HKEx Information Services Limited ("HKEx-IS")

(A wholly-owned member of Hong Kong Exchanges and Clearing Limited Group)

SECURITIES MARKET DATA
MARKET DATAFEED SYSTEM (MDF)

TRANSMISSION SPECIFICATION

VERSION : 7.9
ISSUE DATE : 23 Apr 2013

REVISION LIST

Version	Date of Issue	Comments
0.1	10 July 1996	Draft
1.0	1 October 1996	- More description on error recovery for message lost detected by subscriber. - More information on line failure and primary trading system crashed. - Change field length of Table Entry Count and maximum length of Logon Response message - Addition of Invalid Request Message. - Message ID changed for Ready for Download Message and Database Status Message. - Clarification of meaning of Item count in element type XD. - Change format of Exchange Turnover in element type IN. - Rearrange fields Segment Number and Final Segment Flag in element type NP. - Additional exchange state in element type SM. - Other review comments incorporated.
1.1	29 November 1996	- More description on error recovery and line disconnection with Market Datafeed System. - More description on Retransmission threshold field in element type Logon Request - Clarification of sequence number in Transmission Header. - Add description for Previous Closing Price Type and change value for Accrued Interest field in element type XS. - Change value for Turnover field in element type XT. - Clarification for Item Count field in element type XD.
1.2	23 June 1997	- Add dummy flag in element type XS
1.3	15 July 1997	- Add value '#' to HSI Index Status Indicator in element type IN
1.4	7 October 1997	- Additional information on trade ticker
1.5	19 Jan 1998	- Add basket warrant data
1.6	30 March 1998	- Add Hang Seng 100
1.7	14 May 1998	- Add Regional Stock Index Information
2.0	2 July 1998	- Incorporating changes suggested by ISD including additional information on line protocol, revision of Trade Ticker Information and removal of examples of text pages.
2.1	9 July 1998	- Add equity information
2.2	12 Aug 1998	- Revision of Public Trade Types
2.3	22 Jan 1999	- Add stock borrowing and lending information
2.4	3 March 1999	- Remove Regional Stock Index Information
2.5	4 March 1999	- Add index and turnover information of Growth Enterprise Market - Add Exchange Fund Notes information
2.6	26 April 1999	- Revision of trade ticker information
2.7	13 August 1999	- Revision of HSI information - Clarification for Ticker Key field in element types BT and TT
2.8	16 Oct 1999	- Add Dao Heng Government Bonds Index
2.81	30 May 2000	- Add Hang Seng Information Technology Index and Hang Seng Information Technology Portfolio Index.
3.0	26 October 1999	- AMS/3 various enhancements
3.0a	18 November 1999	- Revision of page number in Logon Response message and Text Page element - Revision of security code in Trading Announcement element - Remove Sub-Market Table from Index and Turnover element - Remove Broker Name and Broker Free Text from Security and Registered Traders Information element

Version	Date of Issue	Comments
		- Revision of maximum frame size for broadcast messages
3.0b	22 December 1999	- Clarification for market page snapshots during initial database download - Clarification for Number of Items in the Security and Registered Traders element - Add Last Trade Price to Security Trade element - Add Sub-Market Table to Index and Turnover element - Revision of maximum frame size for broadcast messages - Revision of page code for Exchange Fund Notes Information - Remove Index Table from Market Static element
3.0c	25 January 2000	- Revision on grouping of information - Revision on transmission sequence of News Index and News elements - Revision on Number of Sessions in the Market Trading Timetable element - Remove Effective Time from the System Message element - Revision on Number of Items in the Linked Security Information element
3.0d	2 February 2000	- Revision on Item Table of Security Detail Queue Information element
3.0e	5 July 2000	- Clarification for message sequence during initial database download - Add new trading status to the System Message element - Revision on Number of Orders in the Security Summary Order Queue Information element
3.0f	17 August 2000	- Clarification for Market Trading Timetable element and News Index element
3.0g	23 October 2000	- Revision on Index and Turnover element
3.1	2 April 2001	- Add MSCI Indexes information page
3.2	7 May 2001	Change name of "Compliance News" to "SDI News"
3.3	31 July 2001	To include a currency code for market turnover in "IN" element. To add new HSI indexes like HSCI, HSHKCI, HSMLCI and new HSCCI.
3.4	29 Nov 2001	- Add new page code "CONT" to logon response. - Add new stock range for Main Board.
3.5	28 Dec 2001	Modify to TCP/IP version.
3.6	14 June 2002	Update with ELI (Equity Linked Instruments) Page 7701 to Page 7800.
3.7	29 August 2002	Revise on the usage of Maturity Date field under the Warrants Specific Data in "XS" element: • To remove the usage as payment date for ELI • To add the usage as "Expiry Date" for ELI and Derivatives Warrants. Effective date will be on 23 Sept 2002
3.8	6 Dec 2002	***S&P/HKEx Index Phase I*** Element Type – PG: Adding information page 783 under a new page code "SPIS" for S&P/HKEx LargeCap Index and S&P/HKEx GEM Index
3.9	18 Dec 2002	***S&P/HKEx Index Phase II*** Element Type – PG: - Redefine information page 788, 8788 to replace All Ordinaries Index and Growth Enterprise Index by S&P/HKEx Large Cap Index and S&P/HKEx GEM Index respectively. - AOI Sectorials will be discontinued and hence page code "AOIS" with information page 789 is removed. Element Type – IN: - Change Index Code "AOI" to "HKL" & "GEI" to "GEM" for S&P/HKEx LargeCap Index and S&P/HKEx GEM Index respectively. (All Ordinaries Index and Growth Enterprise Index will be discontinued) - The update interval for Main Board Market Turnover and Growth Enterprise Market Turnover is changed from every minutes to every 15 seconds.
3.10	13 May 2003	***CPI Enhancements:*** Element Type – PG: Adding information pages 7801 – 7810 under a new page code CAPI for CPI (Capital Protected Instruments) Financial Information.

Version	Date of Issue	Comments
		Element Type – XS: Adding value of data fields for CPI under Warrant Specific Data.
3.11	10 July 2003	Discontinue display of S&P/HKEx indices on information page 783 after the stabilization period of S&P/HKEx indices launch. • Blank page for 783 will be disseminated and reserved for future use. • Page code of 783 will be changed from "SPIS" to "CONT".
3.12	22 July 2003	***HSI Turnover on information page 783:*** • Page 783 will disseminate the HSI Index and Index Turnover figures. • Page code "HSTO" will be used for Page 783.
3.13	3 October 2003	Effective 1 December 2003: (1) Expansion of Index Fund Financial Information page from 7301 to range 7301 – 7304 (2) Revised to add password change recommendation in Section 5 Security and Control.
3.14	3 November 2003	Effective 19 January 2004: Re-arrange page range of information page 3000 Series. • Page 3000-3199 will disseminate the Stock Options information. Page code is "STKO". • Page 3200-3205 will disseminate the Mini Hang Seng Index Options. Page code is "HSIO". • Revised the first filler field in logon request message to be the reserved field.
4.0	10 September 2003	Provision of odd lot and special lot market information. (Target implemented in mid Feb 04) - Add OL element for the odd lot/special lot order summary queue information - Change all "Order Type" to "Order Side"
4.1	25 November 2003	- Revised to incorporate v3.13 and v3.14 changes - Clarification on the relationship between Item Count and Order Table (in page 38) - Definition of BCD field value when overflow (in pages page 21, 35, 36, 38)
4.2	16 December 2003	- Discontinue of SDI news (Target implementation in Mar 04 together with provision of odd lot and special lot market information enhancement) - Clarification on element type XF : the "yield-to-maturity" field of bond specific data is implied 4 decimal places (in page 31)
4.3	30 June 2004	- Clarification on element type XF : the bond status field (page 31 and 33) - Revised to add notes on "TT" element for multiple auction trade tickers enhancement on AMS. (page 39)
4.4	1 June 2005	Review of the whole document for clarification on areas that considered appropriate. There is no technical change. - Revised section 2.1 "Scope" (page 2) - Clarified consolidation of messages in Section 2.2 (page 3) - Revised the word "reset" to "re-activate" for point # 4 in section 2.3.2 Start of Day (page 3) - Revised the numbering of #6 in section 2.3.2 from "1-9" to "a-i"" (page 4) - Removed the last sentence in the first paragraph of section 2.3.5 on Error Recovery (page 5) - Revised to add the "Allocated bandwidth" in Section 3 (page 7) - Revised "Connection Ports for Testing System" section regarding IP addresses for Testing in Section 3 (page 7) - Refined the network diagram in Section 3.1 (page 9)

Version	Date of Issue	Comments
		- Added recommendation on link failure detection in section 3.2 Line Connection Failure (page 10) - Revised section 3.3 and 3.4 (page 10) - Elaborated the description for retransmission threshold field of Logon Request in Section 4.1.2 (page 12) - Elaborated the description for Host Key field of Transmission Header in Section 4.3.1(page 18) - Clarified transmission of Element Type – IN outside trading hours in Section 4.3.2.2(page 43) - Clarified that no force expiry of vendor password in MDS in Section 5 (page 55) - Clarified that Metro-IP network instead of Frame Relay network was used in Section 5(page 55)
4.5	21 Oct 2005	Revise for Additional Index Fund Financial Information Page. The page range allocated for Index Fund Financial Information would be expanded from p.7301 – p.7304 to p.7301 – p.7307 (page 50).
4.6	2 Feb 2006	Revise for increasing allocated bandwidth for MDS from 256kbps to 384kbps (page 7). Revise for adding additional comment to detect line failure in section 3.2 Line Connection Failure (page 10).
4.7	26 Sep 2006	Termination of Information Page 7501 (section 2.1 on page 2, section 1.1.3 on p.14 and modification to PG element on page 50)
4.8	25 October 2006	Enhancements to facilitate No-Paid Ad Project which is tentatively to be implemented in Q1 2007 : ▪ Add page code "NALT" for Information Pages on News Alert Messages. (Section 4.1.3 in page 14) ▪ Add Information Page ranges for News Alert Messages in Element Type – PG: (page 50) - P. 5200-5299: Main Board News Alert Messages in English - P. 5300 – 5399: Main Board News Alert Messages in Chinese - Page 8650-8674: GEM News Alert Messages in English - Page 8675-8699: GEM News Alert Messages in Chinese SDNet Migration (to be completed by end Dec 2006): Updated network diagram from Metro IP Network to SDNet (Section 3.1 in page 9)
4.9	11 December 2006	Clarification on requirement and/or handling of error recovery: (Section 2.3.2, Section 2.3.5, Section 3 and Section 4.1.2) ▪ It is mandatory requirement for Information Vendor to have auto-detection of line failure and auto-switching/auto-reconnection of lines. ▪ Once line disconnection is detected, Information Vendor is required to complete the reconnection via the primary or secondary IP address preferably in 30 seconds and not more than 1 minute. ▪ Information Vendors should be aware of the long lead time required for performing full trade ticker recovery during trading hours which might affect their services. ▪ Information Vendors are advised to perform full trade ticker recovery after trading hours, unless there is strong operational or business need to do it during trading hours. ▪ Information Vendors with non-standard configuration (with two live feeds) are advised to perform full trade ticker recovery on one of the connections, but not both at any one time.
5.0	24 January 2007	Termination of Information Pages for Equity Linked Instruments (pages 7701 – 7800) and Capital Protected Instruments (pages 7801 – 7810), due to AMS/3 stock code range designation/re-designation (section 2.1 on page 2,

Version	Date of Issue	Comments
		section 4.1.3 on p.14 and modification to PG element on page 51)
5.1	1 March 2007	Revised for removal of issuer /listed companies' news from MDF effective 25 June 2007: • Update the Information Content table (Section 2.1 on page 2) • Remove News Type 'LTN', 'LTC', 'GLN', 'GLC' in Element Type – NI (Section 4.3.2.2 on page 47) • Remove News Type 'LTN', 'LTC', 'GLN', 'GLC' in Element Type – NP (Section 4.3.2.2 on page 49) Clarification on Info Page Category • Update the Information Category table in Element Type – PG (Section 4.3.2.2 on page 51)
5.2	27 September 2007	To add a currency code MXN for Mexican Peso
5.3	8 October 2007	Effective 10 December 2007 (Modification made for section 2.1 on page 2, section 4.1.3 on page14 and modification to PG element on page 51): (1) Termination of Basket Warrant pages, 7031 – 7100. (2) Termination of Exchange Fund Notes pages, 7101 – 7199. (3) Termination of Stock Borrowing and Lending Position pages for MAIN Market, 7201 – 7300. (4) Termination of Stock Borrowing and Lending Position pages for GEM Market, 8731 – 8760. (5) Termination of MSCI Japan Index, MSCI Australia Index, MSCI Singapore (Free) Index, MSCI Taiwan Index, MSCI Malaysia (Free) Index, MSCI Korea Index and MSCI China Free Index. Effective 18 February 2008 (Modification made for section 2.1 on page 2, section 4.1.3 on page14 and modification to PG element on page 51): (1) Termination of Stock options pages, 3000 – 3199. (2) Termination of Mini Hang Seng Index Options pages, 3200 – 3205. Effective 7 April 2008 (Clarification on supported number of digits for security code made for XN on page 20, XS on page 22, XL on page 28, OL on page 37, BT on page 39, NI on page 45 and TA on page 52), introduction of 5-digit security codes. Before 7 April 2008, security codes of 4 digits will be transmitted.
5.4	31 October 2007	The following enhancement will be launched on 28 January 2008: ▪ Allocated bandwidth will be increased to 750kbps. [Section 3] The following enhancement will be launched in March 2008: ▪ The number of Linked Security transmitted under Element Type -XL (Linked Security Information) will be expanded from 200 to 500 [Section 4.3.2.2].
5.5	27 November 2007	To add clarification note for the introduction of Closing Auction Session to be launched on 26 May 2008. [Section 2.1 & Section 4.3.2.2]
5.6	10 January 2008	Effective 17 March 2008, Information Pages for Equity Securities Financial Information Pages for Main Board (pages 7003 – 7030) and for GEM (pages 8701 – 8730) will be terminated. [Modification made for section 2.1 on page 2, section 4.1.3 on p.14 and PG element on page 49]
5.7	26 March 2008	To add section 2.4 for technical requirements for direct connection vendors ▪ Vendors who obtain the market data directly from the HKEx must meet all the requirements as set out in this paragraph to ensure that their systems are capable of properly receiving our market data.
5.8	24 February 2009	To add clarification note for the introduction of Price Control Mechanism during Closing Auction Session. [Section 4.3.2.2 Element Type XN & SM] To change the allocated bandwidth to 800Kbps. [Section 3]

Version	Date of Issue	Comments
5.9	13 March 2009	To revise contents for the suspension of Closing Auction Session to be effective on 23 Mar 2009
5.10	8 January 2010	To remove P.781 of Information Pages after the discontinuation of Hang Seng Mainland Composite Index (HSMLCI), Hang Seng Hong Kong Composite Index (HSHKCI), Hang Seng HK LargeCap Index (HSHKLI), Hang Seng HK MidCap Index (HSHKMI) & Hang Seng HK SmallCap Index (HSHKSI) and the reclassification of Hang Seng Composite Index (HSCI) to benchmark index by HSIL.
5.11	5 May 2010	To add three indexes supplied by China Securities Index Company Limited ("CSIC"), namely, CSI 300 Index, CSI Hong Kong 100 Index and CSI Cross-Straits 500 Index, in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element Type IN]
6.1	5 May 2010	Effective End Q3/Early Q4 2010 To change the message frame size from 3400 bytes to 32K bytes in section 4.3 Broadcast Messages on page 19 to effectively support high bandwidth message dissemination. To mandate the requirement for setting the TCP Receive Buffer Size to 64K in section 2.4 Technical Requirement for Direct Connection Vendors on page 7.
6.1a	2 Jun 2010	Supplementary information on the handling of decimal places for CSI 300 Index, CSI Hong Kong 100 Index and CSI Cross-Straits 500 Index
6.2	16 Oct 2010	To add HSI Volatility Index (VHSI) supplied by China Hang Seng Indexes Company Limited ("HSIL") in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element Type IN] To clarify on various elements including XN, XS, XF, XU, XT, XO, OL, IN, MT, SM & SP [Section 4.3.2.2]
7.0	14 July 2010	Effective End Q4 2011 for MDS/3.8 (1) To change the message frame size from 32K bytes to 56K bytes to effectively support high bandwidth message dissemination [Section 4.3 Broadcast Messages on page 19] (2) Modification made for Section 2.1 on page 2, Section 4.1.3 on page 15 and element PG on page 50: a. Removal of MAIN board News Alert Pages, 5200 – 5399 b. Removal of GEM News Alert Pages, 8650 – 8699 (3) To remove the Registered Trader indicator in element XD (Security Detail Queue Information) [Section 4.3.2.2 on page 37] (4) To remove the element TA (Trading Announcement) [Section 4.3.2.2] (5) To change host key field length from 4 bytes to 8 bytes [Section 4.1.2 on page 12, Section 4.3.1, page 19] (6) To add the total turnover of all securities in all market traded in RMB in the element "IN". [Section 4.3.2.2 Element Type IN]
7.1	31 Dec 2010	Update description in Section 2.1, Section 2.4, Section 4.1.2 for Single Licence Regime Modification made to IN element on page 43: Clarification on the currency of the total turnover in each market Effective 7 March 2010 (Modification made for section 2.3.2 on page 3): To change the MDF host available time for information vendor connection from 8:00a.m. to 6:30 a.m. upon the extension of trading hours Effective 4 April 2010 (Modification made for section 2.1 on page 2, section 4.1.3 on page 15 and modification to PG element on page 50): (1) Termination of Stock Financial Information pages, 7001 – 7002 (2) Termination of Index Fund Financial Information pages, 7301 – 7307

Version	Date of Issue	Comments
7.2	24 Mar 2011	Effective 7 March 2011: To change the Updating Period for various indexes and turnover for the extension of trading hours. [Section 4.3.2.2 Element Type IN] Effective End Q4 2011 for MDS/3.8 (1) To prevent unauthorized access to MDS, the password retry limit is reduced from 9 times to 3 times. [Section 2.3.2 Start of Day Page 4] (2) To keep the message frame size remained to be 32K bytes [Section 4.3 Broadcast Messages on page 19] as the previously proposed change of message frame size to 56K bytes is withdrawn. (3) To remove the element XU (Security Trading Status) [Section 4.3.2.2]
7.3	1 Jun 2011	To add ten indexes supplied by China Securities Index Company Limited ("CSIC"): • CSI China Mainland Consumer Index • CSI Hong Kong Private-owned Mainland Enterprises Index • CSI Hong Kong State-owned Mainland Enterprises Index • CSI Hong Kong Listed Tradable Mainland Real Estate Index • CSI Hong Kong Listed Tradable Mainland Consumption Index • CSI Overseas Mainland Enterprises Index (HKD) • CSI Hong Kong Dividend Index • CSI RAFI Hong Kong 50 Index • CSI Hong Kong Middle Cap Select Index • CSI HK Mainland Enterprises Index; and a few indexes from other index source in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element Type IN]
7.3a	14 Jul 2011	To add ten Shanghai Stock Exchange ("SSE") indexes supplied by China Securities Index Company Limited ("CSIC"): • SSE Composite Index • SSE 50 Index • SSE 180 Index • SSE 380 Index • SSE Dividend Index • SSE MID CAP Index • SSE 180 Governance Index • SSE Mega-cap Index • SSE Industry Top index • SSE Commodity Equity Index; in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element Type IN]
7.3b	12 Oct 2011	(1) To change the Updating Period for VHSI indexes [Section 4.3.2.2 Element Type IN] (2) To refine Item type in Security Detail Queue Information for " " (space value) indicating a spread separator when the spread is with no broker queued. [Section 4.3.2.2 Element Type XD]
7.4	16 Mar 2012	To disseminate mid-day and day-end short selling turnover information as separate news types ("SSN" for English short selling turnover information, "SSC" for Chinese short selling turnover information) [Section 4.3.2.2 Element Type NI & NP]
7.5	4 May 2012	Termination of AMS information pages (785, 786, 787) for futures products and index options with effect from 6 August 2012.
7.6	27 Nov 2012	To add one China Exchanges Services Company Limited ("CESC") index supplied by China Securities Index Company Limited ("CSIC"): • CES China 120 Index in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element

Version	Date of Issue	Comments
		Type IN]
7.7	21 Feb 2013	To add two China Exchanges Services Company Limited ("CESC") indices supplied by China Securities Index Company Limited ("CSIC"): • CES CHINA A80 INDEX • CES CHINA HK MAINLAND INDEX in the element "IN" in 15 seconds update interval. [Section 4.3.2.2 Element Type IN]
7.8	2 Apr 2013	Change the update interval of indices supplied by China Securities Index Company Limited ("CSIC") from 15 seconds to 5 seconds in "IN" element. [Section 4.3.2.2 Element Type IN]
7.9	23 Apr 2013	Change the update interval of indices supplied by Hang Seng Indexes Company Limited ("HSIL") and the update interval of market turnover for Main Board and Growth Enterprise Market from 15 seconds to 2 seconds in "IN" and "PG" elements. [Section 4.3.2.2 Element Type IN & PG]

CONTENTS

1. INTRODUCTION

1.1 Purpose

This document specifies the data transmission between the Market Datafeed System (MDS) and the Information Vendors. It defines the real-time data provided by the Market Datafeed System and the messages that contain these data. It also describes the error handling and recovery procedures.

The intended reader of this document is the technical personnel of the Information Vendors which has subscribed for this service. This specification provides information for Information Vendors to develop their own systems to receive real time data from the Market Datafeed System.

1.2 Reading Guide

This document has been arranged so that a reader can easily find the information required.

The Chapters following this introduction are :

Chapter 2 :	the scope and application protocol of the Market Datafeed System;
Chapter 3 :	a description of the line protocol;
Chapter 4 :	a detailed description of the message formats;
Chapter 5 :	a description of security and control
Appendix A :	message flow examples

1.3 Document Convention

The standard notation used in this document consists of:

- 'X' for alphanumeric data;
- '9' for numeric data in ASCII;
- 'Z' for numeric data in ASCII, blank when zero;
- 'b' for blank;
- 'B(1)' for 1 byte binary
- 'B(2)' for 2 byte binary
- 'B(4)' for 4 byte binary
- 'B(8)' for 8 byte binary
- 'BCD(n)' for binary coded decimals of length *n* bytes
- 'YYYY' for year with the century part
- 'YY' for year without the century part. The 50/50 windowing rule is the methodology used by the Exchange to achieve Year 2000 compliance. This rule makes the assumption that all years on or before 50 are treated as 20YY while others are treated as 19YY.

The byte ordering for B(n) and BCD(n) is that the most significant bits are represented in the lowest order bytes (Big-endian).

2. SYSTEM OVERVIEW

2.1 Scope

The Market Datafeed System provides real time trading information for all instruments listed on the Securities Market to Information Vendors. This information can be grouped into the following categories. (For Third Party Content, information supplied by third parties including but not limited to the third party index compilers, Information Vendors should ensure that they have obtained prior consent from those third parties before redistribution of the information.)

Instrument	**Information Content**
Core Information Content	
All types of securities traded on the Securities Market of HKEx, including: ■ Equities ■ Debt Securities ■ Unit Trusts/ Mutual Funds ■ Exchange-traded Funds ■ Equity Warrants ■ Structured Products - Derivative Warrants (DW) - Callable Bull/Bear Contracts (CBBC) - Equity Linked Instruments (ELI)	Trading information for all securities listed on the Securities Market of HKEx: <u>Level 1:</u> Best bid/ask, nominal, last traded price, high, low, previous close, shares traded and turnover value, Indicative Equilibrium Price (IEP) and Indicative Equilibrium Volume (IEV) during pre-opening session. <u>Enhanced Level 2 :</u> Market Depth information including aggregated volume for the best ten prices in the order queue (number and volume of buy/sell orders in queue), individual trade information (excluding overseas trades) and broker ID in the order queues, etc.
Third Party Information: **Market Indices Information** (subject to availability and consent of third parties)	
<u>Important note</u>: Market indices information will be removed from MDS by 3 months after the new index feed is launched. Information Vendors who wish to continue carrying such market indices information may subscribe to the new index feed which will be in production by Q3/Q4 2012.	
Third Party Indices from third party index compilers such as: ▪ Hang Seng Indexes Company Limited. ▪ China Securities Index Company Limited.	Index information including: ▪ CES China 120 Index, CES China A80 Index and CES China HK Mainland Index supplied by China Securities Index Company Limited ▪ Hang Seng Index (HSI); HSI Sub Indices; Hang Seng China Enterprises Index (HSCEI); Hang Seng China Affiliated Corporations Index (HSCCI); HSI Volatility Index (VHSI) supplied by Hang Seng Indexes Company Ltd. ▪ CSI 300 Index, CSI Hong Kong 100 Index, CSI Cross-Straits 500 Index, CSI China Mainland Consumer Index, CSI Hong Kong Private-owned Mainland Enterprises Index, CSI Hong Kong State-owned Mainland Enterprises Index, CSI Hong Kong Listed Tradable Mainland Real Estate Index, CSI Hong Kong Listed Tradable Mainland Consumption Index, CSI Overseas Mainland Enterprises Index (HKD), CSI Hong Kong Dividend Index, CSI RAFI Hong Kong 50 Index, CSI Hong Kong Middle Cap Select Index and CSI HK Mainland Enterprises Index supplied by China Securities Index

	Company Limited. ▪ SSE Composite Index, SSE 50 Index, SSE 180 Index, SSE 380 Index, SSE Dividend Index, SSE Mid Cap Index, SSE 180 Governance Index, SSE Mega-cap Index, SSE Industry Top Index and SSE Commodity Equity Index supplied by China Securities Index Company Limited.
S&P/HKEx Indices	S&P/HKEx indices including S&P/HKEx LargeCap index and S&P/HKEx GEM index supplied by Standard & Poor's.
Reference and Complimentary Information	
News	Exchange News (English and Chinese when available).

2.2 Trading Sessions and Message Transmission

Normally, trading is conducted in auction trading session(s) and continuous trading session(s) every trading day. However, there are situations where there is only half day trading with fewer trading session(s) (Christmas eve, New Year eve and Chinese New Year eve), or a trading session is suspended due to a typhoon etc. The Market Datafeed System is not affected by the number of trading sessions and will continue to provide real time data as long as the Exchange's trading system is available.

Updates are transmitted as they occur. However, in periods of heavy updates, the updates may be consolidated into one message before being transmitted to Information Vendors. For example, if two orders are performed on a particular security, only one security order update (instead of two) will be transmitted for that security but the two order details will be reflected.

This consolidation mechanism applies to all broadcast message types from the Market Datafeed System except for trade tickers.

2.3 Application Protocol

The Application Protocol can be divided into five parts:

- End of day housekeeping
- Start of day
- Normal transmission
- Market Close transmission
- Error recovery

2.3.1 End of Day Housekeeping

The Market Datafeed System will normally be shutdown at 6:00pm and all Information Vendors will be disconnected (see Appendix A.1). This shutdown time, however, is not rigid and the Exchange has the right to adjust this time according to the different trading situations.

After the shutdown, the necessary housekeeping duties are performed on the Market Datafeed System. Meanwhile Information Vendors should perform any necessary housekeeping functions on their own systems in preparation for the next trading day.

2.3.2 Start of Day

The Market Datafeed System will normally be brought up well before 6:30am. However, similar to the end of day shutdown, there is no rigid bring-up time for the Market Datafeed System and Information Vendors should not assume there is one. Information Vendor should have the following information before connecting to the Market Datafeed System: (1) *Subscriber name* – a unique identity given to the Information Vendor for logon; (2) *Three Public Keys* (PK1, PK2 and PK3) – the shared keys known only between the Exchange and the Information Vendors for encryption and decryption.

Information Vendors connection request should be accepted by the Market Datafeed System for the trading day anytime after 6:30am. If any Information Vendor finds that its connection request is not accepted by the Market Datafeed System, the Information Vendor should retry the connection request until the Market Datafeed System is brought up. Information Vendors are advised to connect to the Market Datafeed System well before 8:30am so that there will be sufficient time to prepare for **Market Open at 9:30am (at 9:00am for Pre-Opening Session).** Information Vendors are expected to initiate a logon request within 3 seconds from the time of receiving session key message after connection.

If an Information Vendor successfully connects to the Market Datafeed System, it is required to logon successfully to receive information. The authentication process follows the sequence of events below:

1. Market Datafeed System will send a *Session Key message* containing an encrypted session key to the Information Vendor. The session key is encrypted with the Public Keys using the DES FIPS 46-3 algorithm. Note that the Public Keys will be **changed from time to time** subject to the decision by the Exchange with prior notice to all Information Vendors. Please refer to the following URL for detail information of DES FIPS 46-3 if necessary:

   <http://csrc.nist.gov/publications/fips/fips46-3/fips46-3.pdf>
   Steps to obtain the clear-text Session Key from *Session Key message*:

   a) Decrypt Session Key value using PK3.
   b) Encrypt Session Key value using PK2.
   c) Decrypt Session Key value using PK1.

   After all, a clear-text Session Key (SK) will be obtained.
2. Once the Information Vendor receives this *Session Key message* and obtains the clear-text session key (from step 1). The Information Vendor will then use this clear-text session key to encrypt the password in the *Logon Request message*.

   Steps to create encrypted password in *Logon Request message*:

   a) Encrypt the password value using PK1.
   b) Decrypt the password value using PK2.
   c) Encrypt the password value using clear-text Session Key (SK).
3. The Information Vendor sends a *Logon Request message* containing the subscriber name and encrypted password to the Market Datafeed System.
4. The Market Datafeed System validates the *Logon Request* and performs authentication on subscriber name/password to identify the Information Vendor; it replies to the *Logon Request* with a *Logon Response* if the message is error free and authentication is successful. The *Logon Response* will indicate the current trading day. The *Logon Response* will also set the Database-status flag to "Invalid". If the Logon Request contains invalid field(s) or authentication on subscriber name/password has failed, the Market Datafeed System will reply with the Invalid Request Message and disconnect the link. Whenever the link is disconnected by Market Datafeed System, the Information Vendor needs to reconnect to Market Datafeed System and get the *Session Key message* again for the new session (back to step 1) and sends a valid *Logon Request* in this case. When the authentication of subscriber name and password fails, the Information Vendor can consequently retry 3 times in total which when exhausted will cause Market Datafeed system to suspend the service of the Information Vendor. Once suspended, the Information Vendor should contact the Exchange to **re-activate the connection account and reset the password, if necessary**. Then the Information Vendor should connect to the MDS and logon again to resume the service.
5. On receiving the *Logon Response*, the Information Vendor should validate its expected trading day against the trading day within the *Logon Response*. When the Information

Vendor is ready for data transmission, a *Ready for Download message* is sent by the Information Vendor to the Market Datafeed System. Other *Logon Request* using the same subscriber name/password will not be entertained by Market Datafeed System at this stage.

6. On receiving the *Ready for Download message*, the Market Datafeed System will broadcast database download messages in the following order:
   a) Market static information download (i.e. the MS, MT and SP broadcast elements), if any
   b) Non-blank Text Pages (i.e. the PG broadcast element), if any
   c) All news items released so far (i.e. the NP and NI broadcast elements), if any
   d) Market Page snapshots (i.e. the XN, TT, XS, XM, XL, XR, XT, XO, XD, XF broadcast elements) for all securities, if any
   e) Odd Lot/Special Lot Order Summary Queue snapshots (i.e. OL broadcast elements) for all securities
   f) If the Full Ticker flag in the Logon Request is "Yes", Bulk trade download (i.e. the BT broadcast element) for all securities, if any
   g) Any broadcast element in any order, if any
   h) The current market status (i.e. the SM broadcast element. e.g. Market not yet open)
   i) The *Database Status Message* (i.e. the Information Vendor database is complete and consistent from this point onwards). It is also time for the Information Vendor to check that the number of securities received during the database download agrees with the count it received previously from the MS broadcast element.

Refer to Appendix A.2 for a message flow example.

The Information Vendor is advised not to assume that its database is complete and consistent until a *Database Status Message* is received. If Information Vendor chooses not to request for bulk trade elements during database download, the database is not completed or consistent with regard to ticker information even though a *Database Status Message* is received. Messages within the database download will not be differentiated from normal transmission messages. The download messages merely contain complete information for each transmitted element and therefore should be processed in the same manner as normal transmission messages.

2.3.3 Normal Transmission

Normal message transmission is expected between when the market opens for trading and when the market is closed. There are, however, no time constraints and the Information Vendor should assume that messages, in particular the news messages, may be received at any time as long as its connection to the Market Datafeed System is established.

The Information Vendor should be able to send the *Change Password Request* during this period after a successful logon and database download or recovery completed. If the change of password has failed, then Market Datafeed System will send *Invalid Request Message* to indicate the failure (Error Reason = "09"). Note that the new password value should be different from the last three changes. Otherwise, the request will be rejected with error (Error Reason = "11"). If the request is successfully handled by Market Datafeed System, a *Request Valid* response message will be sent to the Information Vendor to indicate the success. Change of password will be effective for the next logon request session.

2.3.4 Market Close Transmission

After close of a market, the Information Vendor may send a *Full Trade Tickers Request* to request for the download of all trade tickers concluded on that market for the day. In case the market requested is not in the "market closed" state, such request will be rejected.

The Information Vendor can still send the *Change Password Request* in "market closed" state if necessary.

2.3.5 Error Recovery

Whenever the Information Vendor detects an error or receives an *Invalid Request Message (except error 06 – Invalid Market State, error 07- Invalid Market Code and Error 11 – Invalid Password),* Information Vendor's application should automatically disconnect the engaged IP address to the Market Datafeed System. Subsequent to the disconnection, the Information Vendor's application should automatically attempt re-connection and send a Logon Request to the Market Datafeed System. In case the connection attempt is unsuccessful, the Information Vendor's application should automatically attempt to use another IP address among the available pool of IP addresses. Therefore, the Information Vendor's application should be able to swap among the IP addresses for primary system and the backup system.

It is mandatory for the Information Vendors to implement auto-detection on line failure and auto-reconnection / auto-switching to same / alternative line in their applications. Information Vendors are required to successfully reconnect via the primary or secondary IP address preferably in 30 seconds and not more than 1 minute.

The most common types of errors detected are missing broadcast messages (detected through a gap in the broadcast messages received) or a sudden disconnection by the Market Datafeed System due to communication errors.

On receiving a *Logon Request*, the Market Datafeed System will decide whether data transmission will commence from the first lost message detected by the Information Vendors just before disconnection (for recoverable gaps) or from a complete database download (for gaps too large to recover).

The Information Vendors defines what it regards as a recoverable gap. In the *Logon Request*, the Information Vendor supplies a value in the *retransmission threshold* field. If the number of missing broadcast messages is smaller than this value then the gap is recoverable, otherwise the gap is considered too large to recover and a complete database download is performed instead.

When a complete database download is required for a database recovery situation, the Market Datafeed System will reply with an "Invalid" state in the *database status* field in the Logon Response. This informs Information Vendor to initialize its entire database in preparation for a complete database download. Refer to Appendix A.3 for a message flow example.

In a recoverable message gap situation, the Market Datafeed System will reply with a "Valid" state in the *database status* field in the Logon Response. This informs Information Vendor that a re-transmission from the first lost message detected will take place. The odd lot/special lot order summary queue snapshot for all securities will also be disseminated. Refer to Appendix A.4 for a message flow example.

For a complete database download, the broadcast message sequence number always starts from 1. Otherwise it starts from the next sequence number carried by the *sequence number* field on the Logon Request.

It should be noted that a typical complete database download before market open normally transmits about 5,000 broadcast messages with an average size of around 800 bytes. The complete database download data volume will be higher during trading hours. The exact data volume depends on the trading activity. Based on the above information, the Information Vendor should estimate an optimum *retransmission threshold* value in the *Logon Request* to the Market Datafeed System such that a faster approach, i.e. re-transmission from the last received message or a complete database download, will be selected during error recovery.

The expected maximum number of trade tickers per day is 8.1 millions but the actual number depends on the trading activity. A complete database download with *full ticker flag* set up in the *Logon Request* will transmit all trade tickers concluded since start of the day when the error recovery is to be carried out. Information vendors should note that the complete

database download with full trade tickers recovery during trading hours, especially in afternoon session or when there is high trading activity, will take longer time to complete. The long lead time required for performing full trade ticker recovery during trading hours may affect Information Vendor's services. Hence, it is recommended to perform complete database download with full trade ticker recovery after trading hours unless there is strong operational or business need to do so during trading hours. Information Vendors with non-standard configuration (with two live feeds) are advised to perform complete database download with full trade ticker recovery on one of the connections, but not both at any one time.

After sending the *Logon Response* to the Information Vendors, the Market Datafeed System will wait for the *Ready for Download* message from the Information Vendor before it starts transmission. This applies to both re-transmission and complete database download situations. In the case of a complete database download, the exact message sequence described under "Start of day" above applies.

2.3.5.1 Line Connection Failure

Under the standard configuration, the primary IP address of primary system is expected to be used for normal data transmission. If there is a failure on the connection, the Information Vendor can attempt to reconnect to the Market Datafeed System by using the primary IP address of primary system, or reconnect to the Market Datafeed System by using the secondary IP address of primary system as mentioned in section 3.

Information Vendors are recommended to issue 'Keep Alive' messages in the TCP level so that link failures can be detected earlier. Alternatively, Information Vendor could detect the 'IN' element which will be transmitted (approximately) at most every 15 seconds during trading hours and every minute during non-trading hours.

2.3.5.2 Router or Tandem Port Failure

In case of any problem in primary router or primary Tandem port of primary system that Information Vendor cannot receive the Market Datafeed data, Information Vendor should connect to the secondary IP address of primary system to resume the data transmission.

2.3.5.3 Market Datafeed System Component Failover

In case of Market Datafeed System components failover to backup components, Information Vendor connections may be interrupted. In this failover scenario, the affected Information Vendor application should automatically reconnect to the Market Datafeed System using the primary or secondary IP address and initiate a complete database download.

2.3.5.4 Primary Trading System Failure

If a failure has occurred on the primary trading system, the backup trading system together with the Market Datafeed System will be brought up at the backup site. The operation will take approximately 30 minutes. Consequently, the Information Vendor will be required to connect to the Market Datafeed System via the backup system IP addresses. Please note that in this case the Information Vendor should initiate a Logon Request for a complete database download.

2.4 Technical Requirement for Direct Connection Vendors

Vendors who obtain securities market data directly from the HKEx must meet all the requirements as set out in this paragraph to ensure that their systems are capable of properly receiving our market data.

1. The system of the direct connection vendors must have sufficient capacity to process the Exchange's market data with minimum latency. The response time for acknowledging the receipt of MDS messages should on average be less than 1 second, that is, mean delay of less than 1 second. To achieve minimum latency, vendors are required to set the TCP Receive Buffer Size to 64K bytes and are advised to allocate dedicated server for interfacing with the MDS host system.

2. Direct connection vendors must ensure that lines connecting to the Exchange's MDS meet the minimum bandwidth requirement as set out by the Exchange from time to time. (The minimum bandwidth requirement is at present 2 Mbps.)

3. Direct connection vendors who are providing real-time feeds to indirect connection vendors must have dual live connections with the Exchange.

4. Direct connection vendors must be able to detect line failure automatically and reconnect within 1 minute. Such requirement will be included in the MDS Certification Test for new direct connection vendors and will be tested twice a year in the market rehearsals arranged by the Exchange. The results of the market rehearsals will be published on the HKEx website for public reference.

5. Due to the long lead time required for recovering full trade tickers during trading hours which might affect their services, direct connection vendors should avoid requesting full trade ticker download during trading hours immediately after reconnection to the Exchange's Market Datafeed System. Vendors are advised to perform full trade ticker recovery after trading hours, unless there is compelling operational or business need to do so during trading hours. Vendors with dual live connections are advised to perform full trade ticker recovery on one of the connections, but not both at the same time.

6. Applicants choosing direct connection with direct connection to the Market Datafeed System must pass the MDS Certification Test according to the requirements as set out in the MDS Certification Test Procedures before they are approved to redistribute securities market data.

7. Other technical requirements mentioned in this transmission specification should also be observed.

3. LINE PROTOCOL

Mode of transmission	:	IP-based Network
Communication Line Speed	:	2Mbps
Communication Protocol	:	TCP
Allocated bandwidth	:	1.6Mbps

Number of Connections and Connection Requirements

It is a requirement that Information Vendors should have two links configured on their systems. Information Vendors should at all times ensure that all links are ready so that in case of failure, the backup link is ready to receive MDS data. The two links should have the following configuration:

Standard Configuration (with one live feed):

Under the standard configuration, only one of the two links connected to MDS production system can receive MDS data transmission and the other is used as a backup.

Non-Standard Configuration (with two live feeds):

Information Vendor can adopt to receive data transmission concurrently from both links to MDS production system. However, MDS will operate the two links separately as if they were two primary links connected to two independent systems. Information Vendor who will supply MDS feeds to indirectly connected real-time vendors, subject to the Exchange's prior approval, is required to adopt the non-standard configuration with two live feeds.

MDS Connection Ports

IP addresses: Totally 6 IP addresses representing 6 connection ports will be provided to Information Vendor. A port number is also provided for each of these 6 IP addresses:

Connection Ports for Production System:

- two IP addresses in the MDS primary production system; one for the primary connection and the other for the secondary. The Information Vendor application should call the primary address first for normal operation. However, if there is any connection problem using the primary IP address then the secondary IP address must be used to resume the service.

- two IP addresses in the MDS backup production system. These IP addresses must be used when the connection to the primary system has failed and MDS backup production system is active.

Connection Ports for Testing System:

- two IP addresses in the MDS testing system. This is for Information Vendor to connect to the MDS testing system during testing session. Once the Information Vendor has completed the Certification Test and switched the connections to the production MDS systems, these 2 testing IP addresses will be disabled.

Note that a gateway address associated with each IP address will be provided as well. In addition, fixed IP addresses will be assigned by the Exchange for each Information Vendor.

To prevent the vendor application from connecting to the testing system but expecting production data or vice versa, a different subscriber name and password will be assigned to the information vendor.

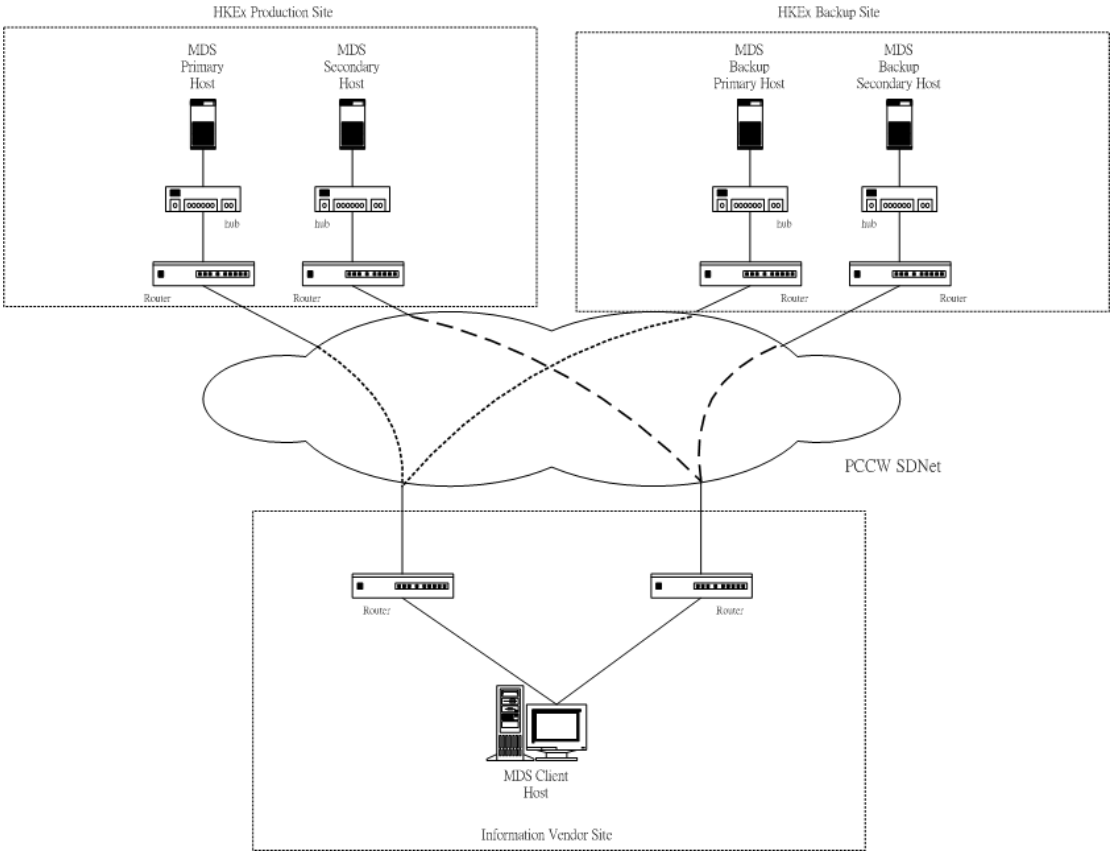
For ease of operation, vendor can call to MDS IP addresses in the order specified below and in a round robin fashion to hunt for a connection.

1. Primary IP address of Primary MDS system
2. Secondary IP address of Primary MDS system
3. Back to point #1

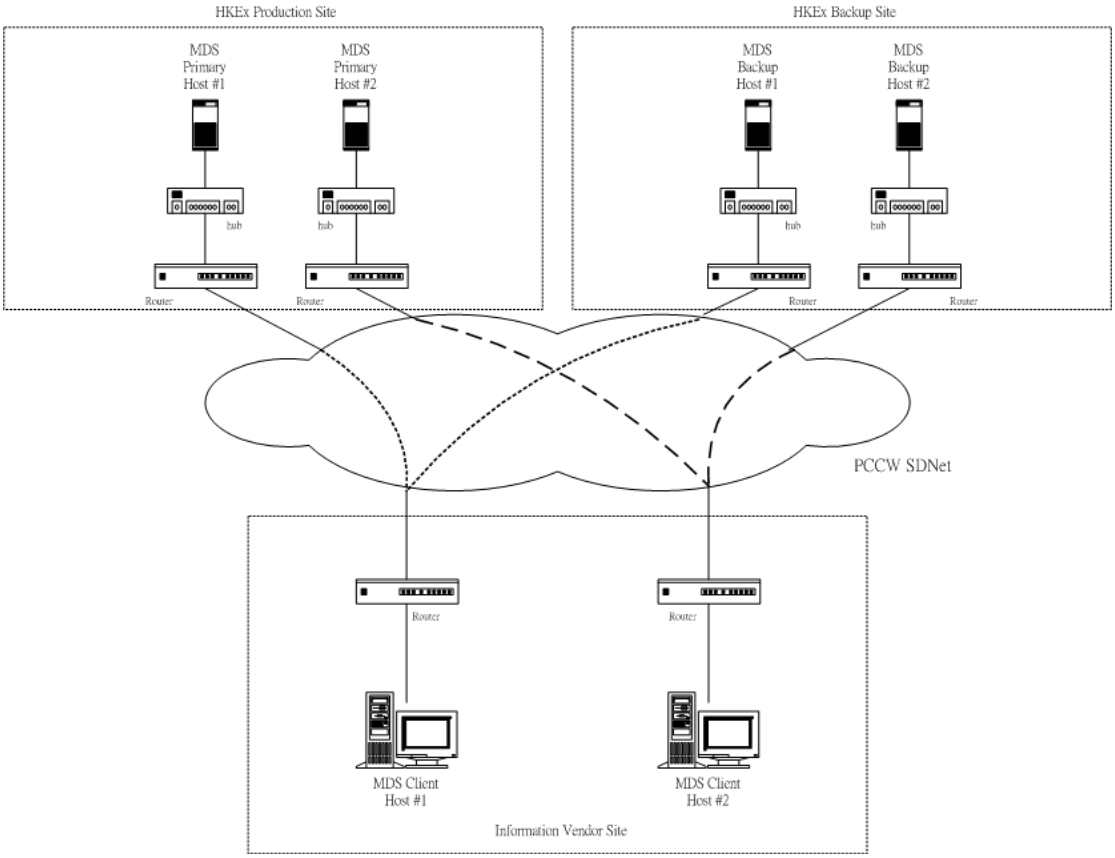
It is recommended that Information Vendor application is able to do the hunting automatically. Provided that the backup site is up under the scenario "Primary Trading System Failure" (See Section 2.3.5.4), the automatic hunting logic should also apply for connection to Primary IP address and Secondary IP address of Backup MDS system.

3.1 Network Diagram

Standard Configuration (with one live feed):



Non-Standard Configuration (with two live feeds):



4. MESSAGE DESCRIPTION

4.1 Interactive Messages

4.1.1 Session Key Message

Once the connection is established with the Market Datafeed System, this message is transmitted by the Market Datafeed System to Information Vendor. Then Information Vendor will get the session key from this message to encrypt the password and send the logon request for this session.

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '00'.
Session Key	X(8)	This field contains the Session Key value for encrypting the password in Logon Request or Change Password Request.	Value is: See Note 1

The length of the Session Key Message is 12 bytes.

Note 1 : A session key is generated by MDS host every time a communication session is established. This key is transmitted in encrypted format. Refer 2.3.2 for details on session key encryption/decryption.

4.1.2 Logon Request

Once the Information Vendor gets the session key from Market Datafeed System, the Information Vendor will send a logon request. Upon the receipt of the logon request the Market Datafeed System will reply with a response. The message format of both the logon request and response are detailed as follows :

Logon Request

Field	**Format**	**Description**	**Values**
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '01'.
Sequence Number	B(4)	This field contains the last message sequence number processed by the Information Vendor. If this is the first logon for the trading day, then the value should be set to zero.	
Last host key	X(8)	This field contains the host key of the last broadcast received by this Information Vendor just before disconnection. If this is the first logon for the	

Field	Format	Description	Values
		trading day, then the value should be set to binary zeros. If the value of this key does not exist on the host then Market Datafeed System will indicate in the Logon Response that the Information Vendor's database is invalid and that a database download will follow.	
Retransmission threshold	B(4)	This field specifies the maximum number of missing broadcast messages since the last disconnection that the Information Vendor is willing to recover. Since the broadcast message is of variable length, Market Datafeed System will use an average of 500 bytes per record to calculate the number of missing messages. If the number of missing broadcast messages exceeds this threshold, the Market Datafeed System will perform a complete database download for the Information Vendor instead of re-transmitting from the last message (data message with host key specified in the last host key field) received by the Information Vendor prior to disconnection. Please note that an zero or one value in this field will cause a complete database download in the recovery scenario.	
Inter-message Delay	B(2)	This field instructs the Market Datafeed System to impose a time delay between successive broadcast messages to the Information Vendor. Normally this value should be set to zero unless the Information Vendor has a relatively slow computer that may be incapable of processing the broadcast messages at the required speed. Information Vendor should be aware that a non-zero value will cause degradation in the transmission throughput of broadcast messages.	This value is measured in centi-seconds.
Database valid flag	X(1)	This field indicates whether the Information Vendor has previously received a valid database (Database Status Message) during its previous connection. If this is the first logon for the trading day then the value should be set to 'N'. E.g. An Information Vendor had	Values are : 'Y' – Database valid 'N' – Database invalid

Field	Format	Description	Values
		previously connected to the Market Datafeed System and was in the process of receiving/awaiting a database download. Prior to the database download being completed (received the Database Status Message), the Information Vendor disconnected. In this example, the Information Vendors. Should send the value 'N' in the next Logon Request.	
Full Ticker flag	X(1)	This field indicates whether the Information Vendor would like to have full trade tickers during complete database download. Information Vendor should note that if this field is set to 'Y' and a complete database download is required, all trades concluded since start of the day will be downloaded. The expected maximum number of trade tickers per day is around 550,000, depends on trading activity rate.	Values are : 'Y' – Yes 'N' – No See Note 1
Subscriber Name	X(20)	This field contains Subscriber Name as assigned to the Information Vendor by the Market Datafeed System.	
Password	X(8)	This field contains the encrypted password for the Subscriber Name above.	Value is: See Note 2
Reserved field	B(1)	This field should not contain any value other than zero. This field is reserved for Market Datafeed System.	Value is 0
Filler	X(19)		

The length of the Logon Request is 72 bytes.

Note 1: Information Vendors are advised of the following for performing full trade ticker recovery:

- Information Vendors should be aware of the long lead time required for performing full trade ticker recovery during trading hours which might affect their services.
- Information Vendors are advised to perform full trade ticker recovery after trading hours, unless there is strong operational or business need to do it during trading hours.
- Information Vendors with non-standard configuration (with two live feeds) are advised to perform full trade ticker recovery on one of the connections, but not both at any one time.

Note 2 : The password is in encrypted format. Refer to section 2.3.2 for details on password encryption.

4.1.3 Logon Response

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '02'.
Trading Day	B(4)	This field specifies the current trading day.	The representation is : YYYYMMDD
Timestamp	B(4)	This field specifies the current time.	The representation is : HHMMSSSS
Database Status	X(1)	This field contains a flag to indicate the state of the Information Vendor's database.	Values are : 'Y' - Database valid 'N' - Database invalid
Filler	X(20)		
Table Entry Count	B(1)	This field contains the number of entries in the Table.	Values are between 1 and 100.
Table			Contains the number of occurrences specified in Table Entry Count.
Start page no.	B(4)	This field contains the start of the page range.	
End page no.	B(4)	This field contains the end of the page range.	
Page code	X(4)	This field contains the code in which the page range may be mapped onto.	Values are : See Note 1
Market code	X(4)	This field contains the market code in which the page range may be mapped onto.	Values are : See Note 2

The maximum length of the Logon Response is 1634 bytes.

Note 1 :

'AHTO' – S&P/HKEx LargeCap Index, Hang Seng Index and Main Board Market Turnover
'GEIO' – S&P/HKEx GEM Index and Growth Enterprise Market Turnover
'CINX' – HSI Sub-Indices, Hang Seng China Enterprises Index and Hang Seng China Affiliated Corporations Index
'EQTY' – Equity Information (Stock Financial Information – Main Board and GEM)
'CONT' – Contingency Freetext Pages
'HSTO' – HSI Index and Index Turnover information

Note 2 : There are four system market codes :

i) MAIN – MAIN Broad
ii) GEM – GEM Board
iii) NASD – Nasdaq Securities
iv) ETS – iShares

Note 3 : On receiving the logon response, the Information Vendor should check that the trading day field in the response matches with what it expects. Otherwise the Information Vendor is using a wrong trading day and it must synchronize itself to the trading day specified in the Logon Response.

4.1.4 Invalid Request Message

This message is transmitted by the Market Datafeed System when an invalid message is received. The invalid message can be a Logon Request, Full Trade Tickers Request or an

unidentified message. After sending this message, the Market Datafeed System will close the connection and wait for a new connection/Logon Request from the Information Vendor.

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '03'.
Error reason	9(2)	This field specifies the error detected on the received message	Values are : See Note 1

The length of the Invalid Request Message is 6 bytes.

Note 1 : '01' - Unidentified message
'02' - Invalid sequence number
'03' - Invalid retransmission threshold
'04' - Invalid inter-message Delay
'05' - Invalid Database valid Flag
'06' - Invalid Market State
'07' - Invalid Market Code
'08' - Invalid Full Ticker Flag
'09' – Invalid Subscriber Name/Password
'10' – Subscriber Suspended
'11' – Invalid Password

Please note that if there are more than one invalid field in the Logon request, only the first invalid field will be reflected in this message.

4.1.5 Full Trade Tickers Request

This message is transmitted by the Information Vendor if Information Vendor would like to download all trade tickers concluded for the requested market for the day. Such request will be rejected if the requested market is not in the "market closed" state.

The message format of the Full Trade Tickers Request Message is detailed as follows:

Full Trade Tickers Request

Field	**Format**	**Description**	**Values**
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '07'.
Market Code	X(4)	This field contains the code of the market requested.	

The length of the Full Trade Tickers Request is 8 bytes.

4.1.6 Change Password Request

This message is transmitted by the Information Vendor if Information Vendor would like to change the password after a successful logon and database recovery/refresh. Such request will

be rejected with "Invalid Request Message" sending back to Information Vendor to indicate the failure (Error Reason = "09") if the change of password has failed or password had been used before for the last three time changes (Error Reason = "11"). Otherwise, a "Request Valid" response message will be sent to the Information Vendor.

The message format of the Change Password Request Message is detailed as follows:

Change Password Request

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '08'.
New Password	X(8)	This field contains the value of the new encrypted password.	Value is: See Note 1

The length of the Change Password Request is 12 bytes.

Note 1 : The new password is in encrypted format. The encryption mechanism follows the password in the logon request. Refer to section 2.3.2 for details on password encryption.

4.1.7 Request Valid Response

This message is transmitted by the Market Datafeed System in reply to a Change Password Request from Information Vendor, when that request is successfully received and processed by Market Datafeed System.

The message format of the Request Valid Response is detailed as follows:

Request Valid Response

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '09'.

The length of the Request Valid Response is 4 bytes.

4.2 Control Messages

Control messages control the state of the Information Vendor's system and do not require an acknowledgment.

4.2.1 Ready for Download Message

This message is sent by the Information Vendor when it is ready to receive transmission from the Market Datafeed System. After the Market Datafeed System has sent a Logon Response to the Information Vendor, data transmission, re-transmission or database download will not proceed unless the Market Datafeed System has received this message from the Information Vendor. There is therefore, no time restriction for the Information Vendor to prepare itself for data reception from the Market Datafeed System.

The message format of the Ready for Download Message is detailed as follows :

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '04'.

The length of the Ready for Download Message is 4 bytes.

4.2.2 Database Status Message

This message is transmitted by the Market Datafeed System on completion of a download. It is used to inform the Information Vendor that its database is currently valid. Information Vendor should note that if full ticker flag field in the Logon Request is 'N', its database will not contain any trade tickers concluded so far since start of the day.

The Information Vendor should check that the number of securities received from the Market Datafeed System matches the count received in the MS broadcast element.

In addition to the above, this message may be sent multiple times to Information Vendors during trading hours. The Information Vendor should ignore these additional Database Status Messages while its database is valid.

The message format of the Database Status Message is detailed as follows :

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '05'.

The length of the Database Status Message is 4 bytes.

4.3 Broadcast Messages

Broadcast messages are messages that are transmitted out to Information Vendors and do not require acknowledgments.

Broadcast messages follow the following format :

Each Broadcast Message has a Transmission Header followed by one or more Transmission Elements which contain an Element Header and an Element Body.

<Transmission Header> [<Transmission Element> <Transmission Element>.....]

Information Vendor should note that each broadcast message may contain multiple stocks and other information.

A maximum frame size of 32K bytes is employed for Broadcast Messages.

4.3.1 Transmission Header

The format of the Transmission Header is detailed as follows :

Field	Format	Description	Values
Message Length	B(2)	This field contains the length of the entire message.	
Message ID	9(2)	This field contains the identification of the message.	Value is '06'.
Sequence Number	B(4)	A number sequentially assigned to a transmission message.	Restarts from 1 for each new trading day, or when the logon response indicates that the Information Vendor's database is invalid. Otherwise it starts from the next sequence number (with respect to the sequence number in the logon request).
Host key	X(8)	This field contains a value that is used by the Market Datafeed System to uniquely identify the transmitted message. This field should only be used by the Information Vendor when sending a Logon Request after a disconnection and reconnection. All other times this field should not be interpreted by the Information Vendor. For database download messages, this field is sent in null value.	

The length of the Transmission Header is 16 bytes.

4.3.2 Transmission Element

A Transmission Element follows the following format :

<Element Header> <Element Body>

Each Transmission Element has an Element Header followed by an Element Body.

4.3.2.1 Element Header

The format of an Element Header is detailed as follows :

Field	Format	Description	Values
Element Type	X(2)	To indicate the type of message element to be processed.	'XN' - Security nominal price update 'XS' - Security summary static 'XL' - Linked security 'XM' - Closing Price and Free Text 'XR' - Security and Registered Traders 'XF' - Instrument Specific Financial Information update 'XT' - Trade summary update 'XO' - Security summary dynamic 'XD' - Security Queue Detail 'OL" – Odd Lot/Special Lot Order Queue Summary 'TT' - Trade Ticker 'BT' - Bulk Trade Download 'TR' - Trade Reject 'IN' - Index and Turnover 'MS' - Market Static 'MT' - Market Trading Timetable 'NI' - News Index 'NP' - News 'PG' - Text Page 'SM' - System Message 'SP' - Spread Table

The length of the Element Header is 2 bytes.

4.3.2.2 Element Body

For each of the Element Type defined in 4.3.2.1, the format of its associated Element Body is defined as follow :

For fields with no specific business values, they will be left blank or zero depending on their formats. However, the Exchange reserves the right to utilize these fields any time due to introduction of new initiatives without prior notice to vendors. ***Vendor systems should be designed flexible enough to cater for changes or new initiatives that the Exchange introduces for the market***.

Element Type - XN (Nominal Price Information)

This element is generated once when at least one of the elements listed below is generated. This element will be the first element in the transmitted message followed by one or more of the elements listed below.

'XD' - Security Detail Queue Information
'XF' - Instrument Specific Financial Information
'XL' - Linked Security Information
'XM' - Previous Closing Price and Free Text Information
'XO' - Security Summary Order Queue Information
'XS' - Security Static Information
'XR' - Security and Registered Traders Information
'XT' - Security Trade Information

'TT' - Trade Ticker Information
'TR' - Rejected Trade Ticker Information

Field	Format	Description	Values
Security Code	B(4)	This field contains the Security Code. It is a 4-byte binary field that can support security codes of more than 5 digits.	5-digit security codes with possible values 1 - 99999: ▪ For securities of Growth Enterprise Market: 8000 - 8999. ▪ For securities of Main Board, NASD and ETS: Security codes out of the range of 8000 - 8999.
Nominal Price	B(4)	This field contains the current nominal price of the associated security.	3 decimal places is implied. If *Nominal Price Type* is 'N', then field contains the nominal price. If *Nominal Price Type* is 'C', then field contains today's closing.
Nominal Price Type	X(1)	This field contains the type in which the *Nominal Price* value is to apply.	Values are : 'N' - Nominal price 'C' - Today's closing 'Y' -Display "DAY CLOSE N/A" 'X' - Display "Nominal N/A"
Filler	X(1)		

Field	Format	Description	Values
Indicative Equilibrium Price	B(4)	This field contains the indicative equilibrium price of the associated security.	3 decimal places is implied.
Indicative Equilibrium Volume	BCD(6)	This field contains the indicative equilibrium volume of the associated security.	If *indicative equilibrium volume* is overflow (i.e. value > 999,999,999,999), then field contains "FFFFFFFFFFFF".

The length of this element is 20 bytes.

Element Type -XS (Security Static Information)

This element is generated during the start of the trading day, when the Information Vendor's system has just established connection to the Market Datafeed System, and when a security has been suspended or re-activated.

This element is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Chinese Character Code in BIG-5	B(2) occurs 8 times	This fixed length array contains up to 8 BIG-5 Chinese character codes.	BIG-5 Chinese Character codes
Chinese Character Code in GCC-5	B(2) occurs 8 times	This fixed length array contains up to 8 GCC-5 Chinese character codes.	GCC-5 Chinese Character codes
Chinese Character Code in GB	B(2) occurs 8 times	This fixed length array contains up to 8 GB Chinese character codes.	GB Chinese Character codes
Lot Size	B(4)	This field contains the board lot size for the security code.	
Currency Unit	B(2)	This field contains the unit of currency.	A non-zero value (*n*) means all price fields for this security should be interpreted as a value equal to the price multiplied by 10 to the power *n*.
Security Short Name	X(15)	This field contains the security short name.	
Currency Code	X(3)	This field contains the currency code.	See note 1.
Previous Closing Price Type	X(1)	This field contains the previous closing price type.	Values are : 'C' - Previous Closing applicable 'X' - Previous closing not applicable
Automatch Flag	X(1)	This field indicates whether the security is an automatch stock.	Values are : 'Y' - Yes 'N' - No
Shortsell Flag	X(1)	This field indicates whether shortselling is allowed for this security.	Values are : 'Y' - Yes 'N' - No
CCASS Flag	X(1)	This field indicates whether the security is a CCASS security.	Values are : 'Y' - Yes 'N' - No
Suspension Flag	X(1)	This field indicates whether the security is suspended or not.	Values are : 'Y' - Suspended 'N' - Not suspended
Dummy Flag	X(1)	This field indicates whether the security is a dummy security or not	Values are : 'Y' - Dummy Security 'N' - Normal Security
Test Stock Flag	X(1)	This field indicates whether the security is a test security or not.	Values are : 'Y' - Test Security 'N' - Normal Security

Field	Format	Description	Values
Intra-day Shortselling Flag	X(1)	This field indicates whether intra-day shortselling is allowed for this security.	Values are : 'Y' - Yes 'N' – No Remarks: Not used
Stamp Duty Flag	X(1)	This field indicates whether this security is subjected to stamp duty.	Values are : 'Y' - Yes 'N' - No
Listing Status	X(1)	This field contains the listing status of the security.	Values are : 'L' - Listed 'D' - Delisted 'P' - Prelisting
Listing Date	B(4)	This field contains the listing date of the security	The representation is : YYYYMMDD Remarks: 19000101 if Listing Date not available
De-listing Date	B(4)	This field contains the de-listing date of the security.	The representation is : YYYYMMDD
Market Code	X(4)	This field contains the market code of the security.	
Sub-Market Code	X(4)	This field contains the sub-market code of the security.	
ISIN Code	X(12)	This field contains the ISIN code of the security.	
EIPO Application Start Date	B(4)	This field contains the EIPO application start date of the security.	The representation is : YYYYMMDD Remarks: Not used
EIPO Application End Date	B(4)	This field contains the EIPO application end date of the security	The representation is : YYYYMMDD Remarks: Not used
EIPO Application Start Time	B(2)	This field contains the EIPO application start time of the security.	The representation is : HHMM Remarks: Not used
EIPO Application End Time	B(2)	This field contains the EIPO application end time of the security	The representation is : HHMM Remarks: Not used
EIPO Price	B(4)	This field contains the EIPO price of the security.	3 decimal places is implied. Remarks: Not used
Spread Table Code	X(2)	This field contains the spread table code of the security	
Instrument Type	X(4)	This field contains the instrument type of the security.	Values are : 'BOND' - Bonds 'BWRT' - Basket Warrants 'EQTY' - Equities 'TRST' - Trusts 'WRNT' - Warrants
Instrument Specific Data	X(142)	This field contains information specific to the *Instrument Type*. The actual size depends on the *Instrument Type*.	
Bonds Specific		This field contains	

Field	Format	Description	Values
Data		information specific to bonds only. Redefines the *Instrument Specific Data*.	
Maturity Date	B(4)	This field contains the maturity date of the security.	The representation is : YYYYMMDD Remarks: Not used
Coupon Rate	B(4)	This field contains the coupon rate of the security.	3 decimal places is implied.
Face Value	B(4)	This field contains the face value of the security.	3 decimal places is implied. Remarks: Not used
EFN Flag	X(1)	This field indicates whether the security is an Exchange Fund Notes security or not.	Values are : 'Y' - Yes 'N' - No
Basket Warrants Specific Data		This field contains information specific to basket warrants only. Redefines the Instrument Specific Data.	
Conversion Ratio	B(4)	This field contains the conversion ratio of the security.	3 decimal places is implied.
Call / Put Flag	X(1)	This field indicates whether it is a call or a put.	Values are : 'C' - Call 'P' - Put
Style	X(1)	This field indicates the exercise style.	Values are : 'A' - American style 'E' - European style
Strike Price	B(4)	This field contains the strike price of the security.	3 decimal places is implied.
Maturity Date	B(4)	This field contains the maturity date of the security .	The representation is : YYYYMMDD
Initial Premium	B(4)	This field contains the initial premium of the security.	3 decimal places is implied. Remarks: Not used
Initial Indicative Volatility	B(2)	This field contains the initial indicative volatility of the security.	Remarks: Not used
Number of Underlying Securities	B(2)	This field contains the number of underlying securities within this message.	The value is within the range 1 to 20.
Underlying Securities table		This table is of variable length depending on the *Number of Underlying Securities*.	Contains the number of occurrences specified in *Number of Underlying Securities*.
Security Code	B(4)	This field contains the code	5-digit Security code.

Field	Format	Description	Values
		of the underlying security.	(See Element Type - XN)
Weight	B(2)	This field contains the weight of the underlying security.	3 decimal places is implied.
Equities Specific Data		This field contains information specific to equities only. Redefines the Instrument Specific Data.	
Board Meeting Date	B(4)	This field contains the board meeting date of the security.	The representation is : YYYYMMDD Remarks: Not used
Ex-Date	B(4)	This field contains the Ex-date of the security	The representation is : YYYYMMDD Remarks: Not used
Book Closing Start Date	B(4)	This field contains the book closing start date of the security.	The representation is : YYYYMMDD Remarks: Not used
Book Closing End Date	B(4)	This field contains the book closing end date of the security.	The representation is : YYYYMMDD Remarks: Not used
Cash Dividend	B(4)	This field contains the cash dividend of the security.	3 decimal places is implied. Remarks: Not used
Bonus Issue Ratio	B(2)	This field contains the bonus issue ratio of the security.	2 decimal places is implied. Remarks: Not used
Other Cash Entitlement	B(4)	This field contains the other cash entitlements of the security .	3 decimal places is implied. Remarks: Not used
Other Entitlements	X(19) occurs 2 times	This field contains the other entitlements.	
Trusts Specific Data		This field contains information specific to trusts only. Redefines the Instrument Specific Data.	
Net Asset Value	B(4)	This field contains the net asset value of the security.	3 decimal places is implied. . Remarks: Not used
Net Asset Value Date	B(4)	This field contains the net asset value date of the security.	The representation is : YYYYMMDD. Remarks: Not used
Warrants and Structured Product Specific Data		This field contains information specific to warrants only. Redefines the Instrument Specific Data.	

Field	Format	Description	Values
Conversion Ratio	B(4)	This field contains the conversion ratio of the security.	3 decimal places is implied. Remarks: For DW and CBBC with stock underlying only
Call / Put Flag	X(1)	This field indicates whether it is a call or a put.	For Warrants, Values are : 'C' –Call 'P' – Put For ELI and CBBC, Values are : 'C' –Bull 'P' – Bear / Range
Filler	X(1)		
Strike Price	B(4)	This field contains the strike price of the security	3 decimal places is implied. Remarks: For DW with stock underlying and all CBBC
Maturity Date	B(4)	This field contains the maturity date of the security.	The representation is : YYYYMMDD Expiry Date for Structured Products
Underlying Security Code	B(4)	This field contains the code of the underlying security	5-digit security code (See Element Type - XN)
Underlying Value	B(4)	This field contains the underlying value of the security.	3 decimal places is implied. Remarks: not used

The maximum length of this element is 274 bytes.

Note 1:
```
'AED' - U.A.E. Dirhams
'ATS' - Austrian Schillings
'AUD' - Australian Dollars
'BDT' - Bangladesh Takas
'BEC' - Belgian Francs Commercial
'BEL' - Belgian Francs Financial
'BHD' - Bahraini Dinars
'BND' - Brunei Dollars
'BRC' - Brazil Cruzeiros
'BUK' - Burmese Kyats
'CAD' - Canadian Dollars
'CHF' - Swiss Francs
'CNY' - Chinese Renminbi
'CYP' - Cypriot Pounds
'DEM' - Deutsche Marks
'DKK' - Danish Kroners
'ECU' - European Currency Unit
'ESP' - Spanish Pesetas
'EUR' - Euro
'FIM' - Finnish Markkas
'FJD' - Fiji Dollars
'FRF' - French Francs
'GBP' - Sterling Pounds
'HKD' - Hong Kong Dollars
'IDR' - Indonesian Rupiahs
'IEP' - Irish Punt
```

'INR' - Indian Rupees
'ITL' - Italian Lira
'JPY' - Japanese Yen
'KES' - Kenyan Shillings
'KRW' - South Korean Won
'KWD' - Kuwaiti Dinars
'LBP' - Lebanese Pounds
'LKR' - Sri Lanka Rupees
'MOP' - Macau Patacas
'MUR' - Mauritius Rupees
'MXN' – Mexican Peso
'MYR' - Malaysian Ringgit
'NGN' - Nigerian Naira
'NLG' - Dutch Guilders
'NOK' - Norwegian Kroners
'NZD' - New Zealand Dollars
'OMR' - Omani Rials
'PHP' - Philippine Pesos
'PKR' - Pakistan Rupees
'PTE' - Portuguese Escudos
'QAR' - Qatar Riyals
'SAR' - Saudi Arabian Riyals
'SCR' - Seychelles Rupees
'SDR' - Special Drawing Rights
'SEK' - Swedish Kroners
'SGD' - Singapore Dollars
'SLL' - Sierra Leone Leones
'THB' - Thailand Bahts
'USD' - US Dollars
'ZAR' - South African Rands

Element Type -XL (Linked Security Information)

This element is generated during the start of the trading day, when the Information Vendor's system has just established connection to the Market Datafeed System, and when a security has been suspended or re-activated.

This element is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Number of Items	B(2)	This field contains the number of linked securities.	The value is within the range 0 to500.
Security Code	B(4) occurs 500 times	These fields contain the list of linked security codes. This array is of variable length depending on the *Number of Items*.	Must contain the number of occurrences as that specified in *Number of Items*. 5-digit Security Code (See Element Type - XN)

The maximum length of this element is 2002 bytes.

Element Type - XM (Previous Closing Price and Free Text Information)

This element is generated at the start of the trading day or when a text update occurs, and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Previous Closing Price	B(4)	This field contains the previous closing price.	3 decimal places is implied.
Free Text	X(19) occurs 2 times	This field contains a fixed length array of free text. When there are no free text, spaces will be present instead.	

The length of this element is 42 bytes.

Element Type - XR (Security and Registered Traders Information)

This element is generated at the start of the trading day, and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Number of Items	B(2)	This field contains the number of items in the item table.	The value is within the range 0 to 50.
Item Table		This table is of variable length depending on the *Number of Items*.	Contains the number of occurrences specified in *Number of Items*.
RT Broker Number	B(2)	This field contains the broker number of the registered trader.	

The maximum length of this element is 102 bytes.

Element Type - XF (Instrument Specific Financial Information)

This element is generated when the instrument specific financial information update occurs (see note 1), and is associated with the security information in the preceding XN element. This element is not necessarily available for dissemination for the trading day.

Field	Format	Description	Values
Instrument Specific Data	X(24)	This field contains information specific to the instrument type. The actual size depends on the instrument type.	
Bonds Specific Data		This field contains information specific to bonds only. Redefines the *Instrument Specific Data*.	
Accrued Interest	B(4)	This field contains the accrued interest of the security.	3 decimal places is implied.
Current Yield	B(4)	This field contains the current yield of the security.	3 decimal places is implied.
Yield to Maturity	B(4)	This field contains the yield to maturity of the security.	4 decimal places is implied.
Yield to Maturity Indicator	X(1)	This field specifies meaning of the *Yield to Maturity* field.	Values are : 'N' - Normal 'O' - Overflow 'U' - Negative overflow 'X' - Not available
Bond Status	X(1)	This field indicates status of the bond.	Values are : 'N' - Normal 'S' - Suspended from calculation 'C' - Trading ceased 'Y' - Yield only (see note 2)
Basket Warrants Specific Data		This field contains information specific to basket warrants only. Redefines the *Instrument Specific Data*.	
Basket Warrant Premium	B(4)	This field contains the premium of the security.	3 decimal places is implied.
Gearing Ratio	B(4)	This field contains the gearing ratio of the security.	3 decimal places is implied.
Implied Volatility	B(2)	This field contains the implied volatility of the security.	
Underlying Index	B(4)	This field contains the underlying index of the security.	3 decimal places is implied.
Underlying Value	B(4)	This field contains the	3 decimal places is

Field	Format	Description	Values
		underlying value of the security.	implied.
Basket Warrant Premium Indicator	X(1)	This field specifies meaning of the *Basket Warrant Premium* field.	Values are : 'N' - Normal 'O' - Overflow 'X' - Not available
Gearing Ratio Indicator	X(1)	This field specifies meaning of the *Gearing Ratio* field.	Values are : 'N' - Normal 'O' - Overflow 'X' - Not available
Implied Volatility Indicator	X(1)	This field specifies meaning of the *Implied Volatility* field.	Values are : 'N' - Normal 'X' - Not available 'A' - Above 200% 'B' - Below 5% 'V' - Nominal price is greater than the underlying value
Underlying Index Indicator	X(1)	This field specifies meaning of the *Underlying Index* field.	Values are : 'N' - Normal 'O' - Overflow 'X' - Not available
Underlying Value Indicator	X(1)	This field specifies meaning of the *Underlying Value* field.	Values are : 'N' - Normal 'O' - Overflow 'X' - Not available
Basket Warrant Status	X(1)	This field indicates status of the basket warrant.	Values are : 'N' - Normal 'S' - Suspended from calculation
Equities Specific Data		This field contains information specific to equities only. Redefines the *Instrument Specific Data*.	
P/E Ratio	B(2)	This field contains the P/E ratio of the security.	1 decimal place is implied.
Warrants Specific Data		This field contains information specific to warrants only. Redefines the *Instrument Specific Data*.	
Warrant Premium	B(4)	This field contains the warrant premium of the security.	3 decimal places is implied.

The maximum length of this element is 24 bytes.

Note 1: The update frequencies are as follows:

Item	Frequency
Accrued Interest	N/A
Current Yield	N/A
Yield to Maturity	N/A

Basket Warrant Premium		N/A
Gearing Ratio		N/A
Implied Volatility		N/A
Underlying Index		N/A
Underlying Value	N/A	
P/E Ratio		N/A
Warrant Premium	N/A	

Note 2 : When the Bond Status is set to 'Y'**,** only the Current Yield will be updated. Other Bonds Specific Data including the Accrued Interest, Yield to Maturity and Yield to Maturity Indicator will be initialized as follow:

Item	Value
Accrued Interest	zero
Yield to Maturity	zero
Yield to Maturity Indicator	' ' (blank)

Element Type -XT (Security Trade)

This element is generated when a trade has been performed (except overseas trades), and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Shares Traded	BCD(6)	This field contains the number of shares traded for a particular security.	If *shares traded* is overflow (i.e. value > 999,999,999,999), then field contains "FFFFFFFFFFFF" .
Turnover	BCD(6)	This field contains the current turnover for a particular security.	If *turnover* is overflow (i.e. value > 999,999,999,999), then field contains "FFFFFFFFFFFF" .
Highest Trade Price	B(4)	This field contains the highest trade price currently performed for a particular security.	3 decimal places is implied. See Note 1.
Lowest Trade Price	B(4)	This field contains the lowest trade price currently performed for a particular security.	3 decimal places is implied. See Note 1.
Last Trade Price	B(4)	This field contains the last traded price for a particular security.	3 decimal places is implied. See Note 1.

The length of this element is 24 bytes.

Note 1 : "Trade Price" refers to the transaction price of trade that will affect the nominal price of the given security.

Element Type -XO (Security Summary Order Queue Information)

This element is generated each time an order is inserted or removed from the summary order queue, and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Best Price	B(4)	The current best price.	3 decimal places is implied.
Order Table		This is an array containing five summary order queues.	
Number of orders	B(4)	This field contains the number of orders at the *Queue Price*.	
Number of shares	BCD(6)	This field contains the total number of shares at the *Queue Price*.	If *number of shares* is overflow (i.e. value > 999,999,999,999), then field contains "FFFFFFFFFFF".
Order Side	X(1)	This field indicates whether the queue information is for ASK orders or for BUY orders.	Values are : 'A' = ASK 'B' = BUY

The length of this element is 55 bytes.

Element Type - XD (Security Detail Queue Information)

This element is generated when at least one order has been added or removed from the order queue and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Item Count	B(2)	This field contains the number of items in the item table. If the *Item Count* is less than or equal to 40, then the value should equal the number of items in the *Items* table.	zero to 40
Order Side	X(1)	This field indicates whether the queue information is for ASK orders or for BUY orders.	Values are : 'A' - ASK 'B' - BUY
Filler	X(1)		
Item Table		This table is of variable length depending on the *Item Count*.	Contains the number of occurrences specified in *Item Count*.
Item	B(2)	This field contains broker numbers present in the queue starting from the best price. This field also contains the number of spreads away from the best price.	See note 1.
Type	X(1)	This field indicates the type of information contained in the item.	Values are: 'B' - Broker Number 'S' - Number of Spread ' ' - Spread Separator
Filler	X(1)		

The maximum length of this element is 164 bytes.

Note 1 : If the *Type* is 'S', then

If the *Order Side* is 'A', then

If the value is *n*, then the subsequent broker numbers are in the order queue with orders of the best price plus *n* spread(s), unless stated otherwise.

If the *Order Side* is 'B', then

If the value is *n*, then the subsequent broker numbers are in the order queue with orders of the best price minus *n* spread(s), unless stated otherwise.

If the *Type* is ' ', then

is the space line acts as a spread separator when the spread is not queued in order to sync with the broker queue currently displayed in the AMS terminals. IV may remove the spread separator in their UI according to their requirement.

Element Type - OL (Security Odd Lot/Special Lot Summary Order Queue Information)

This element is generated whenever the odd lot/special lot order queue is updated in every minute snapshot.

Field	Format	Description	Values
Security Code	B(4)	This field contains the Security Code. It is a 4-byte binary field that can support security codes of more than 5 digits.	5-digit security codes with possible values 1 - 99999: ▪ For securities of Growth Enterprise Market: 8000 - 8999. ▪ For securities of Main Board, NASD and ETS: Security codes out of the range of 8000 - 8999.
Item Count	B(2)	This field contains the number of items in the order table. If the *Item Count* is less than or equal to 5, then the value should equal the number of items in the *Order* table.	zero to 5
Order Side	X(1)	This field indicates whether the queue information is for ASK orders or for BUY orders.	Values are : 'A' = ASK 'B' = BUY
Filler	X(1)		
Order Table		This table is of variable length depending on the *Item Count*	Contains the number of occurrences specified in *Item Count*
Number of orders	B(4)	This field contains the number of orders at the *Queue Price*.	
Number of shares	BCD(6)	This field contains the total number of shares at the *Queue Price*.	If *number of shares* is overflow (i.e. value > 999,999,999,999), then field contains "FFFFFFFFFFF".
Queue price	B(4)	This field contains the Queue Price.	3 decimal places is implied.

The maximum length of this element is 78 bytes.

Element Type - TT (Trade Ticker Information)

This element is generated when a trade has been performed (except overseas trades) and is associated with the security information in the preceding XN element.

Field	Format	Description	Values
Ticker Key	B(4)	This is a unique key given as identification for each trade performed within the trading system. Note that the key value may not be consecutive. This key will be reset for each trading day.	
Ticker Time	B(2)	This is the time in which the trade was performed.	The representation is : HHMM.
Quantity	B(4)	This is the quantity of the trade performed.	
Price	B(4)	This is the price of the trade performed.	3 decimal places is implied.
Public Trade Type	X(1)	This is the public trade type of the trade performed.	Values are : 'X' - Manual/ Special lot Direct 'D' - Odd Lot Direct/ Non-Direct '*' - Rejected 'M' - Manual/ Special lot Non-direct ' ' - Automatch Non-direct 'Y' - Automatch Direct 'P' - Pre-opening Direct/ Non-direct 'U' - Auction Matching Direct/ Non-Direct

The length of this element is 15 bytes.

Trades due to matching of an incoming order with existing order(s) will be consolidated into (at most) two trade tickers, one for direct and one for non-direct, if applicable.

During Auction Matching session, multiple trade tickers will be generated if the total auction trade volume is more than 99,999,999.

e.g. When total auction trade volume is 240,000,000, three auction trade tickers will be generated with trade ticker Quantity equal to 99,999,999, 99,999,999 and 40,000,002 respectively.

Element Type - BT (Bulk Trade Download)

This element is generated during database download or while market closed, upon receiving a Full Trade Tickers Request from the Information Vendor. The element contains multiple trades (except overseas trades).

Field	Format	Description	Values
Number of trades	B(2)	This field contains the number of trades within this message.	The value range is in the range 1 to 112.
Trade table		This table is of variable length depending on the *Number of trades*.	Contains the number of occurrences specified in *Number of trades*.
Security Code	B(4)	This field contains the security code of the associated trade.	5-digit security code (See Element Type - XN)
Ticker Key	B(4)	This is a unique key given as identification for each trade performed within the trading system. Note that the key value may not be consecutive. This key will be reset for each trading day.	
Ticker Time	B(2)	This is the time in which the trade was performed.	The representation is : HHMM.
Quantity	B(4)	This is the quantity of the trade performed.	
Price	B(4)	This is the price of the trade performed.	3 decimal places is implied.
Public Trade Type	X(1)	This is the public trade type of the trade performed.	Values are : 'X' - Manual/ Special lot Direct 'D' - Odd Lot Direct/ Non-direct '*' - Rejected 'M' - Manual/ Special lot Non-direct ' ' - Automatch Non-direct 'Y' - Automatch Direct 'P' - Pre-opening Direct/ Non-direct 'U' - Auction Matching Direct/ Non-Direct
Filler	X(1)		

The maximum length of this element is 2242 bytes.

Element Type - TR (Trade Ticker Reject Information)

This element is generated when a trade has been rejected (except overseas trades) and is associated with the security information in the preceding XN element.

The Information Vendor may receive this element for a trade ticker that it already knows is rejected. In this situation the Information Vendor should ignore this element.

Field	Format	Description	Values
Ticker Key	B(4)	This field identifies the trade that has been rejected.	

The length of this element is 4 bytes.

Note 1 : For auto-matched trade ticker, this element is generated whenever any of the constituent trade has been rejected.

Element Type - IN (Index and Turnover)

[Important Note: Element Type – IN will be removed from MDF by 3 months after the new index feed is launched.]

This element is generated whenever an index update or a market turnover update. It carries information on the following indices and the market turnover of which the updating intervals are specified below:

Type of Information	Updating Interval	Updating Period *
HSI and the associated figures	Every ~~15~~ 2 seconds	09:20 to 16:00
VHSI and the associated figures	Every 15 seconds	09:30 to 16:00
S&P/HKEx LargeCap Index, S&P/HKEx GEM Index and the associated figures	Every 15 seconds	09:30 to 16:00
CSI 300 Index and the associated figures	Every 5 seconds	09:30 to 15:00
CSI Hong Kong 100 Index and the associated figures	Every 5 seconds	09:30 to 16:00
CSI Cross-Straits 500 Index and the associated figures	Every 5 seconds	09:00 to 16:00
CSI China Mainland Consumer Index	Every 5 seconds	09:30 to 15:00
CSI Hong Kong Private-owned Mainland Enterprises Index	Every 5 seconds	09:30 to 16:00
CSI Hong Kong State-owned Mainland Enterprises Index	Every 5 seconds	09:30 to 16:00
CSI Hong Kong Listed Tradable Mainland Real Estate Index	Every 5 seconds	09:30 to 16:00
CSI Hong Kong Listed Tradable Mainland Consumption Index	Every 5 seconds	09:30 to 16:00
CSI Overseas Mainland Enterprises Index (HKD)	Every 5 seconds	09:00 to 16:00
CSI Hong Kong Dividend Index	Every 5 seconds	09:30 to 16:00
CSI RAFI Hong Kong 50 Index	Every 5 seconds	09:30 to 16:00
CSI Hong Kong Middle Cap Select Index	Every 5 seconds	09:30 to 16:00
CSI HK Mainland Enterprises Index	Every 5 seconds	09:30 to 16:00
Market turnover for Main Board and Growth Enterprise Market	Every ~~15~~ 2 seconds	09:20 to 16:30
SSE Composite Index	Every 5 seconds	09:30 to 15:00
SSE 50 Index	Every 5 seconds	09:30 to 15:00
SSE 180 Index	Every 5 seconds	09:30 to 15:00
SSE 380 Index	Every 5 seconds	09:30 to 15:00
SSE Dividend Index	Every 5 seconds	09:30 to 15:00
SSE MID CAP Index	Every 5 seconds	09:30 to 15:00
SSE 180 Governance Index	Every 5 seconds	09:30 to 15:00
SSE Mega-cap Index	Every 5 seconds	09:30 to 15:00
SSE Industry Top Index	Every 5 seconds	09:30 to 15:00
SSE Commodity Equity Index	Every 5 seconds	09:30 to 15:00
CES China 120 Index	Every 5 seconds	09:30 to 16:00
CES China A80 Index	Every 5 seconds	09:30 to 16:00
CES China HK Mainland Index	Every 5 seconds	09:30 to 16:00

* Index information as at day close may be disseminated after the Updating Period

This element will also be sent continuously outside the above time periods in fixed time interval of one minute.

Field	Format	Description	Values
Number of Indices	B(2)	This field contains the number of indices within this message.	The value is within the range 1 to 40.

Field	Format	Description	Values
Index Table		This table is of variable length depending on the *Number of Indices*.	Contains the number of occurrences specified in *Number of Indices*.
Index Code	X(8)	This field contains the code of the index.	See note 1.
Index Value	9(5).9(2)	This field contains the current value of the index.	Values are right fitted. E.g. 9780.67 will be represented as 09780.67. See note 2.
Index Difference Indicator	X(1)	This field indicates the direction of the difference.	Values are : '+' - Upwards '-' - Downwards ' ' - No change
Index Difference	9(5).9(2)	This field contains the movement of the index from its previous closing value.	Values are right fitted. E.g. 13.89 will be represented as 00013.89. If the *Index Difference Indicator* is ' ', then this field must be 0. See note 2.
Index Status Indicator	X(1)	This field indicates the state of the index.	Values are : 'A' - Active ' ' - Not available '#' - Exception (for HSI only)
Number of Markets	B(2)	This field contains the number of markets within this message.	The value is within the range 1 to 40.
Market Table		This table is of variable length depending on the *Number of Markets*.	Contains the number of occurrences specified in *Number of Markets*.
Market Code	X(4)	This field contains the code of the market.	
Turnover	9(15)	This field contains the current turnover in the currency of the market of all transactions in the market.	
Currency Code	X(3)	This field contains the currency code of the market.	See page 28 Note 1.
RMB Turnover	9(15)	This field contains the current total turnover in RMB of all Renminbi (RMB) transactions in the market (transactions for securities with currency code in 'CNY' in XS Element (Securities Static Information).	
Number of Sub-Markets	B(2)	This field contains the number of sub-markets within this message.	The value is within the range 0 to 40.
Sub-Market Table		This table is of variable length depending on the *Number of Sub-Markets*.	Contains the number of occurrences specified in *Number*

Field	Format	Description	Values
Sub-Market Code	X(4)	This field contains the code of the sub-market.	*of Sub-Markets*.
Market Code	X(4)	This field contains the code of the market that the sub-market from.	
Shares Traded	BCD(6)	This field contains the current number of shares traded of the sub-market.	
Number of Trades	BCD(6)	This field contains the current number of trades of the sub-market.	
Turnover	9(15)	This field contains the current turnover of the sub-market.	
Currency Code	X(3)	This field contains the currency code of the sub-market.	

The maximum length of this element is 4046 bytes.

Note 1	HSI	Hang Seng Index	恒生指數
	VHSI	HSI Volatility Index	恒指波幅指數
	HKL	S&P/HKEx LargeCap Index	標普香港大型股指數
	GEM	S&P/HKEx GEM Index	標普香港創業板指數
	CSI300	CSI 300 Index	滬深 300 指數
	CSHK100	CSI Hong Kong 100 Index	中證香港 100 指數
	CSCS500	CSI Cross Straits 500 Index	中證兩岸三地 500 指數
	CSCMC	CSI China Mainland Consumer Index	中證內地消費指數
	CSHKPE	CSI Hong Kong Private owned Mainland Enterprises Index	中證香港內地民營企業指數
	CSHKSE	CSI Hong Kong State owned Mainland Enterprises Index	中證香港內地國有企業指數
	CSHKLRE	CSI Hong Kong Listed Tradable Mainland Real Estate Index	中證香港上市可交易內地地產指數
	CSHKLC	CSI Hong Kong Listed Tradable Mainland Consumption Index	中證香港上市可交易內地消費指數
	CSOME	CSI Overseas Mainland Enterprises Index (HKD)	中證海外內地股港元指數
	CSHKDIV	CSI Hong Kong Dividend Index	中證香港紅利港幣指數
	CSRHK50	CSI RAFI Hong Kong 50 Index	中證銳聯香港基本面 50 港幣指數
	CSHKMCS	CSI Hong Kong Middle Cap Select Index	中證香港中盤精選港幣指數
	CSHKME	CSI HK Mainland Enterprises Index	中證香港內地股港元指數
	SSECOMP	SSE Composite Index	上證綜合指數
	SSE50	SSE 50 Index	上證 50 指數
	SSE180	SSE 180 Index	上證 180 指數
	SSE380	SSE 380 Index	上證 380 指數
	SSEDIV	SSE Dividend Index	上證紅利指數
	SSEMCAP	SSE Mid Cap Index	上證中盤指數
	SSE180GV	SSE 180 Governance Index	上證 180 公司治理指數

	SSEMEGA	SSE Mega-cap Index	上證超級大盤指數
	SSEITOP	SSE Industry Top Index	上證龍頭企業指數
	SSECEQT	SSE Commodity Equity Index	上證大宗商品股票指數
	CES120	CES China 120 Index	中華交易服務中國 120 指數
	CESA80	CES China A80 Index	中華交易服務中國 A80 指數
	CESHKM	CES China HK Mainland Index	中華交易服務中國香港內地指數

Market indices will be updated subject to the trading hours and trading holidays of the securities market of their constituents:

- The following indexes are transmitted during the trading hours of the Hong Kong market & no index update will be provided for non-trading day of Hong Kong market:
  - Hang Seng Index
  - HSI Volatility Index
  - S&P/HKEx LargeCap Index
  - S&P/HKEx GEM Index
  - CSI Hong Kong 100 Index
  - CSI Hong Kong Private-owned Mainland Enterprises Index
  - CSI Hong Kong State-owned Mainland Enterprises Index
  - CSI Hong Kong Listed Tradable Mainland Real Estate Index
  - CSI Hong Kong Listed Tradable Mainland Consumption Index
  - CSI Hong Kong Dividend Index
  - CSI RAFI Hong Kong 50 Index
  - CSI Hong Kong Middle Cap Select Index
  - CSI HK Mainland Enterprises Index
  - CES China 120 Index
  - CES China HK Mainland Index

- The following indexes are transmitted during the trading hours of the Mainland markets & no index update will be provided for non-trading day of the Mainland markets as well as non-trading day of Hong Kong market:
  - CSI 300 Index
  - CSI China Mainland Consumer Index
  - SSE Composite Index
  - SSE 50 Index
  - SSE 180 Index
  - SSE 380 Index
  - SSE Dividend Index
  - SSE MidCap Index
  - SSE 180 Governance Index
  - SSE Mega-cap Index
  - SSE Industry Top Index
  - SSE Commodity Equity Index
  - CES China A80 Index

- CSI Cross-Straits 500 Index is transmitted during the trading hours of the Mainland, Taiwan and Hong Kong markets. No index update will be provided for non-trading day of Hong Kong market.

- CSI Overseas Mainland Enterprises Index (HKD) is transmitted from 9:00 to 16:00 in the trading day of any of the worldwide markets where the underlying securities are listed. No index update will be provided for non-trading day of Hong Kong market.

Note 2 : the transmitted values of CSI series of indexes are rounded to 2 decimal places using 5/4 rounding.

Element Type - MS (Market Static)

This element is generated at the start of the trading day.

Field	Format	Description	Values
Number of Markets	B(2)	This field contains the number of markets within this message.	The value is within the range 1 to 40.
Market Table		This table is of variable length depending on *Number of Markets*.	Contains the number of occurrences specified in *Number of Markets*.
Market Code	X(4)	This field contains the code of the market.	
Market Name	X(25)	This field contains the name of the market.	
Filler	X(1)		
Number of Securities	B(2)	This field specifies the number of securities in this market.	

The maximum length of this element is 1282 bytes.

Element Type - MT (Market Trading Timetable)

This element is generated at the start of each trading day.

Field	Format	Description	Values
Market Code	X(4)	This field contains the code of the market.	
Logical Date	B(4)	This field contains the logical date of the market.	The representation is: YYYYMMDD
Number of Sessions	B(2)	This field contains the number of sessions within this message.	The value is within the range 1 to 12.
Session Table		This table is of variable length depending on *Number of Sessions*.	Contains the number of occurrences specified in *Number of Sessions*.
Session Type	X(1)	This field contains the session type of the market.	Values are : 'A' – Auction 'C' – Continuous Trading
Filler	X(1)		
Number of Statuses	B(2)	This field contains the number of statuses within the session.	The value is within the range 1 to 14.
Status Table		This is a fixed length table of 14 occurrences	Valid statuses are in the first *Number of Statuses* occurrences. Values are :
Trading Status	X(2)	This field contains the trading status of the market.	'OI' – Order Input 'NC' - No Order Cancel or Modification 'MA' – Matching 'BL' – Blocked 'OC' – Order Cancel 'CT' – Continuous Trading 'EI' – Exchange Intervention 'CL' – Close 'DC' – Day Close
Trading Status Start Time	B(4)	This field contains the start time of the trading status of the market.	The representation is : HHMMSS

The maximum length of this element is 1066 bytes.

Element Type - NI (News Index)

This element is generated whenever a news update occurs, and is followed by the related news (NP) element(s). The element indicates which markets and/or securities the news item is applied to. Information Vendor should note that each news index may be followed by more than one news (NP) element.

Field	Format	Description	Values
News Type	X(3)	This field indicates the type of news within this message.	Values are : 'EXN' - Exchange news of Main Board and Growth Enterprise Market 'EXC' - Chinese Exchange news of Main Board and Growth Enterprise Market 'SSN' - English short selling turnover information 'SSC' - Chinese short selling turnover information See note 1.
News ID	9(3)	This field contains a unique number for the news page within each *News Type*.	
All Market Indicator	X(1)	This field indicates the association of this news with which markets or securities.	Values are : 'A' - All markets 'M' - Selected markets as in the *Market Table* 'S' - Selected securities as in the *Security Code Table*
Filler	X(1)		
Number of Market	B(2)	This field contains the number of market codes within this message.	The value is within the range 0 to 40.
Market Table Market Code	X(4)	This is a fixed length table of 40 occurrences. This field contains the market codes that this news applies to.	Valid market codes are in the first *Number of Market* occurrences.
Number of Security	B(2)	This field contains the number of security codes within this message.	The value is within the range 0 to 200.
Security Code Table Security Code	B(4)	This table is of variable length depending on the *Number of Security*. This field contains the security code that this news applies to.	Contains the number of occurrences specified in *Number of Security*. 5-digit security code (See Element Type - XN)

The maximum length of this element is 972 bytes.

Note 1: The News Type and News ID together associate the news index with the news items.

Element Type - NP (News)

This element is generated whenever a news update occurs, and follows the news index element (NI) indicating which markets and/or securities the news item is applied to.

Field	Format	Description	Values
News Type	X(3)	This field indicates the type of news within this message.	Values are : 'EXN' - Exchange news of Main Board and Growth Enterprise Market 'EXC' - Chinese Exchange news of Main Board and Growth Enterprise Market 'SSN' - Short selling turnover information 'SSC' - Chinese short selling turnover information See note 1.
News ID	9(3)	This field contains a unique number for the news page within each *News Type*.	
Cancel Flag	X(1)	This flag means a previously released news item, identified by *News Type* and *News ID*, has been cancelled.	Values are : 'N' - Not cancelled 'Y' - Cancelled
Final Segment Flag	X(1)	This field contains the flag to indicate whether the news item transmitted is complete or not.	Values are : 'N' - Not complete. A subsequent message will follow this with the *Segment Number* incremented by 1. 'Y' - Complete.
Segment Number	B(2)	This field is used to chain large news items that are transmitted over several messages.	The value of this field is usually n (where n=1), however, if the *Final Segment Flag* is 'N' then the *Segment Number* for the next news page for the same news category will contain the value n+1.
Release Time	B(8)	This field contains the time in which the news item was released.	The representation is : YYYYMMDDHHMMSS
Number of Lines	B(1)	This field contains the number news lines within this message.	The value is within the range 1 to 25.
Filler	X(1)		
News Table News lines	 X(80)	 This field contains a line of ASCII text.	Contains the number of occurrences specified in *Number of Lines* For every news item of type 'EXC' or 'SSC', the first two

Field	Format	Description	Values
			lines on segment 1 contain the news index (which is the title of the news item), otherwise, the first line on segment 1 contains the news index.

The maximum length of this element is 2020 bytes.

Note 1: If the *News Type* is 'EXC' or 'SSC', then *News lines* will contain BIG-5 codes in addition to normal ASCII character. The BIG-5 codes used will contain an extension of the commonly used Chinese characters in Hong Kong.

Element Type - PG (Text Page)

This element is generated throughout the day for the following categories of information:

Page Num/Range	Information Category	Supplied By
780, 782 [To be removed by 3 months after the new index feed is launched.]	Hang Seng China Enterprises Index, Hang Seng China Affiliated Corporations Index and HSI Sub-indexes	HSIL
783 [To be removed by 3 months after the new index feed is launched.]	HSI Index and Index Turnover	HSIL
788 [To be removed by 3 months after the new index feed is launched.]	S&P/HKEx LargeCap Index	S&P
	Hang Seng Index	HSIL
	Main Board Market Turnover	SEHK
8788 [To be removed by 3 months after the new index feed is launched.]	S&P/HKEx GEM Index	S&P
	Growth Enterprise Market Turnover	SEHK

SEHK - The Stock Exchange of Hong Kong Limited
HSIL - Hang Seng Indexes Company Limited
S&P - Standard & Poor's

Should the Information Vendor require interpretation of specific data items within the text pages, the appropriate supplier should be contacted. Information Vendor who would redistribute the above information should contract with the respective Information Supplier for authorization.

Field	Format	Description	Values
Page Number	B(4)	This field contains the page number within the information category in which the updates are to be applied to.	
Number of lines	B(1)	This field contains the number of entries in the Table.	Values are within the range 1 to 23.
Table		This table is of variable length depending on the Number of lines.	Contains the number of occurrences specified in Number of lines.
Line number	B(1)	This field contains the line number in which the field Line Text is to be applied to.	
Line Text	X(80)	This field contains a string of 80 character text.	

The maximum length of this element is 1868 bytes.

Element Type - SM (System Message)

This element is generated whenever there is a change in the market status.

Field	Format	Description	Values
Market Code	X(4)	This field contains code of the market.	
Session Type	X(1)	This field contains the current session type of the market	Values are : 'A' - Auction 'C' - Continuous Trading
Filler	X(1)		
Trading Status	X(2)	This field represents the current trading status of the market.	Values are : 'OI' - Order Input 'NC' - No Order Cancel or Modification 'MA' - Matching 'BL' - Blocked 'OC' - Order Cancel 'CT' - Continuous Trading 'EI' - Exchange Intervention 'CL' - Close 'DC' - Day Close 'NO' - Not yet open See note 1
Trading Status Description	X(50)	This field contains the description of the trading status.	See note 3 below
Trading Status Start Time	B(4)	Start time of the trading status.	The representation is : HHMMSS
Trading Status End Time	B(4)	End time of the trading status.	The representation is : HHMMSS

The length of this element is 66 bytes.

Note 1 : During half day trading days, the status Day Close will supersede the status Close. Hence, Day Close will be sent instead of Close to indicate that the market is closed for the current trading day.

Element Type - SP (Spread Table)

This element is generated at the start of each trading day.

Field	Format	Description	Values
Spread Table Code	X(2)	This field contains the spread table code.	
Price From	B(4)	This field contains the lowest order price of the spread table.	3 decimal places is implied.
Number of Items	B(2)	This field contains the number of items in the item table.	The value is within the range 1 to 52.
Item Table		This table is of variable length depending on the *Number of Items*.	Contains the number of occurrences specified in *Number of Items*.
Price To	B(4)	This field contains the highest order price of current spread.	3 decimal places is implied.
Spread Value	B(2)	This field contains the spread value between the previous *Price To* (or *Price From*) and the current *Price To*.	3 decimal places is implied.

The maximum length of this element is 320 bytes.

Note 1: For a given price, the new price that is n spreads away from it can be determined by using the following algorithm:

For "*Price* + *n* spreads":

The Price To and Spread Value of the first item with Price To > *Price* is used to give

Spreads In Range = (Price To - *Price*) / Spread Value

If this is not enough (*n* > *Spreads In Range*), the next item is used (with *Remaining Spreads* = *n* - *Spreads In Range*) and the calculation is repeated, until finally

New Price = Price From + (*Remaining Spreads* x Spread Value)

For "*Price* - *n* spreads":

The Price From and Spread Value of the first item with Price To ≥ *Price* is used to give

Spreads In Range = (*Price* - Price From) / Spread Value

If this is not enough (*n* > *Spreads In Range*), the previous item is used (with *Remaining Spreads* = *n* - *Spreads In Range*) and the calculation is repeated, until finally

New Price = Price To - (*Remaining Spreads* x Spread Value)

5. SECURITY AND CONTROL

Real time information from the Market Datafeed System is not encrypted. Only the receivers who have subscribed for this service with authentication on subscriber name/password and installed the required equipment can obtain the data. For security purpose, MDS vendors are recommended to change their password at an interval of 3 months although the system would not guard against this. MDS system does not force the expiry of the vendor password.

The network applies different levels of security measures to provide a secure infrastructure for the Market Datafeed System. All network routers and LAN switches are password protected. The password protection restricts access to network components.

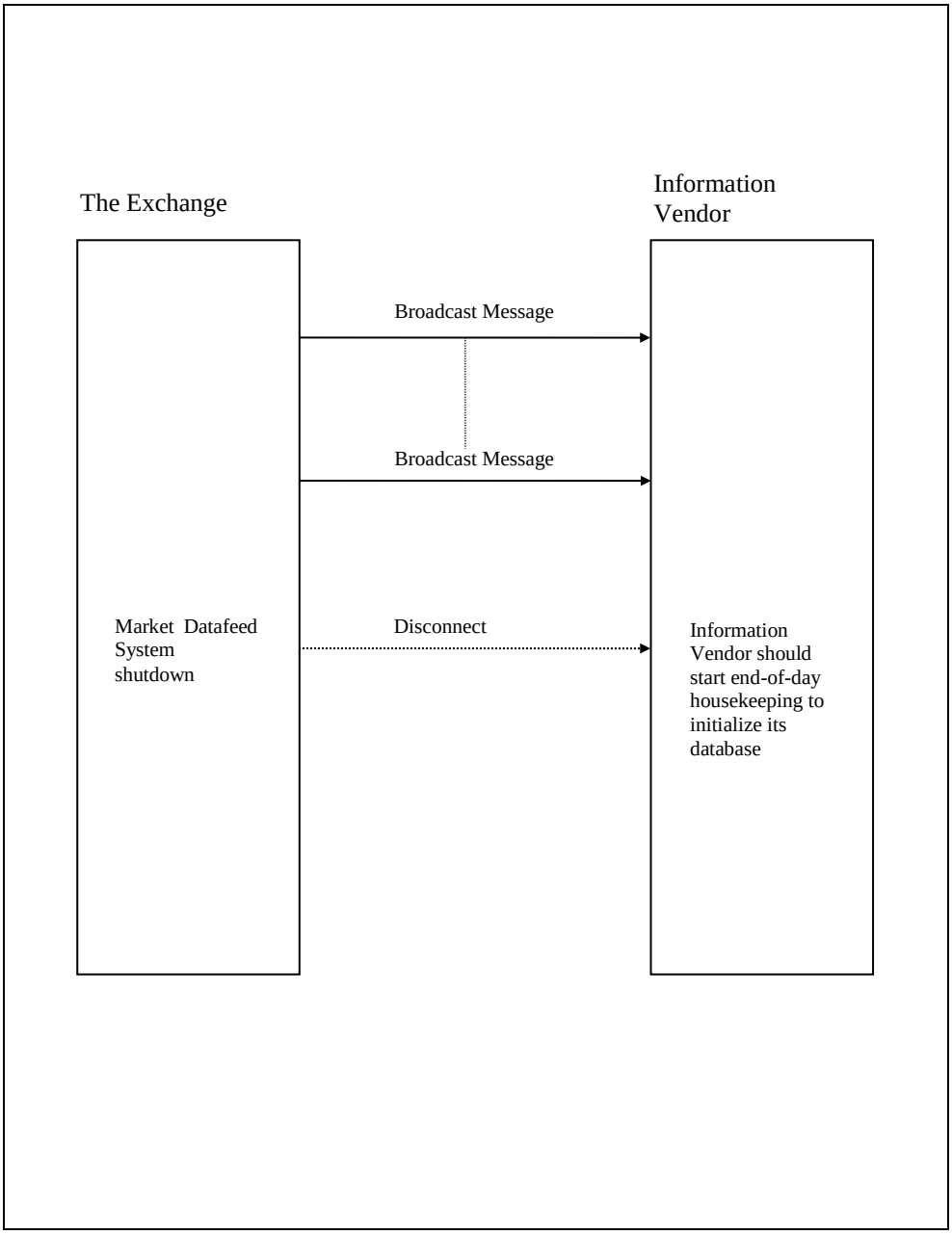
Packet filtering is applied at all core routers within the network. Filtering rules are configured consistently in all routers throughout the path from Information Vendors' sites to MDS host sites and the network only allows traffic to travel in pre-defined paths. Any attempt from a Information Vendor's site to connect any network component or another peer Information Vendor's site is blocked.

Static routing is used between the Information Vendors' sites and the core network. The core network routers never accept routing updates from the Information Vendor's site routers as no routing protocol is running at these WAN interfaces. Static routes are configured in every Information Vendor's site router. Only routes related to host site networks are configured.

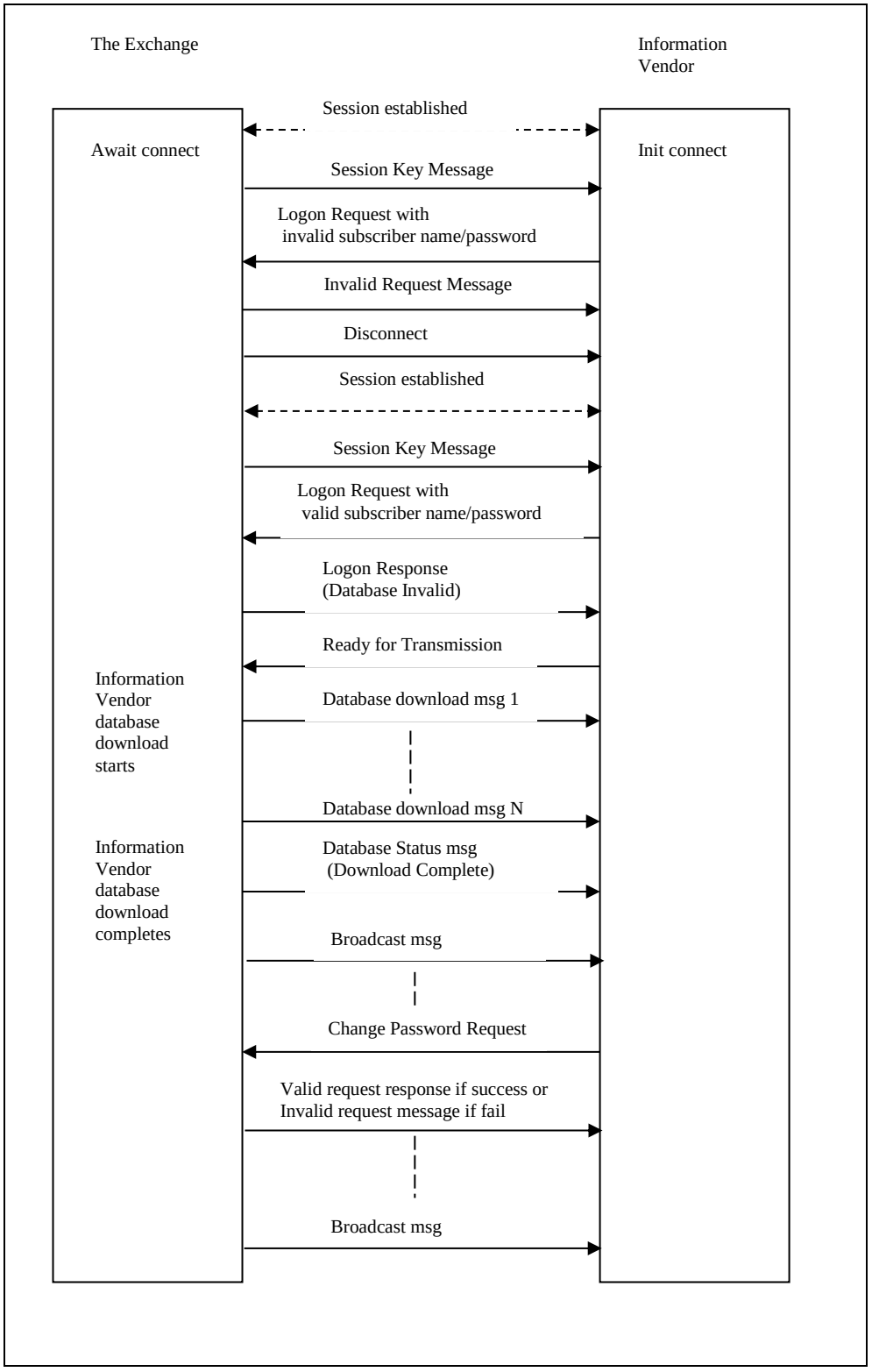
The network will ride on SDNet network in the form of virtual private network. With the provision of private Virtual LAN (VLAN), only pre-defined network access points can communicate with each other.

APPENDIX A. MESSAGE FLOW EXAMPLES

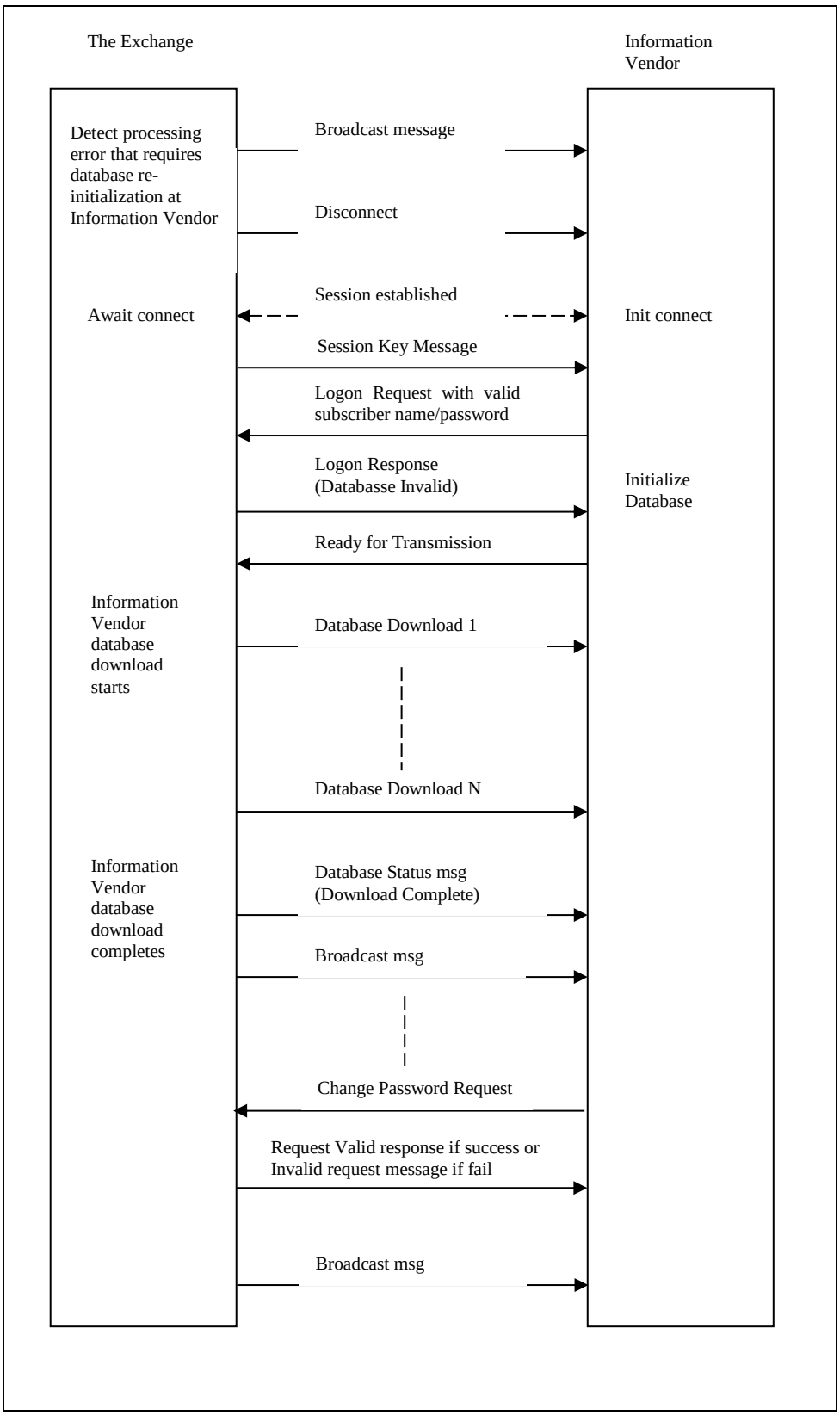
A.1 End of Day Housekeeping



A.2 Start of Day



A.3 Complete Database Download



A.4 Database Recovery