INFORMATION PAPER
HKEx ORION CENTRAL GATEWAY

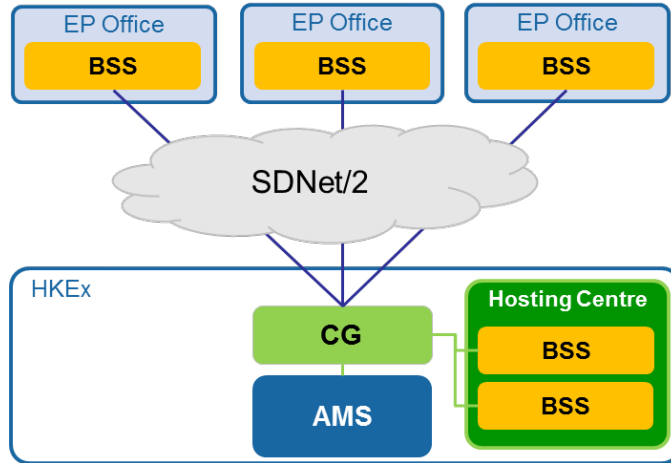**October 2012**

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SECTION 1   Introduction

1.1   HKEx is committed to strengthening the competitiveness of Hong Kong as a leading global financial centre.   With this mission, HKEx is investing in its core platforms, including connectivity networks, a state-of-the-art data centre, and systems providing order matching, market data dissemination and market access services.   A new market access platform for the securities market, namely HKEx Orion Central Gateway ("OCG"), will be another building block of HKEx's next generation core platforms, following the introduction of HKEx Orion Market Data ("OMD") Platform.

1.2   OCG is a new market access platform to support secured connections between the Broker Supplied Systems ("BSS") of Exchange Participants ("EPs") and the HKEx securities market.   Through a phased migration, OCG will replace the existing Open Gateway ("OG").

1.3   OCG will provide a centralized, highly resilient, low latency, flexible and scalable platform for all EPs.   OCG will eliminate the requirement to purchase and maintain OG market access devices and reduce the number of communication lines, thus resulting in cost savings by EPs.

1.4   OCG will be rolled out tentatively by Q4 2013.   It will initially run in parallel with the existing OGs.   After the transitional period, OG connecting BSSs will be de-commissioned around mid of 2015.   EPs can choose to migrate from OG to OCG at the initial rollout or during the transitional period.

1.5   This information paper presents an overview of the OCG.   The detailed technical specifications will be published by Q4 2012.

SECTION 2   Overview of HKEx Orion Central Gateway

2.1   Orion Central Gateway Architecture

2.2   Connection to Orion Central Gateway

EPs shall connect their BSS to OCG via subscription to one or more "OCG Sessions". An OCG Session is similar in concept to a connection to a physical OG in that:

- each OCG Session will be associated with specific Broker ID(s) for order submission;
- each OCG Session will have its own login ID and password for authentication;
- each OCG Session is assigned a throttle rate.

The key differences are the elimination of hardware located on EP sites, and the ability for multiple sessions to be consolidated through a single SDNet/2 circuit as described in the sections below.

2.3   Elimination of Hardware

No hardware is required for connection of BSS to the OCG for trading or backup other than network equipment. OCG therefore simplifies market access infrastructure and reduces support and operational risk for EPs.

2.4   Consolidation of SDNet/2 circuit

While each OG requires a pair of SDNet/2 circuits for connection to AMS/3.8, multiple OCG Sessions may be consolidated into fewer circuits to reduce network costs.

Bandwidth requirements for the OCG will be provided with the technical specifications in Q4 2012.

2.5   Decoupling of Trading and Market Data

Currently, trading and market data are both disseminated through the OG, resulting in duplication of market data for EPs with multiple OGs.   OCG will only be used for trading (i.e. transactional flow such as orders and trades) and will not carry market data. EPs may receive market data by subscribing to the OMD Platform – the same platform used by Information Vendors.   This architecture brings consistency in market data latency and content between EPs and other subscribers to information feeds, and reduces the total bandwidth consumed by EPs.

OMD for the Securities Market will be rolled out in Q2 2013.   Please refer to HKEx website[1] for more details on OMD and its product offerings.

2.6   High Capacity Session

OCG supports up to 250 throttles per OCG Session.   EPs may consolidate higher number of throttles into a single OCG Session for optimizing utilization.

2.7   Low Latency and High Resiliency

OCG employs industry leading low latency technology with high resiliency to provide robust market access to EPs.   OCG will process trading messages significantly faster than OG.

2.8   Drop Copy Service

OCG introduces a new drop copy service[2].   Each drop copy session will provide real-time copies of:
- Orders and Trades; or
- Trades only.

This option can be selected per Broker ID(s) by the EP.

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[1] For details on HKEx Orion Market Data, please refer to www.hkex.com.hk/marketdata.
[2] Drop Copy service will support orders and trades reporting for all HKEx trading devices (i.e. Terminals, Open Gateways, and Orion Central Gateways) via drop copy session.

2.9 Choice of Message Protocols

To better serve the operational needs of the market, OCG will support two different message protocols:

- Binary is designed for customers seeking maximum machine efficiency.
- FIX[3] caters for those adopting the global standard messaging format.

EPs can choose their preferred message protocol for each of their trading order flow and drop copy sessions.

2.10 Throttling Mechanism

OCG provides a more standard and simplified throttle control mechanism for business messages compared to the OG. Order submission, amendment, cancellation and other inbound business messages such as quotes and trade reporting etc. (collectively referred as Messages) will be processed in a single queue as opposed to two segregated queues in the OG. One Standard Throttle which permits a throughput of 1 order and other Messages per second in the OG will be assigned a throughput of 2 Messages per second in OCG. This conversion rate provides additional order throughput for EPs throughout the day and is more flexible for EPs.

2.11 Cancel on Disconnect

Cancel on Disconnect ("COD") is introduced as an optional feature in OCG. COD can be applied by EPs to individual OCG Sessions. If enabled, the OCG will automatically cancel outstanding orders in the affected session upon specific disconnection scenarios. The cancellations are made on a best effort basis.

2.12 Faster On-boarding

The on-boarding time for new OCG Sessions will be shortened as there will be no dependency on hardware delivery times. This will facilitate more timely responses to changes in business requirements.

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[3] FIX (Financial Information eXchange) is the global standard for financial trading messaging. Our intended FIX version is FIX 5.0 SP2 with HKEx specific extension packs. For details, please refer to www.fixprotocol.org.

2.13   Terminals, Multi-Workstation Systems, and Order Routing System

OCG will not be used for connection by AMS terminals and Multi-Workstation Systems ("MWS"), and will not support the Order Routing System ("ORS") currently supported by the OG.

2.14   Align with Industry Standard

In order to conform to FIX standard, some legacy or non-industry standard features available in the existing OG interface will be phased out in the new OCG interface. These changes are implemented to improve the performance of OCG.

Please see Appendix A for the Key Features Comparison between Orion Central Gateway and Open Gateway.

SECTION 3   HKEx Orion Central Gateway Implementation

3.1   Optional Migration

OCG is an optional market access platform at this stage.   EPs can choose to migrate from OG to OCG at the initial rollout or during the transitional period.

EPs with OGs due to refresh in 2013 are advised to migrate to OCG upon its rollout to save the OG hardware procurement costs.

3.2   Publication of Interface Specifications

First version of the interface specifications for order flow and drop copy ("Interface Specification") will be published in October 2012.   With reference to this paper and the Interface Specifications, EPs may determine the migration plan and the selection of message protocol (i.e. binary or FIX) based on business and technical needs.   EPs are advised to plan for the corresponding system development and infrastructure setup to interface with OCG.

For those EPs who would subscribe market data from OMD, please refer to the OMD project corner at HKEx website[4] for interface specification and corresponding technical documents.

3.3   Availability of On-boarding Tools

In order to assist EPs or BSS vendors in developing and testing their own systems, a set of on-boarding tools, including an offline OCG simulator and test cases will be made available in late Q4 2012.   With the on-boarding tools, it is expected that EPs and BSS vendors can effectively test their systems before conducting an end-to-end test in the testing environment of OCG.

For those EPs who would subscribe market data from OMD, please contact us via OrionMarketData@hkex.com.hk for an offline OMD on-boarding tools and relevant documents.

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[4] OMD project corner is located at HKEx website (http://www.hkex.com.hk/marketdata).

3.4 Development of Broker Supplied Systems by Exchange participants

As soon as the Interface Specifications are published, EPs and BSS vendors are advised to start development on their systems. EPs and BSS vendors are welcome to contact HKEx BSS Support Team for any document clarification. Technical briefing sessions will be scheduled in Q4 2012.

3.5 Enrollment

OCG is tentatively scheduled for roll out by Q4 2013. EPs who wish to migrate their OGs to OCGs upon its rollout are required to confirm their enrollment by late Q1 2013. Fees schedule on OCG will be announced prior to the enrollment process. Details of the enrollment process and implementation arrangement will be issued in due course.

3.6 Line Installation Ready for End-to-End Test

EPs should plan for line installation of the new SDNet/2 circuits according to the bandwidth requirement of their total throttle rate. Multiple OCG Sessions and OMD Securities datafeed subscriptions may be carried down by a single set of SDNet/2 circuits in which case the bandwidth required is the aggregate of the individual bandwidth required for each OCG Session and OMD Securities datafeed. The SDNet/2 circuits should be installed and connected to the testing environment of OCG and OMD Platform by Q2 2013 to join the end-to-end open test. EPs who wish to join the initial rollout are advised to contact their SDNet/2 network vendor(s) to confirm the line installation by early Q1 2013, i.e. 3 months prior to the line installation. Those EPs who plan to move into the HKEx Hosting Data Centre ("HDC") and would like to connect to OCG from their racks at HDC should contact the Business Development team of HKEx Hosting Services (hostingservices@hkex.com.hk) to secure the necessary hosting facilities.

3.7 End-to-End Test

To facilitate further system testing by EPs, a testing environment of OCG connecting with the AMS testing environment will be offered in Q3 2013. EPs can connect their systems to the testing environment of OCG to verify the compatibility of their system with OCG in an environment analogous to the target production environment. The open environment will be available from 09:00 to 17:00 on Monday to Friday (except public holidays).

End-to-End test will be conducted in Q3 2013 to ensure that the BSS systems have been

properly developed and tested and are able to successfully interface with OCG for all functions.   EPs are required to pass the end-to-end certification test before taking part in the market rehearsals.

3.8   Market Rehearsals

As the final preparation and verification of readiness before production rollout, market rehearsals will be conducted over a number of weekends starting from late Q3 2013.   EPs who wish to migrate to OCG at the initial rollout will be required to join to verify their system readiness.

3.9   Implementation Schedule

The implementation schedule of OCG is summarized as follows:

Orion Central Gateway Implementation	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013
Publication of Interface Specifications	▬				
Briefing Sessions	▬ ▬				
Distribution of On-boarding Tools (including simulator and test data)	▬				
Broker Supplied System (BSS) Preparation	▬▬▬▬▬▬▬▬▬				
Enrollment			▬▬		
Line Installation			▬▬▬▬▬		
End-to-End Certification Test				▬▬▬	
Market Rehearsals					▬
Orion Central Gateway Rollout					▬

SECTION 4   Fee Structure

4.1   Comparison of Gateway Fees

Monthly Fee	Standard OG	HA OG	OCG
SDNet/2 circuit (to vendor)	Per OG		Per Location
OG Hardware (amortized to 36 months)	$1,000	$3,640	-
OG Maintenance	$230	$520	-
OG User Fee	$1,250		-
OCG Session Fee	-		3 Tiered Fees
Throttle Fee	$480/$960 per throttle		Unchanged
Backup Throttle Fee	$480 per throttle		-

OG hardware, maintenance and user Fee will not apply to OCG.   An OCG Session Fee will be introduced for each OCG Session.

One time and monthly Throttle Fee will be unchanged while Backup Throttle Fee will be waived for throttles assigned to any OCG Backup Session.

The detailed OCG fee structure is described below.   Actual fees will be provided after regulatory approval.

4.2   Orion Central Gateway Fee Structure

Monthly Fee		
OCG Session Fee (for Trading, Market Making and Backup Sessions)	Lite*	1 to 20 throttles
	Standard	21 to 60 throttles
	High Capacity	61 to 250 throttles
Drop Copy Session Fee (for Orders and Trades or Trades only)	Fixed fee for all sessions	
One-time Fee		
New OCG Session Administration Fee	Not applicable for migration of OG	

* First 'Lite Trading' and first 'Lite Backup' OCG Session for each EP will be offered at a discounted price.

HKEx will provide EPs subscribing to OCG the trades-only drop copy sessions in place of the Central Trade Feed ("CTF") available in the OG.

One-time "New OCG Session Administration Fee" does not apply to migration of existing OG. It will only apply to new EPs or additional OCG Session. For example, when an EP with 2 Trading OGs and 1 Market Making OG migrates to OCG with 2 OCG Trading Sessions and 1 OCG Market Making Session, no one-time New OCG Session Administration Fee will be charged. New OCG Session Administration Fee will apply to additional OCG Sessions.

SECTION 5   Enquiries

For queries and further clarification on the HKEx Orion Central Gateway, please write to:

Hong Kong Exchanges and Clearing Limited
12th Floor, One International Finance Centre
1 Harbour View Street
Central
Hong Kong

Re: Information Paper on HKEx Orion Central Gateway

Or Email: OrionCentralGateway@hkex.com.hk

For future project updates, please refer to OCG project corner at HKEx website
http://www.hkex.com.hk/OCG

Appendix A Key Features Comparison between Orion Central Gateway and Open Gateway

ARCHITECTURE	Orion Central Gateway (OCG)	Open Gateway (OG)
Hardware	- No gateway hardware is needed on the EP premises for OCG. EPs just need a connection to HKEx to subscribe to OCG Sessions for order flow and drop copy service.	- Physical gateway hardware is needed for OG.
Market Data	- No market data from OCG. EP may source market data, reference data, and market information from OMD.	- Market data, reference data, and market information are transmitted to BSS through OG.
TECHNICAL ASPECTS		
Message Protocol	- FIX or Binary	- AMS/3 Open Message
Bandwidth Requirement	- Multiple OCG and OMD sessions for the securities market can connect through the same pair of SDNet/2 circuit. - *SDNet/2 circuits cannot be shared amongst different EPs.*	- Each OG needs to have its own pair of SDNet2 circuit.
Throttle mechanism	- Throttling is done on a rejection basis. Messages exceeding entitled limit will be rejected by OCG. - Orders and other inbound business messages (collectively referred as Messages) are processed in the same queue. *One Standard Throttle provides the throughput of 2 Messages per second (MPS).* - BSS is required to implement throttle control to ensure submission to OCG is within the assigned Throttle limit.	- Throttling is done on invitation basis. Invitations are sent by OG to BSS for receiving EPs' requests.
Throttle Capacity	- *Maximum capacity of OCG order flow session is 250 throttles* (equivalent to 500 messages per second).	- Maximum capacity per OG is 60 standard throttle rates (equivalent to 60 orders per second).
Throttle Breach	- *OCG order flow sessions may be disconnected automatically* if there are severe breaches of throttle limit to protect the OCG for other EPs.	- Not applicable
Logon	- *CompIDs (Computer IDs) will be provided by HKEx* to each OCG Session (order flow or drop copy) to logon to OCG servers. No SMART card is needed. A pair of public and private keys will be provided by HKEx to EPs to encrypt the logon password.	- TraderIDs are used for EPs to logon to AMS host through OG. - SMART cards are used for encryption of message with sensitive information.
Backup and Recovery	- OCG will run in High-Availability (HA) mode so that EPs can connect to mirror	- EPs can choose to deploy stand-alone OG or HA OG (which is

	-	servers in a short time if primary servers fail.	-	at a higher cost) for resilience.
	-	EPs do not need to call HKEx Market Operation for connecting to mirror OCG servers.	-	EPs need to deploy backup OGs on their own if necessary.
	-	EPs can pre-register 1 IP address for each OCG Session. In addition, EPs can pre-register up to 3 backup IP addresses for each OCG Backup Session. This set up allows both the primary and backup BSSs to connect to OCG	-	If primary OG fails, EPs need to call HKEx Market Operation for activating their backup OGs, if any.

FUNCTIONAL ASPECTS				
Order and Trade Information	-	There are two types of drop copy service – *Trades Reporting* and *Orders and Trades Reporting*	-	Central Trade Feed will provide the firm-wide trade reporting to EPs.
	-	EP can subscribe drop copy service which provides real-time copy of order and trade reporting of *all broker IDs belonging to the EP regardless of the trading input device used.*		
Spread Table and Trading Timetable Information	-	*Spread table and trading timetable information will not be provided through OCG or OMD.* EPs should refer to HKEx's website for the information.	-	Spread table and timetable is transmitted through OG.
Authorization control in Cross Device Function	-	In order to conform to FIX standard, *there is no authorization required to perform cross device enquiries and cancellations.* Authorizer control should be done within BSS if necessary.	-	EPs have to logon as authorizer to perform cross device enquiries and cancellations.
Odd/Special Lot Order Input	-	In order to conform to FIX standard, *OCG will not support semi-automatic matching method.* Therefore, it will not support odd/special lot order inputs.	-	Odd/special lot order and trade inputs are supported.
	-	Information of odd/special lot orders input by OGs and terminals will be available in OMD for EPs' information.		
	-	Odd/special lot can be entered as manual trade to OCG.		
Quote Withdrawal	-	In order to conform to FIX standard, *quote withdrawal must be done on both sides of the quote.*	-	Quote withdrawal can be done on one side of the quote.
Enquiry functions	-	*There is no enquiry function through the OCG trading session* to allow more effective usage of network bandwidth for trade only session.	-	There are enquiry functions for order, trade, market and news information.
	-	Information will be transmitted to EPs through OCG order flow and drop copy sessions as well as OMD in a real-time manner. EP can implement their own databases to consolidate all information and handle their enquiries internally as		

	-	needed.			
ORS Support	-	*OCG will not support ORS service.*	-	OG supports ORS service.	
Trade Classification "Hedge"	-	In order to conform to FIX standard, *Trade classification "Hedge" will not be supported.*	-	Trade classification "Hedge" is supported.	
Special Limit Order with All-or-Nothing	-	*Special Limit Orders with the All-or-Nothing flag on will not be supported* - Special Limit Order is available in FIX by using Limit Order with Time-in-Force attribute as IOC ("Immediate or Cancel"). For other orders, "All-or-Nothing" can be specified by having Time-in-Force as FOK ("Fill or Kill").	-	Special Limit Orders with the All-or-Nothing flag on are supported.	
Amendment of Trade Classification	-	In order to conform to FIX standard, *amendment of trade classification of auto-matched and manual trades are not supported.*	-	Amendments of trade classification of auto-matched and manual trades are supported.	
Cancel on Disconnect (COD)	-	*An optional feature of Cancel on Disconnect (COD) is introduced.* EPs can apply for COD where OCG will automatically cancel outstanding orders in the affected session upon specific disconnection scenarios. *The cancellations are done on a best effort basis.*	-	There is no COD service.	