

INFORMATION PAPER
HKEx ORION MARKET DATA PLATFORM
SECURITIES MARKET IMPLEMENTATION

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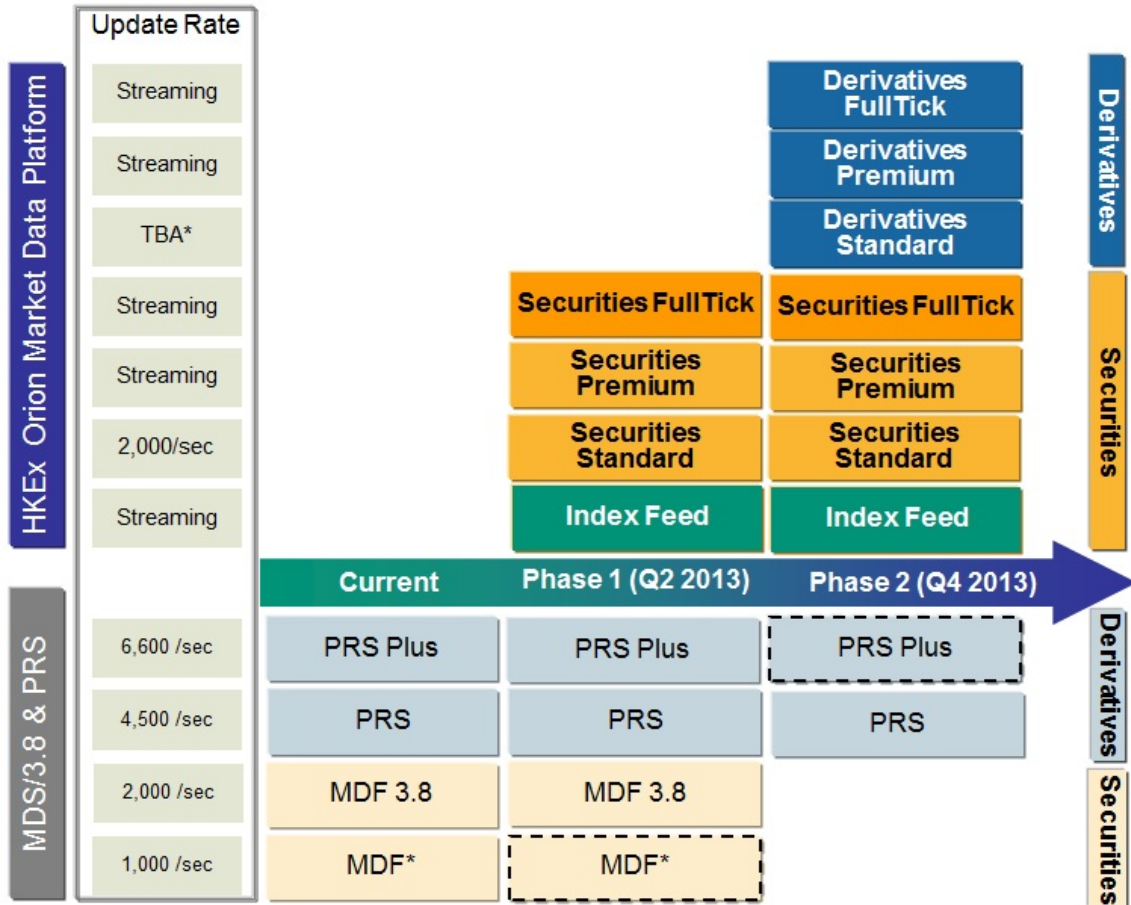
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SECTION 1 INTRODUCTION

- 1.1** HKEx is committed to strengthening the competitiveness of Hong Kong as a leading global financial centre. With this mission, HKEx is investing to revolutionize 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 data system, namely HKEx Orion Market Data Platform, will be the first building block of HKEx's next generation core platforms.
- 1.2** HKEx Orion Market Data Platform is a new and transformative system to disseminate HKEx market data to information vendors, exchange participants and investors. HKEx Orion Market Data Platform is an integrated low-latency platform delivering market data for all asset classes traded on HKEx markets through a single platform in a common message format. HKEx believes that the deeper and faster market data will promote the quality and transparency of the market.
- 1.3** HKEx Orion Market Data Platform will provide new and diversified market datafeed products, with content, depth and bandwidth requirements tailored to suit the specific demands from different types of market participants. HKEx Orion Market Data Platform also enables HKEx to establish points of presence for market data distribution outside of Hong Kong, such as in Mainland China.
- 1.4** HKEx Orion Market Data Platform will be rolled out in phases with securities market data tentatively by Q2 2013 and derivatives market data tentatively by Q4 2013.
- 1.5** For the securities market rollout, HKEx Orion Market Data Platform will initially run in parallel with the existing market data system Market Datafeed System 3.8 (MDS/3.8). After the transitional period, MDS/3.8 will be de-commissioned.
- 1.6** This information paper presents an overview of the HKEx Orion Market Data Platform and its implementation in the securities market. A further information paper will be published by Q4 2012 for the implementation of HKEx Orion Market Data Platform in the derivatives market.

SECTION 2 Overview of HKEx Orion Market Data Platform

2.1 Summary of Key Features



2.2 Single Platform for Market Data Distribution of Securities and Derivatives Markets

Currently, HKEx has separate platforms to disseminate data from the securities and derivatives markets. HKEx Orion Market Data Platform is a multi-asset class system which will unify the markets with a common message protocol. This single platform approach will increase operational efficiency and reduce maintenance costs for customers subscribing to market datafeeds from both markets.

2.3 New Suite of Market Datafeed Products

Currently, HKEx offers only a limited range of market datafeed products. HKEx Orion

Market Data Platform will introduce new and diversified market datafeed products in terms of content, depth and bandwidth requirements to meet different demands from market participants. A new suite of datafeed products will be introduced for each market, including conflated market-by-price datafeeds (*Securities Standard*), streaming market-by-price datafeeds (*Securities Premium*) and streaming market-by-order datafeeds (*Securities FullTick*). A dedicated datafeed will also be created to distribute index information. The complete suite of market datafeed products on HKEx Orion Market Data Platform is currently planned as follows:

Securities Market

Securities Standard

Securities Premium

Securities FullTick

Derivatives Market

Derivatives Standard

Derivatives Premium

Derivatives FullTick

Index Data

Index Feed

Customers may subscribe to one or more of the datafeed products to meet their business needs. They may do so either directly from HKEx Orion Market Data Platform or indirectly from HKEx authorized information vendors. Each datafeed product will be subject to different market data fees. The fee schedule for HKEx Orion Market Data Platform is planned to be announced by mid-2012.

2.4 Faster Market Data

HKEx Orion Market Data Platform employs industry leading low latency technology delivering vital pricing data to customers rapidly and efficiently. HKEx Orion Market Data Platform will process and disseminate data in microseconds.

2.5 Bandwidth

Products will also provide choices in bandwidth requirements. For the most demanding customers, new premium products will stream market data the instance it is created. Lower bandwidth requirements will be met with “conflated” products which provide snapshots of the market constrained within a specified number of messages per second.

2.6 Depth of Market

HKEx Orion Market Data Platform will promote market transparency by providing more choices on depth of market. “Market-by-price” feeds will consolidate the order book to the top 10 levels on both the securities and derivatives markets. In addition, new *FullTick* “market-by-order” feeds will provide updates on every order enabling customers to construct the complete order book.

2.7 Choice of Message Protocols

HKEx Orion Market Data Platform is capable of supporting market datafeed products in two different message protocols - binary and industry standard FIX/FAST:

- Binary is designed for customers seeking maximum machine efficiency.
- FIX/FAST¹ caters for those adopting the global standard messaging format and bandwidth cautious customers.

The existing datafeed products are all provided in proprietary binary protocol. To better serve the market, HKEx offers the choice of message protocols to its customers. Customers can choose their preferred message protocol and balance their business needs with operational efficiency.

2.8 Deployment of Multicast Technology

HKEx Orion Market Data Platform delivers market data via multicast transmission allowing for future growth in the number of customers without impact on service efficiency. The mainstream transmission protocol of HKEx’s market datafeed products will be changed from the current unicast to multicast. (Note that remote hubs may continue to adopt unicast due to network constraints.) Data integrity on multicast feeds will be facilitated through different mechanisms:

- Line arbitration – Data will be transmitted on two separate lines. Packets dropped or missed on one line can be retrieved from the alternate.
- Data Recovery – If data cannot be recovered through line arbitration (e.g. in the event of a customer application failure or connection failure), then two further mechanisms

¹ FIX/FAST –FIX (Financial Information eXchange) is the global standard for financial trading messaging while FAST (FIX Adapted for Streaming) is a compression technique which makes FIX messages efficient for market data. Our intended FIX version is FIX 5.0. For details, please refer to www.fixprotocol.org. Customers who would redistribute or make use of HKEx’s market data in its original FIX/FAST format should pay attention to the FAST patent issue in the U.S. territory.

are provided to enable customers to restore their data images:

- i. **Retransmission Service:** allows customers to retrieve lost messages by specifying a starting and ending sequence number of the messages to be recovered. The requested data will then be retransmitted.
- ii. **Refresh Service:** allows customers to recover the latest market images in case of a prolonged outage on the customer side. The refresh data is provided on a periodic snapshot basis.

2.9 Remote Distribution

HKEx Orion Market Data Platform enables HKEx to extend points of presence for market data distribution outside of Hong Kong. In recent years, the number of information vendors in the Mainland has increased significantly. HKEx Orion Market Data Platform will enable HKEx to establish a point of presence for market data distribution in Shanghai and potentially other financial centres in the future which will reduce costs and improve quality for customers in those regions. For more information, please refer to Section 3.3.

SECTION 3 Rollout Phases of HKEx Orion Market Data Platform

3.1 Rollout in Phases

HKEx Orion Market Data Platform will be rolled out in phases. The tentative schedule is as follows:

<u>Phase No.</u>	<u>Datafeed Products</u>	<u>Rollout Schedule</u>
Phase 1 (a)	Securities Market Index Data	Q2 2013
(b)	Mainland Market Data Hub	Q3 2013
Phase 2	Derivatives Market	Q4 2013

3.2 Phase 1 (a) – Securities Market and Index Data

Customers who are interested in subscribing to the datafeed products of HKEx Orion Market Data Platform should plan accordingly with the implementation activities and schedule stated in Section 5 of this paper.

Information package on detailed implementation arrangement and schedule will be published in Q2 2012.

3.3 Phase 1 (b) – Mainland Market Data Hub

The first market data hub will be established in Shanghai.

Initially, only securities market and index datafeed products will be offered through the Mainland Market Data Hub. The datafeed products to be offered include (a) Securities *Standard* and (b) Index Feed. They will be made available in only FIX/FAST protocol to meet the prevailing demand in the Mainland market. Provision of more premier datafeed products via the market data hub at a later stage will be subject to market demand.

Interface specifications and an information package for the Mainland Market Data Hub will be published in Q2 and Q3 2012 respectively.

3.4 Phase 2 – Derivatives Market

Datafeed products for derivatives market will be implemented at a later stage, tentatively scheduled for the second half of 2013. The detailed product offering and implementation arrangement for derivatives market will be finalized later in 2012.

Information package and interface specifications for implementation of derivatives market will be published by Q4 2012.

3.5 Legacy Feeds Decommissioning

Existing market datafeed products (MDF*² and MDF 3.8 for the securities market and PRS and PRS-Plus for the derivatives market), will be phased out shortly after the rollout of the corresponding HKEx Orion Market Data Platform datafeed products. The phase-out schedule for the existing market datafeed products of different markets is tentatively set as follows:

<u>Datafeed Product</u>	<u>Phase-out Schedule</u>
<i>Securities Market</i>	
- MDF*	Upon rollout of HKEx Orion Market Data Platform for securities market
- MDF 3.8	6 months after rollout of HKEx Orion Market Data Platform for securities market
<i>Derivatives Market</i>	
- PRS	Shortly after or once upon rollout of HKEx Orion Market Data Platform for derivatives market
- PRS-Plus	Upon rollout of HKEx Orion Market Data Platform for derivatives market

For derivatives market, it is projected that capacity required for supporting the market data volume of derivatives market by then will outweigh the technology limit that can be supported by the existing PRS unicast transmission. Unlike the securities market, it is inevitable to have the existing unicast derivatives datafeed products, including PRS and PRS-Plus, replaced by the HKEx Orion Market Data Platform's derivatives market datafeed products shortly after or once the latter platform is successfully rolled out.

² MDF* only includes market depth of 5 levels only and is transmitted at a slower message rate of 1,000 stock pages update rate per second.

The phase-out arrangement will be included in the information package of the corresponding phases of implementation.

SECTION 4 **Securities Market & Index Datafeed Products**

- 4.1** At the initial phase, HKEx will roll out the following datafeed products for securities market and index data:
- i. *Securities Standard*
 - ii. *Securities Premium*
 - iii. *Securities FullTick*
 - iv. *Index Feed*

Complimentary services are provided to the customers of some of the HKEx Orion Market Data Platform’s datafeed products for securities market as elaborated further in Section 4.6 below.

4.2 *Securities Standard*

Securities Standard (“SS”) is positioned to be equivalent to the securities market data currently offered in the Open Gateway (“OG”) of AMS/3.8 as well as the MDF 3.8 in terms of the levels of market depth and the message rate. Market data is provided in conflated snapshots with an initial update rate of 2,000 messages per second. It provides Level-2 securities market data³ (i.e. “market-by-price”) with market depth up to 10 best tick levels and broker queues. Please refer to Appendix A for Securities Market Datafeed Product Summary.

Customers who have been subscribing to MDF 3.8 may refer to Appendix B for the Key Features Comparison among *Securities Standard* and MDF 3.8.

4.3 *Securities Premium*

Securities Premium (“SP”) is a streaming market-by-price datafeed tailored for customers demanding faster market data. It provides Level-2 securities market data with market depth of 10 best tick levels and value added data, including VWAP and end-of-day number of trades. Different from SS, SP will not provide broker queue information as part of its streaming content. SP customers who wish to receive broker queue information can consider the complimentary service on conflated broker queue as described in Section 4.6 below.

³ Level-2 securities market data includes best bid/ask prices, last trade/nominal prices, market depth up to 10 best tick levels and trade tickers.

4.4 Securities *FullTick*

Securities *FullTick* (“SF”) is a market-by-order datafeed product providing full market transparency. It will also meet the demands of latency-sensitive customers seeking to conduct algorithmic trading and advanced technical analysis of market data. It carries information on every order⁴ and trade (without broker identity) on a streaming basis.

4.5 Index Feed

Under HKEx Orion Market Data Platform, index information will be disseminated via a dedicated Index Feed. Initially, Index Feed will transmit the same selected indexes from Hang Seng Indexes Company Limited (“HSIL”), China Securities Index Company Limited (“CSIC”) and Standard & Poor’s (“S&P”) as currently provided by MDF 3.8.

4.6 Complimentary Services

4.6.1 Conflated Broker Queue Feed

The Conflated Broker Queue Feed (“CBQ”), which is included in SS, is provided to the customers of SP as a complimentary service. The service provides broker queue information in conflated mode whilst SP provides market data in streaming mode. The service level between CBQ and SP is therefore inherently different by nature and the information in these two products is not synchronized. Customers who are the licensed information vendors are therefore reminded that if they plan to provide the CBQ along with the market depth available from SP, appropriate disclaimers and warnings should be provided to subscribers highlighting the service level difference.

4.6.2 Odd Lot Order Feed

The Odd Lot Order Feed (“OLO”) offers Odd lot/Special Lot market by order information in streaming mode and is provided to the customers of SS, SP and SF as a complimentary service. This feed is especially tailored for those customers who are also Stock Exchange Participants requiring such information currently on an enquiry basis to support trading in the odd-lot market.

⁴During auction session, no order information will be provided via the OMD Securities *FullTick*.

SECTION 5 Securities Market Implementation

5.1 Publication of Interface Specifications

Interface Specifications for securities market and index datafeed products will be published in March/ April 2012. With reference to this paper and the interface specifications, customers may determine which product(s) can meet their business needs, and also the selection of message protocol (i.e. binary or FIX/FAST). Customers are advised to assess and ensure they have the necessary expertise and skills to process the selected product(s), and to plan for the corresponding system development and infrastructure setup to interface with HKEx Orion Market Data Platform.

5.2 Enrollment on Datafeed Products

Securities market and index datafeed products of HKEx Orion Market Data Platform are tentatively scheduled for roll out by Q2 2013. The enrollment will be kicked off from late Q2 2012. Fees schedule on HKEx Orion Market Data Platform will be announced prior to the enrollment process. An information package detailing the enrollment process and implementation arrangement will be issued later in Q2 2012.

5.3 Development of Interface Systems by Customers

As soon as the interface specifications are published, customers are advised to start development on their systems. Customers are welcome to contact HKEx Vendor Support Team for any document clarification. Technical briefing sessions will be scheduled in due course.

5.4 Availability of On-boarding Tools

In order to assist customers in developing and testing their own systems, a set of on-boarding tools, including canned data, feed handler code skeleton, simulators of real-time data transmission, etc. will be made available in early Q3 2012. With the on-boarding tools, it is expected that customers can effectively test their systems before conducting an end-to-end test in the testing environment of HKEx Orion Market Data Platform.

5.5 Line Installation Ready for End-to-End Test

Customers subscribing to the securities market datafeed products of HKEx Orion Market Data Platform should plan for line installation of the new SDNet/2 circuits according to the bandwidth requirement of their selected datafeed(s). Please refer to Appendix A for the bandwidth required for each individual datafeed. Multiple datafeed subscriptions may be carried down a single set of SDNet/2 circuits in which case the bandwidth required is the aggregate of the individual bandwidth required for each datafeed. The SDNet/2 circuits should be installed and connected to the testing environment of HKEx Orion Market Data Platform by early Q4 2012 to join the end-to-end open test. Customers who wish to join the initial rollout are advised to contact their SDNet/2 network vendor(s) to confirm the line installation by early Q3 2012, i.e. 3 months prior to the line installation. Those customers who plan to move into the HKEx Hosting Data Centre (“HDC”) and would like to receive the market data of HKEx Orion Market Data Platform from their racks at HDC should contact the Business Development team of HKEx Hosting Services to secure the necessary hosting facilities.

5.6 End-to-end Open Test

To facilitate further system testing by customers, a testing environment of HKEx Orion Market Data Platform connecting with the AMS testing environment will be offered in Q4 2012. Customers can connect their systems to the testing environment of HKEx Orion Market Data Platform to verify the compatibility of their system with HKEx Orion Market Data Platform 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).

5.7 Certification Test

Certification test will be conducted in Q1 2013 after the open test to ensure that the customer systems have been properly developed and tested and are able to successfully receive the market data of HKEx Orion Market Data Platform and perform all necessary recovery functions. Customers are required to pass the certification test before taking part in the Market Rehearsals to be conducted in early Q2 2013.

5.8 Market Rehearsals

As the final preparation and verification of readiness before production rollout, market rehearsals will be conducted over a number of weekends in Q2 2013. High trading activities with large volume of market data will be simulated during the market rehearsals. Customers who wish to subscribe for the securities datafeed products of HKEx Orion Market Data Platform at the initial rollout will be required to join to prove their system readiness.

5.9 Implementation Schedule

The implementation schedule of HKEx Orion Market Data Platform's securities market is summarized as follows:

Securities Market Implementation	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Q1 2013	Q2 2013
Regular Information Sessions						
Publication of Interfaces Specifications						
Fees Announcement						
Feed Enrollment						
Distribution of On-boarding Tools (including simulator and canned data)						
System Preparation by Customers						
Line Installation						
Open Test and Certification Test						
Market Rehearsals						
Post Release Test						
Securities Market Data Rollout						

SECTION 6 Enquiries

For queries and further clarification on the HKEx Orion Market Data Platform, 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 Market Data Platform
Securities Market Implementation**

Or Email: OrionMarketData@hkex.com.hk

Appendix A Securities Market Datafeed Product Summary

Datafeed Product		Update Rate	Content	Estimated Bandwidth (preliminary estimation only)	
				Binary	FIX/FAST
1.	Securities <i>Standard</i> (“SS”)	2,000 messages per second	<ul style="list-style-type: none"> Level 1 (Bid/Ask quotations) all trade tickers (timestamp: HH:MM:SS) Level 2 (10 market depths) Broker queues 	10Mbps – Real-time : 7Mbps – Refresh : 3Mbps	7Mbps – Real-time : 5Mbps – Refresh : 2Mbps
2.	Securities <i>Premium</i> (“SP”)	Streaming	<ul style="list-style-type: none"> Level 1 (Bid/Ask quotations), all trades (time timestamp: HH:MM:SS) Level 2 (10 market depths) 	50Mbps – Real-time : 41Mbps – Refresh : 9Mbps	40Mbps – Real-time : 33Mbps – Refresh : 7Mbps
3.	Securities <i>FullTick</i> (“SF”)	Streaming	<ul style="list-style-type: none"> Individual order information (price, quantity & type of each order) Trade by trade information Auction Session : no order information, but IEP & IEV 	20Mbps – Real-time : 10Mbps – Refresh : 10Mbps	14Mbps – Real-time: 7Mbps – Refresh : 7Mbps
4.	Index Feed	Streaming, subject to the source	S&P/HKEX indices and selected indexes from CSIC and HSIL	1Mbps	1Mbps
Complimentary Service Feeds					
1.	Conflated Broker Queue (“CBQ”) - <i>Complimentary to SP</i>	2,000 messages per second	Broker queues	6Mbps – Real-time : 4Mbps – Refresh : 2Mbps	5Mbps – Real-time : 3Mbps – Refresh : 2Mbps
2.	Odd Lot Order (“OLO”) - <i>Complimentary to SS, SP and SF</i>	Streaming	Odd lot market by order information	50Kbps	50Kbps

Remarks: We anticipate that FIX/FAST will be fractionally slower, and test results will be shared with the market at a later date.

Appendix B Key Features Comparison among Securities Standard and MDF 3.8

DATA CONTENT	Securities Standard	MDF 3.8
Real-time Data Content	<p><i>Securities market data:</i></p> <ul style="list-style-type: none"> All trade tickers (timestamp: HH:MM:SS) Odd Lot market by order information in separate fee (OLO) <p><i>Third party content:</i></p> <ul style="list-style-type: none"> No third party content (index data in separate feed) 	<p><i>Securities market data:</i></p> <ul style="list-style-type: none"> All trade tickers (timestamp: HH:MM) Odd Lot market by price information <p><i>Third party content:</i></p> <ul style="list-style-type: none"> Selected CSIC, HSIL and S&P co-branded indices HKFE Futures Products
Static Data Content	<p>To streamline the legacy features, the following data fields currently available at MDF 3.8 will no longer be available at SS:</p> <ul style="list-style-type: none"> Securities Short Name in Big 5 Intra-day shortselling field Automatch Flag field Market Trading Timetable Spread table Information Pages (e.g. 785, 788 etc.) Linked security information Certain instrument specific static data fields with “blank” value under XF element type of MDF 3.8 <p>The following new items will be offered at SS:</p> <ul style="list-style-type: none"> FX rates <p>The following data fields will be changed at SS:</p> <ul style="list-style-type: none"> Securities Short Name in Traditional Chinese coded in GCCS will be changed to Unicode including HKSCS (Hong Kong Supplementary Character Set) Securities Short Name in Simplified Chinese coded in GB will be changed to Unicode 	
TECHNICAL ASPECTS		
Stock Update Rate (subject to further upgrade)	2,000 stock pages per second	2,000 stock pages per second
Message Protocol	Binary (proprietary & similar to UTP-MD) or FIX/FAST	Binary (HKEx proprietary)
Transmission Protocol	Multicast	Unicast
Bandwidth Requirement	10Mbps	6Mbps
Recovery	<ol style="list-style-type: none"> Retransmission (unicast) – recovery of certain or small amount of message lost. Refresh (multicast) – available on a periodic snapshot basis throughout the day. Some bandwidth has been allocated for recovery and so normal data transmission is not affected while Refresh is in progress. 	<ol style="list-style-type: none"> Retransmission – recovery from the last received message Completed database download – provide latest market data image for recovery from long service interruption or late connection to MDS/3.8.

