

Exhibit D- Automated Trading System

Exhibit D-1- Order Matching /Trade Execution System

1. The order matching/trade execution system, including a complete description of all permitted ways in which members or other participants (or their customers) may connect to the trade matching/execution system and the related requirements (for example, authorization agreements).

SGX-DT implemented a trading engine, Quotation and Execution System for Trading (“**QUEST**”), for the derivatives market in August 2004. The Trading Platform subsequently underwent a capacity, hardware and latency improvement upgrade in 2008. The QUEST platform is based on the NASDAQ OMX developed platform, CLICK XT™. This was modified to meet SGX requirements before implementation. The Derivatives Trading Platform comprises the central matching engine, network gateways, market data, static data and the OMNet Application Programming Interface (“**API**”) for member connectivity.

The central trading system is responsible for the following:

- (a) managing the central order book;
- (b) order matching;
- (c) distributing real-time orders, trades and price information to feed handlers and order management systems; and
- (d) interfacing executed trades to the integrated derivatives clearing system, SGXClear.

Trading Members¹ connect their in-house developed OMS² to the QUEST via the API to perform order and trade management.

The availability of the API allows Members³ to retrieve orders, trades and position information in real-time, thus allowing them to better manage their risk exposure. The access via the API is strictly controlled by the Market Control Unit, and all additions and changes to that access will have a clear audit trail.

All orders are queued and matched in accordance with price-time priority. However, for certain products such as the Euroyen TIBOR futures contract, price point and pro-rata matching algorithms are also used.

Order placement, modifications and cancellations are managed within the central trading system. The central trading system also stores stop limit orders and only places them in the order book when the trigger conditions are met.

Information including best bid/offer, last matched price, market and price-depth, is broadcast in real-time by the central system when there are changes to the order book such as receipt of new orders, order modification, withdrawal or matching of orders. This information is collated by the Market Control Unit and disseminated in real-time to Members, their clients and data subscribers either directly or through third party providers.

¹ “**Trading Member**” refers to an individual or corporation granted trading privileges by SGX-DT, as contemplated in the Future Trading Rules of SGX-DT (“**Trading Rule(s)**”)

² “**OMS**” refers to the order management system through which orders are routed to QUEST.

³ “**Members**” refer to either a Trading Member or a Clearing Member with trading privileges and Membership has the correlative meaning

When orders are matched, trade information is sent in real-time to the participants of the trade and to the SGX clearing system.

Members are able to access this information in the following ways depending on their requirements:

- (a) via the SGXClear Participant Interface application (“**PI**”) which is the SGX provided clearing application used by Clearing Members⁴ for clearing.
- (b) the SGXClear API connected by proprietary or Independent Software Vendor (“**ISV**”) provided backoffice system of Clearing Members for clearing.
- (c) via the QUEST API connected by proprietary or ISV provided OMS of Trading Members upon execution of their trades.

The Market Place Assistant is a system used by the Market Control Unit to enable it to monitor the activities on the central trading system and handle market exceptions. It also provides the means for the Market Control Unit to send market messages to communicate with the traders. Market messages such as price limit triggers and cooling period commencement are broadcast via the Market Place Assistant to the OMS of market participants. The Market Control Unit will also provide order and trade details to authorized coordinators upon request. The Unit also provides answers to general queries about SGX-listed products such as product specifications, last trade date, final settlement prices, holiday trading and such matters.

The network gateway provides the connectivity between the Member’s OMS to the central trading engine. The network gateway provided by SGX supports connectivity by OMS platforms which have been developed by Members or provided by third party, ISVs. The messaging between the OMS and the network gateway is based on a defined set of published API specifications. The network gateway routes the orders from the OMS to the central trading system, it routes confirmation messages and it also distributes broadcast information from the central trading system to the OMS. The network gateways also host the automated Pre-Trade Risk Controls (PTRC) module, which checks all orders entering the market against limits pre-set by the Clearing Member.

SGX-DT's primary and secondary data centers are located at two different zones in Singapore to provide sufficient geographical diversity in the event of any major incidents. Both data centers meet a minimum of tier 3 standards and are highly secure facilities with stringent process controls and perimeter security which operates around the clock.

Within all data centers, SGX-DT has implemented an integrated monitoring framework which ensures proactive surveillance of the infrastructure, networks and applications of potential issues and or performance concerns.

The derivatives trading and clearing systems, like other critical SGX-DT systems, have been designed using an active-standby configuration. This allows the trading platform to seamlessly failover within seconds from the primary to secondary data center, in event of a major data center outage, server failure, network failure or application issue. To ensure seamless transition during a failure, the secondary systems and associated infrastructure are configured symmetrical to that of the primary site.

The SGX-DT network infrastructure uses next generation equipment, delivering high capacity and low latency infrastructure as required by business and customers. A tiered storage solution with no single

⁴ “**Clearing Member**” refers to any corporation granted clearing privileges by SGX-DC as contemplated in the clearing rules.

points of failure (“**SPOF**”) is deployed with sufficient capacity to meet both current and three to five year growth plans. Regular failover testing is performed to ensure there is no SPOF and that high-availability solutions continue to work as per their original design and recovery objectives. Members’ network connectivity to SGX’s critical trading and clearing services are provided over a secure and private network which has additional security controls and tighter change control. Segregation of duties and the use of independent monitoring of the system and firewalls are adopted. SGX-DT will only accept applications for API ID logins from Trading Members. Trading Members may access QUEST via OMnet API through SGX Co-location Service or secure Wide Area Network (“**WAN**”).

The Co-location service offers access to SGX-DT trading platforms in a secure, reliable and robust environment.

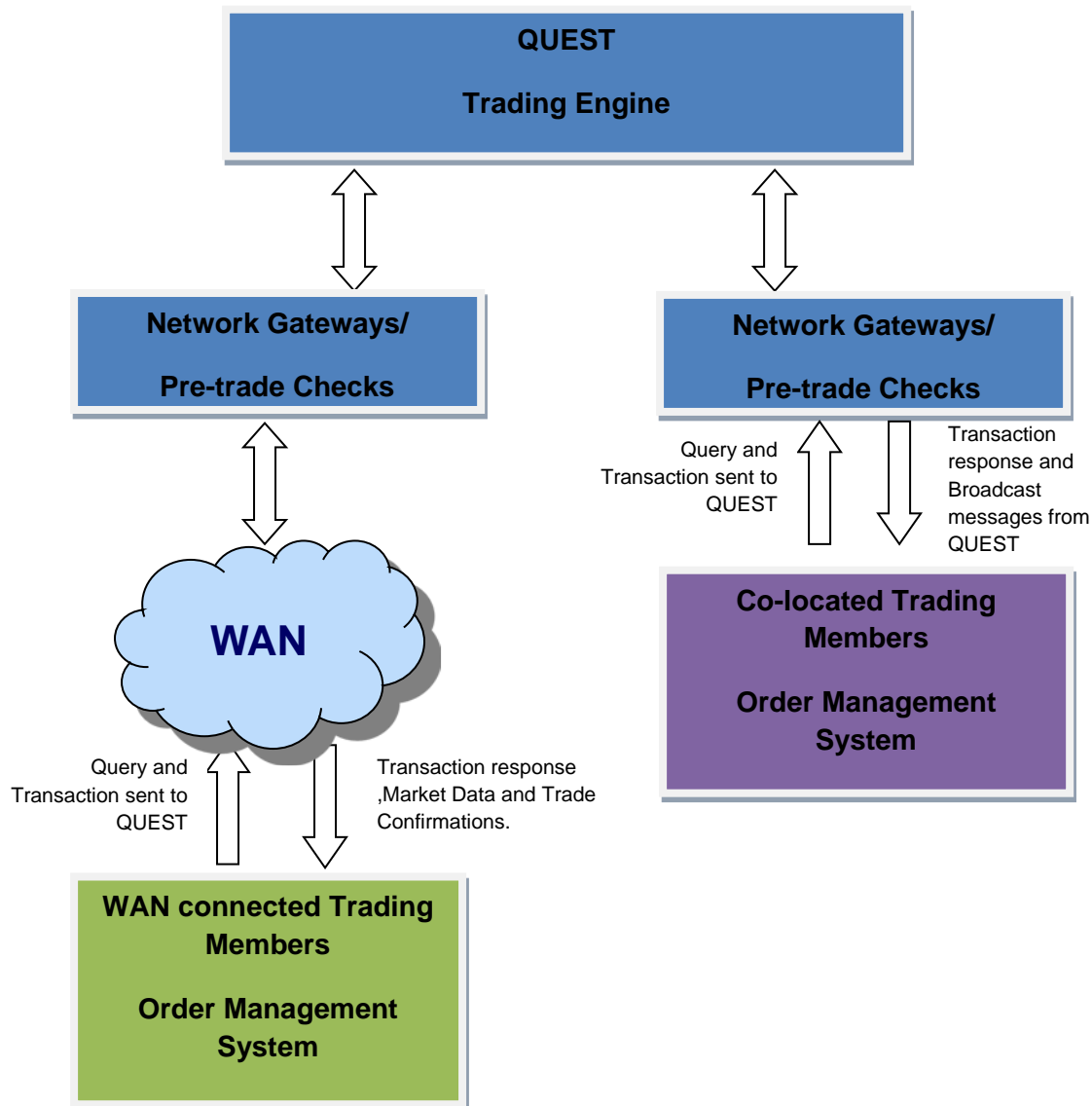
For WAN connections, Members and Customers⁵ are provided the following secured options:

- (a) connection via SGX Managed Network Services;
- (b) connection via third party Network Service Provider (“**NSP**”) Network; and
- (c) connection via ISV Network.

ISVs and Members’/Customers’ proprietary or in-house developed OMS are required to satisfy a stringent SGX conformance test for compliance with the OMX Open API specifications prior to being permitted to access QUEST.

⁵ “**Customer**” refers to an indirect SGX-DT participant

The diagram below shows the transmission of information between the derivatives trading platform and available client interfaces.



The following systems are used by SGX-DT for matching and registering trades, to ensure Trading Members are in agreement about trade details:

- (a) Trade matching algorithms: Regulatory Notice 4.1.6, at paragraph 2, issued pursuant to the Trading Rules⁶, describes the four algorithms that SGX-DT may adopt to match and allocate the orders for Contracts⁷ traded on the SGX-DT market. The four algorithms are:
- (i) price/time priority allocation;
 - (ii) price point maker allocation;
 - (iii) market maker allocation; and
 - (iv) pro-rata order and matching allocation.

⁶ "Trading Rules" refer to Futures Trading Rules of SGX-DT.

⁷ "Contract" refers to rights and obligations incurred through a trade on an exchange, an OTC trade or a financial derivative trade.

Trading Rule 4.1.6, further provides that the trade matching algorithms may be Market and Contract specific. SGX-DT may determine the applicable trade matching algorithm for a Contract and may apply a new or different algorithm to a new or existing Contract provided that advance notification is given to Members.

Currently all contracts offered by SGX-DT use the default matching algorithm of price/time priority. Only one contract traded on SGX-DT, EuroYen (TIBOR) Futures, uses alternate matching algorithms and those alternate algorithms are the price point maker allocation and the pro-rata order and matching allocation. No contracts currently offered by SGX-DT use the market maker allocation algorithm.

- (b) QUEST for exchange-traded derivatives: SGX-DT operates a wholly electronic market and trading access and is solely available via the QUEST platform. The same platform is accessed by Clearing Members to ensure that Clearing Members are in agreement about trade details. The trade and order information is sent from QUEST to the derivatives clearing system enabling Clearing Members to obtain information about their matched trades. Market data is disseminated via OMnet API and SGX DerivativesQuote to data subscribers such as Reuters and BloombergTerminal. Market data is also published on the SGX website.

Please see Exhibit D-2) (Adequate and appropriate trade data is available) below for more information on the data available to market participants.

2. The architecture of the systems, including hardware and distribution network, as well as any pre- and post-trade risk-management controls that are made available to system users.

The backbone of the derivatives trading platform, QUEST (CLICK XT™), is OMnet, a general and powerful messaging system which supplies Market participants with an open, public interface to the central marketplace, trading and clearing functions. OMnet is an essential tool for integrating participant APIs, on different hardware platforms, with the CLICK XT™ system.

The common database, marketplace, information dissemination and deal capture modules provide the core functionality of the central trading system. Together with the applications used for monitoring, supervising and controlling the trading platform, these modules comprise the entire system.

The system architecture follows consistent client-server architecture with Customer and Member APIs either located at the participant's site or located at the SGX data centers. The CLICK XT™ system software is based on the client-server concept, offering participants direct interaction with SGX through their own computer systems access. All transactions are transferred via a defined open interface, the OMnet API, which is available on multiple hardware platforms, giving Customers and Members the ability to choose whether to trade through:

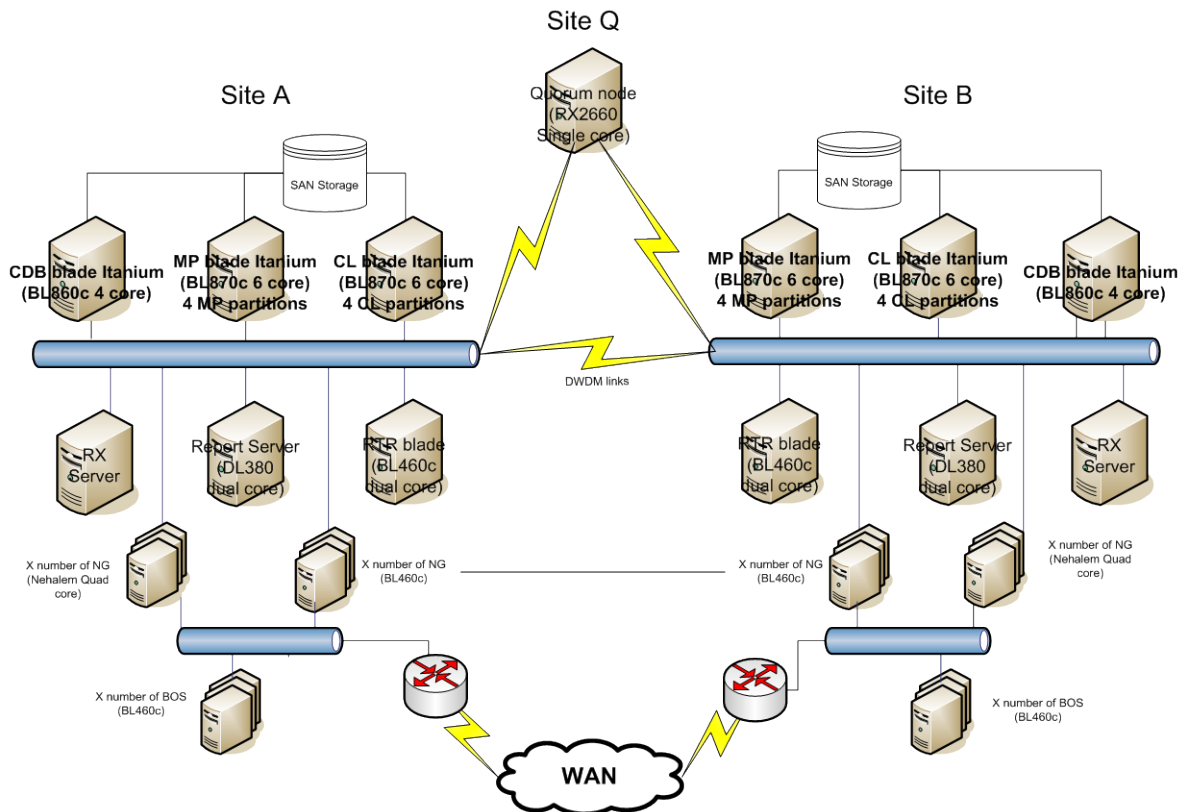
- (a) their own computer systems with proprietary or commercial trading applications; or
- (b) third-party applications.

Members may access QUEST via OMnet API through SGX Co-Location Service or secure wide area network. The co-location service offers access to the SGX trading platforms in a secure, reliable and robust environment. There are several secure wide area network connectivity options for Members and Customers to connect to QUEST. These connectivity options include:

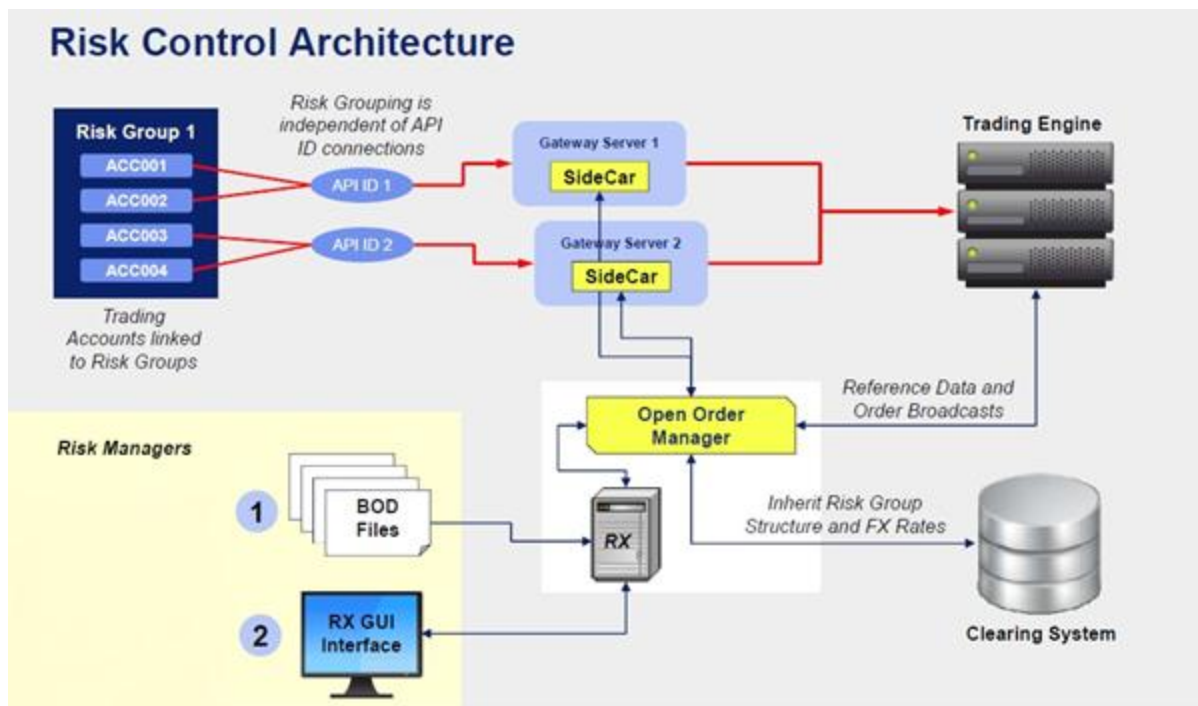
- (a) connection via SGX managed network services;
- (b) connection via third party NSP network; or
- (c) connection via ISV network.

The specifications illustrated below describe the equipment needed for both the primary site, secondary site and the quorum site⁸ for the SGX-DT market. The solution is based on a HP Blade Architecture, which provides the flexibility of having Itanium, Intel Xeon or AMD CPUs in the same Blade System enclosure. The enclosure supports up to 8 full height or 16 half-height blades or a mix of both.

An overview of the QUEST hardware is illustrated below:



⁸ The objective of the quorum site is to ensure that all facilities have one more “vote” assigned on the SGX primary Site in normal operation and if the SGX second site is lost, this extra “vote” ensures that trading can continue uninterrupted without any operator manual intervention. The SGX quorum site resides in the primary data center.



Pre-Trade Risk Management

As part of its membership admission criteria, SGX-DT requires prospective Members to have sufficiently qualified and experienced key personnel able to implement, oversee and maintain adequate internal procedures and risk management controls as contemplated under the Trading Rules (see Trading Rule 2.7.1).

SGX requires all Clearing Members to set pre-execution limits on their trading participants. To facilitate direct market access, SGX has in place certain risk tools to enable Clearing Members to set trading limits on their clients, giving their clients the option of connecting their OMS directly to QUEST without having to go through their Clearing Members' infrastructure, significantly reducing costs and time-to-market.

With pre-trade risk controls, orders sent by clients are checked against a preset trading limit that is defined and controlled by their Clearing Members before being matched. Orders with nominal value exceeding the preset limit are rejected. This eliminates concerns associated with algorithmic and high frequency trading as all orders to SGX are subject to pre-execution limit checks at either a Clearing Member's hosted system, or using pre-trade risk controls hosted at SGX.

Pre-trade risk controls are designed to complement Members' existing risk controls and operate as a backstop system outside the Clearing Member's infrastructure to limit the risk exposure the Member can accumulate intra-day. These controls are consistent with initiatives at the Chicago Mercantile Exchange and Eurex Exchange. With these controls in place, Clearing Members can manage the trading limits of Direct Market Access^[1] clients who do not interface with the Clearing Member's infrastructure for risk management.

^[1] "Direct Market Access" refers to a Customer's direct access to SGX's order matching engine, QUEST, via an SGX or SGX-approved order management system.

Post-trade Risk-management Controls

The Market Control Unit responds to trading-related requests from registered contacts for the QUEST platform. Registered contacts include Trading Members, Clearing Members and their authorized contacts appointed in accordance with Trading Rules Practice Note 4.1.9. The Market Control Unit will only accept calls from registered contacts.

Order Withdrawal Rules and Practices

Trading Rule 4.1.9 provides that a Member, Approved Trader or Registered Representative of SGX-DT shall not withhold or withdraw from QUEST any Customer's order or any part of a Customer's order for any reason, unless it is for the benefit of the Customer or pursuant to the Customer's instruction.

The Market Control Unit can, in cases of emergency, cancel Customer orders upon request. The Market Control Unit procedures for this require confirmation of security information and caller authentication prior to the Market Control Unit processing any order status queries or cancellation requests.

The procedures setting out the rules and practices relating to order withdrawal requests are issued by the Market Control Unit pursuant to Trading Rule Practice Note 4.1.9.

Order withdrawal requests will only be accepted by the Market Control Unit if the Trading Member is unable to withdraw the order on its own due to technical faults. The Market Control Unit will assist on a best-efforts basis. The Member is deemed to have agreed that the Market Control Unit has no liability for order withdrawal or activities related to the order withdrawal on behalf of a Member. The Member indemnifies the Market Control Unit against any claims against the Market Control Unit in connection with any action taken or any inaction by the Market Control Unit with respect to order withdrawals.

Clearing Members or Trading Members may request that the Market Control Unit withdraw orders at the following levels:

- (a) Individual Order level; or
- (b) Access ID level.

All requests for order withdrawals must be made by authorized firm coordinators appointed by the Clearing Member or Trading Members. This is to ensure that all order withdrawal requests are made under proper authority. Clearing Member or Trading Members may appoint up to four authorized personnel as firm coordinators for Single/Access ID order withdrawal and another authorized personnel as firm coordinators for firm-wide orders withdrawal. All calls to the Market Control Unit are taped for record purposes.

On contacting the Market Control Unit, the relevant Member's firm coordinator is required to identify himself/herself by stating his/her:

- (a) Clearing Member or Trading Member;
- (b) name;
- (c) reason for order withdrawal request;
- (d) trading solution used; and
- (e) access/OMS ID,

for security verification and to prevent unauthorized requests, the caller must also answer one or more security questions:

- (a) city of birth;
- (b) NRIC / passport number/ social security number;
- (c) date of birth;
- (d) mother's maiden name;
- (e) last school or institution attended;
- (f) year graduated; or
- (g) residential ZIP/ postal code.

The Market Control Unit will only withdraw orders as requested if the identity of the firm coordinator is authenticated. Notwithstanding the above, if the Market Control Unit has reason to believe that there is a need to further authenticate the identity of the caller, it may exercise its discretion and call the Clearing Member or Trading Member to verify the request.

Upon verification by the Market Control Unit, the firm coordinator is required to provide the following details for withdrawal of individual orders:

- (a) instrument series;
- (b) account number or client account number;
- (c) bid/sell;
- (d) price;
- (e) quantity; and
- (f) QUEST order number.

The Market Control Unit will proceed with the withdrawal once the order has been identified based on the above information. At the point in time when the Market Control Unit staff enters the instruction to withdraw an order, it is possible that during that period, the system may partially match off the order in question. In this case, the remaining order quantity will be withdrawn.

If the Clearing Member or Trading Member wishes to only withdraw orders based on specific Access connections, it will have to state so and specify the relevant Access ID Number. If the Clearing Member or Trading Member wishes to withdraw orders on a firm-wide level, it will have to state so.

Upon completion of the order withdrawal, the Market Control Unit will first communicate the status verbally to the firm coordinator by telephone. This will be followed by a copy of the order withdrawal form being emailed to the Clearing Member or Trading Member.

3. The security features of the systems

In compliance with Section 16(g)(iii), Securities and Futures Act 2008 Rev Ed (Chapter 289 of Singapore) (“SFA”), SGX-DT must provide adequate security arrangements. SGX-DT ensures that there are adequate safeguards in place for the operation of its trading facilities, including safeguards against financial crime and these apply to Trading Members both within and outside Singapore. These measures include:

- (a) by way of admission and registration criteria, ensuring that its Trading Members observe high standards of integrity, market conduct and fair dealing and refrain from any course of conduct which is likely to harm the reputation of the Markets⁹ or any Members (Trading Rule 3.2.1). This requirement continues to apply as part of Trading Members' on-going compliance obligations under Trading Rules 3.2.3 and 3.2.4;
- (b) requiring Trading Members to conduct credit assessment and know-your-customer due diligence before opening any trading accounts for a new Customer (Trading Rule 3.3.1). All Trading Members are required to comply with the MAS Notice (SFA04-N02) on the Prevention of Money Laundering and Countering the Financing of Terrorism—Capital Markets Intermediaries (“**MAS Notice on AML/CFT (MAS SFA 04-N02)**”)(attached at Exhibit B-5). Compliance with the MAS Notice on AML/CFT applies to the General Trading Member¹⁰ as Capital Markets Services (“**CMS**”) licensees and to the Bank Trading Member¹¹ pursuant to the MAS Notice (MAS 626) on the Prevention of Money Laundering and Countering the Financing of Terrorism - Banks (“**MAS Notice on AML/CFT (MAS 626)**”) (attached as Exhibit B-6). In compliance with the MAS requirements, Members must perform customer due diligence and confirm that the Member has:
 - (i) obtained key particulars relating to the Customer (and any person authorized to trade for the Customer);
 - (ii) verified the identity of the Customer and that the Customer has requisite authority to open the account;
 - (iii) understood the Customer's risk appetite and investment objectives all in a manner consistent with industry best practices on know-your-customer requirements; and
 - (iv) during SGX-DT's inspections, the Member Supervision Unit may also review the account opening process of Trading Members (Trading Rule 3.5.1). The frequency of such review is determined by the Trading Member's risk profile. Based on the risk profile, the Member Supervision Unit will carry out the relevant supervisory/inspection action on each Trading Member. Members who are deemed to be of higher risk are monitored more closely and more frequently;
- (c) SGX-DT has in place access controls to protect technology systems from damage, tampering, misuse or unauthorized access. The Technology Unit has in place policies, guidelines and standards pertaining to system access control and security of IT systems. All system access

⁹ “**Market(s)**” refer to any market as contemplated under the Securities and Futures Act that is operated by SGX-DT.

¹⁰ “**General Trading Member**” refers to a Trading Member with such rights and obligations as set out in Chapter 2, Trading Rules. For the avoidance of doubt, a reference to a GTM shall not include a Bank Trading Member.

¹¹ “**Bank Trading Member**” refers to a Trading Member with such rights and obligations as set out in Chapter 2, Trading Rules. For the avoidance of doubt, a reference to a BTM incorporated outside Singapore shall refer to the branch located in Singapore, or a parent bank incorporated in Singapore.

is granted on a need-to-have basis and access levels are provisioned based on the nature of information involved, business requirements and job roles;

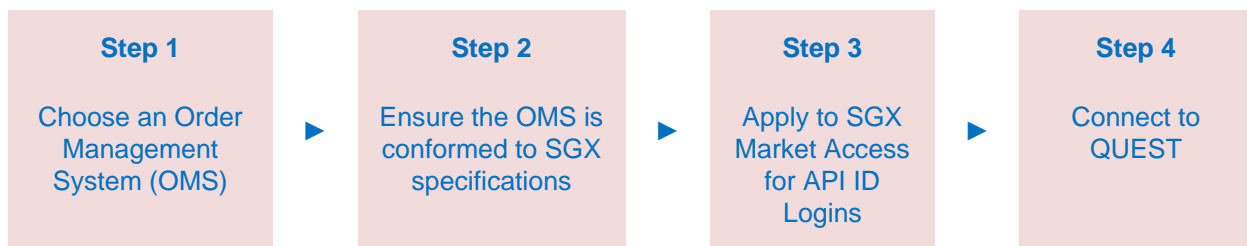
- (d) SGX-DT also protects IT systems through the mandatory two-factor authentication system for remote production support. Remote access is only permitted by authorized staff members and support staff from vendors. Depending on the level of criticality, the Technology Unit has established procedures and standards to assess and determine the level of security requirements required for different IT systems. Examples of these security requirements include user identification and authentication, access control and authorization and audit requirements. To further strengthen the security of IT systems, our policies mandate that validation checks must be conducted for data residing or moving in and out of key systems, to ensure its accuracy, integrity and appropriateness in the circumstances;
- (e) the SGX-DT network is also constantly monitored by intrusion detection system for malicious traffic and suspicious access;
- (f) SGX-DT has processes in place to:
 - (i) ensure timely removal of the identification data of staff and contractors who have left SGX-DT;
 - (ii) review privilege user ID activities;
 - (iii) verify access by managers;
 - (iv) intrusion detection systems;
 - (v) produce monthly hardening reports; and
 - (vi) record all privileged account activities.
- (g) IT security awareness training is conducted annually to heighten the awareness of security amongst staff;
- (h) SGX-DT has imposed strict criteria where only systems and network devices that meet the strict criteria are promoted to the production environment. The IT security procedures cover hardening of the systems based on the prevailing IT security standards which include the use of password and audit trail settings, turning off unnecessary services, resetting default passwords and strict controls on privilege account usage;
- (i) to prevent the introduction of unauthorized programs such as computer viruses, SGX-DT deploys several tools such as:
 - (i) anti-virus software;
 - (ii) host based firewall and intrusion prevention system;
 - (iii) web content filtering;
 - (iv) anti-spam controls;
 - (v) network intrusion prevention system; and
 - (vi) lockdown of system administrator privileges to prevent installation of unauthorized software;

- (j) a security incident and events management system is in place to collect and correlate logs from various systems. The security incident and events management system ensures that SGX quickly identifies and responds to any security incident should one occur. The features of this system are:
 - (i) Testing: a team of specialists undertakes tests to ensure that systems and data are secure from unauthorized access attempts by restricting user access through user identification, password and access level. Tests are also undertaken to ensure that there is no impact on data integrity under various hardware or software failure scenarios;
 - (ii) Policies: SGX ensures the integrity of data processed through information technology systems policies. Controls are defined and enforced to ensure data integrity and confidentiality. Policies requiring secure file transfers and encryption of sensitive fields during transmission are in place. Host and network based intrusion detection systems, and network access control tools capabilities have also been installed to protect the endpoints.
 - (iii) Lock down of drives and content filtering: To further prevent loss, theft or any form of compromise to data security, the Technology Unit has implemented mechanisms such as lock-down of USB drives and content filtering for the internet and e-mail. Where required, defined controls to detect and prevent unauthorized access to sensitive data are also in place. Wireless deployment is strictly controlled with two factor authentication and encryption.
- (k) prior to implementing any new IT systems which are accessible from the network, the Technology Unit's policies prescribe that security tests (such as penetration tests) and network vulnerability scans must be performed. These tests serve to validate adequacy and effectiveness of security controls for IT systems. The results of all tests are documented and maintained for reference purposes; and
- (l) the Technology Unit has implemented a patch management process to mitigate the vulnerabilities in the IT systems. The process is supported with patching tools to facilitate and where possible, automate patching for IT systems and devices to keep them up-to-date. Critical patches are implemented as emergency change to limit the system risk exposure, while other routine patches are scheduled in line with the application release cycles to bundle the changes to the production environment and facilitate testing. To ensure the data integrity of data, the following measures are in place:
 - (i) policies requiring secured file transfers and encryption of sensitive fields during transmission. Host and network based intrusion detection systems and network access control tool capabilities have been installed to protect the endpoints; and
 - (ii) to further prevent loss, theft or any form of compromise to data security, the Technology Unit has implemented mechanisms such as lock-down of USB drives and content filtering for proxy and e-mail. Where required, defined controls to detect and prevent unauthorized access to sensitive data are also in place.

Security arrangements for inputting instructions into the trading engine

SGX-DT has in place rules and guidance governing Members' procedures, controls and security arrangements for inputting instructions into the trading engine. The rules and guidance governing the procedures that Members follow to become connected to trade on QUEST are set out on the SGX website at:

http://www.sgx.com/wps/portal/sgxweb/home/services/market_access/derivatives.



Order Management System - An OMS application is required in order to trade on QUEST. A Member may either develop this application itself, or it may engage an ISV to do so on its behalf. The Member's development team (or Member's ISV) is required to perform self-validation that the OMS or API is working as desired and is ready to go for conformance testing. The QUEST API toolkit is a development platform that can be customized to the Member's requirements. Members choosing to develop their own proprietary trading platform are provided with all necessary technical and reference documentations to enable them to customize their OMS. ISVs can provide developed OMS to enable the Member to trade. The SGX website lists vendor firms which have already conformed their application to the QUEST API.

Conformance Testing – SGX-DT requires conformance testing for all OMS and applications that connect to the QUEST production environment. A conformance certificate is issued upon successful completion of the mandatory test cases.

Apply for QUEST API ID Logins - Following successful completion of the conformance test, the Member can apply to SGX Market Access for a production API ID logins to trade. Applications for API ID logins can only be made by Members. A non-member may approach a Member and request sponsored access. There are three different types of API ID logins available:

- (a) 4 TPS¹² QUEST API ID;
- (b) 20 TPS QUEST API ID;
- (c) market data API ID; and
- (d) Drop Copy API ID.

Connection to QUEST production environment - In order to trade on QUEST, the OMS used by the Member needs to be connected to the QUEST network gateways. There are currently three methods of access:

- (a) SGX offers a Managed Network Service for connecting trading OMS to QUEST. SGX will manage the Member's network connection and provide it with a wide variety of bandwidth options from 512Kbps to 6Mbps. Dual telco exchange-redundant circuits are provisioned for resiliency and reliability. This service is only available for connectivity within Singapore;
- (b) as an alternative to the Managed Network Service, the Member may choose to connect to QUEST via an approved NSP. The list of approved NSPs is available on the SGX website; or
- (c) a further option available to a Member is for it to co-locate its servers within the SGX infrastructure. This provides the Member with higher access speeds and the lowest possible latency, allowing Members to optimize use of the QUEST trading engine. The SGX co-

¹² "TPS" refers to Transactions per Second.

location service enables Members to place their own systems in the same data center as the SGX trading and market data engines. The facility enables the lowest network latency via the same local area network as the SGX trading and market data engines. Members are able to take advantage of SGX's all hours, on-site technical support services.

Once the network connection to QUEST has been established, Members must perform a login test with their API IDs after trading hours and notify SGX via email. All QUEST API connections are subject to QUEST terms and conditions.

The availability of the API allows Members to retrieve orders, trades and position information in real time, thus allowing them to better manage their risk exposure. The access via the API is strictly monitored by the Market Control Unit, and all additions and changes to that access have a clear audit trail.

The OMS application communicates with QUEST by sending and receiving messages to and from a gateway which, in turn, communicates with the central system at SGX. In order to create and transmit these messages, the OMS application uses the API provided by SGX. The API provides a C-programming language interface and has two parts:

- (a) the first part relates to how messages are sent to the gateway and includes a set of function calls that the user application may use (referred to as the "**QUEST API**"); and
- (b) the second part describes what is contained in the messages and includes a set of fixed structures (referred to as the "**OMEX API**").

The QUEST API and OMEX API remain the intellectual property of NASDAQ OMX. In order to access the full technical specifications and the environment document, Members are required to sign a sub-licensing agreement with SGX.

4. The length of time such systems have been operating

QUEST was launched in 2004. Generally, there are one to two service releases per year, each comprising minor enhancements and defect fixes to the existing production systems. Additional releases may be implemented following the introduction of new products or services as part of a business initiative. A robust testing framework has been implemented to ensure that the systems are reliable, secure and have adequate scalable capacity. The test framework comprises:

- (a) test guideline, which outlines SGX-DT's key objectives, principles and approach to testing;
- (b) test methodology, which covers test processes and procedures; and
- (c) test tools and templates, which support the testing function and help to standardize testing deliverables.

Please refer to D-D-1: Significant System Failures

6. The nature of any technical review of the order matching/execution system performed by the home country regulator

For major upgrades or enhancements to the QUEST order matching/execution system, briefings are provided to the home regulator, the MAS, to ensure that the MAS is appraised of relevant details of:

- (a) the technical architecture of the proposed upgrade or enhancement to the system, including details of the system resiliency and robustness;
- (b) the test strategy, including the non-functional test scenarios; and
- (c) the system implementation plan which will include a briefing to the market participants.

7. Trading Hours

Trading hours¹³ vary for each Contract.

The earliest open is 7:40am¹⁴ and the latest close is 2:00am on the following day.

Futures Contracts¹⁵:

CONTRACTS	SGX T Session	SGX T + 1 Session
Eurodollar Futures	NA	NA
Eurodollar Options	NA	NA
Euroyen LIBOR Futures	7.40 am - 7.05 pm	8.00 pm - 2.00 am (following day)
Euroyen LIBOR Options	7.40 am - 7.05 pm	8.00 pm - 2.00 am (following day)
Euroyen TIBOR Futures	7.40 am - 7.05 pm	8.00 pm - 2.00 am (following day)
Euroyen TIBOR Options	7.40 am - 7.05 pm	8.00 pm - 2.00 am (following day)
3-Month Singapore Dollar Interest Rate Futures	8.45 am - 5.00 pm	NA
5-Year Singapore Government Bond Futures	9.00 am - 5.00 pm	NA
10-Year Full-Sized JGB Futures	7.45 am – 5.10 pm	6.30 pm – 2.00 am (following day)
10-Year Mini JGB Futures	7.45 am – 5.10 pm	6.30 pm – 2.00 am (following day)
10 Year Mini JBD Options	7:45 am – 5:15 pm	6.30 pm – 2.00 am (following day)
URO STOXX 50 Index Futures	8.00 am – 12.55 pm	1.30pm - 2.00 am (following day)
EURO STOXX 50 Index Options	8.00 am – 1.00 pm	1.30pm - 2.00 am (following day)
Nikkei 225 Index Futures	7.45 am - 2.25 pm	3.15 pm - 2.00 am (following day)
Nikkei 225 Index Options	7.45 am - 2.30 pm	3.15 pm - 2.00 am (following day)
Mini Nikkei 225 Index Futures	7.45 am - 3.25 pm	4.15 pm - 2.00 am (following day)
USD Nikkei 225 Index Futures	7.45 am - 2.25 pm	3.15 pm - 2.00 am (following day)
Nikkei Stock Stock Average Dividend Point Index Futures	7.45 am – 5.55 pm	6.45 pm – 2.00am (following day)
MSCI Singapore Index Futures	8.30 am - 5.10 pm	6.15 pm - 2.00 am (following day)
MSCI Singapore Index Options	8.30 am - 5.15 pm	6.15 pm - 2.00 am (following day)
MSCI Taiwan Index Futures	8.45 am - 1.45 pm	2.35 pm - 2.00 am (following day)
MSCI Taiwan Index Options	8.45 am - 1.50 pm	2.35 pm - 2.00 am (following day)
MSCI Hong Kong+ Index Futures	9.45 am - 12.30 pm 2.30 pm - 4.10 pm	NA
Straits Times Index Futures	8:30 am - 5.10 pm	6.15 pm - 2.00 am (following day)
S&P CNX Nifty Index Futures	9.00 am - 6.10 pm	7.15 pm - 2.00 am (following day)
MSCI Asia Apex 50 Index Futures	7.55 am - 5.05 pm	6.15 pm - 2.00 am (following day)
FTSE China A50 Index Futures	9.00 am - 3.25 pm	4.10 pm - 2.00 am (following day)

For the latest list of contracts, please refer to the SGX website at http://www.sgx.com/wps/portal/sgxweb/home/trading/derivatives/trading_hours_calendar

¹³ All trading hours are in Singapore Time (GMT +8) and exclude the pre-opening, pre-closing and respective non-cancel session states. Please refer to the full contract specifications for details on these session states.

¹⁴ This excludes the pre-opening which starts at 7:30am.

¹⁵ “**Futures Contract**” refers to any Contract, over any asset, Commodity, instrument, index, reference rate or any other thing whose price movement determines the value of the Contract, designated by SGX-DT as a futures contract.

Commodities Contracts:

CONTRACTS	SGX T Session	SGX T + 1 Session
Fuel Oil 380cst Futures	9.30 am - 6.30 pm	7.30 pm - 2.00 am (following day)
Crude Palm Oil (CPO) Futures	10.30 pm - 12.35 pm 2.55 pm - 6.00 pm	NA
Robusta Coffee Futures	10.00 am - 7.00 pm	8.00 pm - 2.00 am (following day)
SICOM RSS3 Rubber Futures SICOM TSR20 Rubber Futures	7.55 am – 6.00 pm	NA
LME-SGX Copper Futures	8.00 am - 3.20 pm	4.00 pm - 2.00 am (following day)
LME-SGX Aluminium Futures	8.00 am - 3.20 pm	4.00 pm - 2.00 am (following day)
LME-SGX Zinc Futures	8.00 am - 3.20 pm	4.00 pm - 2.00 am (following day)

For the latest list of contracts, please refer to the SGX website at http://www.sgx.com/wps/portal/sgxweb/home/trading/derivatives/trading_hours_calendar

8. Types and duration of orders accepted

Order Types

Orders may only be entered if they are valid for that current Trading State.

The following order types are supported by the API:

- (a) Limit Order—Order with a specified price and quantity. A limit order has a price (premium) on the order, telling how much the trader is willing to pay or wants to receive for a contract;
- (b) Market to Limit (“**MTL**”) Order— These orders are always entered with only a volume and no price. They are assigned the best price on the opposite side of the order book and match any available quantity at that price. MTL orders have a validity time just as other orders, and can be entered as FAK/FOK (Fill-and-Kill/Fill-or-Kill), or be stored in the book (Day/ Good-till-Cancelled). If the order is a store order, any remaining quantity in the order will be stored in the book at that price. If there is no price at the opposite side of the order book, the order is stored as a limit order at one price tick better than the best price on the same side of the book. If no such price exists the order will be rejected;
- (c) Market Order— A market order is entered without a price. A market order can only be entered if it is allowed during the current Trading State. The Market Order will get its price in one of two ways:
 - (i) If it is entered during a state where orders are continuously matched, then the market order will be matched at the best possible price;
 - (ii) If it is entered during a state where orders are not continuously matched, then the market order takes the equilibrium price as its price. Accordingly, the order price will change if the equilibrium price changes;
 - (iii) Stop (Limit, MTL and Market) Order- Once a certain Stop Order trigger condition is fulfilled, the Stop Order is converted to either Limit, Market or Market-to-Limit (MTL)

order. A Stop Order is not shown to the market before it is converted to the specific order. The Stop Order trigger condition can be defined by the following parameters:

- A. Stop Series: The Stop Series defines the instrument the Stop Price shall be compared to;
 - B. Stop Price: The Stop Price defines what price level the price condition must meet to convert the order to a limit order;
 - C. Stop Price Reference Type: The Stop Price Reference Type can be Bid Price, Ask Price or Last Price. This will indicate if the Stop Price shall be compared to the Bid, Ask or Last Price; or
 - D. Stop Price Condition: The Stop Price Condition can be bigger than or equal to (\geq) or less than or equal to (\leq). This will indicate if the Stop Price must be bigger than or equal to (\geq) or less than or equal to (\leq) the Bid, Ask or Last Price to convert the order to a limit order;
- (iv) When the Stop Order trigger condition is fulfilled, the Stop Order is converted to the specified order type as defined in the order itself;
- (d) Market-if-Touched (“MIT”) Order— A MIT is an order to buy (or sell) a contract below (or above) the market. This order is held in the system until the trigger price conditions is reached (i.e. when an instrument reaches a specified price), and is then submitted as a market order. An MIT order is similar to a Stop order, except that an MIT sell order is placed above the current market price, and a stop sell order is placed below. MIT orders are not shown to the market before they are converted to the specific order;
- (e) Session state order (Limit, MTL, Market, Stop and MIT)— Session state orders trigger the entry of an order into the order book. The orders are entered into the order book based on price and time priority. Session state orders will trigger only when the market transitions into a new session state. Market participants can query for the list of valid session states and select the appropriate session state. Session state orders and their triggered orders are not visible to other market participants until triggering occurs. The session state order will be deleted at the end of the trading day if the market does not transition into the session state during the day (e.g. due to trading halts, invalid session state and etc.) Session state orders may not be GTC (Good-till-Cancelled);
- (f) Hidden volume order—Hidden volume orders are entered with a total volume and a shown volume. The hidden volume order will lose its queue priority when all of the shown volume has been matched. Hidden volume orders will be assigned volume in pro-rata matching only on the basis of their shown volume. Hidden volumes cannot be entered for combination series;

Time in Force for Orders

Limit order can be of the following ages:

- (a) Day;
- (b) Fill-and-Kill;
- (c) Fill-or-Kill; or
- (d) Good-till-Cancelled.

Market and MTL order can be of the following ages:

- (a) Fill-and-Kill; or
- (b) Fill-or-Kill.

Stop order can be of the following ages:

- (a) Day; or
- (b) Good-till-Cancelled.

9. Information to be included on orders

Information that is included in an order message includes the following: client account, buy/sell indicator, price, quantity, instrument, order type, validity, user ID (participant code and user number), order number, and timestamp of the order.

10. Trade confirmation and error trade procedures

Trade Confirmation

Section 18, SFA, requires SGX-DT to maintain a record of all transactions effected through its facilities in such form and manner as prescribed by the MAS including the details of each transaction to be recorded and the period of time that the record is to be maintained.

SGX-DT also complies with the MAS Guidelines on the Regulation of Markets ("**MAS Guidelines**") (attached as Exhibit D-1-1) which, at paragraph 2.7, provides guidance on the requisite standard for ensuring that satisfactory arrangements are made for recording transactions effected on SGX-DT for the purposes of transparency in the market. The MAS Guidelines provide that transparency may be defined as the degree to which information about trading (both pre-trade and post-trade) is made publicly available on a real-time basis. Pre-trade information, such as best bids and offers, should be made available to enable investors to know the transactions they may enter into and at what prices. Post-trade information on executed trades should be similarly publicized to reflect the market prices of executed trades. In addition, material information such as corporate announcements, required to assess the value of Futures Contracts, should be readily available to investors in a comprehensible manner and on a timely basis.

SGX-DT has proper systems in place for recording transactions. Under Trading Rule 3.3.6, other than orders made on-line by Customers, a Member may only accept orders on behalf of Customers through its Registered Representatives¹⁶. Unless an order or amendment or cancellation of an order is immediately entered by an Approved Trader into the OMS, the Registered Representative must immediately record the order on an order form (as required under Regulation 39(3), Securities and Futures (Licensing and Conduct of Business) Regulations 2002 ("**Conduct of Business Regulations**") (attached at Exhibit A-5-3)) and other information as prescribed by Trading Rules (see Trading Rule 3.3.8).

SGX-DT records the following information for every transaction traded on SGX-DT's trading facilities:

- (a) the name of the investment;
- (b) the underlying asset;
- (c) price;

¹⁶ "**Registered Representative**" refers to an individual sponsored by a corporate Member, an employee of a Bank or a trading representative of a Singapore Exchange Securities Trading Limited ("**SGX-ST**") member.

- (d) the quantity;
- (e) the date and time stamp (for transacted derivatives Contracts);
- (f) name and account number of the counterparty; and
- (g) details regarding the counterparties in the transaction.

In addition to the requirements prescribed in Regulation 39(3), Conduct of Business Regulations, Trading Rule Regulatory Notice 3.3.8 requires that the order form applicable to SGX-DT include the following:

- (a) the Customer's designation, which shall readily identify the account for which the order was given;
- (b) the date and time that the Customer's order, amendment or cancellation was passed from the Registered Representative to the Approved Trader;
- (c) the Contract for which the Customer's order was given;
- (d) the Contract month of that Futures Contract;
- (e) the quantity of that Futures Contract;
- (f) the order type;
- (g) the price (if any) to buy or sell that Futures Contract;
- (h) in the case of an option contract, the class of options and the strike price; and
- (i) the date and time that the order or amended order was executed

Regulation 5, Securities and Futures (Markets) Regulations 2005 ("**2005 Regulations**"), attached as Exhibit A-5-2, requires SGX-DT to maintain all books and records for a minimum of five years. This includes transaction records.

Real-time information on these trades is disseminated to the Trading Members. The underlying assets of the traded derivatives Contracts are stated in the relevant Contract Specifications¹⁷ along with the settlement method (namely whether it is cash settled or settled via physical delivery).

Error Trade Procedures

The Market Control Unit deals with error trades requested by Members in accordance with Trading Rule 4.1.8.

The Regulatory Notice 4.1.8 which is appended to the Trading Rules sets out the error trade policy applicable to contracts traded on SGX-DT. An error trade occurs when a transaction is effected on QUEST as a result of an error in the entry of a bid or offer that is subsequently matched. The following procedures apply in relation to error trades:

- (a) a Member shall take all necessary steps and exercise due diligence in monitoring trades done for any errors;

¹⁷ "**Contract Specifications**" refer to commercial and technical terms of a Contract.

- (b) a Member requesting cancellation or repricing of an error trade shall take all necessary mitigating actions to minimize the losses suffered;
- (c) the error trade policy administered by SGX-DT may be specific to the Market or a Contract; and
- (d) the cancellation or repricing of an error trade by SGX-DT does not affect SGX-DT's right to take any disciplinary action against the Member, Approved Trader or Registered Representative who was responsible for the error trade.

For the avoidance of doubt, SGX-DT is not liable for any loss or damage (including consequential loss or damage) which may be suffered as a result of the cancellation or repricing of an error trade in accordance with this Trading Rule 4.1.8.

Upon the occurrence of an error trade, SGX-DT retains the discretion (a) to cancel an error trade partially or fully; or (b) to adjust the trade price of the error trade partially or fully to the nearest limit of the error trade price range; if a party to the trade makes a request and the trade price falls outside the error trade price range for the contract for that day. If an error trade is done within the error trade price range, then the trade will stand, and no further action will be taken. However, there are no trade price adjustments for:

- (a) transactions in strategies listed for trading by SGX-DT;
- (b) trades involving implied orders as a result of strategy matching; and
- (c) option trades, except those which are approved as designated Option Contracts.

SGX-DT may consider the following factors when deciding whether to adjust the trade price or cancel any trades:

- (a) the difference between the price at which the error trade was done and the preceding traded prices of the Contract;
- (b) market conditions, including market liquidity in the Contract at the time the error trade occurred;
- (c) the monetary loss involved and the financial impact on the parties if the error trade is or is not adjusted or cancelled;
- (d) the reason(s) given by the erring party for the error;
- (e) whether the error trade was caused partially or fully by problems with the SGX-DT's systems; and
- (f) any other relevant factors.

SGX-DT retains the discretion to take into account other relevant market information to determine the error trade price range or the reference price, and determine error trade price ranges using any other methodology, if, in its opinion, it is desirable to do so to protect the financial integrity, reputation or interests of the Markets operated by SGX-DT.

The Market Control Unit notifies all Members of the error trade price range or volatility range, in terms of absolute prices, via a broadcast message on a daily basis. In addition, SGX-DT informs all Members, via circular, of any changes in the size of the error trade price range at least one week before effecting such change.

SGX-DT may consider the following factors when deciding whether to adjust the trade price or cancel any trades:

- (a) the difference between the price at which the error trade was done and the preceding traded prices of the Contract;

- (b) market conditions, including market liquidity in the Contract at the time the error trade occurred;
- (c) the monetary loss involved and the financial impact on the parties if the error trade is or is not adjusted or cancelled;
- (d) the reason(s) given by the erring party for the error;
- (e) whether the error trade was caused partially or fully by problems with SGX-DT's systems; and
- (f) any other relevant factors.

Certain error trades may be cancelled if the counterparties consent to the cancellation. The terms of the cancellation (including any compensation payable) are for the relevant parties to agree on. SGX-DT will not be involved in this process or in any disputes arising from this process.

Procedure for Cancellation of Error Trades

The Member's authorized coordinator intending to report an error trade shall:

- (a) contact the Market Control Unit within ten minutes from the time the trade is done, and requests that the trade have its price adjusted or cancelled. The SGX-DT may, in its discretion extend this period depending on the situation; and
- (b) immediately complete the QUEST error trade Information form and send it by fax or email to the Market Control Unit.

Once an error trade has been brought to the attention of the Market Control Unit, the following procedures will apply:

- (a) the Market Control Unit will send an alert to all QUEST terminals indicating that a specified trade may be in error; and
- (b) for cancellation of trades, the SGX-DT will, at its discretion, cancel a trade, either partially or fully, only if all counterparties to the error trade agree to the trade cancellation within fifteen minutes of the alert sent by the Market Control Unit. SGX-DT reserves the right to extend this period depending on the situation and the number of counterparties involved in the error trade.

The Market Control Unit will send a message to all QUEST terminals of SGX-DT's decision in respect of any request to cancel a trade or adjust the trade price. SGX-DT will not consider any requests to review its decision following an announcement.

11. Anonymity of the participants

Pre-Execution (i.e. order in queue)

Order details such as Trading Member code, Clearing Member code and client account are visible only to the executing party's Trading Member and Clearing Member. The counterparty to the trade is not able to see the Trading Member code, clearing member code and client account. Neither can other market participants see the Trading Member code, Clearing Member code or the client account details.

Post-Execution

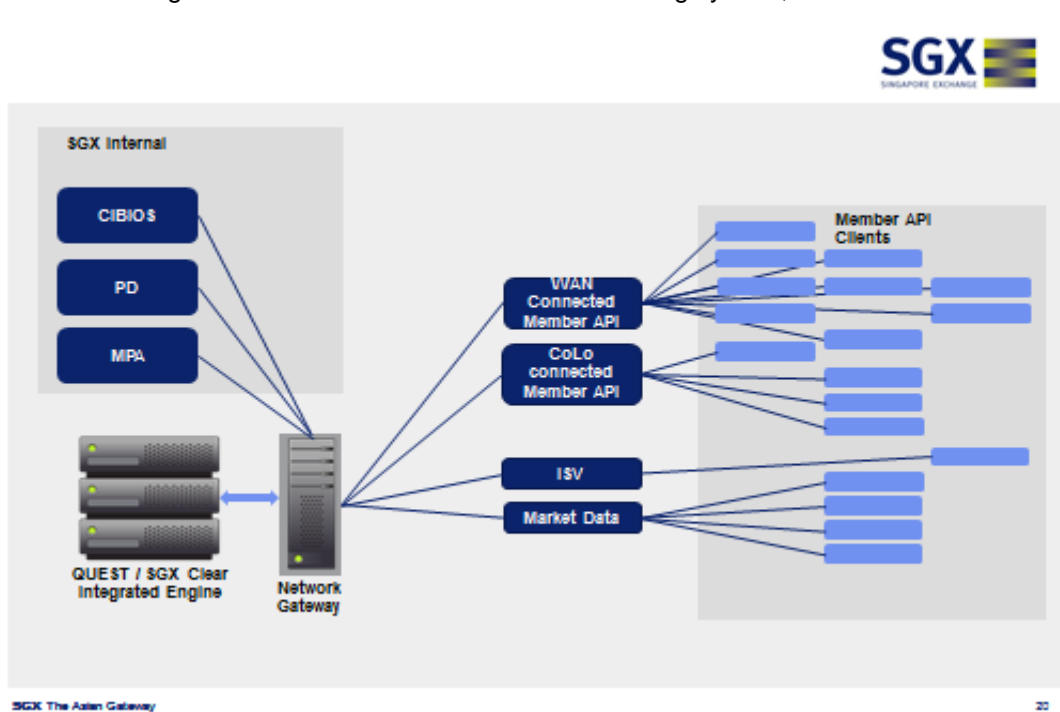
Post-execution, the Clearing Member code is disseminated to trade counterparties. The client account details are not.

12. Trading system connectivity with clearing system

The QUEST platform is an integrated trading and clearing system. Orders are matched automatically by QUEST and the trade details are disseminated to the clearing subsystem in real-time.

The QUEST trading system is responsible for the following:

- (a) managing the central order book;
- (b) order matching;
- (c) distributing real-time orders, trades and price information to feed handlers and order management systems; and
- (d) interfacing executed trades to the derivatives clearing system, SGXClear.



13. Response time

The door-to-door latency is the time that it takes for an exchange (QUEST) to receive, process, and acknowledge an order as measured from the customer side of the exchange network gateway within the exchange’s data center. As a daily average, the QUEST trading latency measurement is between 3.5 and 4.0 millisecond.

14. Ability to determine depth of market

There are two types of public pre-trade information available for subscription through the OMnet API: Market By Price (“**MBP**”) and Market By Order (“**MBO**”). Real-time MBP information that summarizes the total quantity at each published price is available at 5 or 10 price levels. The MBP updates are sent out with a ranking position for participants to recreate the price depth in their system. Snapshot query for all MBP information of an instrument is also available.

Real-time MBO messages are available to enable participants to maintain an order book copy in the form of individual orders. The orders are sent out with ranking position which enables participants to recreate exact ranking of orders in the trading engine order book. Snapshot query for all the orders in the order book are also available.

SGX-DT also has a separate feed for data subscribers known as DerivativesQuote. This provides enriched and derived market data statistics to its subscribers. The source of this data is obtained in real time from QUEST via OMnet API. Only MBP information is available and the number of price levels published is 10. This feed also provides delayed market data feed up to 10 minutes.

15. Market continuity provisions

SGX-DT has business continuity plans in place. Regulation 12 and 25, 2005 Regulations, provides that an approved exchange is required to maintain at all times a business continuity plan setting out the procedures and establishing the systems necessary to restore fair, orderly and transparent operations of any market it operates, in the event of any disruption to the operations of the market. An approved exchange is required to notify the MAS of any activation of its business continuity plan and of any action taken or intended to be taken to restore fair, orderly and transparent operations of any market it operates. An approved exchange is also required to inform the MAS of any material change to the business continuity plan.

Regulation 6.1(a) and 6.1(b), 2005 Regulations, provides that an approved exchange is required to operate a fair, orderly and transparent market and shall not engage in activities or businesses that may conflict with this obligation. An approved exchange is expected to ensure that-

- (a) appropriate and adequate systems and controls are in place to identify, assess, monitor and manage risks to its market operations;
- (b) appropriate and adequate emergency procedures and business continuity plans, as are in place; and
- (c) there is periodic testing or review of its systems and controls, including its business continuity plans.

Business Continuity Management ("**BCM**") is a critical function within SGX-DT under senior management oversight which regularly reports to the MAS. The MAS provides seven specific BCM guidelines for the financial services industry which are included as part of SGX-DT's business continuity plans. The Risk Management Committee ("**RMC**"), on behalf of the Board, oversees BCM. Senior management provides an annual attestation on BCM to the RMC. Included in the attestation are the state of preparedness of SGX, its alignment with the BCM Guidelines, annual testing and outcomes and disclosure of residual risks.

The Technology Unit ensures all systems employed by critical functions have in place a tested DRP¹⁸. A review of the DRP is conducted annually to enhance SGX's disaster recovery capability and the plan is rehearsed at least once a year to ensure its completeness and accuracy. To minimize the impact from disruptions of IT services, all critical systems are similarly configured across the primary and secondary¹⁹ data centers.

Generally, the BCM Guidelines centers on the following principles:

Principle 1: Board and senior management should be responsible for their institution's business continuity management;

¹⁸ "**DRP**" refers to SGX IT Disaster Recovery Plan.

¹⁹ During an outage of the derivatives trading system in the primary data center, the trading system will failover to its standby server at the secondary data center with no loss of data.

- Principle 2:* Institutions should embed business continuity management into their business-as-usual operations, incorporating sound practices;
- Principle 3:* Institutions should test their business continuity plan regularly, completely, and meaningfully;
- Principle 4:* Institutions should develop recovery strategies and set recovery time objectives for critical business functions;
- Principle 5:* Institutions should understand and appropriately mitigate interdependency risk of critical business functions;
- Principle 6:* Institutions should plan for wide-area disruptions; and
- Principle 7:* Institutions should practice a separation policy to mitigate concentration risk of critical business functions.

The RMC, on behalf of the Board, oversees business continuity management in SGX. In adherence with BCM Principle 1, senior management is accountable for BCM readiness and steers BCM with appropriate policies and strategies via the BCM Committee. The BCM Committee ensures that business continuity planning takes an organized and coordinated approach at the organization level.

Senior management provides an annual attestation on BCM to the RMC. Included in the attestation are the state of preparedness of SGX, its alignment with BCM Guidelines and disclosure of residual risks. This includes ensuring that Business Continuity Planning documentation covering:

- (a) policies and guidelines;
- (b) business impact analysis;
- (c) business recovery strategies;
- (d) emergency response procedures;
- (e) crisis communications;
- (f) restoration of business;
- (g) succession plans for critical staff and senior management; and
- (h) roles and responsibilities of management and BCP recovery teams are in place.

The BCM program is also reviewed by the Internal Audit Unit and the external auditor, PricewaterhouseCoopers, on an annual basis. A self-assessment report on BCM is also submitted to the MAS each year.

The operational, tactical and strategic plans to ensure SGX business continuity is endorsed by a working committee of senior executives chaired by SGX's President. This BCM Committee meets periodically to provide guidance, review current threats to business continuity, approve mitigations and ensure continuous improvement. Regular testing, continuous maintenance and updates to DRP and Business Continuity Plans are part of the SGX roadmap.

SGX conducts annual testing of its DRP during which all relevant scenarios within the BCP are validated with both the internal users of SGX as well as with market participants. An annual industry-wide BCP exercise is conducted to confirm the resiliency of the SGX business services in the event of a disaster at the primary data center and to ensure the timely recovery and resumption of SGX operations. The scope of the exercise includes testing by SGX, our vendors and market participants.

The most recent industry-wide BCM exercise was conducted on 29 October 2011. The scope and objectives of the exercise were finalized and endorsed by the Organizational Resilience Management ("ORM") Committee. The exercise involved 51 Trading Members, 61 Clearing Members and 23 data vendors. It proceeded as follows:

- (a) the exercise simulated the failure of the primary data center and SGX teams performed a recovery of critical systems and functions from its primary operations center. The entire exercise was run by a command center which was built to support the Technology Unit, SGX users and market participants;
- (b) all but two critical services recovered in three hours 49 minutes which was within the stated RTO of 4 hours. Subsequently the two delayed services were recovered within the next three hours. An unexpected hardware failure and a configuration error resulted in the delay in recovery of these two specific services;
- (c) all the other systems were tested by SGX and its market participants. The systems were tested for connectivity and mock trading, clearing and payments transactions were performed by all the market participants with the results of which were sent to SGX. Communication channels, via e-mail, SMS and a web portal, were set up to keep participants updated on the progress of the exercise; and
- (d) post exercise, a focus group session was held in which all of the market participants were invited to provide their feedback on the exercise.

Besides the implementation of a permanent split site for selected critical units since 16 Jan 2012, other regular BCM exercises undertaken during the previous 12 months included a company-wide unannounced "call-tree"²⁰ exercise, an unannounced mobilization exercise of Technology Unit staff, an industry-wide crisis management exercise and a number of table-top crisis management activities. Post-exercise reviews and feedback for these activities were presented to the ORM Committee.

SGX has additional pre-failure controls in place:

- (a) Data is backed-up through disks, tapes, and encrypted replication between primary and secondary storage between the data centers on a real time basis over the SGX WAN. SGX procedures mandate that all back-up data on tapes will be transmitted to an offsite onshore location that is certified to be environmentally protected and access-controlled. The SGX backup process for tapes provides for daily same-day pick up and up to one business day for retrieval. SGX has controls in place to protect back-up data from unauthorized access, misuse or corruption. Where possible, all of SGX back-up data is encrypted using strong cryptographic standards. SGX also has controls in place to regularly test the restoration of data previously backed up on tape.
- (b) Failover testing and testing of data loss within the limits defined by the users is a mandatory non-functional test scenario in the user acceptance test.
- (c) A disaster recovery document is required of all new systems or systems with major enhancements. In the absence of such a document, new systems or major enhancements are not permitted to be launched into production. The requirement for this document operates as confirmation that the system failover has been tested.

²⁰ A call tree is a telephone procedure which can be used to notify staff of an emergency. One person will call a small group of staff members with a message and then those persons will phone other staff and pass on the message, until finally all relevant members of staff have received the message. To ensure that a *call tree* is effective it must be regularly tested: missing or changed phone numbers can severely degrade the performance of a call tree.

- (d) Exercises and tests to validate the overall adequacy of the contingency plans for managing total failure of the primary data center. This includes mobilizing key recovery teams and activating the SGX business recovery center. Currently key support staff members are located in separate locations to mitigate the staff concentration risk of operating in a single location.

To minimize the impact from disruptions of IT services, all critical systems are configured similarly across the primary and secondary²¹ data centers. The Technology Unit ensures all systems employed by critical functions have in place a well and regularly tested IT DRP. A review of the IT DRP is conducted annually to enhance SGX's disaster recovery capability and the plan is rehearsed at least once a year to ensure its completeness and accuracy.

Business Continuity Management Framework

SGX has in place a BCM team, overseen by the ORM Committee to manage the risk of a prolonged disruption to SGX's business operations by maintaining and enhancing the disaster recovery and business continuity framework within SGX. The BCM team ensures that operational risks associated with a business continuity incident are appropriately assessed and managed. As part of the SGX ORM Policy and Guidelines (attached as Exhibit D-1-2) an industry BCM exercise is conducted annually to validate the adequacy of all critical business functions. Operational risks arising as a result of a business continuity event are accordingly recognized and managed.

Under Trading Rule 2.6.6, the following requirements apply to a Trading Member:

- (a) a Trading Member must assess its business and operational risks and maintain adequate business continuity arrangements;
- (b) a Trading Member must document its business continuity arrangements in a business continuity plan;
- (c) a Trading Member's senior management shall be responsible for the Trading Member's business continuity plan. Sufficient awareness of the risks, mitigating measures and state of readiness must be demonstrated by way of an attestation to the Trading Member's Board of Directors;
- (d) a Trading Member must review and test its business continuity plan regularly; and
- (e) a Trading Member must appoint emergency contact persons and furnish the contact information of those persons to SGX. The Trading Member's emergency contact persons must be contactable at all times and must immediately notify SGX in the event of emergencies.

Within the various Units²², there are also specific controls to prevent the occurrence of operational risks.

- (a) Each unit has a number of standard operating procedures in place to manage operational risks of key processes. These standard operating procedures prevent knowledge loss and ensure that key operational processes within SGX are systematically documented, standardized, consolidated and updated where required, for effective delivery of services to businesses and customers. They can also be leveraged as a knowledge management and training tool.

²¹ During an outage of the Derivatives Trading system in the primary data center, the service will failover to its standby server at the secondary data center with no loss of data.

²² "Units" refers to the divisions within the SGX organizational structure with particular responsibilities.

- (b) SGX teams maintain task checklists for key operational procedures which outline key activities and timelines, for employees to perform adherence checks against. This checklist serves as a control tool to ensure that critical work activities are completed on a timely basis. Additionally, it provides positive affirmation and assurance to the team managers and Unit heads on the fulfillment of obligations.
- (c) Dual control for critical processes implemented through key processing activities typically require a dual control arrangement whereby one staff member will process the transaction, while another more senior or experienced staff member will perform verification. This process minimizes operational and processing errors.
- (d) System failover processes ensure operational continuity. To ensure IT systems are resilient and not prone to failure, data from SGX's systems are replicated in real time from the primary to the secondary data center. In the event of a system failover at the primary data center, there will be no loss of data for the clearing and depository system. Daily backups are performed centrally with monthly encrypted data taped-out. Critical business data is also stored for a period of seven years offsite. The various processes mentioned also help to manage the operational risk of data loss arising from the lack of failover systems.

Reporting and recordkeeping requirements

Reporting

Both SGX-DT and the MAS are willing to share information with the Commission to facilitate proper market surveillance and effective enforcement of the applicable securities and derivatives laws and regulations of each relevant jurisdiction.

The MAS and the Commission²³ are parties to the IOSCO Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information ("**IOSCO MMOU**"). Pursuant to the IOSCO MMOU, the authorities agree to provide mutual assistance and exchange of information for the purpose of enforcing and securing compliance with applicable securities and derivatives laws.

The MAS and the Commission are also signatories to the Boca Declaration which was executed by regulatory authorities at the same time as the Boca MOU was executed by futures exchanges and clearing organizations.

The Boca Declaration provides for information to be obtained from the authority's records or any other source in that jurisdiction. An authority may refuse to provide the information if it would be contrary to public interest. The authorities also agree to use best efforts to facilitate delivery of information where a futures exchange or clearing organization is unable to respond directly to a request under the Boca MOU by another futures exchange or clearing organization.

Under Singapore law, SGX-DT would be limited in its ability to disclose user information whose confidentiality is safeguarded by the SFA subject to certain specified exceptions.

Section 21(1), SFA, prescribes that SGX-DT and its officers and employees must maintain, and aid in maintaining, confidentiality of all user information that (a) comes to the knowledge of SGX-DT or any of its officers or employees; or (b) is in the possession of SGX-DT or any of its employees. "**User information**" means transaction information that is referable to a named user or a group of users from which the name of a user can be directly inferred. Under Section 2, SFA, "**user**" is defined as a

²³ "**Commission**" or "**CFTC**" refers to the Commodity Futures Trading Commission

member or a customer of a member of the approved exchange; and "**transaction information**" means, *inter alia*, information relating to: (a) offers or invitations to purchase, sell, or exchange securities or futures contracts; or (b) executed transactions in securities or futures contracts.

The specified exceptions to Section 21(1), SFA, are set out in Regulation 11(1), 2005 Regulations, and can be summarized as follows:

- (a) where disclosure is necessary for the making of a complaint or report under Singapore law for an offence alleged or suspected to have been committed under such laws;
- (b) where the user's consent has been provided;
- (c) where disclosure is to SGX by SGX-DT;
- (d) where disclosure is necessary in any disciplinary hearings of SGX-DT or for publication of such hearings and the outcome of the hearing;
- (e) where the user information is already in the public domain;
- (f) where disclosure is in connection with an arrangement for protection against default of a member;
- (g) where disclosure is in connection with the outsourcing of SGX-DT's functions; the creation or installation of systems; or the appointment of an auditor or other professionals; and
- (h) where disclosure is in relation to the administration of an estate or bankruptcy and winding-up of a user.

In terms of the MAS' authority to provide assistance to the Commission, the MAS is empowered under Sections 169 to 174, SFA to provide assistance to a foreign regulatory authority if, among other things:

- (a) the assistance is intended to enable such authority to carry out supervision, investigation or enforcement;
- (b) the foreign authority has given a written undertaking not to use materials for other purposes, and not to disclose to a third party any materials;
- (c) the materials are of sufficient importance to the carrying out of supervision, investigation or enforcement and cannot be reasonably obtained by other means;
- (d) the matter is of sufficient gravity; and
- (e) the assistance will not be contrary to public interest or interest of the investing public.

Assistance that may be rendered by the MAS to the Commission includes:

- (a) transmitting materials in the MAS' possession;
- (b) ordering any person to furnish such materials; or
- (c) ordering any person to make oral statements.

SGX-DT is unable to disclose the content of inspection reports produced by the MAS unless such disclosure is first approved by the MAS (Section 150A, SFA).

Where SGX-DT is constrained by the SFA to share information with the Commission, then the MAS has the duty, power and authority (by virtue of Section 21(2), SFA) and pursuant to the MOU between the Commission and MAS, to share such information with the Commission.

The MAS, the Commission and the U.S. **Securities and Exchange Commission** ("**SEC**") signed a MOU concerning consultation and cooperation and exchange of information dated 17 May 2000. Pursuant to the MOU, the authorities agree to provide assistance to each other to facilitate:

- (a) market oversight;

- (b) granting of licenses, authorizations, waivers or exemptions for conduct of securities and futures business;
- (c) supervision of securities and futures business;
- (d) inspection of securities and futures business; and
- (e) investigation, litigation or prosecution of activities potentially violating laws and regulations.

Such assistance includes providing information, taking depositions and obtaining information and documents from persons. However, a request for assistance may be denied if the request would require the authority to act in a manner violating its domestic law or on grounds of public interest.

Recordkeeping

Section 18, SFA, requires SGX-DT to maintain a record of all transactions effected through its facilities in such form and manner as prescribed by the MAS including the extent to which the record includes details of each transaction and the period of time that the record is to be maintained.

Regulation 5, 2005 Regulations, requires SGX-DT to ensure that all relevant books and records and other information as may be required by MAS for the purposes of the SFA are kept for a minimum of 5 years. This includes transaction records.

SGX-DT has satisfactory arrangements for the recording of transactions which are traded through its facilities. SGX-DT records the following information for every transaction:

- (a) the name of the investment;
- (b) the underlying asset;
- (c) price;
- (d) the quantity;
- (e) the date and timestamp (for transacted derivatives Contracts);
- (f) name and account number of the counterparty; and
- (g) details regarding the counterparties in the transaction.

Real-time information on these trades is disseminated to Members. The underlying assets of the traded derivatives Contracts are stated in the relevant Contract Specifications along with the settlement method (namely whether it is cash settled or settled via physical delivery).

SGX-DT has in place arrangements for creating, maintaining and safeguarding an audit trail of transactions for at least five years. Once an order is entered, the trading system will automatically create an audit trail, regardless whether the order was rejected or resulted in a match. Pursuant to paragraph 2.1.2, Regulatory Notice 4.1.8 to the Trading Rules, any amendment to a trade will have to be requested by a party to the trade and is also recorded in the trading system. After the trade has been cleared, records of the trades remain in the SGX-DT trading system for a period of seven years in accordance with the SGX Document Retention and Destruction Policy (attached at Exhibit D-1-3) (details of which are provided below). These systems enable access to historical data of all the transactions conducted under the systems operated by SGX-DT.

Records of the trade are retained and disposed of in accordance with the SGX Document Retention and Destruction Policy, which is applicable to SGX and its subsidiaries, including SGX-DT. While Regulation 5, 2005 Regulations, requires relevant books and other information, as may be required by the MAS, to be kept for a minimum of five years, the SGX Document Retention and Destruction Policy requires SGX-DT to retain all relevant paper and electronic versions of work papers, files, records, documents, communication and data in any form, whether in electronic, printed, in the form of video or audio tapes, digital format, or any other mode of capturing information ("**Documents**"), for a period of

seven years from the end of the financial year in which the transactions or operations to which the records relate are completed, save for excepted classes of Documents which are to be retained in perpetuity such as corporate records and books of the company, licenses, permits, leases, tax or license exemption documents and employee related documents (which should only be destroyed seven years after the employment ceases).

Upon expiry of the seven years, the Documents may be disposed of (save for the excepted classes of Documents) provided that (a) the recommended retention period (which is based on statutory requirements) for the Documents has lapsed; and (b) there is no ongoing or expected litigation, enquiry or other circumstance relating to the Documents which may require their retention. Where such circumstances exist, care is taken to retain all relevant records, even if Documents are slated for destruction and even if no request has been made for them.

SGX-DT has in place arrangements to keep clear and complete audit trails for all uses of IT systems and to reconcile the audit trails with equivalent information held by the system users and other interested parties where appropriate.

In SGX, audit trails are mandatory for all production systems and network devices before the equipment is approved to be used in the production environment. The adequacy of the audit trails are assessed through the SGX IT security compliance checks that are conducted on a monthly basis.

Session recording of all privileged user activities is also maintained to enable detailed and complete reconciliation of privileged user activities.

In accordance with the SGX Document Retention and Destruction Policy as mentioned above, critical transaction data and reports are kept for a period of seven years, from the end of the financial year in which the transactions or operations to which the records relate are completed.

This allows SGX-DT to retrieve such records for investigations if necessary. To securely house such records, SGX engages the services of Cisco Recall, a worldwide industry leader with its core business in document management, data protection and document destruction. At the end of the retention period set out in the SGX Document Retention and Destruction Policy, the permission of the business owner of the records must be sought before such records can be destroyed.

In accordance with the SGX Document Retention and Destruction Policy, critical transaction data and reports are kept for a period of seven years, from the end of the financial year in which the transactions or operations to which the records relate are completed.

This allows SGX-DT to retrieve such records for investigations if necessary. To securely house such records, SGX engages the services of Cisco Recall, a worldwide industry leader with its core business in document management, data protection and document destruction. At the end of the retention period set out in the SGX Document Retention and Destruction Policy, the permission of the business owner of the records must be sought before such records can be destroyed.

Exhibit D-2 - Description of the manner in which the FBOT assures the following with respect to the trading system:

1. Algorithm

Trading Matching Algorithms: Paragraph 2, Regulatory Notice 4.1.6 to the Trading Rules, describes the four algorithms that SGX-DT may adopt in order to match and allocate the orders for Contracts traded on the SGX-DT market. The four algorithms are:

- (a) price/time priority allocation;
- (b) price point maker allocation;
- (c) market maker allocation; and
- (d) pro-rata order and matching allocation.

Trading Rule 4.1.6 provides that trade matching algorithms may be market and contract specific. SGX-DT may determine the applicable trade matching algorithm for a contract and may apply a new or different algorithm to a new or existing Contract provided that advance notification is given to Members.

Price/time priority refers to:

- (a) orders at the best price (highest bid/lowest offer) have priority over other orders in the same contract months/spreads; and
- (b) orders entered at the same price will then be matched based on time priority.

To cater to the increasingly more sophisticated needs of the market, SGX introduced two additional matching algorithms in QUEST in February 2006. The trading algorithms are part of SGX's wider strategy to effect functional enhancements to improve market efficiency and widen the scope of electronic trading.

Alternate Matching algorithms refer to:

- (a) price-point maker allocation; and
- (b) pro-rata order and matching allocation.

In the normal course of trading, whether orders are allowed to be modified or withdrawn depends on which session state the product is currently in. For example, in the NON_CXL or non-cancel session state, no orders can be withdrawn or modified.

Please refer to Appendix G of SGX QUEST-DT Click 19.3 Environment Document Version 3.3 (attached as Exhibit D-2-2) for the full list of permitted orders behavior during the various session states.

In addition, Members can decide beforehand whether to keep or inactivate their own orders in the event of a voluntary or involuntary logout. The options available are:

- Keep all orders active (Day, Market and GTC orders)
- Inactivate all orders (Day, Market and GTC orders)
- Keep GTC orders

Orders that have been inactivated on voluntary or involuntary logout will remain inactive when the user next logs in. Similarly, orders that are kept active on voluntary or involuntary logout will still be active when the user next logs in.

For inactivation of orders, the action will only be done on the 90th second (after 2 heartbeats) from the time of involuntary logout and immediately in case of voluntary logout.

The system is designed to be equitable to all market participants by the trade matching algorithm which matches trade according to Price/Time priority. SGX also has Euro Yen product which is configured to have alternate algorithm such as pro-rata and price point maker algorithm.

Please refer to D-D-2: *IOSCO Principles*

3. The audit trail captures all relevant data, including changes to orders and the audit trail data is securely maintained and available for an adequate time period.

The availability of the QUEST API allows Members to retrieve orders, trades and position information in real time allowing them to better manage their risk exposure. The access via the API is strictly controlled by the Market Control Unit and all additions and changes to that access will have a clear audit trail.

SGX-DT has in place arrangements for creating, maintaining and safeguarding an audit trail of transactions for at least five years. Pursuant to Regulatory Notice 4.1.8 to the Trading Rules, any amendment to a trade will have to be requested by a party to the trade and is recorded in the SGX-DT trading system as well. SGX-DT has in place arrangements to keep clear and complete audit trails for all uses of IT systems and to reconcile the audit trails with equivalent information held by the system users and other interested parties where appropriate.

Audit trails are mandatory for all production systems and network devices before the equipment is approved to be used in the production environment. The adequacy of the audit trails are assessed through the SGX IT security compliance checks that are conducted on a monthly basis.

Session recording of all privileged user activities is also maintained to enable detailed and complete reconciliation of privileged user activities. For each audit trail, a back-up copy is retained by the SGX Technology Unit's data center for a period of seven years. This helps ensure business continuity in case of disruption or emergency. Records of the trade are retained and disposed of in accordance with the SGX Document Retention and Destruction Policy, which is applicable to SGX and its subsidiaries, including SGX-DT. While Regulation 5, 2005 Regulations, requires relevant books and other information, as may be required by the MAS, to be kept for a minimum of five years, the SGX Document Retention and Destruction Policy requires SGX-DT to retain documents for seven years from the end of the financial year in which the transactions or operations to which the records relate are completed, save for excepted classes of Documents which are to be retained in perpetuity such as corporate records and books of the company, licenses, permits, leases, tax or license exemption documents and employee related documents.

After a trade has been cleared, records of the trades are backed up from the SGX-DT trading system for a period of seven years in accordance with the SGX Document Retention and Destruction Policy. To access all the transactions conducted under the systems operated by SGX-DT, the historical records within the last 30 days are available online and can be restored from our backup media if they are more than 30 days old.

This allows SGX-DT to retrieve such records for investigations if necessary. To securely house such records, SGX engages the services of Cisco Recall, a worldwide industry leader with its core business in document management, data protection and document destruction. At the end of the retention period set out in the SGX Document Retention and Destruction Policy, the permission of the business owner of the records must be sought before such records can be destroyed.

In SGX, audit trails are mandatory for all production systems and network devices before the equipment is approved to be used in the production environment. The adequacy of the audit trails are assessed through the SGX IT security compliance checks that are conducted on a monthly basis.

4. Adequate and appropriate trade data is available to users and the public.

SGX-DT ensures that adequate and appropriate trade data is available to users and the public. It has procedures and arrangements in place to provide appropriate information to enable users of SGX-DT's facilities to monitor their use of the trading facilities.

Trade Information

Users of SGX-DT's facilities can connect their in-house-developed OMS to SGX-DT's facilities via the OMnet API to perform order management. The availability of the API allows Members to retrieve orders, trades and position information in real time, allowing them to manage their risk exposure.

Trade information, such as price, quantity of orders which have been matched and the identity of the clearing counterparty (but not the trading counterparty), is made available to Members via their access logins. A Member will only receive trade information relating to orders it has entered and will not see the trade information of other participant's orders.

Public information includes market data such as price depth, order depth, last done price, trade volume and trade value. Such information can be accessed via OMnet API, SGX DerivativesQuote and/or the SGX website. No information about the Trading Member, Clearing Member or client account will be disclosed to the public. For hidden volume orders, only the disclosed part of the order is available.

Market Direct Feed Service

SGX-DT's market direct feed service is available to the public and provides real-time price information on all futures and options Contracts enabling users of SGX-DT's facilities access faster price data, catering to high frequency trading and a low latency environment. Users enjoy:

- (a) direct connectivity to the QUEST and fast delivery of market data;
- (b) full list of trades in the market;
- (c) up to 10 levels of market depth;
- (d) TCP/IP connection and reliable communication link for trade recovery feed
- (e) access via SGX Managed Network Services (which includes requisition and installation of local MPLS lines with managed leased routers and support), Co-location or any authorized ISVs; and
- (f) consistent high system availability

Prospective users must apply for conformance testing and certification before being connected to QUEST enabling them to access the market direct feed service.

SGX DerivativesQuote

SGX DerivativesQuote is market information and price feed of all futures and options products traded on Markets operated by SGX-DT. The feed can be subscribed directly from SGX or SGX authorized redistributors. Subscribers have options of subscribing for real-time or delayed price feed as well as the following market information:

SGX DerivativesQuote Packages ("x" indicates that the feature is available)

Real Time Data	Level 1	Level 2
Open	x	x
High	x	x
Low	x	x
Close	x	x
Volume	x	x
Last Trade	x	x
New Enhanced Functions	x	x
Improved & Flexible Data Recovery Feature	x	x

Improved Trading Sessions Information	x	x
Enhanced Data Refresh & Streaming	x	x
Final Settlement Price & Session Summary	x	x
Pre Open Orders	x	x
10 Levels Best Bid/Ask & Size		x
Spread Strategies & Daily Full Series Broadcast		x
Calendar Spreads & Bid/Ask Spreads		x
VWAP, Implied Volatility (IVOL), Delta & Equilibrium Price		x

Users of SGX-DT's facilities can connect to SGX DerivativesQuote data feed via a direct connection or an indirect connection as described below:

(a) Direct Connection

SGX DerivativesQuote is accessible via an IP-based connection at a minimum data transmission speed of 512Kbps. Market data vendors may subscribe via SGX Managed Network Services or through certain global network connectivity providers to receive real-time prices and volume information directly from SGX-DT.

(b) Indirect Connection

Users may also connect to SGX DerivativesQuote via SGX authorized market data vendors as listed on the SGX website.

The drop copy API ID enables Clearing Members to view the consolidated orders and trades from an associated Trading Members. The drop copy API also allows a Clearing Member to cancel, as proxy, the orders of its associated Trading Member(s). It can also be used by Trading Members who are brokers to cancel trades on behalf of their Customers.

Announcements on market microstructure are disseminated to all Members, Data Vendors and ISVs in a circular or email communique.

In addition, the Market Control Unit disseminates market messages to Members via a system called market place assistant. Market messages such as price limit triggers and cooling period commencement are broadcast via market place assistant to market participants' OMS. Upon request, the Market Control Unit also provides order and trade details to authorized firm coordinators from Members. The Market Control Unit also provides answers to general queries on SGX-DT listed products with regards to product specifications such as last trade date, final settlement prices, holiday trading and the like.

5. The trading system has demonstrated reliability.

SGX has set up a range of monitoring tools and procedures which track the status, health and performance of critical components in the trading system IT infrastructure.

In addition, SGX-DT complies with the MAS Internet Banking and Technology Risk Management Guidelines (attached as Exhibit D-2-1).

SGX ensures that IT systems are resilient by designing critical IT systems with an active-standby configuration. This provides for real-time mirroring of data which ensures that the SGX derivatives trading system will failover to its standby server at the standby data center with no loss of data in the event of a system failure at the primary data center.

All critical systems are required to have at least a 100 percent processing capacity above its historical peak. This caters for unanticipated spikes in processing volumes.

Systems availability and capacity reports on critical systems are reported to the senior management, EXCO and Chairman of SGX on a monthly basis. Review sessions are also conducted annually with business owners to ensure that SGX systems have sufficient capacity and service availability to meet projected business growth.

Daily backups are performed centrally with monthly encrypted data taped-out. Critical business data is also stored for a period of seven years offsite to address the risk of the inaccessibility of backups which could be caused by the unavailability of data centers.

The Technology Unit has also implemented procedures to review the total technological infrastructure for a single point of failure and weaknesses. Any issues discovered are then translated into risks and reviewed on a regular basis to ensure that the mitigation techniques remain both relevant and effective.

SGX-DT conducts structured system integration, user acceptance, conformance and industry test phases, with appropriate levels of governance and control. The testing undertaken confirms that:

- (a) the delivered solution functions as detailed in the business and operational requirements and functional specifications, passes technical tests and is fit for use;
- (b) any enhancement or change does not adversely impact existing systems, processes, functions or facilities; and
- (c) system documentation meets requirements and standards.

In addition to testing functional behavior, the test team or specialists undertake tests to ensure that:

- (a) systems and data are secure from unauthorized attempts to access them;
- (b) systems meet specified non-functional requirements like; failover duration, performance criteria such as response times for critical business transactions, latency, throughput, capacity and expected current, future and peak workloads; and
- (c) there is business continuity/no impact on data integrity under various hardware or software failure scenarios.

To ensure that IT systems are resilient, SGX designs critical IT systems with an active-standby configuration. This provides for real-time mirroring of data to ensure that the SGX derivatives trading system will failover to its standby server at the secondary data center with no loss of data at the primary data center.

6. Access to the trading system is secure and protected.

Access to SGX-DT's trading facilities is subject to criteria designed to ensure that access to the trading system is secure and to protect the orderly functioning of the market and the interests of investors. Section 16(1)(d), SFA requires SGX-DT to ensure the safe and efficient functioning of its facility and to protect the interests of the investing public.

SGX-DT has in place access controls to protect technology systems from damage, tampering, misuse or unauthorized access. The Technology Unit has also put in place policies, guidelines and standards for system access control and the security of IT systems. All system access is granted on a need-to-have basis, and access levels are strictly controlled.

The IT Security Governance team, which is part of the Technology Unit, manages the IT security operations. That team's responsibilities include:

- (i) ensuring compliance to regulatory standards and guidelines;
- (ii) developing IT security policies and standards;
- (iii) managing security threats, vulnerability and incidents;
- (iv) implementing and maintaining IT security infrastructure and tools; and
- (v) providing security advisories to Technology Unit's project team and other business Units

The QUEST trading system has the following safeguards to ensure that access to the trading system is secure and protected:

- (a) SGX-DT has implemented password complexity and ageing requirements. All passwords are required to be encrypted at all times with approved industry standard algorithms. Passwords are encrypted and not sent in the clear when the Trading Member performs a login via their systems;
- (b) each Member has a dedicated secured line;
- (c) audit trails are maintained for all transactions with sufficient detail to ensure full event reconstruction including trade amendments and cancellation;
- (d) role based access have been implemented to ensure segregation of duty within the application work flows;
- (e) software controls are in place to ensure all production destined objects are correctly promoted. Access to promote software is limited to designated staff;
- (f) annual penetration testing is conducted for all internet facing interfaces and monthly hardening reports are generated for review against SGX Security Standards;
- (g) daily back-up and archival process are active and off-site tapes are stored for 7 years;
- (h) trading systems are included in the business contingency exercises carried out annually on an industry wide basis; and

Members are required to comply with all information technology and data security requirements that SGX-DT may prescribe, including a requirement that Members install measures to prevent tampering of data and records (Trading Rule 3.3.24). Members are also required to issue unique identification tags and passwords to Customers which have access to QUEST through that Member (Trading Rule 3.3.25).

Further, once admitted to membership, a Member must comply with such security requirements or restrictions as are specified in Trading Rule 2.6 which deals with technical and risk management controls. Members are required to have security arrangements in place to ensure that unauthorized persons are denied direct market access (Trading Rule 2.6.2). As well, pursuant to Trading Rule 2.6.3, Members are required to have written policies and procedures and demonstrate compliance with the following areas:

- (a) ensuring that the OMS conducts pre-execution checks for all client orders and includes the ability to set and manage automated limits;

- (b) ensuring that the OMS has error prevention alerts for possible erroneous entries of quantity, price and other data fields;

To ensure that the Customers are conducting its trading in secure, fair and orderly manner, the Member shall, in accordance with Trading Rule 3.3.5, provide its on-line Customer with adequate information and training with respect to the following matters:

- (a) potential limitations and risk of on-line trading;
- (b) prohibited trading practices;
- (c) system functionalities and order management procedures; and
- (d) contract specifications.

Please refer to Practice Note 3.3.5 for further information on Customer education.

To monitor and ensure Members' control and security arrangements for entering its instructions on the trading platform, Members must have security arrangements in place to ensure that unauthorized persons are denied access to the Markets (Trading Rule 2.6.2). In addition, Trading Rule 2.6.3 requires the Member to have written policies and procedures and demonstrate compliance in the following areas:

- (a) monitoring the credit risk arising from the acceptance of the orders of Customers; and
- (b) monitoring account activity on an intraday basis;
- (c) ensuring that the OMS has error-prevention alerts so that when Customers enter orders, they are alerted to possible erroneous entries of quantity, price and other data fields;
- (d) defining and managing the Member's sources of liquidity to ensure that there are sufficient liquidity facilities to meet increased settlement obligations;
- (e) limiting the impact of significant market movements through the use of tools such as cash flow projection, stress testing or position limits; and
- (f) maintaining a strict separation between the credit control, trading, dealing and marketing departments so as to ensure independence and mitigate the risks and consequences of conflict of interests.

Pursuant to SGX-DT's Proposed Amendment to the Trading Rule 2.6.3, the Member must also ensure that (i) automated pre-execution risk management control checks are conducted on all orders, including credit control checks on all Customers' orders, and (ii) there are appropriate internal controls for the setting and modification of any of those parameters.

Please refer to Practice Note 3.6.3(c) and Practice Note 2.6.3(d) for further information on pre-execution checks and error-prevention alerts.

The Member Supervision Unit ensures Member compliance with the above requirements via its supervision and inspection processes.

7. There are adequate provisions for emergency operations and disaster recovery

BCM is a priority within SGX and is given senior management oversight. The Business Continuity function requires regular reporting to the MAS. The MAS provides seven specific BCM guidelines for the financial services industry which are included as part of SGX business continuity plans. The SGX RMC, on behalf of the SGX Board, oversees BCM in SGX. Senior management provides an annual attestation on BCM to the RMC. The annual attestation details the state of preparedness of SGX, its alignment with the MAS' BCM Guidelines, annual testing and outcomes and disclosure of residual risks.

The key activities of BCM include:

- (a) the preparation of operational, tactical and strategic plans to ensure SGX business continuity is endorsed by a working committee of senior executives chaired by a member of the SGX Executive Committee.
- (b) the ORM committee arranges periodic meetings to provide guidance, review current threats to business continuity, approve mitigations and ensure continuous improvement to our preparedness for a major disruption. Regular testing, continuous maintenance and updates to the DRP and business continuity plans are part of the SGX roadmap.

SGX Technology ensures all systems employed by critical functions have in place a tested DRP. A review of the DRP is conducted annually to enhance the disaster recovery capability and the plan is rehearsed at least once a year to ensure its completeness and accuracy. To minimize the impact from disruptions of IT services, all critical systems are configured similarly across the primary and secondary data centers.

SGX has robust disaster recovery plans and procedures in place to ensure seamless integration of the primary trading system and the standby system. This secondary data center is set up with redundant infrastructure as a provision against emergencies and disasters. If the primary trading engine experiences system failure or disruption, then the standby trading system will be activated. The standby trading system is populated with the data files in the primary trading engine. All transactions are replicated between primary and secondary on a real time basis.

SGX has automated system monitoring, transaction latency monitoring and reporting systems which use a range of products and procedures to track the status, health and performance of critical components in its IT infrastructure. All critical systems are required to have at least 100% processing capacity above its historical peak. This caters for any unexpected spikes in processing volumes.

Systems availability and capacity reports on critical systems are prepared for the senior management of SGX on a monthly basis. Annual review sessions are also conducted with business owners to ensure that SGX systems have sufficient capacity and service availability to meet projected business growth.

Daily backups are performed centrally with monthly encrypted data taped-out. Critical business data is also stored for a period of seven years offsite to guard against the risk of the inaccessibility of backups which could be caused by the inability to access the data centers.

Whilst SGX strives to perform business operations without defects, there may be errors or incidents involving or affecting its operations or market participants that require escalation to relevant levels within the organization. To ensure timely and appropriate escalation and management of such incidents, SGX has in place incident escalation and management guidelines, which are closely adhered to by the various Units within SGX. The guidelines require that an incident report is produced to provide an analysis of the incident, including the root cause of the incident, and to ensure that corrective measures are put in place to prevent similar recurrence. The incident report is then reviewed by senior line managers and, where deemed necessary, by senior management. Any actions which are deemed necessary for rectification are then tracked to closure.

The incident escalation and management guidelines also serve to manage concerns and expectations of market participants and stakeholders, including the MAS. Additionally, SGX conducts an annual industry-wide BCM exercise to confirm the resilience of the SGX business services and technology in the event of a disaster at the primary data center. The key systems tested are:

- (a) trading and clearing;
- (b) risk management systems;
- (c) market surveillance;
- (d) SGX website;
- (e) corporate announcements system;
- (f) market data dissemination; and
- (g) e-mail.

As a part of this exercise, SGX infrastructure such as backup, application, storage and network equipment and other critical infrastructure at the SGX secondary data center get tested for readiness. The scope includes testing by SGX, its vendors and its market participants. SGX has the following controls to ensure business continuity in the event that any IT system fails:

- (a) Data is backed up through disks and tapes. The backed up data on disks is replicated between primary and secondary data centers via storage vendors proprietary standards. All data media leaving the data centers are encrypted using strong cryptographic standards;
- (b) SGX has active servers in both the primary and secondary data centers to take over operations in the event of failure;
- (c) SGX uses failover testing as a mandatory test scenario in conducting user acceptance testing;
- (d) SGX requires a disaster recovery document to be prepared for all new systems or systems with major enhancements; otherwise, SGX will not permit the system to be launched into production; and
- (e) SGX also runs exercises and tests annually to validate the overall adequacy of the contingency plans for managing systems where there is a total failure in the primary data center. This includes mobilizing key recovery teams, activating the SGX business recovery center and conducting split operations for the key operating units of SGX.

SGX contingency planning includes an assessment of the adequacy and readiness of the business recovery center as well as conducting business continuity exercises that simulates scenarios involving major system outages and total incapacitation of the primary data center. Critical systems have Recovery time objectives of less than four hours (tested annually) and stringent recovery point objectives are applied to all critical data. Recovery plans and contingency tests take into account inter-dependencies among critical systems. The most recent industry-wide disaster recovery exercise was conducted successfully in October 2011. The scope and objectives of the exercise were finalized and endorsed by the ORM Committee, responsible for the overall Business Continuity at SGX. The test schedule and scope were published to SGX users and market participants in July 2011. Other regular BCM exercises undertaken during the last twelve months include an unannounced call-tree exercise, an unannounced mobilization exercise of Technology staff, an industry-wide crisis management exercise and a number of table-top crisis management activities.

SGX also conducts a semi-annual exercise where all market participants are able to test their individual disaster recovery plans from their secondary or DR sites to SGX's production IT services. The most recent test was conducted with 36 market participants successfully testing their individual Business Continuity Plans.

8. Trading data is backed up to prevent loss of data

To ensure IT systems are resilient and not prone to failure, data from SGX's systems are replicated in real time from the primary to the secondary data center. In the event of an unavailability of the primary data center, the system will failover to the secondary data center with no loss of data. Daily backups are performed centrally with monthly encrypted data taped-out. Critical business data is also stored for a period of seven years offsite. The various processes mentioned also help to manage the operational risk of data loss arising from the lack of failover systems.

To securely house records, SGX engages the services of Cisco Recall, a worldwide industry leader with its core business in document management, data protection and document destruction. At the end of the retention period set out in the SGX Document Retention and Destruction Policy, the permission of the business owner of the records will be sought before such records can be destroyed.

9. Mechanisms are available to ensure that only those futures, option or swap contracts that have been identified to the CFTC as part of the application or permitted to be made available for trading by direct access are made available for trading by direct access

QUEST has the capability to prohibit members who are directly connected to the trading engine from trading certain products. This is done by setting the user profile to limit the type of products available for trade by that particular Member. Likewise, data subscribers can be blocked from receiving data of certain products.

SGX-DT only makes available for trading by direct access such contracts that have been identified to the Commission or permitted by the Commission for trading by direct access.

10. Mechanisms are available that ensure a competitive, open, and efficient market and mechanism for executing transactions

Orders sent into QUEST are processed strictly by time priority (first in, first out). These will then be matched according to the instrument's matching algorithm. Adequate order and trade acknowledgements, as well as price information, are available to all trading participants to ensure transparency in the market. As described herein, the SGX-DT trading platform provides a competitive, open and efficient market and mechanism for executing transactions in listed products.