



Public Consultation

Market Management Consultation

28 June 2022

Invitation to comment

ASX is seeking submissions on aspects of ASX's approach to market management in the event of an incident on the ASX market.

Submissions are due by **Tuesday 9 August 2022** and should be sent by email to:
consultations@asx.com.au

or by mail to:
 ASX Limited
 PO Box H224
 Australia Square NSW 1215
 Attention: ASX Consultations

ASX would prefer to receive written submissions in electronic form. If you would like to meet and discuss the consultation paper please call Ben Jackson on +61 2 9227 0897 or Rob Nash on +61 2 9227 0032.

If you would like your submission, or any part of it, to be treated as confidential, please indicate this clearly in your submission. ASX reserves the right to publish the submissions it receives. Where a submission, or part thereof, is marked confidential ASX will consider publishing the content on a collated and anonymous basis

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1. Introduction

1.1 Background

On 24 November 2021, the Australian Securities and Investments Commission (**ASIC**) published Report 708 entitled 'ASIC's expectation for industry in responding to a market outage' (**REP 708**)¹. REP 708 outlines the findings from ASIC's review of the market outage and other operational incidents that affected the ASX equity market in the week of 16 November 2020 (**November 2020 incident**).

REP 708 sets out *expectations to support the resilience and robustness of the Australian equity market* that are variously applicable to Market Operators (eight expectations), market participants (seven expectations) and large institutional investors (one expectation).

ASIC's expectations of Market Operators (**ASIC's expectations**) cover:

- Expectation 1: *Technology status and market monitoring*
- Expectation 2: *Session states*
- Expectation 3: *Certainty about order and trade positions*
- Expectation 4: *Frequency and content of communications*
- Expectation 5: *Intraday checkpoints and cut-off times*
- Expectation 6: *Policies for disabling market components*
- Expectation 7: *Software release testing framework*
- Expectation 8: *Business continuity planning and IT disaster recovery.*

This consultation is the first in an anticipated sequence of three consultations ASX Limited (**ASX**) will be undertaking as ASX implements its response to ASIC's expectations.

Throughout this document, text in *italics* is verbatim from the sections of REP 708 that relate to ASIC's expectations.

ASX commissioned an independent expert review of the ASX Trade Refresh Project that culminated in the implementation of a new version of ASX Trade on 16 November 2020. This review was undertaken by IBM Australia Limited and the final report (**IBM Report**) was publicly responded to by ASX in August 2021. The executive summary of the report is available on ASX's website².

The IBM report sets out 17 high level recommendations (with 59 discrete tasks). Whilst the majority of these recommendations relate to internal ASX processes, tasks 6.4.2 (performance testing) and 7.1.1. (default time for closing the market) relate to matters that impact or potentially impact ASX Participants and the management of the ASX market, and will be covered in this consultation process.

ASX's response to these tasks will be also be discussed in ASX's intended consultations in response to ASIC's expectations.

ASX is aware that the content and outcomes of ASX's consultation process may directly impact programs of work underway at ASX Participants in response to the expectations on market participants set out in REP 708.

¹ <https://asic.gov.au/regulatory-resources/find-a-document/reports/rep-708-asic-s-expectations-for-industry-in-responding-to-a-market-outage/>

² <https://www2.asx.com.au/content/dam/asx/markets/trade-our-cash-market/ibm-report-executive-summary-161221-redacted.pdf>

1.2 ASX's consultation approach

The indicative timeline for ASX's intended three consultations to meet a number of ASIC's expectations is:

- **June 2022: first market management consultation** (this consultation), which broadly assesses the current position and considers refinements and improvements based on current capabilities
- **September 2022: second market management consultation**, which ASX anticipates will incorporate feedback from the first market management consultation and will consider improvements based on potential future capabilities
- **December 2022: testing consultation**, which ASX anticipates will cover potential improvements to participant testing and will incorporate agreed changes arising from the first and second market management consultations.

The intended content is set out in more detail below.

- **First market management consultation** - this consultation, which broadly considers improvements based on current ASX Trade capabilities and covers:
 - Expectation 2 (in part): *Session states*
 - *procedures for session states during market outages*
 - *thresholds for moving to a session state that accommodates participant interaction*
 - *how and when this will be re-assessed on an outage day*
 - Expectation 3 (in part): *Certainty about order and trade positions*
 - *policies and processes for providing participants with trade confirmations and order status including ... data formats*
 - Expectation 4: *Frequency and content of communications*
 - *the communication protocol for outages, including the scope of information and updates to be provided, and the delivery mechanism to other market operators, participants and other stakeholders*
 - Expectation 5 (in part): *Intraday checkpoints and cut-off times*
 - *the protocol for intraday checkpoints during a market outage, including a final cut-off time after which the market would not be re-opened.*

Expectation 5 overlaps with IBM Task 7.1.1 which will also be addressed in this first market management consultation.

- Task 7.1.1: During an outage where the market is not in a fully open state, identify what length of time would require a default decision of closing the market and performing end of day activities, unless there are other overriding circumstances.
- **Second market management consultation – target date September 2022** - ASX anticipates this will incorporate feedback from the first market management consultation and cover improvements based on potential future capabilities of ASX Trade and may cover:
 - Expectation 2 (the balance of this expectation): *Session states*

- potential *alternatives to the Enquire session state and options that allow participants to manage their orders* that may be available subject to the related consultation on Expectation 5
- Expectation 3 (the balance of this expectation): *Certainty about order and trade positions*
 - potential *alternative arrangements ... to provide trade confirmations during operational incidents where they are not reliably available via the usual channels*
 - potential alternative processes for providing participants with order status during operational incidents where that is not reliably available via the usual channels
- Expectation 5 (the balance of this expectation): *Intraday checkpoints and cut-off times*
 - potential *alternative approaches that may assist with restoring trading more quickly, such as an intraday reboot of key trading systems.*

ASX is currently assessing the feasibility of the potential alternatives set out above and intends to consult on those which are both feasible and offer a meaningful improvement in one or more areas of ASIC's expectations.

The second market management consultation will also cover:

- Expectation 6: Policies for disabling market components
 - *the circumstances under which particular order types or market components will be disabled, as well as the notice period before these changes including before market open and intraday.*
- **Testing consultation – target date December 2022** - ASX anticipates this will cover potential improvements to participant testing based on agreed changes arising from the first and second market management consultations to be potentially incorporated into future participant test activities:
 - Expectation 8: *Business continuity planning and IT disaster recovery*
 - *testing of simulated market outage events during business continuity plan testing to enable participants to develop test cases to practice recovery strategies or switching to alternative arrangements for critical dependencies.*

ASX intends to incorporate any changes resulting from the testing consultation in the next annual ASX Trade BCP test, which will occur in June 2023.

IBM Task 6.4.2 will also be incorporated in this testing consultation.

- Task 6.4.2: engage the market to understand the benefits and demand for the re-introduction of a performance testing environment.

1.3 This first market management consultation

The commentary in this consultation paper has been divided into sections addressing different topics:

- Section 2: Certainty about trade and order status
- Section 3: Session states, intraday cut-offs and checkpoint times
- Section 4: Incident communications
- Section 5: Dependencies.

The first part of each section is a brief introduction to the topic. Subsequent sub-sections discuss different issues relevant to that topic.

The questions being asked are set out in orange boxes throughout this consultation paper. For your convenience, ASX has also gathered them together in Annexure A of this consultation paper.

Areas that ASX intends to discuss further in subsequent consultations are set out in grey boxes.

1.4 Stakeholders invited to comment

ASX welcomes feedback to this consultation paper from all interested stakeholders. ASX is particularly keen to receive feedback from:

- ASX Participants
- ASX subscribers
- retail and wholesale investors
- industry bodies representing the groups above
- other Market Operators.

ASX appreciates that this consultation paper covers complex issues and has a large number of questions. Stakeholders should feel free to limit their responses to those parts of the consultation paper and the consultation questions that are of particular interest to them. Where appropriate, ASX identifies questions where the opinions of a specific group of stakeholders is sought.

1.5 Due date for responses to this consultation paper

Stakeholders interested in making a submission to this consultation are asked to do so in writing by the **close of business on Tuesday 9 August 2022** by:

- email to:
consultations@asx.com.au
- mail to:
ASX Limited
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1.6 Matters excluded from this consultation

Some of the ASIC expectations, or aspects of the ASIC expectations, fall outside the scope of ASX's intended consultations. ASX does not intend public consultation on the following:

- Expectation 1: *Technology status and market monitoring*

These matters are internal to ASX

- Expectation 4 (in part): *Frequency and content of communications*

- *protocols for incidents or major events (including outages) that may affect other market operators that rely on and interact with common market infrastructure*

As is current practice, ASX will engage directly with other Market Operators regarding protocols between Market Operators.

- Expectation 7: Software release testing framework

These matters are internal to ASX.

Services provided by the wider ASX group under licences other than the licence for the ASX market held by ASX are outside the scope of REP 708 and ASX's intended consultations. In particular:

- services provided by ASX Clear Pty Limited and ASX Settlement Pty Limited to all Market Operators including ASX.

1.7 Some key terms

Throughout this document, “**MIRs**” is used to refer to the ASIC Market Integrity Rules (Securities Markets) 2017 and “**MIR**” is used to identify a specific rule in the MIRs. The MIRs are substantially concerned with market structure and obligations surrounding trading, and define a rules framework that applies to Market Operators, Market Participants, CGS Market Operators, CGS Market Participants and Other Regulated Entities³.

In the context of the MIRs and this consultation, ASX is a Market Operator and a CGS Market Operator. Throughout this paper “**Market Operator**” is used to refer to an entity that is a Market Operator and/or a CGS Market Operator.

“**Corporations Act**” is used to refer to the Corporations Act 2001 (Cth). As a licensed Market Operator under the Corporations Act, ASX is required, to the extent that it is reasonably practicable, to do all things necessary to ensure that each of its licensed markets is “fair, orderly and transparent” or “**FOT**”.

ASX's has published a guidance note on the “Maintenance of a fair, orderly and transparent market” (**FOT guidance note**), which is available on ASX's website⁴. The FOT guidance note sets out considerations ASX will have in mind when assessing whether the ASX market, or activity thereon, is FOT. These considerations also impact the actions ASX may, or may not, undertake during incidents.

ASX uses the term “**ASX market**” to refer to the markets in ASX-listed products offered by ASX, as a licensed Market Operator, in accordance with the ASX Operating Rules⁵ as set out in Section 2 of the ASX Operating Rules. This includes the following product groups:

- Cash market products
 - equities
 - warrants
 - AQUA products

³ The preceding list are all defined terms in the MIRs.

⁴ https://www2.asx.com.au/content/dam/asx/rules-guidance-notes-waivers/asx-operating-rules-guidance-notes/asx_or_guidance_note_10.pdf

⁵ <https://www2.asx.com.au/about/regulation/rules-guidance-notes-and-waivers/asx-operating-rules-guidance-notes-and-waivers>

- government bond depositary interests
- Derivatives market contracts
 - options market contracts.

ASX operates the ASX market on the ASX Trade platform (**ASX Trade**). Generally, an issue affecting ASX Trade is likely to impact the ASX market as a whole rather than markets in individual ASX-listed products or groups of ASX-listed products⁶.

ASX Trade offers execution services and reporting services to entities that are approved to interact with the ASX market, referred to as “**ASX Participants**”. ASX Trade also distributes information about activity on the ASX market to ASX Participants and other entities that receive such data, referred to as “**ASX subscribers**”.

Within ASX Trade, a “**matching engine**” is responsible for managing order books and executing trades. ASX Trade has four matching engines⁷ each responsible for a subset of ASX-listed products. All matching engines run identical software⁸. Throughout this document, references to the matching engine should be considered as plural where appropriate.

Individual ASX-listed products in each product type are generally distributed across all four matching engines⁹. The equities market is further divided into five “**groups**” with distinct opening times, each of which is distributed across all four matching engines. Where their underlying is ASX-listed, derivative instruments are generally managed by the same matching engine that manages the underlying. This permits ASX Participants to create and trade combination instruments, known as “**tailor-made combinations**” or “**TMCs**”.

“**Market data**” refers to the data broadcast by ASX Trade to ASX subscribers and includes non-confidential data about orders and trades. ASX subscribers use market data to create their own view of the order books managed by ASX Trade. Market data is broadcast to ASX subscribers using the “**ITCH**” and “**OMNet**” protocols.

“**Private data**” refers to the data published by ASX Trade directly to ASX Participants to whom the data relates and contains confidential data about orders and trades. Private data is published to ASX Participants using the “**OUCH**” and OMNet protocols. OUCH and OMNet are also used by ASX Participants to enter and manage orders in ASX Trade.

All trades and all orders that are pre-trade transparent are published in both market data and private data. These orders, which represent the public view of the order books in ASX Trade, are often termed “**lit orders**” as they are visible¹⁰ to market observers.

Orders that are not pre-trade transparent are published only in private data to the ASX Participant to whom the order relates. These orders, which represent a non-public view of sections of the order books in ASX Trade, are often termed “**dark orders**” as they are not visible to market observers.

Together, market data and private data constitute the “**systematic messaging**” provided by ASX Trade. During an incident, ASX may also provide information about orders and trade via other channels, referred to in this document as “**non-systematic messaging**”.

⁶ An exception to this general observation might occur where the impacted functionality is specific to a product.

⁷ Sometimes also referred to as ‘partitions’. Generally, a partition refers to a distinct logical ‘stripe’ throughout the system. ASX Trade is not fully partitioned – some processes cater for instruments managed by all four matching engines. The term ‘partition’ is therefore not used.

⁸ Any vulnerability is therefore present in all matching engines including all standby and backup matching engines at ASX’s primary and alternate sites. Whether and when a vulnerability may be hit will vary depending on the processing undertaken by each matching engine.

⁹ Exceptions are ETFs, index options and Australian Government Bonds, which are only present in a single matching engine.

¹⁰ In limited circumstances, aspects of the order may not be fully visible. For example, ‘iceberg’ functionality permits the total volume of an order to remain hidden whilst a portion of that volume is visible.

“ENQUIRE” and “ADJUST” are used to refer, respectively, to the ENQUIRE and ADJUST session states on ASX Trade as described in the ASX Operating Rules¹¹.

Other approved Market Operators may offer execution and reporting services in ASX-listed products. Such services offered by other Market Operators are referred to throughout this document as “**other market(s)**” in ASX-listed securities. Other approved Market Operators may offer execution and reporting services in products that are not ASX-listed products. Such services offered by other Market Operators are referred to as “**non-ASX market(s)**”. Other markets and non-ASX markets are outside the scope of the ASX market¹².

An ASX Participant may also be a participant of another market(s). Activities undertaken by ASX Participants under the rules of another market(s) are outside the scope of the ASX market¹³.

ASX uses the term “**the market**” to refer to the totality of all markets in ASX-listed securities operated by all Market Operators. The market encompasses the ASX market and all relevant other markets¹⁴. Non-ASX markets are outside the scope of this definition of the market.

The scope of the defined terms the ASX market, other markets, the market and the MIRs is illustrated in the following table.

Listed by	ASX	Another Market Operator
Executed on or reported to	ASX	Another Market Operator
ASX	“ASX market”	not applicable <small>ASX does not offer trading in securities listed solely by other Market Operators</small>
Another Market Operator	“other market(s)” in ASX-listed securities	“non-ASX market(s)”

Scope of ASX’s obligations

Scope of “the market” in ASX-listed securities

Scope of the MIRs

¹¹ <https://www2.asx.com.au/about/regulation/rules-guidance-notes-and-waivers/asx-operating-rules-guidance-notes-and-waivers>

¹² Such markets also fall outside the scope of ASX obligations and responsibilities under the Corporations Act and the MIRs.

¹³ Such activities fall within the scope of the other market.

¹⁴ Currently this comprises the ASX market and the market in ASX-listed securities operated by CBOE Australia Ltd.

2. Certainty about trade and order status

2.1 Background

This section discusses the potential impacts of an incident on ASX Trade in relation to ASX's ability to provide information about the status of trades and orders, particularly in real-time through the usual channels. This section also describes existing services ASX offers in such circumstances. It covers aspects of ASIC's Expectation 3.

2.2 ASX Trade overview

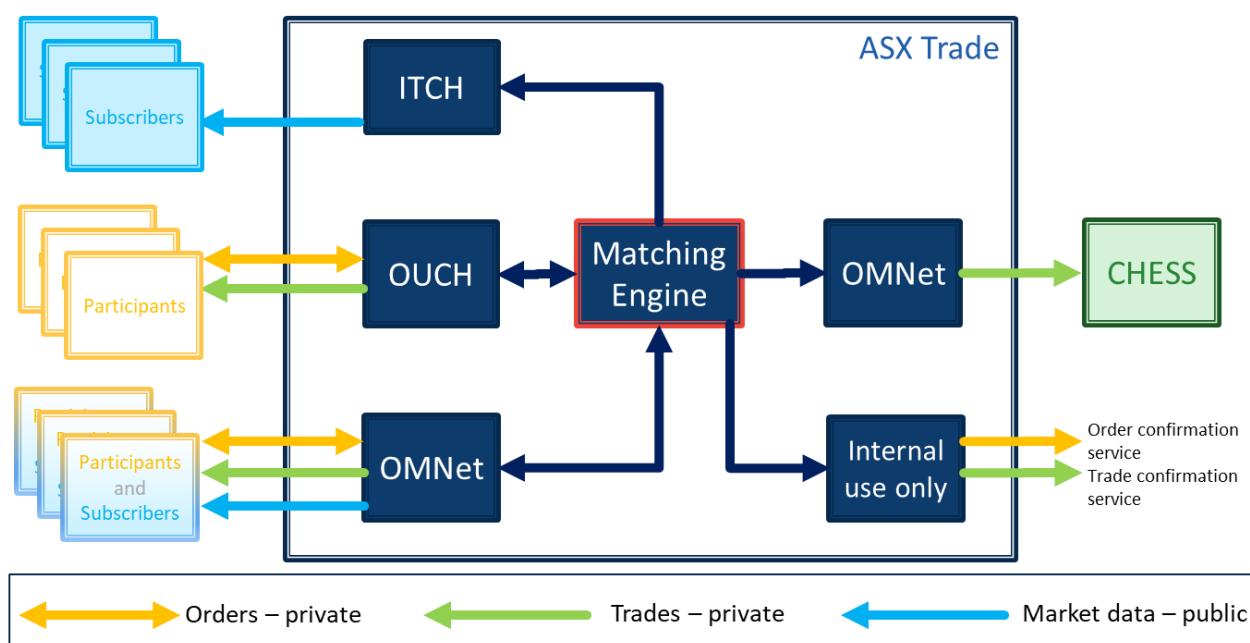
During an incident, ASX seeks to determine at the earliest possible opportunity the status of all ASX market data and private data published between the start of the incident and the time the ASX market was frozen.

In particular, ASX seeks to confirm the status of executed trades and current orders.

ASX's ability to make this determination will be dependent on sufficient understanding inter alia of the impact of the incident on certain ASX Trade components:

- the matching engine - responsible for managing orders and executing trades
- the components that publish private data to ASX Participants – OUCH and OMNet
- the components that publish market data to ASX subscribers –ITCH and OMNet
- the component that publishes trades to CHES – OMNet.

These components are illustrated in the diagram below, which provides a simplified overview of the market data and private data flows.



As discussed further below, multiple market data and private data paths are available and, in the event of an incident, may present different views of executed trades to different ASX Participants and ASX subscribers.

The impact of incidents affecting the matching engine and the market data and private data processes is considered further below.

2.3 Matching engine impacts

Each matching engine is responsible for maintaining the current view of a set of order books and for the execution of trades in those order books. The matching engine publishes changes to the order book including the execution of trades to the separate processes that are responsible for the publication of market data (ITCH and OMNet) and private data (OUCH and OMNet).

In the event that there is a significant issue with a matching engine itself, the current view of order books within the matching engine may be corrupted. Where this matching engine source data is corrupted, ASX may not be able to provide accurate or complete order book data and may also not be able to publish the market data and private data messages relating to orders and trades.

An issue in a matching engine may also result in corruption in market data and private data.

In some circumstances, an incident impacting a matching engine may result in the loss of all orders. In such circumstances, ASX will be unable to provide confirmation of the status of any order in real-time through the normal market data and private data channels¹⁵. ASX will be able to confirm that all orders will be effectively deleted and that there will be no orders remaining in ASX Trade. **ASX has never experienced an incident with this impact¹⁶.**

Question 2.3: If circumstances arise such that all orders in ASX Trade are lost, to what extent are you able to act on a formal notification from ASX (e.g. an ASX Notice or an update to the ASX SSP) that all orders have been deleted without systematic messaging through the normal channels?

Please detail any technical, operational or compliance challenges you might experience?

ASX has previously sought stakeholder feedback on how to manage incidents that affect a subset of the four ASX Trade matching engines - particularly given the structure of the ASX market across all four of these matching engines.

ASX's view remains that if a substantial subset of ASX-listed products is impacted by an incident, the ASX market should be frozen as soon as possible to avoid uncertainty and to expedite recovery. However, ASX will consider the circumstances of any incident prior to taking action. For example, in the event of an operational issue¹⁷ affecting a group of equities, ASX may consider resolving the issue within that group without impacting other groups¹⁸. Whereas, given the distribution of ASX-listed products and groups across all four matching engines, ASX's view remains that a technical issue¹⁹ impacting any number of matching engines²⁰ should be considered to affect the entire ASX market²¹. ASX does not propose to change this approach.

¹⁵ On the subsequent startup of ASX Trade, all ASX Participants 'own order book' downloads will be null.

¹⁶ Long orders were retained in the September 2016 incident and the November 2020 incident.

¹⁷ An operational issue is more likely to align with the business configuration in ASX Trade. It may therefore be possible to manage an operational issue without impacting the entire ASX market.

¹⁸ As an example - during the market management of the outage events of the ASX trading platform (ASX Trade) on 19 September 2016, ASX experienced an issue where a subset of securities was not available for trading. Securities in Groups 4 and 5 were not available to open, for a short period, as a result of an operational error caused when reopening the market. On that occasion, ASX considered that resolving the issue with the single group of equities, would be relatively quick, and leaving the remaining groups in their normal state for a period would be less disruptive.

¹⁹ A technical issue is more likely to align with the technical configuration in ASX Trade. It is therefore unlikely that it will be possible to manage a technical issue without impacting the ASX market in its entirety.

²⁰ In the November 2020 incident, only one matching engine was impacted at the time the ASX market was placed in ENQUIRE.

²¹ As an example - a logic issue would likely cause corruption within the matching engine, or a matching engine process or processes crash, on this event the orders will be lost for any crashed process.

2.4 Market data and private data impacts

Private order and trade data is published to ASX Participants via the OUCH and OMNet interfaces in accordance with the Participant's interactive logins and subscriptions.

Public market data is published to ASX subscribers²² via ITCH and OMNet in accordance with their market data logins subscriptions.

ASX Trade also publishes trades²³ to CHESS via OMNet²⁴.

ITCH, OUCH and OMNet are separate processes and may be independently or jointly impacted by an incident. The OMNet feed to CHESS is a further separate process from the OMNet market data and private data feeds and may be independently or jointly impacted by an incident.

ITCH, OUCH and OMNet support both real-time and recovery services. An incident may impact real-time services and/or query and recovery services.

In the event that there is a significant issue with one or more private or market data services, ASX may inadvertently publish inaccurate or incomplete data in real-time. Further, ASX may also inadvertently provide inaccurate or incomplete data in response to queries and recovery requests.

In some circumstances, an incident impacting the publication of market data and private data may result in ASX not being able to provide reliable market data and private data through ITCH and/or OUCH and/or OMNet until the underlying issue has been resolved. ASX may also be unable to rectify errors in market data and private data that have already been published until the underlying issue has been resolved.

It is ASX's view that in such circumstances, consideration of ASX's obligations to provide a fair, orderly and transparent market will prevent ASX from unfreezing the ASX market where doing so would result in the publication of erroneous ASX market data and/or private data²⁵.

Question 2.4: What views do you have on the benefits and risks of ASX unfreezing the ASX market where doing so would result in the publication of erroneous ASX market data and/or private data?

If you see benefits, how will you accommodate the uncertainty that unfreezing the ASX market in such circumstances would create?

ASX will always seek to establish a complete and accurate view of market data at the earliest opportunity and will, as part of this process and where possible, attempt to preserve orders of remaining duration longer than one day (**long orders**).

An incident with a market data service or private data service will not result in corruption to the matching engine. ASX therefore anticipates that, in such circumstances, it will generally be possible to preserve long orders.

The preservation of long orders and the establishment of an accurate view of market data are currently typically achieved through the end of day and start of day processes²⁶. Consequently, **ASX may currently not be able to provide complete and accurate order data through normal channels until the resumption of service on the business day following an incident²⁷.**

²² ASX subscribers include other Market Operators.

²³ Trades are also published to Signal B via OMNet.

²⁴ This architecture will change when ASX implements the feed from ASX Trade to the replacement CHESS.

²⁵ This was the scenario in both the September 2016 incident and the November 2020 incident.

²⁶ In the November 2020 incident, ASX markets remained frozen until the end of day process which established a clean view of the order books. Market data services resumed on system open the following day.

²⁷ ASX Trade is normally available from 2:25 am. Participants can query their order status from this time.

ASX is examining alternative recovery models that could potentially bring forward the processes that may preserve long orders and will establish an accurate view of market data. ASX intends to discuss the feasibility of this alternative model in the second market management consultation.

ASX offers services to confirm trades and orders that are not reliant on the normal market data paths. These are described below in sections 2.6 and 2.7 respectively.

2.5 FOT review

Once ASX has established a sufficient understanding of the impact of the incident, ASX may usually need to review executed trades in the context of ASX's obligation to operate a fair, orderly and transparent market (**FOT review**).

As a matter of priority, ASX will endeavour to:

- establish a sufficient understanding of the impact of the incident to facilitate the FOT review
- undertake the FOT review
- make public the results of the FOT review.

The FOT guidance note sets out considerations ASX will have in mind when undertaking the FOT review. ASX notes in particular that the FOT review will likely need to balance a number of considerations in reaching its final determination.

One consideration is the consistency of the view of trades to ASX Participants as the impact of a particular incident on trades published via OUCH and OMNet may differ. A further consideration is the view of trades that have been accepted by CHES - which is necessarily consistent between ASX Participants²⁸. **Where there are differences in view, ASX is likely to give precedence to the view held by CHES**²⁹.

The outcome of the FOT review will be either:

- executed trades stand

OR

- some or all executed trades will be cancelled.

ASX will publish the results of the FOT review in the next available update on the ASX System Status page. The update will include:

- confirmation of the status of executed trades
- if appropriate, the basis on which any trades will be cancelled.

2.6 Trade confirmations – current service

ASX will seek to provide general guidance as to the status of executed trades as soon as certainty has been established via the updates made to the ASX System Status page.

ASX has in place arrangements to provide customers with lists of trades via an alternative path to that used to distribute market data in normal circumstances. A service description for this service is available on ASX's website³⁰.

²⁸ CHES receives a single 'two-sided' execution report for each trade. ASX Participants involved in a trade receive two independent 'one-sided' execution reports, which may be received via different protocols and may be impacted differently in an incident scenario.

²⁹ This was observed in the September 2016 incident which impacted OMnet private data and the feed to CHES but did not impact OUCH private data.

³⁰ <https://www2.asx.com.au/markets/market-resources/incident-management>

Whilst this service is independent of the normal market data and private data paths, it is possible that an incident may impact the alternative path used by this service and the service may therefore be unavailable.

During an incident, any data obtained from the trade confirmation service must be understood in the context of any separate explicit statement on the validity of trades issued by ASX. For example, the trade confirmation service may provide details of trades which have been explicitly cancelled by ASX as a consequence of the incident.

ASX is examining a further alternative path to obtain trades that is neither dependent on the normal market data paths nor on the path used for the current trade confirmation service. ASX intends to discuss the feasibility of this alternative model in the second market management consultation.

2.7 Order confirmations – current service

ASX will seek to provide general guidance as to the status of current orders as soon as certainty has been established via the updates made to the ASX System Status page.

ASX has in place arrangements to provide customers with current order positions via an alternative path to that used to distribute market data in normal circumstances. A service description for this service is available on ASX's website³¹.

Whilst this service is independent of the normal market data and private data paths, it is possible that an incident may impact the alternative path used by this service and the service may therefore be unavailable.

As noted above in section 2.3, there are also circumstances where it will not be possible for ASX to provide any individual order confirmation through any channel.

ASX is examining a further alternative path to obtain order confirmations that is neither dependent on the normal market data paths nor on the path used for the current order confirmation service. ASX intends to discuss the feasibility of this alternative model in the second market management consultation.

³¹ <https://www2.asx.com.au/markets/market-resources/incident-management>

3. Session states, intraday cut-offs and checkpoint times

3.1 Background

This section discusses ASX's approach to the management of incidents impacting ASX Trade and the ASX market. It describes and reflects aspects of ASX's current approach and seeks feedback in certain areas of that approach in respect of the management of incidents. It covers aspects of ASIC's Expectations 2 and 5.

In particular, this section discusses:

- the initial imposition of a comprehensive freeze of ASX Trade and the detail of how this is effected
 - the use of ENQUIRE
- the assessment of whether or not to permit ASX Participants' interaction with ASX Trade and the considerations which impact that assessment
 - the use of ADJUST
- the assessment of whether or not to resume the ASX market and the considerations which impact that assessment
 - including timings
- the potential market management outcomes that emerge from this analysis.

3.2 Incident management: freezing the ASX market

ASX considers it best practice that when an issue has been identified that is assessed to result in uncertainty on the status of ASX Trade and/or the data disseminated by ASX Trade, an immediate and comprehensive 'freeze' of ASX Trade should be implemented. This freeze should and will impact the entire ASX market³².

This freeze is intended to:

- prevent dissemination of potentially incomplete or inaccurate data³³; and
- prevent further issues from manifesting³⁴; and
- provide a static environment³⁵ for initial root cause analysis.

ASX effects the freeze on ASX Trade, through:

- the global use of ENQUIRE – pausing all ASX Participant-initiated activity³⁶; and
- ASX's internal procedures – pausing all ASX-initiated activity, other than approved changes needed to manage the incident itself.

³² This includes both the execution of trades by ASX Trade and the reporting of trades to ASX Trade.

³³ ASX is obliged under s792A(a) of the Corporations Act to operate an FOT market.

³⁴ In the November 2020 incident, at the time ASX Trade was placed in ENQUIRE, an issue had occurred in matching engine 3 and all the pre-conditions for a similar incident existed in matching engines 1 and 4 (but not in matching engine 2). Placing ASX Trade in ENQUIRE prevented the occurrence of the same issue in matching engines 1 and 4 (likely within a short period given the pre-conditions were already in place) and likely prevented the same issue in matching engine 2 (in due course).

³⁵ A dynamic data environment adds additional complexity to root cause analysis.

³⁶ There is one aspect of the current configuration of ENQUIRE which is not consistent with the purpose of ENQUIRE. 'Cancel on disconnect' functionality is available in ENQUIRE. This is discussed further in section 3.4.

Question 3.2: What views do you have about ASX freezing ASX Trade in circumstances where an issue has been assessed to result in uncertainty on the status of ASX Trade and/or the data disseminated by ASX Trade?

Please provide reasons why you believe this is or isn't the correct course of action?

What are some of the challenges a freeze presents?

3.3 ENQUIRE

ASX's intended purpose of ENQUIRE is to pause all ASX Participant³⁷-initiated activity. During an incident, this prevents any ASX Participant action that could lead to the dissemination of potentially incomplete or inaccurate data or the manifestation of further issues.

ENQUIRE is configured to prevent:

- the entry of any new transactional data³⁸ by ASX Participants
- the execution of new trades³⁹ by ASX Trade
- the reporting of new trades⁴⁰ by ASX Participants.

Preventing the entry of new transactional data also effectively prevents the creation of new market data or private data which would result from the activities listed above.

ENQUIRE has very limited use during normal operations⁴¹. ASX proposes to cease the sole existing use in normal operations. This is discussed further in section 3.5 below.

As the session state name suggests, ASX Participants are able to query⁴² data in ASX Trade whilst in ENQUIRE. However, if the data present at the time ASX Trade is placed in ENQUIRE is incomplete or inaccurate then the results of a query whilst in ENQUIRE will be correspondingly incomplete or inaccurate. Consequently, queries should be used with caution whilst in ENQUIRE until ASX has confirmed the state of data in ASX Trade⁴³.

Whilst ASX Trade is in ENQUIRE, which pauses ASX Participant-initiated changes in transactional data, ASX's internal procedures ensure there are no ASX-initiated changes to reference data⁴⁴ - other than those approved changes needed to manage the incident itself⁴⁵. This combination of ENQUIRE and ASX procedures provides a static environment that allows ASX to investigate an issue with confidence about the state of data.

ASX believes ENQUIRE remains the most appropriate initial session state during an incident. The use of any other session state might permit activity which could exacerbate the incident or hinder its investigation.

³⁷ ASX itself is also an ASX Participant and cannot undertake any transactional activity during ENQUIRE.

³⁸ Order, quote and trade report add, modify, delete and cancel messages.

³⁹ The prevention of new transactional data from ASX Participants inherently prevents execution of lit orders. Execution of Centre Point orders that are dark orders may be triggered by changes to external data and are therefore also specifically prevented by ENQUIRE.

⁴⁰ Trades executed by ASX Participants that are reported to ASX.

⁴¹ The equity options market between 17:00 and 18:50 is the sole use of ENQUIRE in normal operations.

⁴² This is a read-only action which cannot result in changes to data.

⁴³ In the November 2020 incident, ASX confirmed order data from matching engines 1, 2 and 4, and all trades were accurate, and that order data from matching engine 3 was not reliable.

⁴⁴ Reference data: configuration data managed by internal ASX teams to define system behaviour, market structure, instruments and participants. Reference data is typically pre-configured outside of market hours. Changes during market hours are usually limited to those required for normal market operations (for example, scheduled and ad hoc session state changes).

⁴⁵ ASX may also consider continuing to publish certain other changes to reference data where doing so is assessed to be safe and may assist ASX Participants. For example, in the November 2020 incident, ASX Trade continued to publish certain session state changes to reflect updates in the listing status of affected securities.

Question 3.3: What benefits and risks do you think arise when using ENQUIRE as the initial session state during an incident? If not, what alternative session state would you propose and why?

3.4 Use of cancel on disconnect in ENQUIRE

ASX Trade offers optional cancel on disconnect (**CoD**) functionality⁴⁶. When enabled, if a CoD event⁴⁷ occurs for a given user of a given ASX Participant, relevant orders⁴⁸ for that user will be automatically deleted by ASX Trade in accordance with the user's pre-configured settings.

Currently, CoD functionality is enabled in ENQUIRE. Participants that have users that are configured for CoD are therefore able to trigger deletion of those users' relevant orders by creating a CoD event⁴⁹. There is no other means for Participants to delete orders when ASX Trade is in ENQUIRE.

When ASX Trade is experiencing an issue, data created and published in response to order deletions, whether Participant initiated or automatically through CoD, may be incomplete or inaccurate and the deletions may lead to the manifestation of further issues.

Consequently, whilst CoD offers a means for Participants to delete orders during an incident, it is ASX's view that the availability of CoD during ENQUIRE can result in:

- the dissemination of potentially incomplete or inaccurate data⁵⁰; or
- the manifestation of further issues⁵¹.

ASX considers that the availability of CoD functionality in ENQUIRE is not consistent with the comprehensive freeze that the use of ENQUIRE is intended to create. In order to ensure ENQUIRE effects a comprehensive freeze on all ASX Participant-initiated activity, ASX proposes that CoD functionality should NOT be available in ENQUIRE⁵².

With this proposed change in place, ENQUIRE effects a comprehensive pause on ASX Participant-initiated activity. Use of CoD functionality in all other session states is unaffected by this proposal.

Question 3.4 What benefits and risks arise if ASX discontinues the availability of cancel on disconnect functionality in ENQUIRE? If cancel on disconnect was to remain, how will you accommodate the potential unreliability of the data that the cancel on disconnect could create?

3.5 Use of ENQUIRE in the equity options market

Generally, after a market in a particular product has closed, the ASX market is placed into session state ADJUST followed by session state ADJUST ON. The market in equity options is the sole exception: its closing sequence is LATE_TRADING and then ENQUIRE. This is the sole use of ENQUIRE in normal operations.

⁴⁶ More accurately, 'inactivate on disconnect' functionality which is described in detail in the ASX Trade Introduction and Business Information: <https://www.asxonline.com/content/dam/asxonline/public/documents/asx-trade-refresh-manuals/asx-trade-introduction-and-business-information.pdf#page=109>

⁴⁷ Per the pre-configured settings for that user, either a timeout after three missed heartbeats (which does not include a logout) or a disconnection (which does include a logout).

⁴⁸ Per the pre-configured settings for that user, either orders valid for that day only or all orders.

⁴⁹ In the November 2020 incident, a few ASX Participants triggered a CoD event.

⁵⁰ In the November 2020 incident, data published consequent to the CoD events in relation to instruments in matching engine 3 was potentially incomplete and inaccurate.

⁵¹ In the November 2020 incident, at the time ASX Trade was placed in ENQUIRE there were no issues present in matching engines 1, 2 and 4. Given the nature of the issue experienced in matching engine 3, deletions triggered by a CoD event could have resulted in the same issue manifesting in matching engines 1, 2 and 4. In this case, perhaps given only a few ASX Participants triggered a CoD event, that did not occur. More widespread triggering of CoD events would have significantly increased the likelihood of the same issue manifesting in the previously unaffected matching engines.

⁵² CoD configuration is loaded at the start of each business day and cannot be disabled in real-time.

ASX proposes that, in order to ensure ENQUIRE is only used in exceptional circumstances, the current sole use of ENQUIRE in normal operations will cease and a new session 'ADJUST_OPTIONS' will be used for equity options between 17:00 and 18:50.

With this proposed change in place, ENQUIRE will be reserved for use during incident scenarios only.

Question 3.5: What benefits and risks arise by removing ENQUIRE from the closing sequence of the Equity Option Market?. Does this change, to restrict the Enquire session state to incident management only, create any operational concerns? How does replacing the ENQUIRE Session State with a new session state 'ADJUST_OPTIONS' for the closing sequence of the Equity Options Market impact your systems/operations?

ASX's intended purpose of ADJUST is to allow ASX Participants to delete and amend existing orders, but not add or improve⁵³ any order, at times when execution is not occurring. ADJUST is routinely used in normal operations in the post market close period. ADJUST also allows the entry of reports of trades executed off market by ASX Participants.

ASX also uses a further session state ADJUST_ON, which has identical characteristics to ADJUST. ADJUST_ON is only used directly after ADJUST in markets where there is a need to identify two distinct periods of time after trading activity has ceased where other activities are permitted⁵⁴.

3.6 Considerations for the use of ADJUST

The ADJUST session state permits ASX Participants to delete and amend (but not add or improve) orders.

When an ASX Participant submits a request to delete or amend an order the ASX Trade matching engine updates the order in its internal view of the order book and makes any associated adjustments to any related system-generated orders⁵⁵. Subsequent processes generate the private data⁵⁶ needed to inform the ASX Participant of its deletion or amendment and the market data⁵⁷ necessary to inform the wider market of changes to all affected orders.

If, during an incident, there are issues in any of the processes in the path of the inbound and outbound message flows relating to a deletion or an amendment, the act of processing a deletion or amendment may result in a recurrence of an issue or the manifestation of a new issue.

For an ASX Participant's deletion or amendment to be both effective and confirmed back to the ASX Participant, the matching engine processes and the relevant private data processes must be working correctly. If either the matching engine process or the private data process is not working correctly then the deletion may not be effective and/or may not be confirmed back to the ASX Participant.

ASX greatly appreciates the desire for ASX Participants to be able manage their orders in ASX Trade in the normal manner during incidents. However, ASX suggests that a requested deletion or amendment which may not be effective and/or may not be confirmed is likely to be of limited value to the submitting ASX Participant and is likely to lead to increased reconciliation differences. ASX considers that moving to ADJUST

⁵³ Addition and improvement of orders is prevented to ensure there is no potential for execution.

⁵⁴ For example, in the equities market ADJUST lasts for 30 minutes reflecting the permitted period for submission of late trade reports (types L1 to L5) and is followed by ADJUST_ON where late trade reports are not permitted.

⁵⁵ ASX Trade supports the trading of combination instruments (from two to six underlying individual instruments traded as a single instrument). ASX Trade further offers functionality that can create 'implied' orders that would, if executed against, satisfy a complex trading scenario involving combination orders. Implied orders may variously be created, amended or deleted by ASX Trade in response to changes to orders by ASX Participants in either the underlying instruments or the combination instrument. Implied order functionality has been disabled since the November 2020 incident.

⁵⁶ OMNet or OUCH protocols, as required.

⁵⁷ OMNet and ITCH protocols.

without absolute confidence that matching engine functionality, market data and private data are working correctly is most likely to exacerbate any issue.

ASX therefore proposes that it is inappropriate to move to ADJUST, or any other session state that permits deletion or amendment, where doing so would result in the publication of incomplete or inaccurate data⁵⁸ and/or may lead to the occurrence of an issue that would result in the publication of incomplete and inaccurate data⁵⁹.

Question 3.7: What are the benefits and risks of moving to ADJUST (or any other session state) that permits deletion or amendment, when there is no certainty that ASX market data and private data are correct?

ASX is examining the feasibility of new processes that would support ASX Participants deleting their orders during certain incident scenarios that could provide accurate private data but would not produce corresponding market data. ASX intends to discuss the feasibility of this alternative model in the second market management consultation.

3.7 Incident management: unfreezing the ASX market

As a matter of procedure ASX seeks to unfreeze the ASX market and, if appropriate, proceed towards resumption of trading as soon as it is assessed to be appropriate⁶⁰ to do so.

In considering when it is appropriate to unfreeze the ASX market, ASX considers:

- **the status of ASX Trade:** whether removing the freeze will NOT result⁶¹ in
 - the dissemination of potentially incomplete or inaccurate market data and/or private data⁶²; or
 - a recurrence of the issue; or
 - the manifestation of further issues

AND

- **the status of private data:** whether ASX Participants have a complete and accurate view of
 - their executed trades; and
 - their current orders in ASX Trade

AND

- **the status of market data:** whether ASX subscribers have, or have access to, a complete and accurate view of
 - the current state of all order books in ASX Trade.
 - executed trades

⁵⁸ This was the circumstance in relation to matching engine 3 during the November 2020 incident.

⁵⁹ This was the circumstance in relation to matching engines 1, 2 and 4 during the November 2020 incident. All necessary pre-conditions for a recurrence of the issue observed in matching engine 3 were present in matching engines 1 and 4 at the time ASX Trade was moved to ENQUIRE.

⁶⁰ In the context of ASX's obligations to operate an FOT market.

⁶¹ Necessary pre-conditions are therefore sufficient understanding of the issue and technical ability to permit preventative action to stop recurrence.

⁶² These conditions were not considered to be met during market hours on the 16 November 2020. Preventative action was undertaken after hours and all conditions were met by the system opening time 02:25 on 17 November 2020.

ASX considers that a negative assessment of any one of the tests set out above is sufficient to indicate that ASX Trade should remain in a freeze.

ASX considers that a positive assessment of all the tests set out above is sufficient to indicate that ASX Trade can move out of ENQUIRE into a session state that permits ASX Participant-initiated activity.

Question 3.8: Do you consider the tests above are appropriate and sufficient to determine if ASX can unfreeze the ASX market? If not, what additional tests should be considered?

A positive determination by ASX to unfreeze the ASX market is a condition precedent for resumption of the ASX market. However, resumption of the ASX market is based on a number of additional assessments set out in section 3.9 below.

ASX effects the unfreeze by moving ASX Trade out of ENQUIRE into a session state that permits the resumption of ASX Participant-initiated activity but does not permit execution. ASX would move to one of the following session states:

- ADJUST where there is no short-term intention to resume the ASX market; or
- PRE-OPEN where there is a short-term intention to resume the ASX market.

ASX will always advise stakeholders in advance of any such proposed changes to session states and the associated timings.

3.8 Determining the feasibility of resuming the ASX market

Throughout an incident, ASX periodically assesses the feasibility of resuming the ASX market.

This assessment considers whether:

- intraday recovery is NOT possible

OR

- the issue has been diagnosed AND
- a recovery path has been confirmed AND
- the recovery path cannot be completed by the backstop time

OR

- the backstop time has been reached.

ASX considers that a positive assessment of any one of the tests set out above is sufficient to indicate that it is not feasible to resume trading on that business day.

Subsequent to the November 2020 incident, ASX introduced a process to undertake this assessment every 45 minutes throughout an incident.

Question 3.9: Do you consider 45 minutes to be an appropriate period between each assessment of the feasibility of resuming the ASX market? If not, what period do you consider appropriate and why?

Where ASX determines that it is not feasible to resume the ASX market on that business day, ASX will notify stakeholders at the earliest opportunity.

ASX's assessment as to whether the ASX market can be unfrozen is independent of ASX's assessment of the feasibility of resuming the ASX market.

3.9 Assessment of the backstop time for resuming the ASX market

ASX published details of its standard resumption session state sequence in its "Response to consultation on the management of the ASX Market" published in September 2018⁶³.

A minimum of 40 minutes elapsed time is required for this sequence, consisting of:

- 20 minute notice of pending PRE-OPEN followed by
- 20 minutes in PRE-OPEN.

After PRE-OPEN concludes an auction occurs and OPEN trading commences.

ASX proposes no changes to these timings.

Question 3.10.1: Do you consider the current minimum timings for the resumption sequence to be sufficient? If not, what periods do you consider appropriate for notice and for PRE-OPEN and why?

The determination of a backstop time needs to consider the duration of the resumption session state sequence – 40 minutes – and the duration of a minimum viable period of open trading before the closing auction sequence commences at 4.00 pm.

As a matter of policy, ASX does not propose to change the timings of the closing auction sequence as the result of an incident. ASX understands that ASX Participants and other stakeholders have processes that may be contingent on existing timings.

Following the September 2016 incident, ASX and ASX Clear respectively consulted on the determination of the ASX market closing price and the ASX Clear settlement price. The resultant policy, which will be followed in the event that there is no closing auction on the ASX market, is available on ASX's website⁶⁴.

Question 3.10.2: What are the benefits and risks if ASX does NOT change the timing of the closing auction sequence as a result of an incident? What system changes would be required for you, if the closing auction time was extended? What would be the latest time for the closing auction sequence to commence?

ASX proposes a backstop time of 1.30 pm. This would permit up to 1 hour and 50 minutes of OPEN trading before the closing auction sequence begins at 4.00 pm.

ASX notes that a later backstop time could be supported if considered appropriate and would suggest this could be as late as 2.30 pm.

Question 3.10.3: Taking into consideration the resumption session state sequence what would you consider an appropriate backstop time for the final determination of the resumption of the ASX market and why?

The backstop time is the latest possible time at which ASX will confirm the results of its feasibility assessment. However, **ASX will make its determination whenever any of the tests set out above are assessed as positive and this may be considerably earlier⁶⁵ than the backstop time.**

⁶³ <https://www2.asx.com.au/content/dam/asx/about/regulations/asx-market-management-response-to-consultation-paper-on-the-management-of-the-asx-market.pdf>

⁶⁴ <https://www.asxonline.com/content/dam/asxonline/public/notices/2018/apr/asx-closing-and-settlement-price-determination.pdf>

⁶⁵ For example, if ASX is advised by its vendor or concludes that ASX Trade cannot be recovered without progressing throughout the shutdown and restart process which currently takes place overnight.

3.10 Incident management: resuming the ASX market

As a matter of procedure ASX seeks to resume the ASX market where it is considered safe to do so, there is sufficient time, sufficient clarity on the current position, and a sufficient level of Participant access.

In considering when it is safe to resume the ASX market, ASX considers whether:

- the ASX market can be unfrozen, as discussed in section 3.8

AND

- resuming the ASX market is feasible, as discussed in section 3.9

AND

- a sufficient number of Participants have access to ASX Trade⁶⁶.

ASX has a view on the level of Participant access at all times and will commence the resumption session state sequence with knowledge of the level of Participant access.

3.11 Incident outcomes: no unfreeze and no resumption

As discussed in this paper, ASX may determine:

- it is not possible to unfreeze the ASX market AND
- it is not possible to resume the ASX market.

In such circumstances, ASX Trade will remain in ENQUIRE throughout any remaining period when the ASX market would normally be trading and will commence the normal closedown sequence from 6.50 pm.

In this scenario, ASX anticipates that the conditions set out in sections 3.8 (unfreeze) and 3.11 (resumption) will be met at the time ASX Trade becomes available on the following business day⁶⁷ when normal service will resume.

3.12 Incident outcomes: unfreeze and no resumption

As discussed in this paper, ASX may determine

- it is possible to unfreeze the ASX market BUT
- it is not possible to resume the ASX market.

In such circumstances, ASX Trade will move to ADJUST, which permits limited ASX Participant activity, and remain in ADJUST until the normal closedown sequence from 6.50 pm. ADJUST provides the ability for ASX Participants to 'cancel back' all orders if required.

Moving to the ADJUST does not necessarily imply that the ASX market will subsequently resume. There may also be circumstances where ASX determines it can move to ADJUST after it has already concluded that it is not possible to resume the ASX market.

In this scenario, ASX anticipates that the conditions set out in section 3.11 (resumption) will be met at the time ASX Trade becomes available on the following business day when normal service will resume.

⁶⁶ This is discussed in the FOT guidance note.

⁶⁷ As was the case in the September 2016 incident and the November 2020 incident.

3.13 Incident outcomes: unfreeze and resumption

As discussed in this paper, ASX may determine:

- it is possible to unfreeze the ASX market AND
- it is possible to resume the ASX market.

In such circumstances, ASX will move through the resumption sequence set out in section 3.10.

4. Incident communications

4.1 Background

ASX has established processes regarding communications during incidents.

The ASX System Status Page (**SSP**)⁶⁸ on the ASX website is the mechanism for providing live, public updates during any incidents. Any interested party can configure active alerts for individual ASX systems so that they immediately receive text and/or email alerts when that system status changes or ASX publishes an update.

ASX has technical, operational and business teams which support ASX Participants and ASX subscribers during an incident. These teams are able to assist customers with their specific matters and may also provide the same general information as is made available on the SSP:

- the Customer Technical Support (**CTS**) team operates a 'service desk' style support centre for ASX Participants and ASX subscribers in relation to technical matters
- the Trading Operations team operates a 'service desk' style support centre for ASX Participants and ASX subscribers in relation to the operation of the ASX market
- each ASX Participant has an assigned Technical Account Manager (**TAM**).

The support teams do not and will not provide any customers with information about the incident or the management of the incident that has not been made available via the SSP.

This section considers the approach, timing and content of communications during incidents affecting the ASX market in the context of the feedback discussed in REP 708.

ASX also has established processes for communicating with other Market Operators. Any potential changes to these processes are outside the scope of this consultation.

4.2 Feedback identified in REP 708

The feedback identified by ASIC, presented in REP 708, is set out below along with ASX's proposed response:

- *the half-hourly updates provided on ASX's system status webpage were helpful*
 - ASX proposes no change to this approach.

Question 4.2: Do you consider half-hourly updates are appropriate? If not, what frequency would you propose?

- *there was substantial confusion and uncertainty about the nature and scale of the issues*
 - Whilst it is the nature of an incident that there will be a period of time where there is some uncertainty as to the nature and scale of the issue, ASX recognises that earlier communications of more detail of the issues⁶⁹ will assist customers.
 - ASX proposes to include additional detail about the nature, scale and impact of the issue in updates to the SSP. This is discussed further in section 4.4 below.
- *the updates were very general and did not provide any substantive information*

⁶⁸ <https://www2.asx.com.au/markets/market-resources/system-status>

⁶⁹ In the November 2020 incident, detailed information about the incident was published after normal market close in an ASX Market notice <https://asxonline.com/public/notices/2020/nov/1469.20.11.html>

- ASX proposes to include additional details in relation to the status of orders and trades in updates to the SSP. This is discussed further in section 4.4 below.
- *it was effectively in a holding pattern, with no indication as to how long the market outage would likely take to be resolved*
 - ASX's proposed approach to the timings around incident management is discussed in section 3.
 - ASX proposes to include the outcome of the proposed incident management process in updates to the SSP.
- *Some participants had phone calls with ASX staff to attempt to gather further information on the market outage, including specific issues that affected their firm*
 - ASX proposes to continue with existing support arrangements for customers.
 - ASX proposes to continue with the existing approach of providing specific support to customers. As is already the case, the support teams will not provide additional information to specific customers about the incident or the management of the incident beyond what has been made available via the SSP.

4.3 Open conference line

REP 708 raised an 'open conference line' as an alternative mechanism for communications during an incident and offered the following feedback:

Some stakeholders indicated that an open conference line that participants and other stakeholders can dial into during a market outage is an alternative mechanism to provide key updates and information efficiently and equally to market users. However, this option may also create further complexities, such as maintaining appropriate focus, resourcing and monitoring of the issues that are being assessed. [ASIC] consider there is merit in further exploring the costs, benefits and feasibility of this option.

ASX broadly agrees with the concerns raised in the REP 708 feedback regarding an open conference line and notes that an open conference line:

- is likely to be more resource intensive - both for ASX and stakeholders - at a time when demands on resources are high
- risks having less stakeholder coverage than the existing 'push' subscription service provided by the SSP
- if interactive, may risk becoming a channel for dealing with customer specific issues
 - creating 'noise' in the broader communication
 - diverting resources away from existing, more appropriate channels
- alternatively, if not interactive, may effectively become a 'broadcast' service for the content of the SSP updates
 - offering limited additional value to the existing SSP service.

Perhaps the most compelling argument for an open conference line is the perceived 'real-time' nature of such a call compared with the scheduled nature of the SSP update. In practice, any formal update of sufficient importance to merit communication over an open conference line would also trigger an off-schedule update to the SSP.

As described in section 4.4, ASX proposes to increase the regular content in the SSP. ASX's intention with the increased detail in the SSP updates is to satisfy the clear demand for additional information that was noted

in the REP 708 feedback. ASX considers that this may also mitigate the demand for an alternative communication mechanism where it may have been perceived that the alternative channel might provide more content than the SSP.

ASX has considered the option of an open conference line and has concluded that the current approach, using the SSP, is more efficient and equitable.

4.4 Content of the system status page updates

Further to feedback from ASX Participants, directly and via REP 708, ASX proposes to increase the standard content for inclusion in SSP updates. ASX proposes that each update should include information relating to:

- the current state of the ASX market
- the current state of ASX Trade

and, where possible and as it becomes available, information relating to:

- any known impacts to ASX Trade, including:
 - users impacted
 - nature of impact
- the status of executed trades
 - including, where relevant, the results of any appropriate FOT review as discussed in section 2.5
- the status of current orders
- any negative determination of the feasibility of resuming the ASX market as discussed in section 3.9.

Question 4.4: Do you consider that the proposed scope of content of updates to the SSP is sufficiently comprehensive? If not, what other items of information would you propose are included?

5. Dependencies

5.1 Background

An incident impacting ASX Trade directly impacts the ASX market. ASX recognises that the status of ASX Trade and the status of the ASX market can have a direct impact on ASX Participants and ASX subscribers, which may include other Market Operators and may indirectly impact participants and Market Operators of other markets.

This section considers the potential dependencies on ASX Trade and the ASX market for:

- ASX Participants and ASX subscribers – in particular, potential dependencies which may impact their ability to manage orders in their own systems and therefore in the market
- other Market Operators- in particular, potential dependencies which may impact their ability to operate their own markets

5.2 ASX Participants and ASX subscribers

ASX Participants enter orders into, and manage their orders within ASX Trade. ASX Trade provides confirmations of activity undertaken in ASX Trade to ASX Participants in their private data and publishes corresponding market data to provide transparency of activity⁷⁰ in the ASX market to ASX subscribers.

In normal operations, ASX Participants and ASX subscribers systematically process private data and market data to maintain, respectively, their private and public views:

- the private data provided by ASX allows ASX Participants to ensure their own systems accurately reflect the state of all of their orders⁷¹ in ASX Trade
- the market data provided by ASX Trade allows ASX subscribers to ensure their systems accurately reflect the state of the lit orders⁷² in order books in ASX Trade⁷³.

An incident which impacts private data will affect the ability of ASX Participants to maintain an accurate view of their orders in ASX Trade. The incident may also prevent ASX Trade from providing, in the normal manner, the real-time updates that ASX Participants use to systematically maintain their private view of their orders in the ASX market. This uncertainty may also indirectly impact the ability of ASX Participants to manage orders in the market.

An incident which impacts market data will affect the ability of ASX subscribers to maintain an accurate view of the order books in ASX Trade. The incident may also prevent ASX Trade from providing, in the normal manner, the real-time updates that ASX subscribers use to systematically maintain their view of lit order books.

The impact of an incident may, for a period of time, therefore include both uncertainty over data and an inability to systematically manage orders due to an absence of systematic messaging from ASX Trade.

ASX procedures for resuming the ASX market (discussed further in Section 3.9) require certainty about:

- the status of ASX Trade

⁷⁰ All trades and lit orders.

⁷¹ Both lit orders and dark orders.

⁷² There is no market data for dark orders.

⁷³ ASX Trade also provides market statistics including opening price, high price, low price, last traded price, traded volume and various reference prices. These are not required to maintain the state of the lit orders books but may be used for other purposes by ASX subscribers.

- the status of market data
- the status of private data.

The ASX procedures also always provide a period of time during which ASX Participants may manage their orders before trading resumes⁷⁴.

Given these procedures, ASX Participants can have **certainty as soon as the ASX market is frozen** that before trading resumes on the ASX market:

- **no order in ASX Trade will execute** and
- **any order in ASX Trade can be deleted**⁷⁵ or otherwise managed before there is any possibility that it may execute
 - however, this may not be possible through normal channels until the resumption sequence has commenced.

A key challenge for ASX Participants is therefore whether and how to manage orders in their own systems during in an incident where:

- the current state of orders in ASX Trade may be uncertain⁷⁶ and
- there is no systematic messaging available from ASX Trade but
- the future state of all orders in ASX Trade is certain and is in the control of the ASX Participant (as set out above).

There are potential incident scenarios where, as discussed further in this paper, ASX currently remains unable to unfreeze ASX Trade and ASX Trade will not provide real-time systematic messaging until the underlying cause has been rectified (or avoided), and certainty of ASX market data and private data is established⁷⁷.

In such scenarios ASX will provide non-systematic messaging through ASX's System Status Page⁷⁸ concerning:

- the status of ASX Trade
- the status of ASX market data
- the status of ASX private data

and will also provide, on request and where possible, detailed information to ASX Participants concerning:

- executed trades
- current orders.

ASX seeks to understand the extent to which ASX Participants remain dependent on ASX in such circumstances.

Question 5.2.1: To what extent are you able to manage orders in your systems where the current state of orders in ASX Trade is uncertain?

⁷⁴ Currently a minimum of 20 minutes. This is discussed further in section 3.10.

⁷⁵ In the event that an ASX Participant is unable to connect, ASX's Trading Operations team can assist the ASX Participant in deleting all orders.

⁷⁶ Where ASX is able to confirm the current status of orders. This is discussed further in section 2.3.

⁷⁷ As was the case in the September 2016 incident and the November 2020 incident.

⁷⁸ <https://www2.asx.com.au/markets/market-resources/system-status>

Question 5.2.2: To what extent are you able to manage orders in your systems where the state of orders in ASX Trade is certain but there is no systematic messaging from ASX Trade? Do you have procedures for such circumstances?

Question 5.2.3: To what extent are you able to rely on the certainty that no trades will execute on the ASX market during an incident?

Question 5.2.4: To what extent are you able to rely on the certainty that you will be able to delete or otherwise manage all orders on the ASX market before trading resumes on the ASX market?

Question 5.2.5: Aside from the points in the preceding questions, what other factors prevent you from managing orders in your systems during an incident on the ASX market?

ASX, in its role as the listing authority for ASX-listed securities, is responsible for disseminating the **listing status** of ASX-listed securities – that is, whether the relevant security is available for, or suspended from trading on the market. Listing status is disseminated independently of ASX Trade⁷⁹ and is also available (indirectly) via ASX Trade⁸⁰. An incident affecting ASX Trade impacts neither the dissemination of listing status nor the ability of other Market Operators⁸¹ to receive listing status from ASX.

ASX, in its role as the operator of the ASX market, is responsible for disseminating the **trading status** of ASX-listed securities on the ASX market – that is, whether and how the relevant security is available for trading on the ASX market on ASX Trade. The trading status disseminated by ASX Trade appropriately reflects the listing status of the security and will change in response to changes in the listing status of the security. The trading status of the security will also reflect the status of ASX Trade and the ASX market.

With the sole exception described in the following paragraph, Market Operators are responsible for managing the trading status of a security on their markets and there is no dependency on the trading status of the same security on ASX Trade. With the sole exception described below, an incident affecting ASX Trade does not impact the ability of other Market Operators to manage the trading status of securities on their own market.

In respect of events in the Extreme Trading Range (“**ETR**”) in ASX-listed securities on both the ASX market and on other markets, ASX is designated under the MIRs as the Responsible Market Operator⁸². This designation makes ASX responsible for disseminating a change in trading status as a consequence of an ETR event on the ASX market or an ETR event on another market. This is achieved through a bidirectional message flow, mandated by the MIRs, which creates a dependency between ASX Trade and other market operators in relation to this specific change in trading status⁸³. ASX and other market operators have agreed contingency plans that can be enacted if ASX Trade is unavailable.

ASX and other Market Operators may provide execution services, reporting services and pricing services in accordance with the MIRs. Certain of these services make use of data provided by Market Operators other than the Market Operator which provides the service. Specifically, reporting and execution services in relation to Trades with Price Improvement⁸⁴ make use of the best available bid and offer prices consolidated

⁷⁹ Via the ASX Market Announcements FIX Gateway <https://www.asx.com.au/documents/products/asx-mar-fix-overview.pdf>

⁸⁰ Where it is possible, ASX will endeavor to continue publishing updates to listing status via ASX Trade during an incident. This action will not override the preventative controls effected through the global use of ENQUIRE. Throughout the November 2020 incident, ASX Trade continued to publish updates to individual session states reflecting changes in the listing status of affected instruments (for example, by moving individual instruments into and out of the PRE_NR session state when appropriate).

⁸¹ ASX Participants and participants of other markets that operate a crossing system (as defined under the MIRs) may also consume listing status in relation to their operation of a crossing system.

⁸² MIR 1.4.5.

⁸³ MIR Part 8.2 sets out these bidirectional interactions.

⁸⁴ MIR 6.2.3.

from the orders books of all Market Operators (the National Best Bid and Offer or **NBBO**). These services may include:

- **Execution services:** the validation of Trades with Price Improvement that are executed by a Market Operator
- **Reporting services:** the validation of Trades with Price Improvement undertaken off-market by a participant⁸⁵ that are subsequently reported to a Market Operator
- **Pricing services:** the pricing of Orders that are not pre-trade transparent by reference to the NBBO to ensure that any resulting trade will be a Trade with Price Improvement.

In the event that ASX Trade is unavailable, the best available bid and best available offer on ASX Trade are invalid and need not be incorporated into the determination of the NBBO. An incident affecting ASX Trade does not impact the ability of other Market Operators to offer these services.

ASX concludes from this analysis that, with the potential exception of the ETR process mandated by the MIRs, other Market Operators are substantially independent of ASX Trade and the ASX market in the event of an incident impacting ASX Trade and the ASX market. As such, an incident impacting ASX Trade and the ASX market should not prevent another Market Operator from providing their services.

5.3 ASX's dependency on other Market Operators⁸⁶

ASX only offers trading in ASX-listed securities. ASX does not offer trading in securities that are solely listed by other Market Operators and has no dependency on other Market Operators for the listing status of any security on the ASX market (as all securities on the ASX market are ASX-listed).

With the sole exception described below, ASX is responsible for managing the trading status of a security on the ASX market and there is no dependency on the trading status of the same security on other markets.

ASX is the Responsible Market Operator for ASX-listed securities. This creates an interdependency between ASX and other Market Operator(s) around the management of ETR events on other markets. In the event that the Market Operator of another market experiences an incident which results in the suspension of trading, there can be no ETR events on the other market. This dependency is effectively suspended for the duration of the period of no trading on the other market.

ASX offers execution services and reporting services in relation to Trades with Price Improvement which make use of the NBBO. In the event that the Market Operator of another market experiences an incident which results in the suspension of trading, that other market does not contribute to the NBBO⁸⁷. This dependency is effectively suspended for the duration of the period of no trading on the other market.

ASX concludes from this analysis that ASX is independent of another market in the event of an incident impacting that other market. As such, ASX will generally take no action in the event of an incident impacting another Market Operator.

⁸⁵ Notwithstanding the provision of this service by Market Operators, the participant remains responsible for ensuring compliance with the MIRs <https://asic.gov.au/about-asic/corporate-publications/newsletters/market-integrity-update/market-integrity-update-issue-137-may-2022/#review-of-trades-with-price-improvement>

⁸⁶ This is also discussed in the FOT guidance note.

⁸⁷ When such an incident occurs, the prevailing price from the other market is flushed from ASX Trade.

5.4 Considerations for investors

ASX recognises that there is a very significant ecosystem surrounding ASX that services and supports the investment activities of both wholesale and retail investors. All investor activity on ASX is intermediated by an ASX Participant and may, potentially, be intermediated by other parties⁸⁸.

ASX's reach into that broad investor ecosystem extends only as far as the data ASX provides to ASX Participant and ASX subscribers. ASX appreciates that there is an appropriately strong dependency from ASX Participants and ASX subscribers on the services ASX operates and the data ASX provides about activity on the ASX market. ASX strives to ensure that these services are available and that the data is reliable - accurate, comprehensive and timely - and made available systematically. This consultation papers considers the circumstances when, unfortunately, that is not the case.

ASX's view – informed by ASX's obligation to operate an FOT market – is that ASX should neither offer services that are not in a known good state nor publish data that is unreliable. As has been discussed, there are circumstances – including the circumstances of both the September 2016 incident and the November 2020 incident – where, for a period of time, ASX considers it may not be able to offer its services and may not be able to provide data that is completely reliable or available systematically.

In such incident scenarios ASX always aims to restore its services and re-establish reliable and systematically available data at the earliest possible time. Sometimes this cannot be achieved on the same business day. As proposed in this discussion paper, where this is the case, ASX will provide early notification.

ASX's second market management consultation will discuss some potential approaches to restoration that may be achieved at an earlier time.

This consultation paper discusses both what ASX is able to do and what ASX considers it should not do in incident scenarios. In particular, it describes the certainty ASX can provide about trades and the management of orders - noting that this certainty may, at least for a period of time, be provided through non-systematic messaging.

ASX trusts that the matters discussed in this consultation paper assist investors in considering their response to an incident that impacts ASX Trade.

ASX will continue to invest in improving the reliability of its systems and processes with the intention of minimising both the frequency and the impact of any potential future incidents.

⁸⁸ For example, where investor activity is introduced to an ASX Participant by a third party.

Annexure A – Consultation Questions

2. Certainty about trade and order status

2.3 Matching engine impacts

Question 2.3: If circumstances arise such that all orders in ASX Trade are lost, to what extent are you able to act on a formal notification from ASX (e.g. an ASX Notice or an update to the ASX SSP) that all orders have been deleted without systematic messaging through the normal channels?

Please detail any technical, operational or compliance challenges you might experience?

2.4 Market data and private data impacts

Question 2.4: What views do you have on the benefits and risks of ASX unfreezing the ASX market where doing so would result in the publication of erroneous ASX market data and/or private data?

If you see benefits, how will you accommodate the uncertainty that unfreezing the ASX market in such circumstances would create?

3. Session states, intraday cut-offs and checkpoint times

3.2 Incident management: Freezing the ASX market

Question 3.2: What views do you have about ASX freezing ASX Trade in circumstances where an issue has been assessed to result in uncertainty on the status of ASX Trade and/or the data disseminated by ASX Trade?

Please provide reasons why you believe this is or isn't the correct course of action?

What are some of the challenges a freeze presents?

3.3 ENQUIRE

Question 3.3: What benefits and risks do you think arise when using ENQUIRE as the initial session state during an incident? If not, what alternative session state would you propose and why?

3.4 Use of cancel on disconnect in ENQUIRE

Question 3.4: What benefits and risks arise if ASX discontinues the availability of cancel on disconnect functionality in ENQUIRE? If cancel on disconnect was to remain, how will you accommodate the potential unreliability of the data that the cancel on disconnect could create?

3.5 Use of ENQUIRE in the equity options market

Question 3.5: What benefits and risks arise by removing ENQUIRE from the closing sequence of the Equity Option Market?. Does this change, to restrict the Enquire session state to incident management only, create any operational concerns. How does replacing the ENQUIRE Session State with a new session state 'ADJUST OPTIONS' for the closing sequence of the Equity Options Market impact your systems/operations?

3.7 Considerations for the use of ADJUST in incident management

Question 3.7: What are the benefits and risks of moving to ADJUST (or any other session state) that permits deletion or amendment, when there is no certainty that ASX market data and private data are correct?

3.8 Incident management: unfreezing the ASX market

Question 3.8: Do you consider the tests above are appropriate and sufficient to determine if ASX can unfreeze the ASX market? If not, what additional tests should be considered?

3.9 Incident management: determining the feasibility of resuming the ASX market

Question 3.9: Do you consider 45 minutes to be an appropriate period between each assessment of the feasibility of resuming the ASX market? If not, what period do you consider appropriate and why?

3.10 Assessment of the backstop time for resuming the ASX market

Question 3.10.1: Do you consider the current minimum timings for the resumption sequence to be sufficient? If not, what periods do you consider appropriate for notice and for PRE-OPEN and why?

Question 3.10.2: What are the benefits and risks if ASX does NOT change the timing of the closing auction sequence as a result of an incident? What system changes would be required for you, if the closing auction time was extended? What would be the latest time for the closing auction sequence to commence?

Question 3.10.3: Taking into consideration the resumption session state sequence what would you consider an appropriate backstop time for the final determination of the resumption of the ASX market and why?

4. Incident communications

4.2 Feedback identified in REP 708

Question 4.2: Do you consider half-hourly updates are appropriate? If not, what frequency would you propose?

4.4 Content of the system status page updates

Question 4.4: Do you consider that the proposed scope of content of updates to the SSP is sufficiently comprehensive? If not, what other items of information would you propose are included?

5. Dependencies

5.2 ASX Participants and ASX subscribers

Question 5.2.1: To what extent are you able to manage orders in your systems where the current state of orders in ASX Trade is uncertain?

Question 5.2.2: To what extent are you able to manage orders in your systems where the state of orders in ASX Trade is certain but there is no systematic messaging from ASX Trade? Do you have procedures for such circumstances?

Question 5.2.3: To what extent are you able to rely on the certainty that no trades will execute on the ASX market during an incident?

Question 5.2.4: To what extent are you able to rely on the certainty that you will be able to delete or otherwise manage all orders on the ASX market before trading resumes on the ASX market?

Question 5.2.5: Aside from the points in the preceding questions, what other factors prevent you from managing orders in your systems during an incident on the ASX market?

ASX would encourage stakeholders to provide additional feedback on topics which they feel to be of relevance and which may not been specifically referenced to in this first consult paper.

Annexure B – Glossary

ADJUST	The ADJUST session state on ASX Trade as described in the ASX Operating Rules
ASIC	The Australian Securities and Investments Commission
ASIC’s expectations	ASIC’s expectations of Market Operators as set out in REP 708
ASX	ASX Limited
ASX market	The markets in ASX-listed products offered by ASX as a licensed Market Operator
ASX Participant	An entity authorised to interact transactionally with, and receive private data from, ASX Trade
ASX subscriber	An entity authorised to receive market data from ASX Trade
ASX Trade	The trading platform through which ASX operates the ASX market
CoD	Cancel on disconnect capability offered by ASX Trade
Corporations Act	Corporations Act 2001 (Cth)
dark order	An order that is not visible to market observers and is not published in market data
ENQUIRE	The ENQUIRE session state on ASX Trade as described in the ASX Operating Rules
FOT	“Fair, orderly and transparent” as required of Market Operators by the Corporations Act
FOT guidance note	ASX’s guidance note on the “Maintenance of a fair, orderly and transparent market”
FOT review	A review of trades undertaken in the context of ASX’s obligation to operate a FOT market
IBM report	The Final Report of the review of the ASX Trade Refresh project undertaken by IBM Australia, to which ASX responded publicly in August 2021
ITCH	A protocol used by ASX Trade to publish market data
lit order	An order that is visible to market observers and is published in market data
long order	An order with a duration beyond the end of the current business day
Market data	Data broadcast by ASX Trade to ASX subscribers that includes public non-confidential data about orders and trades
Market Operator	As defined in the MIRs
MIRs	ASIC Market Integrity Rules (Securities Markets) 2017
NBBO	The National Best Bid and Offer constructed in accordance with the MIRs

non-ASX market	A market in securities that are not ASX-listed securities operated by a Market Operator other than ASX
Non-systematic messaging	Data about orders and trades distributed outside of the normal distribution channels (OUCH, ITCH and OMNet)
November 2020 incident	The market outage and other operational incidents that affected the ASX market in the week of 16 November 2020
OMnet	A protocol used by ASX Participants to interact with ASX Trade and by ASX Trade to publish market data and private data
other market	A market in ASX-listed securities operated by a Market Operator other than ASX
OUCH	A protocol used by ASX Participants to interact with ASX Trade and by ASX Trade to publish private data
private data	Data published by ASX Trade directly to ASX Participants to whom the data relates that contains confidential data about orders and trades
REP 708	Report 708, entitled “ASIC’s expectation for industry in responding to a market outage” published by ASIC on 24 November 2021
September 2016 incident	The market outage and other operational incidents that affected the ASX market on 19 September 2016
SSP	The System Status Page on ASX’s website
systematic messaging	Private data and market data variously distributed via OUCH, ITCH and OMNet
the market	The totality of all markets in ASX-listed securities operated by all Market Operators
