages

- Test their application's ability to recover from service disruptions

- Test outside of normal market hours

The above service offerings are available via a combination of testing environments described in the following sections.

The test markets offered for the ASX Trade platform are the CDE and CDE+, described in section 3 below.

Both the CDE and CDE+ support the Open Interface (OI), ITCH and OUCH services. Connectivity details for these services can be obtained by contacting CTS.

4. ASX Trade Open Interface (OMNet API)

4.1. Service Description

CDE and CDE+ offer a shared test environment for all participants to help them develop, test and run their trading and market data applications for ASX Trade.

The CDE environment utilises the most current version of ASX Trade software and the CDE+ has the next version of the software. Both the CDE and CDE+ are only for functional testing, they are not built for capacity or load testing. There is no end-to-end integration into CHESS.

ASX encourages participants to always use the latest supported operating system and the latest API kits. These details can be obtained by contacting CTS.

- **Customer Development Environment (CDE)**
  The CDE is a communal test market that uses the current production version of the ASX Trade software.

- **Customer Development Environment Plus (CDE+)**
  Similar to the CDE, except that CDE+ has the next version of the ASX Trade software, containing bug fixes and new features to be part of the next release of ASX Trade.

Within the CDE and CDE+ these interfaces are available: ASX Trade Open Interface (the "OI"), ASX OUCH, and ASX ITCH.

4.2. Access to the Open Interface

To access the OI, customers will be required to complete an order form via their Business Development Manager (Technical Services) representative.

Connectivity can be established via the following methods:

1. Direct Connectivity from an ALC Cabinet

2. Connectivity over ASX Net

3. Connection via IPsec VPN

For more information on the connectivity methods, please contact CTS.

Trading Day Cycle

4.2.1. CDE and CDE+ Availability

The CDE and CDE+ operate 7 days a week across all instruments. In addition, equity groups 3-5 and Listed Funds Warrants & St Prods market follow an exceptional schedule.

4.2.2. Standard Schedule

All times are in AEST.

Trading Session State	Description	Time
PRE_OPEN	PRE_OPEN is 07:00 - 10:00. During PRE_OPEN: • Brokers enter orders into ASX Trade in preparation for the market opening. • Matching does not occur and prices can overlap.	07:00:00 – 10:00:00

Trading Session State	Description	Time
OPEN	The opening process starts at approx. 10:00 and lasts for approx. 10 minutes. ASX Trade calculates opening prices during this phase. Securities open in five groups, according to the first letter of their ASX code: Group 1 10:00:00 +/- 15 secs 0-9 and A-B, e.g. ANZ, BHP Group 2 10:02:15 +/- 15 secs C-F, e.g. CPU, FXJ Group 3 10:04:30 +/- 15 secs G-M, e.g. GPT Group 4 10:06:45 +/- 15 secs N-R, e.g. QAN Group 5 10:09:00 +/- 15 secs S-Z, e.g. TLS Each approx. time is randomly generated by ASX Trade and occurs up to 15 seconds on either side of the times given above, e.g. Group 1 will open at any time between 09:59:45 and 10:00:15	10:00:00 +/- 15 secs
PRE_CSPA	Between 16:00 and 16:10, Sydney time, the market is placed in PRE_CSPA. Similar to PRE_OPEN, matching is prevented and brokers can enter, amend and cancel orders in preparation for CSPA.	16:00:00 – 16:10:00
CSPA	The Closing Single Price Auction occurs between 16:10* - 16:12 ASX Trade calculates closing prices during this phase. *Randomized +/- 30 secs	16:10:00* - 16:12:00
ADJUST	The ADJUST state allows for trade reports, trade cancellation, amend of orders where priority is not improved, and cancellation of orders. No matching occurs.	16:12:00 – 16:42:00

Trading Session State	Description	Time
ADJUST_ON	This state is the same as the ADJUST session state.	16:42:00 – 18:50:00
PURGE_ORDERS	This state allows for trade cancellation and trade reporting only. Where orders meet the purge criteria, they will be cancelled.	18:50:00 – 18:59:00
SYSTEM_MAINTENANCE	Administration/system adjustment session state.	18:59:00 – 19:00:00
CLOSE	No trading messages may be entered or amended in ASX Trade and no matching or auctions take place.	19:00:00 – 19:30:00

Specific contract session timings follow the production times described here: http://www.asx.com.au/about/trading-hours.htm

Use the drop-down selection box to view the schedules, the first two choices: Shares and Options are relevant to the ASX Trade market.

4.2.3.   Exceptional Schedule

To facilitate further testing of trading sessions and allow for testing out of Sydney time zone, the CDE and CDE+ have a modified schedule for equity instruments in groups G-M, N-R, S-Z (groups 3, 4, 5) and Listed Funds Warrants & St Prods market as detailed in the following tables. These instruments cycle through the trading states more frequently than in a standard schedule.

On the last trading day of the ASX24 quarterly SPI 200^{TM} futures contracts, CDE and CDE+ will follow the production schedule for those days, where the five equity groups A-B, C-F, G-M, N-R, S-Z open 4 minutes apart starting from 10:00 Sydney time. Other days follow the CDE and CDE+ exceptional schedule.

CDE Equity Market Group 3 (G-M)

Trading Session State	Time
PRE_OPEN	01:10:00
OPEN	01:15:00
PRE_OPEN	09:55:00
OPEN	10:04:15
PRE_CSPA	16:00:00
CSPA	16:15:00
ADJUST	16:17:00

Trading Session State	Time
ADJUST_ON	16:42:00
PRE_OPEN	17:10:00
OPEN	17:15:00
ADJUST	21:17:00
ADJUST_ON	21:18:00
PURGE_ORDERS	21:20:00
SYSTEM_MAINTENANCE	21:29:00
CLOSE	21:30:00

CDE Equity Market Group 4 (N-R)

Trading Session State	Time
PRE_OPEN	00:10:00
OPEN	00:15:00
PRE_OPEN	09:55:00
OPEN	10:06:30
PRE_CSPA	16:00:00
CSPA	16:10:00
ADJUST	16:12:00
PRE_OPEN	16:25:00
OPEN	16:30:00
ADJUST	21:17:00
ADJUST_ON	21:18:00
PURGE_ORDERS	21:20:00
SYSTEM_MAINTENANCE	21:29:00
CLOSE	21:30:00

CDE Equity Market Group 5 (S-Z)

PRE_OPEN	00:10:00
OPEN	04:00:00
PRE_CSPA	04:15:00
CSPA	04:30:00
PRE_OPEN	04:32:00
OPEN	06:00:00
PRE_CSPA	06:15:00
CSPA	06:30:00
PRE_OPEN	06:32:00
OPEN	10:08:45
PRE_CSPA	10:15:00
CSPA	10:30:00
PRE_OPEN	10:32:00
OPEN	12:00:00
PRE_CSPA	12:15:00
CSPA	12:30:00
PRE_OPEN	12:32:00
OPEN	14:00:00
PRE_CSPA	14:15:00
CSPA	14:30:00
PRE_OPEN	14:32:00
OPEN	15:45:00
PRE_CSPA	16:00:00
CSPA	16:15:00
ADJUST	16:17:00
PRE_OPEN	16:25:00

OPEN	16:30:00
PRE_CSPA	21:00:00
CSPA	21:10:00
ADJUST	21:12:00
ADJUST_ON	21:18:00
PURGE_ORDERS	21:20:00
SYSTEM_MAINTENANCE	21:29:00
CLOSE	21:30:00

CDE+ Equity Market Groups 1 (A-B), 2 (C-F)

Trading Session State	Time
PRE_OPEN	07:00:00
OSPA	09:59:00
OPEN	09:59:45
PRE_OPEN	11:50:00
OSPA	11:59:00
OPEN	11:59:45
PRE_OPEN	13:50:00
OSPA	13:59:00
OPEN	13:59:45
PRE_CSPA	16:00:00
CSPA	16:10:00
ADJUST	16:12:00
ADJUST_ON	16:42:00
PURGE_ORDERS	18:50:00
SYSTEM MAINTENANCE	18:59:00
CLOSE	19:00:00

CDE+ Equity Market Groups 3 (G-M), 4 (N-R), Warrants, Interest Rates

Trading Session State	Time
PRE_OPEN	01:10:00
OPEN	01:15:00
PRE_OPEN	08:00:00
OSPA	09:59:00
OPEN	09:59:45
PRE_OPEN	11:50:00
OSPA	11:59:00
OPEN	11:59:45
PRE_OPEN	13:50:00
OSPA	13:59:00
OPEN	13:59:45
PRE_CSPA	16:00:00
CSPA	16:10:00
ADJUST	16:12:00
ADJUST_ON	16:42:00
PRE_OPEN	17:10:00
OSPA	17:19:00
OPEN	17:19:45
ADJUST	21:17:00
ADJUST_ON	21:18:00
PURGE_ORDERS	21:20:00
SYSTEM MAINTENANCE	21:29:00
CLOSE	21:30:00

CDE+ Equity Market Group 5 (S-Z)

Trading Session State	Time
PRE_OPEN	0:10:00
OPEN	0:30:00
ENQUIRE	1:00:00
CANCEL_ONLY	1:10:00
OPEN	1:40:00
ENQUIRE	2:00:00
CANCEL_ONLY	2:10:00
OPEN	2:40:00
ENQUIRE	3:00:00
CANCEL_ONLY	3:10:00
…	…
Schedule will continue this rotation	…
…	…
PRE_OPEN	08:00:00
OSPA	09:59:00
OPEN	09:59:45
PRE_OPEN	11:50:00
OSPA	11:59:00
OPEN	11:59:45
PRE_OPEN	13:50:00
OSPA	13:59:00
OPEN	13:59:45
ENQUIRE	14:00:00
CANCEL_ONLY	14:10:00

Trading Session State	Time
OPEN	14:40:00
ENQUIRE	15:00:00
CANCEL_ONLY	15:10:00
OPEN	15:40:00
ENQUIRE	16:00:00
CANCEL_ONLY	16:10:00
OPEN	16:40:00
…	…
Schedule will continue this rotation	…
…	…
PRE_CSPA	21:00:00
CSPA	21:10:00
ADJUST	21:12:00
ADJUST_ON	21:18:00
PURGE_ORDERS	21:20:00
SYSTEM_MAINTENANCE	21:29:00
CLOSE	21:30:00

CDE & CDE+ Listed Funds, Warrants and Structured Products

Trading Session State	Time
PRE_OPEN	07:00:00
OPEN*	09:59:46
PRE_CSPA	21:00:00
CSPA	21:10:00
ADJUST	21:12:00
ADJUST_ON	21:18:00

Trading Session State	Time
PURGE_ORDERS	21:20:00
SYSTEM_MAINTENANCE	21:29:00
CLOSE	21:30:00

* Index warrants OPEN at the earlier time of 09:49:45

4.3. Load Injector

ASX runs a load generation script in both the CDE and CDE+ so customers can test against valid data such as order depth and trades. Data is loaded in for viewing and testing by participants. The activity is supplied at a reduced volume and speed – a sample set of data from production is fed into CDE and CDE+ at a speed of 1 transaction per second (tps). Customers can use orders entered by the injector to execute against as part of their testing. Production is simulated by taking an aged log file and injecting the market data based on historical activity. As a result, activity in test market order books is closely related to its proportion of activity in the production environment. Popular equities such as BHP and CBA will display frequent activity. Options, warrants and interest rate products will display less activity.

4.4. Performance Testing

Performance testing is not supported within CDE and CDE+, as these environments are set up for development, testing and conformance purposes only, and they are not scaled to be production environments.
OI users will be throttled to 10 or 50 tps, depending on their profile settings.

4.5. ITCH Packet Drop

The UDP packets will experience a 10% loss for the duration of 120 seconds. This occurs on the hour from 10:00 to 16:00, 7 days a week. As ITCH multicast and blink services both use UDP, packets are not guaranteed delivery. Whilst messages may be dropped this is not a regular occurrence. The packet drop configuration in the test environment has been created to encourage testing of the ITCH Rewinder service, allowing clients to configure their systems for recovery on the UDP channels.

4.6. Outage Simulation

The CANCEL_ONLY session state is designed only for use in the event of a production market outage. Similarly, the Order and Trade Download Service (ODS, TDS) is only intended for use in major ASX Trade incident scenarios. In such situations where order book changes are likely to result in the broadcast of erroneous market data, the processes broadcasting potentially erroneous market data would be shut down.

ASX will conduct a simulated market incident scenario that incorporates ODS, TDS, the cessation of market data broadcasts and the CANCEL_ONLY session state in the CDE+ environment once a month on the final Friday of each month. The simulation will begin at 2pm on these days and will follow the below sequence of events:

Time	Event
14:00	Disable market data (cessation of BO5 broadcasts, ITCH multicast and recovery services)
14:10	All Markets transition to ENQUIRE session state
14:15	Pre FOT assessment TDS files generated for SFTP(trades after 12:00 flagged as under review)
14:20	ODS files generated for SFTP
14:30	Post FOT assessment TDS files generated for SFTP (trades after 12:17:01 flagged as 'Trades will not stand')
15:00	All Markets transition to CANCEL_ONLY session state
21:20	All Markets run through end of day session state sequence

5. ASX Trade ITCH and OUCH

The ITCH and OUCH services are available on both the CDE and CDE+ systems.

6. Practice Market

Practice market is included in the CDE, CDE+ and production environments. This section focuses on the practice market, which is offered as part of the ASX Trade **production** system. The practice market allows users to practice and train in accordance with ASX Operating Rules. This market must not be used for general testing, practice instruments should be used only for connectivity validation and training purposes.

In the practice market:

- Orders can be entered for practice
- Trades are executed without the daily totals being affected
- Orders and trades are deleted nightly
- Practice market executions do not flow through to production clearing and settlement systems

At the interface level, the practice market is defined as:

Market	Description	Internal ID
PRAC	PRACTICE MARKET	250

Instrument Type	Description	Market	Instrument 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

Instrument Type	Description	Market	Instrument Group
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 WHOLSALE INT RATE SECURITIE	PRAC	WHL
PDTM	PRACTICE GENERIC TAILOR MADE	PRAC	TMC

7. Conformance Testing

The conformance testing process is designed to test and certify functional and non-functional aspects of the application, based on a customer's intent for the application.

It aims to ensure that applications:

- Can communicate with the production system in the correct manner

- Do not adversely affect the production system

- Do not inadvertently affect the production market.

Each customer application must pass the conformance test prior to their application going live in production. Customers using a vendor-supplied system will rely on the vendor company to seek accreditation for their own systems.

For details relating to conformance testing, please contact CTS and your Technical Account Manager.

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