INTERFACE SPECIFICATIONS

HKEX Orion Market Data Platform
Securities Market & Index Datafeed Products (OMD-C)
Binary Protocol

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1. INTRODUCTION

1.1 PURPOSE

The target readers of this document are the technical personnel of Market Data Vendors, End-Users, Application Service Providers ("ASPs") and Independent Software Vendors ("ISVs") of HKEX Orion Market Data Platform – Securities Market & Index Datafeeds ("OMD-C").

This document specifies the Binary interface of the OMD-C.

This document is the Transmission Specification(s) of the relevant Datafeed(s) under your Market Data Vendor Licence Agreement, Market Data End-User Licence Agreement or Market Data Application Service Provider Licence Agreement ("Licence Agreement"). Please refer to Section 1.2, Section 1.3 and Section 1.4 for the information applicable to the Datafeed(s) under your Licence Agreement.

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1.2 READING GUIDE

The chapters following this introduction are:

Chapter 2: System Overview

Chapter 3: Message Formats

Chapter 4: Recovery

Chapter 5: Aggregated Order Book Management

Appendix A: List of Indices under OMD Index

All chapters and appendices except Chapter 3 and Appendix A are applicable to all Datafeeds unless otherwise specified. In Chapter 3, there are indications* in individual sections/sub-sections for their applicability to individual Datafeeds, and Appendix A is applicable to OMD Index only. The information is also summarised in Section 1.3 Summary Table.

* Example

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.3	●	●	●	●

1.3 SUMMARY TABLE

Section	Message Format	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.1	Data Types	●	●	●	●
3.2	Packet Structure	●	●	●	●
3.3	Packet Header	●	●	●	●
3.4	Control Messages	●	●	●	●
3.5	Retransmission	●	●	●	●
3.6	Refresh	●	●	●	●

3.7	Reference Data	●	●	●	
3.8	Status Data	●	●	●	
3.9.1	Add Order (30)			●	
3.9.2	Modify Order (31)			●	
3.9.3	Delete Order (32)			●	
3.9.4	Add Odd Lot Order (33)	▲	▲	▲	
3.9.5	Delete Odd Lot Order (34)	▲	▲	▲	
3.9.6	Aggregate Order Book Update (53)	●	●		
3.9.7	Broker Queue (54)	●	▲	▲	
3.9.8	*Order Imbalance (56)*	●	●	●	
3.10.1	Trade (50)		●	●	
3.10.2	Trade Cancel (51)		●	●	
3.10.3	Trade Ticker (52)	●			
3.10.4	Closing Price (62)	●	●		
3.10.5	Nominal Price (40)	●	●		
3.10.6	Indicative Equilibrium Price (41)	●	●	●	
3.10.7	Reference Price (43)	●	●	●	
3.10.8	VCM Trigger (23)	●	●	●	
3.11.1	Statistics (60)	●	●		
3.11.2	Market Turnover (61)	●	●		
3.11.3	Yield (44)	●	●		
3.12	News	●	●		
3.13	Index Data				●
3.14	Stock Connect Data	▲	▲	▲	

● The information supplied in the corresponding sub-section applies to the Datafeed(s)
▲ Complimentary service to the Datafeed(s).

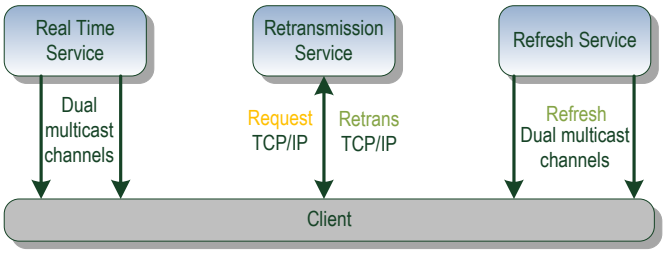
1.4 SCOPE OF INFORMATION

HKEX Orion Market Data Platform – Securities Market & Index Datafeed Products ("OMD-C") provides real time trading information of all instruments listed and traded on the securities market, indices and market information to the Licensees.

2. SYSTEM OVERVIEW

2.1 SCOPE

Figure 1: Access to Market Data



OMD provides market data represented in an efficient binary message format for all instruments listed on the Securities Market. It has been designed for high throughput and low latency.

2.1.1 Multicast

Messages are published in a one-to-many fashion using the IP multicast and UDP transport protocols. Multicast is not a connection-oriented protocol. Data is sent strictly in one direction from server to clients.

2.1.2 Dual Multicast Channels

Due to the inherently unreliable nature of the UDP transport, packets may be lost or delivered out-of-order. To mitigate the risk of packet loss, the messages are duplicated and sent over two separate multicast channels (dual channels). Technically, a multicast channel corresponds to a multicast group.

Each pair of dual multicast channels has a unique identifier, which is referred to as the ChannelID.

More details regarding the configuration parameters (including IP addresses, port numbers corresponding to the multicast channels) could be found in the Connectivity Guide.

2.1.3 Recovery Mechanisms

OMD provides two recovery mechanisms:

- A retransmission server provides on request gap-fill retransmission of lost messages. The retransmission requests and gap-fill replies are point-to-point (TCP/IP connection).

- A refresh server provides snapshots of the market state at regular intervals throughout the business day. Snapshots are sent using multicast on separate channels for the real time messages.

2.2 SESSION MANAGEMENT

Each multicast channel maintains its own session. A session is limited to one business day. During this day the message sequence number is strictly increasing and therefore unique within the channel.

OMD-C does not operate on non-trading days of the Hong Kong Securities Market except those days when there are real-time index data calculated and disseminated by the index compiler. HKEX may perform system testing on Saturdays, Sundays or days when OMD-C is not in operation. Clients should treat data transmitted via OMD-C on those days as non production data and disregard them.

2.2.1 Start of Day

Housekeeping and system maintenance work may take place overnight until 6:00am. In this regard, Clients are advised to make connection to OMD Securities Market ("OMD-C") at or after 6:00am every business day to ensure that the data received from OMD-C are good for the start of the day. Please also refer to the OMD-C Developer's Guide for more information.

On each channel the first message at the start of the business day is the Sequence Reset message. The Sequence Reset message carries sequence number 1. On receipt of this message, the client must clear all cached data for all instruments.

The reference data for all markets, securities, liquidity providers and currency rates is published each day shortly after the start of day.

If a client starts listening after the start of business day and misses the Sequence Reset message and reference data, it must use the refresh service to recover and synchronize with the real time channels.

2.2.2 Normal Transmission

Normal order and trade message transmission in Securities Market Datafeed Products channels (i.e. SS, SP & SF) is expected between when the market opens for trading and when the market is closed. OMD will normally stop sending messages (including heartbeats) on all real-time and refresh channels around 6:30pm.

Heartbeats are sent around every 2 seconds on each channel whenever there is no activity.

2.2.3 End of Day

OMD will normally be shutdown after 9:00 p.m. The shutdown time and the message stop sending time, however, are not rigid and the Exchange has the right to adjust this time according to the different trading situations.

2.2.4 Error Recovery

2.2.4.1 System Component Failure

In OMD, below contents are supplied by the component in an active-standby configuration. Both Line A and B are supplied by the same system component. If the system component fails and requires a failover, there will be a short interruption in multicast dissemination from **both** Line A and Line B.

Applicable datafeed(s) is marked with [●]

Content	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
Reference Data	●	●	●	
Trading Session Status	●	●	●	
Security Status	●			
Order Book Data	●			
Trade and Price Data	●			
Yield	●			
Statistics	●			
Market Turnover	●	●		
News				
Index Data[1]				●
Stock Connect Data[2]	▲	▲	▲	
Conflated Broker Queue[3]	●	▲	▲	
Odd Lot Order Book Data[4]				

▲ Note 1, 2, 3, 4: Complimentary service to the Datafeed(s).

Below contents are supplied by the component in an active-active configuration. Line A and Line B are supplied by different system component independently and so line arbitration will allow the client to continue receiving messages – see section 4

for more information about recovery. If a system component fails and requires a failover, there will be a short interruption in multicast dissemination in **either** Line A or Line B.

Applicable datafeed(s) is marked with [●]

Content	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
Reference Data				
Trading Session Status				
Security Status Data		●	●	
Order Book Data		●	●	
Trade and Price Data		●	●	
Yield		●		
Statistics		●		
Market Turnover				
News	●	●		
Index Data[1]				
Stock Connect Data[2]				
Conflated Broker Queue[3]				
Odd Lot Order Book Data[4]	▲	▲	▲	

▲ Note 1, 2, 3, 4: Complimentary service to the Datafeed(s).

2.2.4.2 Disaster Recovery

In the unlikely event of a disaster recovery situation at the primary site, OMD at the disaster recovery (DR) site will take up servicing.

During the interruption, there might only be heartbeat available or no data will be sent including heartbeats.

A Disaster Recovery (DR) Signal message indicating the DR status will also be sent on its dedicated channel when OMD is ready – see section 3 for more information about the DR Signal message.

IP addresses and ports that have been provided for the disaster site's retransmission service should be used. *See Connectivity Guide for more details.*

2.3 Trading Sessions

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).

Under severe weather and typhoon scenarios, there may be an impact on trading to suspend trading session. Even though, system connectivity on OMD-C will continue in service without impact.

2.4 Race Conditions

The information supplied in this section does not apply to OMD Index.

Due to the nature of the exchange matching system the real time order/trade data and reference data are disseminated via separate channels so users need to be aware that there is a race condition.

As an example the Trading Session Status (20) messages and market activity are decoupled; e.g. for a short time after a TradingSesStatus of "Halted" is reported realtime data for that same market may continue to arrive.

3. MESSAGE FORMATS

3.1 DATA TYPES

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.1	●	●	●	●

The following table lists all the data types used by OMD.

Format	Description
String	ASCII characters which are left aligned and padded with spaces, unless otherwise specified
Uint8	8 bit unsigned integer
Uint16	Little-Endian encoded 16 bit unsigned integer
Uint32	Little-Endian encoded 32 bit unsigned integer
Uint64	Little-Endian encoded 64 bit unsigned integer
Int16	Little-Endian encoded 16 bit signed integer
Int32	Little-Endian encoded 32 bit signed integer
Int64	Little-Endian encoded 64 bit signed integer
Binary	Unicode encoding used for Chinese characters

3.1.1 Null Values

From time to time certain fields cannot be populated and specific values are used to represent null. This is currently used within Int64 fields of the Index Data (71) message, Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81). It could be used at all Int64 fields.

Data Type	Null Representation	Example of Usage
Int64	0x8000000000000000 (Hex 2's complement) or -9223372036854775808 (Decimal)	HighValue, LowValue of Index Data (71) DailyQuotaBalance of Stock Connect Daily Quota Balance (80) Buy Turnover and Sell Turnover of Stock Connect Market Turnover (81)

3.1.2 Currency Values

Please refer to the Third Schedule of Rules of the Exchange in HKEX website for possible ISO-4217 Currency Codes used in OMD-C. Apart from the Currency Codes listed in the aforesaid Schedule, OMD-C will also use the Currency Code listed below:

Currency Code	Currency
CNH	Chinese Renminbi (Offshore)

HKEX may add or delete currency code(s), whenever applicable, in the future.

3.2 PACKET STRUCTURE

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.2	●	●	●	●

Multicast packets are structured into a common packet header followed by zero or more messages. Messages within a packet are laid out sequentially, one after another without any spaces between them.

Packet Header	Message 1	Message 2	...	Message n

The maximum length of a packet is 1500 bytes which includes the multicast headers, Packet Header and Messages.

The packet header provides information including the total packet length, the number of messages within the packet, the sequence number of the first message and a send timestamp.

A packet will only ever contain complete messages. A single message will never be fragmented across packets.

The format of each message within a packet will vary according to message type. However, regardless of the message type, each message will start with a two-byte message size (MsgSize) followed by a two-byte message type (MsgType). These are described in the following table.

Table 1: MsgSize and MsgType Fields

Field	Format	Len	Description
MsgSize	Uint16	2	Message length (including this field)
MsgType	Uint16	2	Type of message. The valid values for MsgType are below: Sequence Reset (100) Logon (101) Logon Response (102) Disaster Recovery Signal (105) Retransmission Request (201) Retransmission Response (202) Refresh Complete (203) Market Definition (10) Security Definition (11) Liquidity Provider (13) Currency Rate (14) Trading Session Status (20) Security Status (21) Add Order (30) Modify Order (31) Delete Order (32) Add Odd Lot Oder (33) Delete Odd Lot Order (34) Aggregate Order Book Update (53) Broker Queue (54) Order Imbalance (56) Trade (50) Trade Cancel (51) Trade Ticker (52) Closing Price (62) Nominal Price (40) Indicative Equilibrium Price (41) Reference Price (43)

Field	Format	Len	Description
			VCM Trigger (23) Statistics (60) Market Turnover (61) Yield (44) News (22) Index Definition (70) Index Data (71) Stock Connect Daily Quota Balance (80) Stock Connect Market Turnover (81)

3.3 PACKET HEADER

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.3	●	●	●	●

All packets will begin with a common packet header.

Offset	Field	Format	Len	Description
0	PktSize	Uint16	2	Size of the packet (including this field)
2	MsgCount	Uint8	1	Number of messages included in the packet
3	Filler	String	1	
4	SeqNum	Uint32	4	Sequence number of the first message in the packet
8	SendTime	Uint64	8	The number of nanoseconds since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest millisecond
Packet length			16	

3.4 CONTROL MESSAGES

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.4	●	●	●	●

3.4.1 Heartbeat

Heartbeats consist of a packet header with MsgCount set to `0`. They do not carry a sequence number and therefore do not increment the sequence number of the multicast channel. SeqNum is set to the sequence number of the previous message sent on the channel.

The Heartbeat message will be identical for all the services.

3.4.2 Sequence Reset (100)

The Sequence Reset message is sent on each multicast channel at start of day. It may also be sent when there is a need for the rectification of stock reference data before market open.

The client must ignore the sequence number of the Sequence Reset message itself, and set the next expected sequence number to NewSeqNo. The client may receive multiple sequence reset messages from all channels. Whenever the

Sequence Reset message is received, clients must clear all cached data for all instruments received from the channels and then subscribe to the refresh channels to receive the current state of the market.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	100 Sequence Reset
4	NewSeqNo	Uint32	4	New sequence number	Always set to 1
Total Length			8		

3.4.3 Disaster Recovery Signal (105)

The Disaster Recovery (DR) Signal message is sent on a dedicated multicast channel (DR channel) whenever a site failover scenario is triggered: (1) HKEX Primary Data Center failure that requires to bring up OMD-C at the Secondary Data Center, or (2) Orion Trading Platform – Securities Market (OTP-C) failure that requires OTP-C to be bought up at the Secondary Data Center. In normal situation, including OMD-C node failover, the dedicated DR channel only carries Heartbeat till end of business day.

When site failover begins, DR Signal is sent with "DRStatus=1" indicating that the DR process has been activated. Clients should then clear all cached market data and prepare their own system for the site failover. When the site failover process finishes, DR Signal will be sent with "DRStatus=2" thereupon clients could start rebuild the latest market image from the refresh service. The same DR Signal will be sent periodically until end of business day.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	105 DR Message
4	DRStatus	Uint32	4	Status during site failover	1 DR in progress 2 DR completed
Total Length			8		

3.5 RETRANSMISSION

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.5	●	●	●	●

Refer to Retransmission service for details on the retransmission messages.

Note that when the Logon (101) or Retransmission Request (201) messages are sent to the OMD server, the client must also include a packet header as shown below:

Offset	Field	Format	Len	Values	Notes
0	PktSize	Uint16	2	32	16 bytes for this header plus 16 bytes for either the Logon (101) or Retransmission Request (201) message

Offset	Field	Format	Len	Values	Notes
2	MsgCount	Uint8	1	1	One message only
3	Filler	String	1		Empty Filler
4	SeqNum	Uint32	4	0	The field is not used
8	SendTime	Uint64	8	0	The field is not used

After this header, the fields for either Logon (101) or Retransmission Request (201) should follow.

Also note that the same header is used by the RTS server when sending either Logon Response (102) or Retransmission Response (202) messages to clients. Again in this case the SeqNum and SendTime fields are not relevant and can be discarded.

3.5.1 Logon (101)

The Logon message enables client authentication. This is not required for multicast channels and is only used to for retransmission requests.

Normal operation: Client sends a Logon message containing username to the OMD, which responds with a Logon Response message with the SessionStatus set to 0 (Session Active).

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	101 Logon
4	Username	String	12	Username to log on, padded with binary null characters	
Total Length			16		

3.5.2 Logon Response (102)

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	102 Logon Response
4	SessionStatus	Uint8	1	Status of the session	0 Session Active 5 Invalid username or IP Address 100 User already connected
5	Filler	String	3		
Total Length			8		

3.5.3 Retransmission Request (201)

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	201 Retransmission Request
4	ChannelID	Uint16	2	Multicast Channel ID with which the retransmission relates	
6	Filler	String	2		
8	BeginSeqNum	Uint32	4	Beginning of sequence	
12	EndSeqNum	Uint32	4	Message sequence number of last message in range to be resent	
Total Length			16		

3.5.4 Retransmission Response (202)

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	202 Retransmission Response
4	ChannelID	Uint16	2	Multicast Channel ID with which the retransmission relates	
6	RetransStatus	Uint8	1	Status of the Retransmission response	0 Request accepted 1 Unknown/Unauthorized channel ID 2 Messages not available 100 Exceeds maximum sequence range 101 Exceeds maximum requests in a day
7	Filler	String	1		
8	BeginSeqNum	Uint32	4	Beginning of sequence	
12	EndSeqNum	Uint32	4	Message sequence number of last message in range to be resent	
Total Length			16		

3.6 REFRESH

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.6	●	●	●	●

Refer to Refresh service for details on the Refresh Complete message.

3.6.1 Refresh Complete (203)

This message is published to mark the end of a refresh.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`203` Refresh Complete
4	LastSeqNum	Uint32	4	Sequence number with which the refresh is synchronized	Numerical
Total Length			8		

3.7 REFERENCE DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.7	●	●	●	

3.7.1 Market Definition (10)

The Market Definition message is generated at the start of the business day for each market segment.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`10` Market Definition

4	MarketCode	String	4	Market segment identifier	`MAIN`
					`GEM`
					`NASD`
					`ETS`

8	MarketName	String	25	Market segment name	Alphanumerical
33	CurrencyCode	String	3	Base currency code of the market segment	See Currency Values in section 3.1.2 for full details.
36	NumberOfSecurities	Uint32	4	Number of securities within the market segment	
Total Length			40		

3.7.2 Security Definition (11)

This Security Definition message contains all the reference data for a security.

Security Definition messages may be received intraday – for example the 'FreeText' field may be updated during the day.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	`11` Security Definition
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values `1` – `99999`

8	MarketCode	String	4	Market segment identifier	`MAIN`
					`GEM`
					`NASD`
					`ETS`

12	ISINCode	String	12	ISIN code of the security.	
24	InstrumentType	String	4	Instrument type of the security	`BOND` Bonds `EQTY` Equities `TRST` Trusts `WRNT` Warrants & Structured products

28	ProductType	Uint8	1	Product type of the security	`Equity`
					`1` Equity – Ordinary Shares
					`2` Equity – Preference Shares
					`6` Equity – Rights
					`7` Equity – Depository Receipt (HDR) – Ordinary Shares
					`12` Equity – Depository Receipt (HDR) – Preference Shares
					`24` Equity – SPAC Shares
					
					`Warrant`
					`3` Warrant – Derivative Warrant (DW)
					`11` Warrant – Callable Bull/Bear Contract (CBBC)
					`13` Warrant – Equity Warrant
					`15` Warrant – Inline Warrant
					`21` Warrant – SPAC Warrants
					
					`Bond`
					`4` Bond – Debt Security
					
					`Trust`
					`8` Trust – Real Estate Investment Trust (REIT)
					`9` Trust – Other Unit Trusts
					`10` Trust – Leveraged and Inverse Product (LIP)
					`16` Trust – Equity ETF
					`17` Trust – Fixed Income and Money Market ETF
					`18` Trust – Commodities ETF
					`99` Others – None of the above

29	Filler	String	1		
30	SpreadTableCode	String	2	Spread table code of the security.	`01` Part A* `03` Part B* `04` For Inline Warrant (same as Part E* up to and include HK$ 1.00 as per SEHK)

Offset	Field	Format	Len	Description	Values
					05 Part D* 06 Part E* * Spread table as per Second Schedule of Rules of the Exchange
32	SecurityShortName	String	40	Security short name	
72	CurrencyCode	String	3	Currency code of the security	See Currency Values in section 3.1.2 for full details.
75	SecurityNameGCCS	Binary	60	Security name in Traditional Chinese using Unicode	**Unicode UTF-16LE encoded**
135	SecurityNameGB	Binary	60	Security name in Simplified Chinese using Unicode	**Unicode UTF-16LE encoded**
195	LotSize	Uint32	4	Board lot size for the security	
199	Filler	String	4		
203	PreviousClosingPrice	Int32	4	Previous closing price of the security; or Net asset value (NAV) published by issuer for ETF or L&I Product on the trading day before its first day listing	3 implied decimal places
207	VCMFlag	String	1	Indicates whether Volatility Control Mechanism (VCM) is applicable to the security	Y VCM applicable N VCM not applicable
208	ShortSellFlag	String	1	Indicator for short-sell authorization.	Y Short-sell allowed N Short-sell not allowed
209	CASFlag	String	1	Indicates whether Closing Auction Session (CAS) is applicable to the security	Y CAS applicable N CAS not applicable
210	CCASSFlag	String	1	Indicates whether or not the security is a CCASS security	Y CCASS security N Non CCASS security
211	DummySecurityFlag	String	1	Dummy Security Flag.	Y Dummy security N Normal security
212	Filler	String	1		
213	StampDutyFlag	String	1	Indicator for stamp duty requirement	Y Stamp duty required N Stamp duty not required
214	Filler	String	1		
215	ListingDate	Uint32	4	Date of security listing	The representation is YYYYMMDD Value is 19000101 for unknown listing date
219	DelistingDate	Uint32	4	Date of security delisting	The representation is YYYYMMDD Value is 0 if no date exists
223	FreeText	String	38	Free text associated to the security	Fixed length array of free text. When there is no free text, spaces will be present instead.
261	Filler	String	62		
323	POSFlag	String	1	Indicates whether Pre-Opening Session (POS) is applicable to the security	Y POS applicable N POS not applicable

Offset	Field	Format	Len	Description	Values
324	POSUpperLimit	Int32	4	Upper price limit of all orders in POS Order Input period, and At-auction Limit sell order in POS No Cancellation and Random Matching periods	3 implied decimal places 0 means Not available
328	POSLowerLimit	Int32	4	Lower price limit of all orders in POS Order Input period, and At-auction Limit buy order in POS No Cancellation and Random Matching periods	3 implied decimal places 0 means Not available
332	DomainStmtSecurityCode	Uint32	4	Security code of the corresponding Domain Settlement Counter	5 digit security codes with possible values 1 – 99999 Value is 0 if the security itself is already the domain settlement counter
336	Filler	String	37		
Bonds Specific Data					
373	EFNFlag	String	1	EFN Indicator	Y EFN N Non-EFN
374	AccruedInterest	Uint32	4	Accrued interest of the security	3 implied decimal places
378	CouponRate	Uint32	4	Coupon rate of a bond security	3 implied decimal places
382	Filler	String	1		
383	FaceValue	Uint64	8	Face value of a bond security	See DecimalsInFaceValue for the number of decimal places defined 0 Not available
391	DecimalsInFaceValue	Uint8	1	Number of decimal places in Face Value	Not applicable if FaceValue = 0
392	FaceValueCurrency	String	3	Currency code of Face Value	See Currency Values in section 3.1.2 for full details.
395	MaturityDate	Uint32	4	Date of maturity of a bond security	The representation is YYYYMMDD
399	InvestorType	String	1	Investor type of a bond security	R Retail Investor P Professional Investor
400	Filler	String	44		
Warrants and Structured Product specific data					
444	ConversionRatio	Uint32	4	Conversion ratio for Structured Product	3 implied decimal places 0 means Not available
448	StrikePrice1	Int32	4	Strike price of the security if it has only one strike price, or Lower strike price of the security if it has lower and upper strike prices (i.e. upper strike price not = 0)	3 implied decimal places
452	StrikePrice2	Int32	4	Upper strike price of the security if it has lower and upper strike prices	3 implied decimal places Value is 0 if the securities has only one strike price
456	MaturityDate	Uint32	4	Date of maturity of a warrant or structured security	The representation is YYYYMMDD

Offset	Field	Format	Len	Description	Values
460	CallPutFlag	String	1	Indicator of whether the warrant or structured product is a call or put option	For Derivative Warrant / Inline Warrants : C Call P Put O Others For ELI & CBBC: C Bull P Bear / Rang
461	Style	String	1	Style of the warrant	A American style E European style <blank> Other
462	Filler	String	2		
464	WarrantType	String	1	Warrant type of the warrant	N Normal instrument X Exotic instrument "0" Not available
465	CallPrice	Int32	4	Call price for CBBC	See DecimalsInCallPrice for the number of decimal places defined 0 Not available
469	DecimalsInCallPrice	Uint8	1	Number of decimal places in Call Price	Not applicable if CallPrice = 0
470	Entitlement	Int32	4	Entitlement of the warrant	See DecimalsInEntitlement for the number of decimal places defined 0 Not available
474	DecimalsInEntitlement	Uint8	1	Number of decimal places in Entitlement	Not applicable if Entitlement = 0
475	NoWarrantsPerEntitlement	Uint32	4	Number of warrants per entitlement	Not applicable if Entitlement = 0
479	Filler	String	63		
542	NoUnderlyingSecurities	Uint16	2	Number of underlying securities if the underlying security is defined in Security Definition (11) message	0 for structured product of which the underlying is not a security defined in Security Definition (11) message 1 for structured product of which the underlying is defined in Security Definition (11) message
544	UnderlyingSecurityCode	Uint32	4	5-digit code identifying the underlying security	
548	Filler	String	4		
Total Length			544 + $8n_U$		

(n_U = value of NoUnderlyingSecurities)

Note:

(1) PreviousClosingPrice may be set to 0, for example on the first day of listing of non- Exchange Traded Products (ETPs) (no existing previous closing price)

(2) Fields in Bonds Specific Data & Warrants and Structured Product Specific Data should be ignored if they are not applicable to the InstrumentType

3.7.3 Liquidity Provider (13)

The Liquidity Provider message is generated at the start of the business day for securities that have at least one liquidity provider.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	13 Liquidity Provider
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	NoLiquidityProviders	Uint16	2	Number of liquidity providers within this message	1 to 50
10	LPBrokerNumber	Uint16	2	Broker number of the liquidity provider	
Total Length			10 + $2n_T$		

(n_T = value of NoLiquidityProviders)

3.7.4 Currency Rate (14)

The Currency Rate message provides the foreign exchange conversion rates between various foreign currencies and the Hong Kong dollar.

The Currency Factor and Currency Rate fields should be interpreted as below:

For example if 1 Euro is valued 10.22 HKD
- Currency Factor will be 0 (1 EUR)
- Currency Rate will be 102200 *(4 decimals implied)*

For example if 1000 Japanese Yen is worth 90.678 HKD
- Currency Factor will be 3 *(1000 JPY)*
- Currency Rate will be 906780 (*4 decimals implied*)

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`14` Currency Rate
4	CurrencyCode	String	3	Currency code	See Currency Values in section 3.1.2 for full details
7	Filler	String	1		
8	CurrencyFactor	Uint16	2	Currency factor conversion.	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^n
10	Filler	String	2		
12	CurrencyRate	Uint32	4	Currency rate	Rate, expressed in HKD for one foreign currency unit. 4 decimals implied.
Total Length			16		

3.8 STATUS DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.8	●	●	●	

3.8.1 Trading Session Status (20)

The Trading Session Status provides information on the status of a market segment. It is sent whenever there is change of trading session.

This message may be sent on a separate multicast channel from order and trade data and therefore may not be synchronized.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	

Offset	Field	Format	Len	Description	Values
2	MsgType	Uint16	2	Type of message	20 Trading Session Status
4	MarketCode	String	4	Market segment identifier	MAIN GEM NASD ETS
8	Filler	String	1		
9	TradingSessionSubID	Uint8	1	Trading session sub-identifier.	100 Not Yet Open (NO) Pre-opening Session: 1 [POS] Order Input (OI) 101 [POS] No Cancellation (NW) 108 [POS] Random Matching (RM) 2 [POS] Order Matching (MA) 7 Blocking (BL) Continuous Trading Session: 3 Continuous trading (CT) Closing Auction Sessions: 105 [CAS] Reference Price Fixing (RP) 5 [CAS] Order Input (OI) 106 [CAS] No Cancellation (NW) 107 [CAS] Random Close (RC) 4 [CAS] Order Matching (MA) Other Sessions: 102 Exchange Intervention (EI) 103 Close (CL) 104 Order Cancel (OC) 0 Day Close (DC)
10	TradingSesStatus	Uint8	1	Status of the current trading session	0 Unknown (for NO) 10 Halted (for EI) 20 Pre-Open (for [POS] OI, NW, RM, MA, and BL) 30 Open (for CT and OC) 40 Pre-Close (for [CAS] RP, OI, NW, RC, MA) 50 Closed (for CL) 100 Day Closed (for DC)
11	TradingSesControlFlag	String	1	Indicates how control of trading session and sub-session transitions are performed	0 Automatic (Default) 1 Manual (this invalidates the normal schedule for the day)
12	Filler	String	4		
16	StartDateTime	Uint64	8	Start time of the trading status	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second. Set to 0 if no time is available
24	EndDateTime	Uint64	8	End time of the trading status	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second

Offset	Field	Format	Len	Description	Values
					Set to 0 if no time is available
Total Length			32		

3.8.2 Security Status (21)

The Security Status message is generated

- At the start of the business day if the security is not available for trading.
- Whenever a security state changes.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	21 Security Status
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	SuspensionIndicator	Uint8	1	Indicate whether the security is currently halted/ suspended for trading	2 Trading Halt or Suspend 3 Resume
9	Filler	String	3		
Total Length			12		

Note: 'Resume' in Suspension Indicator means the security is now available for trading,

3.9 ORDER BOOK DATA

The full order book information is not available in Pre-Opening Auction Session and Closing Auction Session.

3.9.1 Add Order (30)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.1			●	

The Add Order message is generated when a new order is inserted into the order book. The OrderId is unique per security but will not increment consecutively.

Note for Securities instruments the OrderBookPosition is always set to zero.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	30 Add Order

Offset	Field	Format	Len	Description	Values
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderId	Uint64	8	Unique identifier for each order performed within the trading day	Values may not be consecutive
16	Price	Int32	4	Price	3 implied decimal places
20	Quantity	Uint32	4	Number of shares	
24	Side	Uint16	2	Side of the order	0 Bid 1 Offer
26	OrderType	String	1	Order type	1 Market 2 Limit
27	Filler	String	1		
28	OrderBookPosition	Int32	4	Order rank information for the order position within the order book for each security	Integer
Total Length			32		

3.9.2 Modify Order (31)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.2			●	

The Modify Order message is generated when an existing order identified by the OrderId is modified. The only attribute that can be modified is the quantity.

Note for Securities instruments the OrderBookPosition is always set to zero.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	31 Modify Order
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderId	Uint64	8	Unique identifier for each order performed within the trading day	Values may not be consecutive
16	Quantity	Uint32	4	Number of shares	
20	Side	Uint16	2	Side of the order	0 Bid 1 Offer
22	Filler	String	2		
24	OrderBookPosition	Int32	4	Order rank information for the order position within the order book for each security	Integer
Total Length			28		

3.9.3 Delete Order (32)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.3			●	

The Delete Order message is generated when an existing order identified by the OrderId is deleted.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	32 Delete Order
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderId	Uint64	8	Unique identifier for each order performed within the trading day	Values may not be consecutive
16	Side	Uint16	2	Side of the order	0 Bid 1 Offer
18	Filler	String	2		
Total Length			20		

3.9.4 Add Odd Lot Order (33)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.4	▲ (via complimentary odd lot order feed)	▲ (via complimentary odd lot order feed)	▲ (via complimentary odd lot order feed)	

▲ Complimentary service to the Datafeed(s)

The Add Odd Lot Order message is generated when a new odd lot order is inserted into the order book.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	33 Add Odd Lot Order
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderId	Uint64	8	Unique identifier for each order performed within the trading day	Values may not be consecutive
16	Price	Int32	4	Price	3 implied decimal places
20	Quantity	Uint32	4	Number of shares	

Offset	Field	Format	Len	Description	Values
24	BrokerID	Uint16	2	Integer identifier uniquely identifying the Broker	Integer
26	Side	Uint16	2	Side of the order	0 Bid 1 Offer
Total Length			28		

3.9.5 Delete Odd Lot Order (34)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.5	▲ (via complimentary odd lot order feed)	▲ (via complimentary odd lot order feed)	▲ (via complimentary odd lot order feed)	

▲ Complimentary service to the Datafeed(s)

The Delete Odd Lot Order message is generated when an existing odd lot order identified by the OrderId is deleted.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	34 Delete Odd Lot Order
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderId	Uint64	8	Unique identifier for each order performed within the trading day	Values may not be consecutive
16	BrokerID	Uint16	2	Integer identifier uniquely identifying the Broker	Integer
18	Side	Uint16	2	Side of the order	0 Bid 1 Offer
Total Length			20		

3.9.6 Aggregate Order Book Update (53)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.6	●	●		

Refer to Section 5 - Aggregate Order Book Management for details on the Aggregate Order Book Update message. The Aggregate Order Book Update message only applies to Board Lots.

For an UpdateAction of '74 – Orderbook Clear' please refer to Example 6 within the Aggregate Order Book Management section 5.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	53 Aggregate Order Book Update
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	Filler	String	3		
11	NoEntries	Uint8	1	Number of book entries within the message	
12	AggregateQuantity	Uint64	8	Aggregated number of shares.	
20	Price	Int32	4	Price	3 implied decimal places
24	NumberOfOrders	Uint32	4	Number of orders	
28	Side	Uint16	2	Side of the order	0 Bid 1 Offer
30	PriceLevel	Uint8	1	Price level	
31	UpdateAction	Uint8	1	Type of market data update action	0 New 1 Change 2 Delete 74 Orderbook Clear
32	Filler	String	4		
Total Length			12 + 24n_o		

(n_o = value of NoEntries)

3.9.7 Broker Queue (54)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.7	●	▲ (via complimentary conflated broker queue feed)	▲ (via complimentary conflated broker queue feed)	

▲ Complimentary service to the Datafeed(s)

The Broker Queue message contains the priority list of the (max) top 40 broker IDs for a given side, and is generated whenever any of the entries in the list are modified. Entries are ordered according to distance away from the best price with best price brokers being at the front of the queue. The queue will also include spread level entries between each price level, which are marked when the Type field is set to 'S'. When the Type field is set to 'S', there are two possibilities;

- The Item is non-zero – indicating the number of spread levels away from the best price
- The Item is zero – indicating that there are no brokers with orders at the spread level indicated by the previous entry of Type set to 'S'

Example: if the active offers are as below, and assuming a spread level is 0.01:

Ask Price	Broker ID
20.28	2137
20.28	4138
20.29	2141

Ask Price	Broker ID
20.29	5123
20.31	3145

Then the resulting Ask side Broker Queue will be represented as below:

Entry	1	2	3	4	5	6	7	8	9
Item	2137	4138	1	2141	5123	2	0	3	3145
Type	B	B	S	B	B	S	S	S	B

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

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`54` Broker Queue
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values `1` – `99999`
8	ItemCount	Uint8	1	This field contains the number of items in the message – repeating items are shown indented below.	`0` to `40`
9	Side	Uint16	2	Side of the order	`1` Buy `2` Sell
11	BQMoreFlag	String	1	Flag indicating if there are more broker numbers in the queue	`Y` More broker numbers exist in the queue `N` No more exist
12	Item	Uint16	2	This field contains either the broker number or the number of spreads away from the best price	
14	Type	String	1	Indicates the type of information contained in the item	`B` Broker number `S` Number of Spread
15	Filler	String	1		
Total Length			12 + 4n_I		

(n_I = value of ItemCount)

3.9.8 Order Imbalance (56)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.9.8	●	●	●	

The Order Imbalance message provides order imbalance information at the Indicative Equilibrium Price (IEP) during the Pre-Opening Session (POS) and Closing Auction Session (CAS).

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`56` Order Imbalance
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values `1` – `99999`
8	OrderImbalanceDirection	String	1	Indicates the imbalance direction when the matchable buy quantity and sell quantity at IEP are not equal	`N` Buy = Sell `B` Buy Surplus `S` Sell Surplus <space> Not applicable, i.e. when IEP is not available
9	Filler	String	1		
10	OrderImbalanceQuantity	Uint64	8	The absolute difference between the matchable buy quantity and the sell quantity at IEP Value should be ignored if Order Imbalance Direction is <space>	
18	Filler	String	2		
Total Length			20		

3.10 Trade And Price Data

3.10.1 Trade (50)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.1		●	●	

The Trade message is generated each time a trade has been performed.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`50` Trade
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values `1` – `99999`

Offset	Field	Format	Len	Description	Values
8	TradeID	Uint32	4	Unique identifier per security for each trade performed within the trading system. The ID is reset for each trading day	Starting from 1, incrementing by 1 for each trade
12	Price	Int32	4	Price	3 implied decimal places
16	Quantity	Uint32	4	Number of shares	
20	TrdType	Int16	2	Public trade type	0 Automatch normal (Public Trade Type <space>) 4 Late Trade (Off-exchange previous day) (Public Trade Type "P") 22 Non-direct Off-Exchange Trade (Public Trade Type "M") 100 Automatch internalized (Public Trade Type "Y") 101 Direct off-exchange Trade (Public Trade Type "X") 102 Odd-Lot Trade (Public Trade Type "D") 103 Auction Trade (Public Trade Type "U") 104 Overseas Trade
22	Filler	String	2		
24	TradeTime	Uint64	8	Time of trade	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 Precision is provided to microsecond
Total Length			32		

3.10.2 Trade Cancel (51)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.2		●	●	

The Trade Cancel message is generated when a trade has been cancelled.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	51 Trade cancel
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	TradeID	Uint32	4	Unique identifier per security for each trade performed within the trading system. The ID is reset for each trading day	Starting from 1, incrementing by 1 for each trade

Offset	Field	Format	Len	Description	Values
Total Length			12		

3.10.3 Trade Ticker (52)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.3	●			

The Trade Ticker is an aggregation of several trades into one message, combining quantities of subsequent trades made on a given instrument at a given fixed price.

When a trade is cancelled, a Trade Ticker message will be generated with the TickerID set to the ticker which contains the cancelled trade and with the AggregateQuantity set to remaining quantity outstanding.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	52 Trade ticker
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	TickerID	Uint32	4	Unique identifier per security for each trade ticker generated within the trading system. The ID is unique per security for each trading day.	Starting from 1, incrementing by 1 for each trade ticker
12	Price	Int32	4	Price	3 implied decimal places
16	AggregateQuantity	Uint64	8	Aggregated number of shares.	Remaining quantity if TrdCancelFlag = Y
24	TradeTime	Uint64	8	Time of trade	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 Precision is provided to microsecond Not applicable when TrdCancelFlag = Y

Offset	Field	Format	Len	Description	Values
32	TrdType	Int16	2	Public trade type	0 Automatch normal (Public Trade Type <space>) 4 Late Trade (Off-exchange previous day) (Public Trade Type "P") 22 Non-direct Off-Exchange Trade (Public Trade Type "M") 100 Automatch internalized (Public Trade Type "Y") 101 Direct off-exchange Trade (Public Trade Type "X") 102 Odd-Lot Trade (Public Trade Type "D") 103 Auction Trade (Public Trade Type "U") Not applicable when TrdCancelFlag = Y
34	TrdCancelFlag	String	1	Indicates that a trade covered in the original Trade Ticker has been cancelled	Y Cancelled N Not cancelled
35	Filler	String	1		
Total Length			36		

3.10.4 Closing Price (62)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.4	●	●		

The Closing Price message is generated near the end of the business day for each security. If the closing price is not available, the field 'ClosingPrice' is set to 0. Note that the 'NumberOfTrades' field is not populated for SS (OMD Securities Standard) clients.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	62 Closing Price
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	ClosingPrice	Int32	4	Current Day Closing Price	3 implied decimal places
12	NumberOfTrades	Uint32	4	Total Number of Trades performed on the given instrument	
Total Length			16		

3.10.5 Nominal Price (40)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.5	●	●		

The Nominal message may be generated when an order is added, deleted or modified in a book or when trade or trade cancel is performed. Before the arrival of the first Nominal Price message, the nominal price should be the same as the previous closing price provided in the Security Definition (11) message.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	40 Nominal Price
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	NominalPrice	Int32	4	Nominal price of a security	3 implied decimal places
Total Length			12		

Note: Nominal Price may be 0 in specific cases (e.g. no reference price)

3.10.6 Indicative Equilibrium Price (41)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.6	●	●	●	

The Indicative Equilibrium Price (IEP) message is generated whenever there is change of the Indicative Equilibrium Price (IEP) or Indicative Equilibrium Volume (IEV) during the Pre-Opening Session (POS) or Closing Auction Session (CAS). The IEP will become 0 when IEP does not exist.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	41 Indicative Equilibrium Price
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	Price	Int32	4	IEP	3 implied decimal places Value is 0 if IEP is not available
12	AggregateQuantity	Uint64	8	IEV	
Total Length			20		

3.10.7 Reference Price (43)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.10.7	●	●	●	

This message provides the reference price, lower and upper price limits for order input during an applicable auction session and will be sent again when there is any change of the reference price, lower and upper price limits during the session. Also the same information may be resent during the auction session.

For Pre-Opening Session (POS), a Reference Price message is generated at the beginning of No Cancellation session for all securities applicable for POS. At Blocking session, all prices will be reset to zero.

Note: with regard to the upper and lower price limit for Order Input session in POS, please refer to the POS related fields in Security Definition (11).

For Closing Auction Session (CAS), a Reference Price message is generated at the start of the session for all the securities tradable on the day, regardless of whether it is a CAS applicable security or not.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	43 Reference Price
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	ReferencePrice	Int32	4	Reference price of the security for order input in POS and CAS.	3 implied decimal places Value is 0 if the reference price is not available
12	LowerPrice	Int32	4	Lower price limit of at-auction Limit sell order in POS No Cancellation and Random Matching periods Lower price of the allowed price band for order input in CAS	3 implied decimal places 0 means Not available
16	UpperPrice	Int32	4	Upper price limit of at-auction Limit buy order in POS No Cancellation and Random Matching periods Upper price of the allowed price band for order input in CAS	3 implied decimal places 0 means Not available
Total Length			20		

Note: Reference Price may be 0 in special cases (e.g. no nominal price).

3.10.8 VCM Trigger (23)

The VCM Trigger message is generated whenever a cooling off period is triggered by Volatility Control Mechanism (VCM).

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	23 VCM Trigger

Offset	Field	Format	Len	Description	Values
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	CoolingOffStartTime	Uint64	8	Time when the cooling off period starts	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second.
16	CoolingOffEndTime	Uint64	8	Time when the cooling off period ends	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970, precision is provided to the nearest second.
24	VCMReferencePrice	Int32	4	Reference Price for the cooling off period	3 implied decimal places
28	VCMLowerPrice	Int32	4	Lower price in the price band allowed during the cooling off period	3 implied decimal places
32	VCMUpperPrice	Int32	4	Upper price in the price band allowed during the cooling off period	3 implied decimal places
Total Length			36		

3.11 VALUE ADDED DATA

3.11.1 Statistics (60)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.11.1	●	●		

The Statistics message provides statistics including volume-weighted average price and turnover. It is generated, excluding overseas trades, once after:

- all corresponding trades matched in Continuous Trading Session (CTS) or in an auction session
- manual trade
- odd lot trade
- trade cancel

Note that the 'VWAP' field is not populated for SS (OMD Securities Standard) clients.

The ShortSellSharesTraded and ShortSellTurnover fields (the shortsell fields) are only updated twice each day at most for securities with shortselling activities - at the end of the morning session if the shortsell fields are non-zero and at the end of the afternoon session if the value of any of the shortsell fields are different from that disseminated at the end of the morning session.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	

Offset	Field	Format	Len	Description	Values
2	MsgType	Uint16	2	Type of message	60 Statistics
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	SharesTraded	Uint64	8	Number of shares traded for a security	
16	Turnover	Int64	8	Current turnover	3 implied decimal places
24	HighPrice	Int32	4	Highest trade price currently performed for a security.	3 implied decimal places
28	LowPrice	Int32	4	Lowest trade price currently performed for a security	3 implied decimal places
32	LastPrice	Int32	4	Last trade price for a security	3 implied decimal places
36	VWAP	Int32	4	Volume-Weighted Average Price.	3 implied decimal places
40	ShortSellSharesTraded	Uint32	4	Number of short-sell shares traded for a security	
44	ShortSellTurnover	Int64	8	Current short-sell turnover for a security.	3 implied decimal places
Total Length			52		

3.11.2 Market Turnover (61)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.11.2	●	●		

The Market Turnover message contains the total turnover (excluding the turnover of overseas trades) for all securities on a given market segment for a given trading currency. It also provides the total turnover (excluding the turnover of overseas trades) for all securities regardless of trading currency on a given market segment in HKD equivalent. Under normal circumstances, the updates are disseminated around every 2 seconds during the trading hours.

When the CurrencyCode is blank, the turnover represents the total turnover traded on the given market segment for all trading currencies, expressed in HKD.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	61 Market Turnover
4	MarketCode	String	4	Market segment identifier	MAIN GEM NASD ETS
8	CurrencyCode	String	3	Currency code of all securities of which the market turnover is derived.	See Currency Values in section 3.1.2 for full details. Blank for total turnover for the Market Segment (i.e. MarketCode) in HKD equivalent.

Offset	Field	Format	Len	Description	Values
11	Filler	String	1		
12	Turnover	Int64	8	Total Traded Turnover of the stocks traded on the market segment in the respective currency	3 implied decimal places
Total Length			20		

3.11.3 Yield (44)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.11.3	●	●		

The Yield message is generated for bond securities when their yield percentage changes.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	`44` Yield
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values `1` – `99999`
8	Yield	Int32	4	Current yield of the bond security based on its coupon rate and nominal price	3 implied decimal places `0` means Not available
Total Length			12		

3.12 NEWS

3.12.1 News (22)

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.12	●	●		

The News message is generated whenever a news update occurs. The message indicates which markets and/or securities the news is applied to. If NoMarketCode and NoSecurityCodes are both set to zero, the news applies to all markets.

The news may be fragmented across multiple consecutive messages. The LastFragment field will be set to 'Y' in the message that contains the last fragment. The "Headline" will only be carried in the first message and blanked from the second message onwards.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	

Offset	Field	Format	Len	Description	Values
2	MsgType	Uint16	2	Type of message	22 News
4	NewsType	String	3	Type of Exchange news	EXN Exchange news EXC Chinese Exchange news
7	NewsID	String	3	Unique number for the news page within each NewsType	
10	Headline	String / Binary	320	News headline	If NewsType is EXN the Headline is ASCII encoded If NewsType is EXC the Headline is Unicode UTF-16LE encoded
330	CancelFlag	String	1	Indicator of whether previously released exchange news (identified by NewsType and NewsID) has been cancelled	Y Cancelled N Not cancelled
331	LastFragment	String	1	Indicates whether this message is the last in a sequence of messages	Y Complete N Not complete
332	Filler	String	4		
336	ReleaseTime	Uint64	8	Release time of the news.	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 ReleaseTime precision is currently provided to the nearest second
344	Filler	String	2		
346	NoMarketCodes	Uint16	2	Number of Market segment identifier within this message	0 to 4
348	MarketCode	String	4	Market segment identifier	MAIN GEM NASD ETS
$348 + 4n_M$	Filler	String	2		
$350 + 4n_M$	NoSecurityCodes	Uint16	2	Number of security codes within this message	0 to 200
$352 + 4n_M$	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
$352 + 4n_M + 4n_S$	Filler	String	2		
$354 + 4n_M + 4n_S$	NoNewsLines	Uint16	2	Number of news lines.	Maximum of 10 lines per “news page” is currently supported
$356 + 4n_M + 4n_S$	NewsLine	String / Binary	160	News line	If NewsType is EXN the NewsLine is ASCII encoded If NewsType is EXC the NewsLine is Unicode UTF-16LE encoded
Total Length		$356 + 4n_M + 4n_S + 160n_P$			

(n_M = value of NoMarketCodes)

(n_S = value of NoSecurityCodes)

(n_P = value of NoNewsLines)

3.13 INDEX DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.13				●

The indices supplied under the OMD Index are described in more detail in Appendix A, as it may be amended from time to time.

3.13.1 Index Definition (70)

The Index Definition message contains the static referential data for the given index and is generated at the start of the business day and may be re-disseminated during the trading hours.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	70 Index Definition
4	IndexCode	String	11	Upstream source's index code or market information identifier	See Index Code in Appendix A for full details
15	IndexSource	String	1	Index or market information source.	C CSI and CES H HSI X HKEX
16	CurrencyCode	String	3	Currency code of Index Turnover.	See Currency Values in section 3.1.2 for full details. CurrencyCode can be blank if not defined by third party index compilers
19	Filler	String	1		
Total Length			20		

3.13.2 Index Data (71)

The Index Data message contains all the real-time data for a given index. Fields within this message may be populated with null values to identify when an update is not provided. See section 3.1.1 (Null Values) for more information about null values.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	71 Index Data
4	IndexCode	String	11	Upstream source's index code or market information identifier.	See Index Code in Appendix A for full details

Offset	Field	Format	Len	Description	Values
15	IndexStatus	String	1	Index status.	C Closing value I Indicative O Opening index P Last close value (prev. ses.) R Preliminary close S Stop loss index T Real-time index value IndexStatus can be blank if not defined by third party index compilers
16	IndexTime	Int64	8	Publisher timestamp.	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 IndexTime precision is currently provided to the nearest second.
24	IndexValue	Int64	8	Current value of the index.	4 implied decimal places
32	NetChgPrevDay	Int64	8	Net change of IndexValue from the previous close, as provided in index source	4 implied decimal places
40	HighValue	Int64	8	Highest value for an index.	4 implied decimal places
48	LowValue	Int64	8	Lowest value for an index	4 implied decimal places
56	EASValue	Int64	8	Estimated Average Settlement Value	2 implied decimal places
64	IndexTurnover	Int64	8	Current turnover of underlying constituents	4 implied decimal places
72	OpeningValue	Int64	8	First value for an index.	4 implied decimal places
80	ClosingValue	Int64	8	Last value for an index	4 implied decimal places
88	PreviousSesClose	Int64	8	Previous session closing value (previous day's closing value for CSI , CES and S&P, previous session's closing value for HSI and TR)	4 implied decimal places
96	IndexVolume	Int64	8	Index volume of underlying constituents. Only applicable for CSI and CES.	
104	NetChgPrevDayPct	Int32	4	Percentage change of IndexValue from the previous close, as provided in index source	4 implied decimal places
108	Exception	String	1	Exception indicator	# Index with HSIL defined exceptional rule applied ' ' Normal index (empty string)
109	Filler	String	3		
Total Length			112		

3.14 STOCK CONNECT DATA

The information supplied in this section and its sub-sections applies to the Datafeed(s) marked with [●]

Section	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.14	▲	▲	▲	

▲ Complimentary service to the Datafeed(s)

3.14.1 Stock Connect Daily Quota Balance (80)

The Stock Connect Daily Quota Balance message provides updates on the Northbound Daily Quota Balance (DQB) for Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect separately. Under normal circumstances, the updates are disseminated around every 5 seconds during the trading hours.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	`80` Stock Connect Daily Quota Balance (DQB)
4	StockConnectMarket	String	2	Markets connected under Stock Connect Program	`SH` Shanghai Stock Exchange `SZ` ShenZhen Stock Exchange
6	TradingDirection	String	2	Trading Direction	`NB` Northbound trading
8	DailyQuotaBalance	Int64	8	Northbound Daily Quota Balance (DQB) value for specified Stock Connect Program	DQB in Renminbi (RMB) NULL value will be provided when DQB is above or equal to 30% of the daily quota. Actual DQB value will be provided when DQB is below 30% of the daily quota. Upon that, the actual DQB value will be provided for the rest of the trading day. `0` when the respective DQB is used up
16	DailyQuotaBalanceTime	Uint64	8	Time of DailyQuotaBalance	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 DailyQuotaBalanceTime precision is currently provided to the nearest second.
Total Length			24		

3.14.2 Stock Connect Market Turnover (81)

The Stock Connect Market Turnover message provides aggregate turnover under Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect (“the Stock Connect programs”). The aggregate turnover is provided for the Northbound trading and the Southbound trading separately under each of the Stock Connect programs.

For Northbound trading, Buy+Sell Turnover will only be provided after the market close of the trading day in Shanghai and Shenzhen market, normally by 16:00.

For Southbound trading, under normal circumstances, the updates are disseminated around every one minute during the trading hours.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	`81` Stock Connect Market Turnover
4	StockConnectMarket	String	2	Markets connected under Stock Connect Program	`SH` Shanghai Stock Exchange `SZ` ShenZhen Stock Exchange
6	TradingDirection	String	2	Trading Direction	`NB` Northbound trading `SB` Southbound trading
8	BuyTurnover	Int64	8	Total turnover of Buy trades from the Southbound trading (as specified in TradingDirection) under the Stock Connect Program rounded down to integer	Turnover in HKD for Southbound trading Turnover for Northbound trading is not available Null value for Northbound trading
16	SellTurnover	Int64	8	Total turnover of Sell trades from the Southbound trading (as specified in TradingDirection) under the Stock Connect Program rounded down to integer	Turnover in HKD for Southbound trading Turnover for Northbound trading is not available Null value for Northbound trading
24	Buy+SellTurnover	Int64	8	Sum of the values of BuyTurnover and SellTurnover rounded down to integer	Turnover in RMB for Northbound trading and HKD for Southbound trading
Total Length			32		

4. RECOVERY

OMD provides three different mechanisms for recovering missed data:

- Line arbitration – using dual multicast channels (Line A and Line B)
- Retransmission Server – recovery of a limited number of messages
- Refresh Server – snapshot of current market state

These mechanisms should be used as described in the following table.

Table 2: Recovery Mechanisms

Event	Action
Packet lost on one either Line A or Line B	Try to recover data from the other line with a configurable timeout ("arbitration mechanism").
Dropped packet(s) on both Line A and Line B	Recover dropped message(s) from the Retransmission Server.
Late start up or extended intraday outage	Wait for a refresh of the current market state and then continue with real time messages.

4.1 GAP DETECTION

Each packet provides the sequence number (SN) of the first message it contains. This sequence number starts at 1 and increases with each subsequent message.

The sequence numbers provided in every packet header is calculated by adding the previous sequence number and the message count, as shown in table below:

Table 3: Sequence Number Calculation

Packet	Sequence Number	Message Count
Packet 1	1	4
Packet 2	5	2
Packet 3	7	1
Packet 4	8	3
Packet 5	11	1

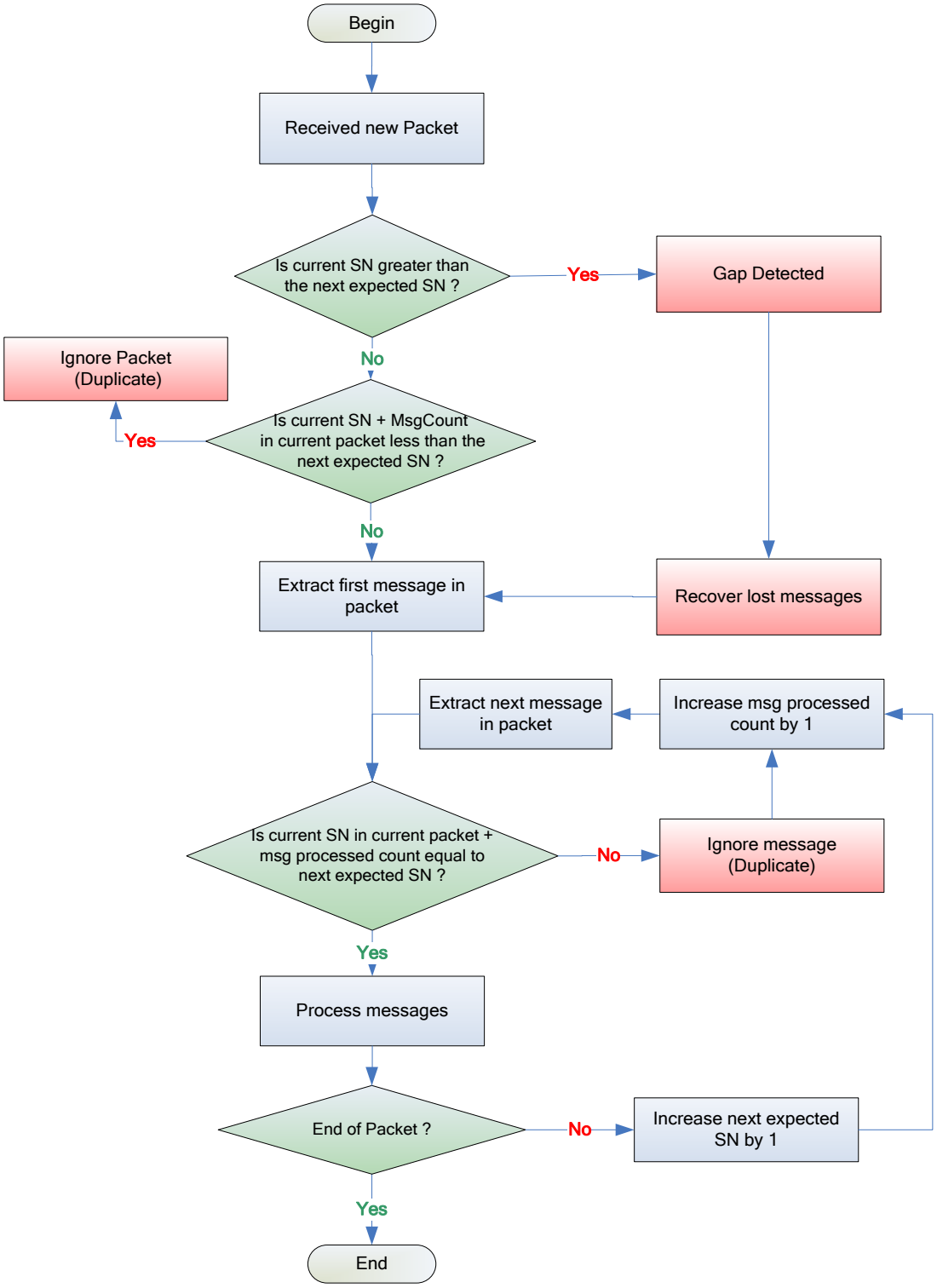
If the client drops the first five packets they would request a gap fill for messages 1-11.

All messages conform to the message level sequencing. Each channel has its own sequence number. This allows recipients to detect gaps or duplicates in each message sequence number and, if appropriate, reconcile them (line arbitration) with the primary or secondary multicast groups or request retransmission of the missing / corrupted messages.

Users should use this sequence number to detect gaps in the transmission of messages.

The following diagram illustrates how the message sequence number should be used to detect gaps in the feed.

Figure 2: Gap Detection using the Sequence Number (SN)



4.2 LINE ARBITRATION

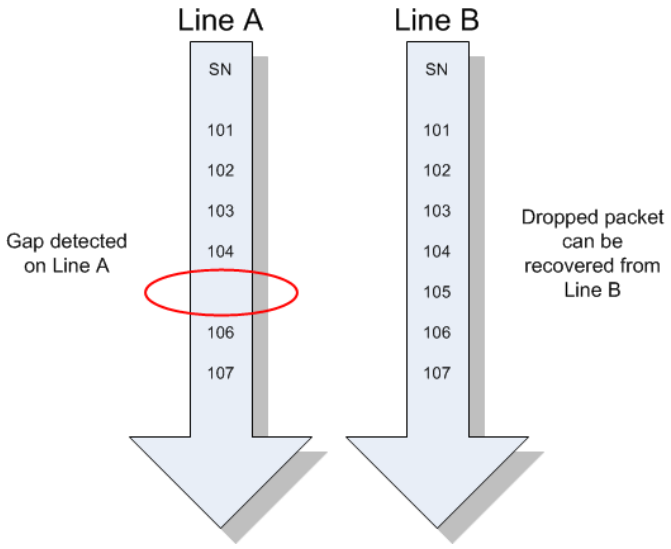
Client applications should check the sequence number (SN) and message count (MC) for every packet received. SNs are unique and increase monotonically for each service, the MC indicates the number of messages within each packet.

Line A and Line B are identical in terms of:

- SNs
- Messages that are sent
- Sequence in which messages are sent

However it is not guaranteed that a packet content between Line A and Line B will be the same. For example the third packet of the day from the Line A could contain SN 10 with MC 3, whereas the third packet of the day from Line B could contain SN 9 with MC 4. For this reason clients must arbitrate on SN (at the message level) rather than packet content. Client applications should listen to both Line A and Line B in real-time. Clients should look at packets coming from both lines and process the ones that arrive first, regardless of whether they came from Line A or Line B. It is advisable to apply the "first come – first served" rule.

Figure 3 – Detecting Missing Packets



Additional Notes;

- The above example of a dropped packet is a simplified example assuming 1 message per packet, in reality each packet is likely to contain multiple messages
- Whilst the order of individual messages between Line A and Line B will be identical, there is no guarantee that the packets will contain exactly the same messages.
- In the example below, three packets are sent on each line, but message 'OrderUpdate3' appears in one packet from Line A but in the subsequent packet on Line B.

Figure 4 – Normal Message Delivery

Primary		
Messages	**MC**	**SN**
OrderUpdate1 OrderUpdate2 OrderUpdate3	3	101
Trade1 OrderUpdate4	2	104
Trade2 Statistics1	2	106

Secondary		
SN	**MC**	**Messages**
101	2	OrderUpdate1 OrderUpdate2
103	3	OrderUpdate3 Trade1 OrderUpdate4
106	2	Trade2 Statistics1

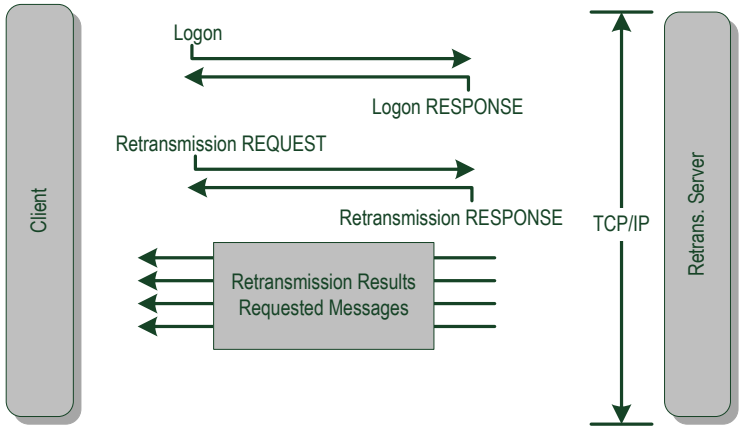
4.3 RETRANSMISSION SERVICE

The retransmission service is provided via the TCP/IP protocol and is designed to allow clients to recapture a small number of missed messages already published on the real time channels.

It is not intended that clients use the retransmission server to recover data after long outages or on late start up (in these situations, clients should use the Refresh service). To that end, it supports the retransmission of the last 50,000 messages per multicast channel only. The sequence range of messages that a client can request and the number of retransmission requests permitted per day is also limited.

The following diagram illustrates the message flow during a retransmission session:

Figure 5: Retransmission Request



Logon

The client establishes a TCP/IP connection and initiates a session by sending the Logon message. Once the client is authenticated the server will respond immediately with the Logon Response message. If the client does not send a Logon message within the logon timeout interval, the server will close the connection.

Logons may be rejected for the following reasons:

- Invalid username
- User already connected

In all cases the server will close the connection after sending the Logon Response message.

Making a request

The client can make a retransmission request by sending the Retrans Request message. The server will respond with a Retrans Response message to indicate whether the request has been accepted or not.

In the case of a successful request the server will send the requested messages immediately after the Retrans Response message.

The sequence numbers will be the same as when they were first sent on the real time multicast channel. The framing of the retransmitted messages into a packet may differ from the original transmission.

Retransmission requests may be rejected for the following reasons:

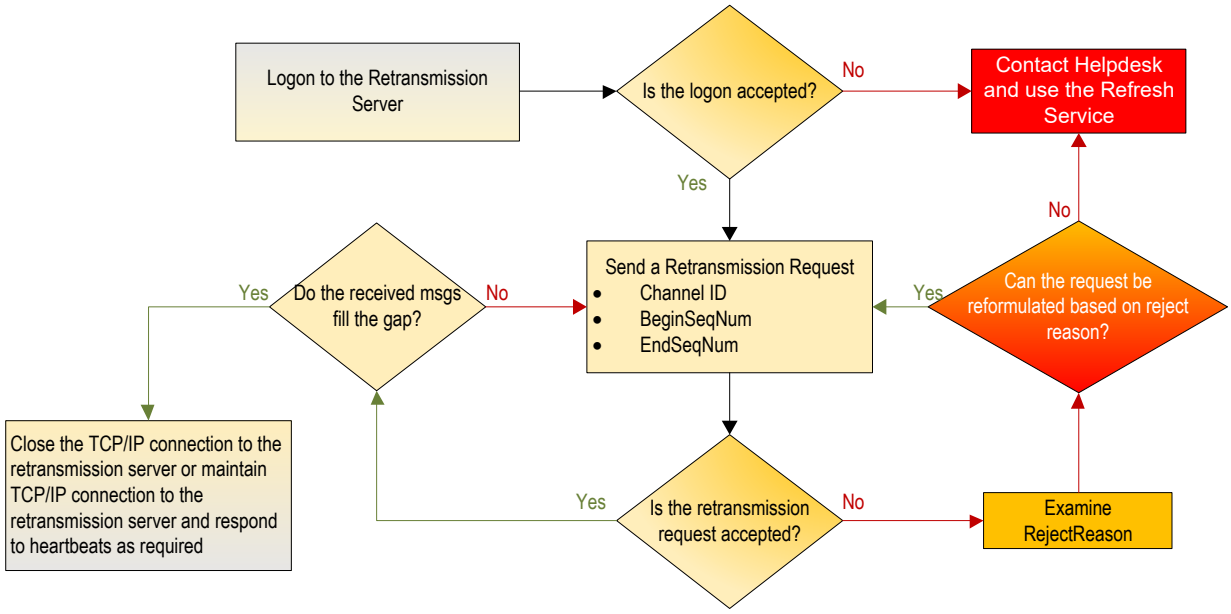
- Unknown channel ID or illegal (not authorized)
- Messages not available
- Exceeds maximum sequence range

- Exceeds maximum requests in a day

In the case where the client has exceeded the maximum number of requests allowed in a day, the server will close the connection after sending the Retrans Response message.

The following diagram is a guideline of the flow of logic when making a request:

Figure 6: Requesting Dropped Packets



Multiple requests and concurrent sessions

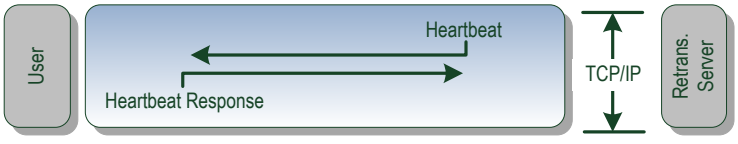
Clients can send multiple requests during a session and can keep the session open during idle periods by responding to heartbeats sent by the server. Concurrent sessions however will not be supported. Each user can only have one session open at a time.

If a client makes multiple requests, the server will process them serially. Clients are unable to cancel outstanding requests.

Heartbeats

To determine the health of the user connection on the TCP/IP channel, the Retransmission Server will send regular heartbeat packets to the user. The heartbeat frequency is 30 seconds. The client application must respond with a “Heartbeat Response” packet. The time out for this heartbeat response packet is set at 5 seconds. If no response is received by the server within this timeframe, the TCP/IP session will be disconnected.

Figure 7: Retransmission Server Heartbeat Message



A “heartbeat response” packet consists in an exact copy of the incoming heartbeat packet.

Closing the session

Sessions should be terminated by gracefully closing the TCP/IP connection.

System limits

The system limits mentioned above are set as follows:

System Limit	Value
Last number of messages available per channel ID	50,000
Maximum sequence range that can be requested	10,000
Maximum number of requests per day	1,000
Logon timeout (seconds)	5
Heartbeat interval (seconds)	30
Heartbeat response timeout (seconds)	5

Please note that the maximum number of requests per day limit is across all channels.

High availability

Four sets of IP address and port are provided for the retransmission service in order to facilitate high availability (two are in primary site and two are in secondary site). All four retransmission servers are available to be connected regardless of the multicast dissemination is in the primary or secondry site. Clients may connect to any one of retransmission servers at the start of the day and maintain the connection during the day by responding to heartbeats. However, clients should not connect to multiple retransmission servers concurrently.

In the event that a Retransmission Server does not respond to a logon or retransmission request, another Retransmission Server should be used.

In the event of a failure of any Retransmission Server, there may be a short period of unavailability. This failure should be detected by clients through the loss of connection. In this case another Retransmission Server should be used.

Alternative Retransmission Servers should not be used as a means of requesting from multiple sources at the same time.

4.4 REFRESH SERVICE

The refresh service is designed to allow clients to recover from a large scale data loss. This can happen after a late start or during a major outage.

Synchronization is on a per channel basis. For each real time multicast channel, there exists a corresponding refresh multicast channel on which snapshots of the market state are sent at regular intervals throughout the business day until the time as stated in Section 2.2.2 for various channels.

Market state

A snapshot of the market state is described in the table below.

Message	Snapshot description
Market Definition	Latest market static message for each market.
Security Definition	Latest security static message for each security.
Liquidity Provider	Latest liquidity provider message for each security.
Trading Session Status	Latest trading session status message for each market.
Security Status	Security Status message for halted securities and securities resumed trading with status changed to 'resumed' on the current trading day.
VCM Trigger	Latest VCM Trigger message for each VCM applicable security with cooling off period trigged by VCM.
Add Order	Snapshot for all non-empty books.
Add Odd Lot Order	Snapshot for all non-empty books.

Message	Snapshot description
Aggregate Order Book Update	Snapshot for all non-empty books. Occasionally Aggregated Order Book Update messages will be sent for emptied order books after cancellation or matching of all outstanding orders. In such cases the value of the NoEntries will be “0”.
Broker Queue	Snapshot for all non-empty books. Occasionally Broker Queue messages will be sent for emptied broker queues after cancellation or matching of all outstanding orders. In such cases the value of the ItemCount will be “0”.
Order Imbalance	Latest Order Imbalance for each CAS applicable security.
Closing Price	Closing Price message if available for each security.
Indicative Equilibrium Price	Latest Indicative Equilibrium Price message for each security.
Nominal Price	Latest Nominal Price message for each security.
Reference Price	Latest Reference Price for each security.
Statistics	Latest Statistics message for each security.
Market Turnover	Latest Market Turnover message per market / currency pair.
Currency Rate	Latest Currency Rate message for each currency.
News	All News messages.
Index Definition	Latest Index Definition message for each index.
Index Data	Latest Index Data message for each index.
Yield	Latest Yield message generated for bond securities when their yield percentage last changed
Stock Connect Daily Quota Balance	Latest Stock Connect Daily Quota Balance for each Stock Connect Program
Stock Connect Market Turnover	Latest Stock Connect Market Turnover for each Stock Connect Program and trading direction.

Refresh complete

A Refresh Complete message is sent at the end of a snapshot indicating the sequence number with which the snapshot is synchronized.

Snapshot processing

Below is an overview of the steps to carry out in order to process a channel snapshot.

- Subscribe to the real time multicast channel and cache received messages.

- Subscribe to the corresponding refresh multicast channel and discard messages until the Refresh Complete message is received.
- Process received messages until the next Refresh Complete message is received.
- Store the LastSeqNum sequence number provided in the Refresh Complete.
- Unsubscribe to the refresh multicast channel.

- Discard the cached real time messages with sequence number less than or equal to LastSeqNum.
- Process the remaining cached real-time messages and resume normal processing.

Missed messages

The retransmission server does not support refresh channels. If a client misses messages, it must wait for the next snapshot. Similarly if a client starts listening during the middle of a snapshot, it must wait for the next snapshot.

5. AGGREGATE ORDER BOOK MANAGEMENT

Book Identification

For each security there exists an odd lot book and a board lot book in the trading system. A book is therefore uniquely identified by SecurityCode.

Partial Price Depth

Securities shall be traded in accordance with the scale of spreads set out in the Second Schedule of the Rules of the Exchange respective to the Spread Table Code specified in their Securities Definition message. The tick level provides information on how many spreads from the best price for an order price whereas a price level is assigned to each price existing in the OMD order book. An order price with tick level 1 means the order price is the best price, a tick level of 2 means the order price is one spread from the best price, etc. The Aggregate Order Book Update message sends out the price level but not the tick level.

The concept of tick and price levels is illustrated in the table below, assuming that the best bid price of a security is 9800 and the spread is 10 for this price range. In the table there are orders in 5 bid prices so the number of price levels is 5 (contiguous price levels from 1 to 5); these orders are distributed over 10 spreads (tick levels) so the tick levels are from 1 to 10. Taking orders with bid price 9710 as example, it is the 5th price in the book so the price level will be 5 and it is 9 spreads from the best bid price so the tick level will be 10.

Bid Side			
Tick	**PriceLevel**	**AggregateQuantity**	**Price**
1	1	700	9800
2	2	350	9790
3			
4			
5	3	150	9760
6			
7			
8			
9	4	250	9720
10	5	100	9710

OMD provides a view of 10 tick depths of the aggregate order book for securities market and does not provide updates on price levels which are more than 9 spreads away from the best price. This view can be visualized as a number of rows in a table for each of the bid and ask sides. On each side there are a number of rows showing the aggregate quantity available at a number of price levels and tick levels.

Bid Side				Ask Side			
Tick	**PriceLevel**	**AggregateQuantity**	**Price**	**Price**	**AggregateQuantity**	**PriceLevel**	**Tick**
1	1	700	9730	9760	500	1	1
2	2	350	9720	9770	300	2	2
3	3	150	9710	9780	100	3	3
4	4	250	9700	9790	150	4	4
5	5	100	9690				5
6	6	150	9680				6
7	7	50	9670				7
8	8	200	9660				8
9	9	100	9650				9
10							10

OMD only sends updates within the 10 tick levels in the aggregate order book except for Explicit Deletion (please refer Example 5 illustrated below for details)

Book Updates

Book update messages are generated by OMD as delta messages defined in section 3.9.6 (Aggregate Order Book Update (53)). Each message may contain any combination of new, changed or deleted entries for a book. The nature of an entry is defined by its UpdateAction.

New, to create/insert a new price level
Delete, to remove a price level
Change, to update aggregate quantity at a price level
Orderbook Clear, to inform users that all price levels should be cleared

Example 1 – Quantity Reduction and Explicit Addition

For example suppose the Ask order at price level 9770 is reduced in quantity and at the same time a new order is added at price level 9850, then the following message is sent;

Offset	Field Name	Value
0	MsgSize	60
2	MsgType	53
4	SecurityCode	1234
8	Filler	NULL
11	NoEntries	**2**
12	AggregateQuantity	200
20	Price	9770
24	NumberOfOrders	1
28	Side	1 (Offer)
30	PriceLevel	2
31	UpdateAction	1
32	Filler	NULL
36	AggregateQuantity	300
44	Price	9850
48	NumberOfOrders	1
52	Side	1 (Offer)
54	PriceLevel	5
55	UpdateAction	0
56	Filler	NULL

The resulting book should now be as follows:

Bid Side				Ask Side			
Tick	PriceLevel	AggregateQuantity	Price	Price	AggregateQuantity	PriceLevel	Tick
1	1	700	9730	9760	500	1	1
2	2	350	9720	9770	200	2	2
3	3	150	9710	9780	100	3	3
4	4	250	9700	9790	150	4	4
5	5	100	9690				5
6	6	150	9680				6
7	7	50	9670				7
8	8	200	9660				8
9	9	100	9650				9
10				9850	300	5	10

Example 2 – Implicit Level Adjustments

The client must adjust the price level of entries below deleted or inserted entries. Potential level adjustments must be carried out after each single entry in Aggregate Order Book message.

For example, if a bid order with price 9740 and quantity 50 is added to the order book above, it will cause the following message to be sent:

Offset	Field Name	Value
0	MsgSize	36
2	MsgType	53
4	SecurityCode	1234
8	Filler	NULL
11	NoEntries	1
12	AggregateQuantity	50
20	Price	9740
24	NumberOfOrders	1
28	Side	0 (Bid)
30	PriceLevel	1
31	UpdateAction	0
32	Filler	NULL

After processing this message, the client's book should look as follows:

Bid Side				Ask Side			
Tick	PriceLevel	AggregateQuantity	Price	Price	AggregateQuantity	PriceLevel	Tick
1	1	50	9740	9760	500	1	1
2	2	700	9730	9770	200	2	2
3	3	350	9720	9780	100	3	3
4	4	150	9710	9790	150	4	4
5	5	250	9700				5
6	6	100	9690				6
7	7	150	9680				7
8	8	50	9670				8
9	9	200	9660				9
10	10	100	9650	9850	300	5	10

Price levels of the other 9 Bid orders must all be incremented although there will not be Aggregate Order Book Update messages sent for the increment.

Example 3 – Implicit Deletions

If a new book entry causes the bottom entry of a book to be shifted out of the book (i.e. more than 9 spreads away from the best price), the client must delete the excess entry. If the book shrinks again, the server resends the entries that have temporarily fallen out.

For example, if a bid order with price 9750 and quantity 250 is added to the book above, and the bid quantity at price 9660 is reduced from 200 to 150, it will cause the following message to be sent:

Offset	Field Name	Value
0	MsgSize	60
2	MsgType	53

	4	SecurityCode	1234	
	8	Filler	NULL	
	11	NoEntries	2	
	12	AggregateQuantity	250	
	20	Price	9750	
	24	NumberOfOrders	1	
	28	Side	0 (Bid)	
	30	PriceLevel	1	
	31	UpdateAction	0	
	32	Filler	NULL	
	36	AggregateQuantity	150	
	44	Price	9660	
	48	NumberOfOrders	1	
	52	Side	0 (Bid)	
	54	PriceLevel	10	
	55	UpdateAction	1	
	56	Filler	NULL	

After processing this message, the client's book should look as follows:

Bid Side				Ask Side			
Tick	PriceLevel	AggregateQuantity	Price	Price	AggregateQuantity	PriceLevel	Tick
1	1	250	9750	9760	500	1	1
2	2	50	9740	9770	200	2	2
3	3	700	9730	9780	100	3	3
4	4	350	9720	9790	150	4	4
5	5	150	9710				5
6	6	250	9700				6
7	7	100	9690				7
8	8	150	9680				8
9	9	50	9670				9
10	10	150	9660	9850	300	5	10

Price 9750 and quantity 250 is added according to the message.

Price 9650 and quantity 100 must be deleted by the client.

Price 9660 quantity must be reduced to 150 – PriceLevel 10 is used in the incoming message to reflect the new price level of the price 9660 after the addition of the price 9750.

Example 4 – Explicit Additions

If a match causes an order to be removed so that there are now less than 10 levels visible then the server will also automatically send the additional level(s) that are now revealed.

For example, if the bid order with price 9750 and quantity 250 is now removed from the book above and this reveals an 11th level which needs to be disseminated then it will cause the following message to be sent:

	Offset	Field Name	Value	
	0	MsgSize	60	
	2	MsgType	53	
	4	SecurityCode	1234	
	8	Filler	NULL	

	11	NoEntries	2
	12	AggregateQuantity	250
	20	Price	9750
	24	NumberOfOrders	1
	28	Side	0 (Bid)
	30	PriceLevel	1
	31	UpdateAction	2
	32	Filler	NULL
	36	AggregateQuantity	100
	44	Price	9650
	48	NumberOfOrders	1
	52	Side	0 (Bid)
	54	PriceLevel	10
	55	UpdateAction	0
	56	Filler	NULL

The resulting order book should now be;

Bid Side				Ask Side			
Tick	PriceLevel	AggregateQuantity	Price	Price	AggregateQuantity	PriceLevel	Tick
1	1	50	9740	9760	500	1	1
2	2	700	9730	9770	200	2	2
3	3	350	9720	9780	100	3	3
4	4	150	9710	9790	150	4	4
5	5	250	9700				5
6	6	100	9690				6
7	7	150	9680				7
8	8	50	9670				8
9	9	200	9660				9
10	10	100	9650	9850	300	5	10

Example 5 – Explicit Deletions

Suppose a new book entry causes the last tick entry (Tick 10 in the previous order book in Example 4) to be shifted out of the book, if the shifted out entry is within 10 price level, OMD will send an explicit deletion for the entry. If the shifted out entry is outside the 10 price level, OMD will not send further updates on that price and the client must delete the excess entry (please refer to Example 3 above for details) to ensure their order book will not keep out-dated information.

For example, if an ask order with price 9750 and quantity 300 is added to the order book above, it will cause the following message to be sent:

	Offset	Field Name	Value
	0	MsgSize	60
	2	MsgType	53
	4	SecurityCode	1234
	8	Filler	NULL
	11	NoEntries	2
	12	AggregateQuantity	300
	20	Price	9750
	24	NumberOfOrders	1
	28	Side	1 (Offer)

	30	PriceLevel	1	
	31	UpdateAction	0	
	32	Filler	NULL	
	36	AggregateQuantity	300	
	44	Price	9850	
	48	NumberOfOrders	1	
	52	Side	1 (Offer)	
	54	PriceLevel	6	
	55	UpdateAction	2	
	56	Filler	NULL	

The resulting order book should now be;

Bid Side				Ask Side			
Tick	PriceLevel	AggregateQuantity	Price	Price	AggregateQuantity	PriceLevel	Tick
1	1	50	9740	9750	300	1	1
2	2	700	9730	9760	500	2	2
3	3	350	9720	9770	200	3	3
4	4	150	9710	9780	100	4	4
5	5	250	9700	9790	150	5	5
6	6	100	9690				6
7	7	150	9680				7
8	8	50	9670				8
9	9	200	9660				9
10	10	100	9650				10

Explicit Deletions versus Implicit Deletions

Suppose initially bid orders are queued in 8 price levels in the aggregate order book and assume there is no order inputted at price 9770 & 9740. The aggregate order book will be as follows.

Bid Side			
Tick	PriceLevel	AggregateQuantity	Price
1	1	700	9800
2	2	350	9790
3	3	150	9780
4			
5	4	250	9760
6	5	100	9750
7			
8	6	400	9730
9	7	200	9720
10	8	300	9710

When new bid orders at 3 different prices (9860, 9850 & 9840) arrived, the resulting book will be changed as follows:

Bid Side				
Tick	PriceLevel	AggregateQuantity	Price	
1	1	450	9860	← new order, Explicit Addition
2	2	550	9850	← new order, Explicit Addition
3	3	650	9840	← new order, Explicit Addition

4				
5				
6				
7	4	700	9800	← previous best bid, now at PriceLevel 4 (Tick 7), Implicit Level Adjustment
8	5	350	9790	← previous 2nd best bid, now at PriceLevel 5 (Tick 8), Implicit Level Adjustment
9	6	150	9780	← previous 3rd best bid, now at PriceLevel 6 (Tick 9), Implcit Level Adjustment
10				
11	7	250	9760	← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion
12	8	100	9750	← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion
13				
14	9	400	9730	← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion
15	10	200	9720	← orders exceed 10 Tick but within 10 PriceLevel, Explicit Deletion
16	11	300	9710	← orders exceed 10 Tick & exceed 10 PriceLevel, Implicit Deletion

Orders in shaded area which were originally within the 10 tick levels offered in OMD now fall outside the 10 tick levels. OMD will send Explicit Delete for orders which fall outside 10 tick levels but are within 10 price levels (i.e. entries highlighted in blue). However OMD will not send Explicit Delete for orders which are outside 10 price levels (i.e. entries highlighted in pink) and the client must delete the excess entries (i.e. Implicit Delete by the client).

The following message will be sent:

Offset	Field Name	Value
0	MsgSize	180
2	MsgType	53
4	SecurityCode	1234
8	Filler	NULL
11	NoEntries	7
12	AggregateQuantity	450
20	Price	9860
24	NumberOfOrders	1
28	Side	0 (Bid)
30	PriceLevel	1
31	UpdateAction	0
32	Filler	NULL
36	AggregateQuantity	550
44	Price	9850
48	NumberOfOrders	1
52	Side	0 (Bid)
54	PriceLevel	2
55	UpdateAction	0
56	Filler	NULL
60	AggregateQuantity	650
68	Price	9840
72	NumberOfOrders	1
76	Side	0 (Bid)
78	PriceLevel	3
79	UpdateAction	0
80	Filler	NULL
84	AggregateQuantity	250
92	Price	9760
96	NumberOfOrders	1
100	Side	0 (Bid)

102	PriceLevel	7
103	UpdateAction	2
104	Filler	NULL
108	AggregateQuantity	100
116	Price	9750
120	NumberOfOrders	1
124	Side	0 (Bid)
126	PriceLevel	7
127	UpdateAction	2
128	Filler	NULL
132	AggregateQuantity	400
140	Price	9730
144	NumberOfOrders	1
148	Side	0 (Bid)
150	PriceLevel	7
151	UpdateAction	2
152	Filler	NULL
156	AggregateQuantity	200
164	Price	9720
168	NumberOfOrders	1
172	Side	0 (Bid)
174	PriceLevel	7
175	UpdateAction	2
176	Filler	NULL

Example 6 – Orderbook Clear

In certain failure scenarios the system may send an 'Orderbook Clear' message at which point clients should clear both Bid and Ask side orderbooks for the specified security. An example message is shown below.

Following an 'Orderbook Clear' message any existing orders for the security will be resent as normal to rebuild the current image.

Offset	Field Name	Value
0	MsgSize	36
2	MsgType	53
4	SecurityCode	1234
8	Filler	NULL
11	NoEntries	1
12	AggregateQuantity	0
20	Price	0
24	NumberOfOrders	0
28	Side	0
30	PriceLevel	0
31	UpdateAction	74
32	Filler	NULL

6. MISSING INDEX REPORT

In a situation that some index data are not published due to OMD Index Feed issue, a missing index report would be delivered to subscribers by email at the end of business day. Report would not be provided in case of the failure from index compliers.

The missing index report contains the missed index data updated from the index source during the interuption as indicated in the report file name. The report is in CSV format and sample file could be downloaded via this link.

Record Fields

Field	Description	Values
IndexCode	Upstream source's index code or market information identifier	See Index Code in Appendix A for full details
IndexStatus	Index status	C Closing value I Indicative O Opening index P Last close value (prev. ses.) R Preliminary close S Stop loss index T Real-time index value IndexStatus can be blank if not defined by third party index compilers
IndexTime	Publisher timestamp	The number of nanoseconds elapsed since midnight Coordinated Universal Time (UTC) of January 1, 1970 IndexTime precision is currently provided to the nearest second.
IndexValue	Current value of the index	4 implied decimal places
NetChgPrevDay	Net change of IndexValue from the previous close, as provided in index source	4 implied decimal places
HighValue	Highest value for an index	4 implied decimal places
LowValue	Lowest value for an index	4 implied decimal places
EASValue	Estimated Average Settlement Value	2 implied decimal places
IndexTurnover	Current turnover of underlying constituents	4 implied decimal places
OpeningValue	First value for an index	4 implied decimal places
ClosingValue	Last value for an index	4 implied decimal places
PreviousSesClose	Previous session closing value (previous day's closing value for CSI , CES and S&P, previous session's closing value for HSI and TR)	4 implied decimal places
IndexVolume	Index volume of underlying constituents. Only applicable for CSI and CES	
NetChgPrevDayPct	Percentage change of IndexValue from the previous close, as provided in index source	4 implied decimal places
Exception	Exception indicator	# Index with HSIL defined exceptional rule applied ' ' Normal index (empty string)

APPENDIX A – LIST OF INDICES AND MARKET INFORMATION UNDER OMD INDEX

The information supplied in this appendix applies to OMD Index only.

Appendix A1

The indices supplied under the OMD Index are described in the table below, as it may be amended from time to time pursuant to clause 2.2 of the Licence Agreement. The mark [●] specifies if an index disseminated under the OMD Index is Third Party Content under the Licence Agreement. Licensee shall refer to clause 10.6 of the Market Data Vendor Licence Agreement and notices issued from time to time for redistribution of Third Party Content.

The Index Source and Index Code in the table below include the source and code for market information.

Index Source[1]	Index Code	Name of the Index and market information disseminated under the OMD Index	Third Party Content under the Licence Agreement	Third Party Index Ownership
C[2]	CES120	CES China 120 Index	●	CES
C	CESA80	CES China A80 Index	●	CES
C	CESCPD	CES China Mainland Property Developer Index	●	CES
C	CESFHY	CES Forecast High Dividend Yield Index	●	CES
C	CESHKM	CES China HK Mainland Index	●	CES
C	CES280	CES China 280 Index	●	CES
C	CESG10	CES Gaming Top 10 Index	●	CES
C	CES300	CES Stock Connect 300 Index	●	CES
C	CES100	CES Stock Connect Hong Kong Select 100 Index	●	CES
C	CESHKB	CES HK Biotechnology Index	●	CES
C	CESP50	CES Stock Connect Hong Kong Premier 50 Index	●	CES
C	990001	CES China Semiconductor Chips Index	●	CES
C	CSI300	CSI 300 Index	●	CSI
C	000942	CSI China Mainland Consumer Index	●	CSI
C	H11123	CSI Hong Kong Mainland Enterprises 50 Index	●	CSI
C	H11100	CSI Hong Kong 100 Index	●	CSI
C	H11140	CSI Hong Kong Dividend Index	●	CSI
C	H11144	CSI Hong Kong Listed Tradable Mainland Consumption Index	●	CSI
C	H11143	CSI Hong Kong Connect Mainland Real Estate Index	●	CSI
C	H11120	CSI Hong Kong Middle Cap Select Index	●	CSI
C	H11152	CSI Hong Kong Private-owned Mainland Enterprises Index	●	CSI
C	H11153	CSI Hong Kong State-owned Mainland Enterprises Index	●	CSI
C	H11110	CSI RAFI Hong Kong 50 Index	●	CSI
C	000016	SSE 50 Index	●	SSE
C	000021	SSE 180 Governance Index	●	SSE
C	000010	SSE 180 Index	●	SSE
C	000009	SSE 380 Index	●	SSE
C	000066	SSE Commodity Equity Index	●	SSE
C	000001	SSE Composite Index	●	SSE
C	000015	SSE Dividend Index	●	SSE
C	000043	SSE Mega-cap Index	●	SSE

C	000044	SSE Mid Cap Index	●	SSE
C	000065	SSE Industry Top Index	●	SSE
H	0001500	Hang Seng China Affiliated Corporations Index	●	HSDS
H	0001400	Hang Seng China Enterprises Index	●	HSDS
H	0000100	Hang Seng Index	●	HSDS
H	0000101	HSI Sub Indices – Finance	●	HSDS
H	0000102	HSI Sub Indices – Utilities	●	HSDS
H	0000103	HSI Sub Indices – Property	●	HSDS
H	0000104	HSI Sub Indices – Commerce & Industry	●	HSDS
H	0105000	HSI Volatility Index (VHSI)	●	HSDS
H	0200700	Hang Seng Mainland Banks Index	●	HSDS
H	0200800	Hang Seng Mainland Properties Index	●	HSDS
H	0201000	Hang Seng Mainland Oil and Gas Index	●	HSDS
H	0205000	HSI ESG Index	●	HSDS
H	0205100	HSCEI ESG Index	●	HSDS
H	0207700	Hang Seng Biotech Index	●	HSDS
H	0208300	Hang Seng TECH Index	●	HSDS
H	0215000	HSI ESG Enhanced Index	●	HSDS
H	0216200	Hang Seng HKEX Stock Connect China Enterprises Index	●	HSDS
H	1006800	Hang Seng Index (Gross Total Return Index)	●	HSDS
H	1006801	Hang Seng Finance Sub-Index (Gross Total Return Index)	●	HSDS
H	1006802	Hang Seng Utilities Sub-Index (Gross Total Return Index)	●	HSDS
H	1006803	Hang Seng Properties Sub-Index (Gross Total Return Index)	●	HSDS
H	1006804	Hang Seng Index Commerce & Industry Sub-Index (Gross Total Return Index)	●	HSDS
H	1007200	Hang Seng China Enterprises Index (Gross Total Return Index)	●	HSDS
H	2006800	Hang Seng Index (Net Total Return Index)	●	HSDS
H	2006801	Hang Seng Finance Sub-Index (Net Total Return Index)	●	HSDS
H	2006802	Hang Seng Utilities Sub-Index (Net Total Return Index)	●	HSDS
H	2006803	Hang Seng Properties Sub-Index (Net Total Return Index)	●	HSDS
H	2006804	Hang Seng Index Commerce & Industry Sub-Index (Net Total Return Index)	●	HSDS
H	2007200	Hang Seng China Enterprises Index (Net Total Return Index)	●	HSDS

Appendix A2

HKEX Indices, comprising HKEX's proprietary and co-branded index offerings, supplied under the OMD Index datafeed are described in the table below, which may be amended from time to time. Distribution of the HKEX Indices to Market Data Vendors, End-Users or Application Service Providers ("Clients") via the OMD Index datafeed, however, does not confer, and shall not be construed as conferring, any right, licence, consent or permission to use the HKEX Indices for any purpose. Any use of the HKEX Indices is subject to a separate licence from HKEX Information Services Limited ("HKEX-IS") for non-Mainland incorporated clients or HKEX Informaton Services (China) Limited ("HKEX-IS CHINA") for Mainland incorporated clients. Accordingly, any Client wishing to use the HKEX Indices in any manner or for any purpose must obtain an appropriate licence from HKEX-IS or HKEX-IS CHINA (as the case may be).

Index Source[1]	Index Code	Name of the Index and market information disseminated under the OMD Index
X	HKEXT100	HKEX Tech 100 Index
X	HKEXTT	HKEX Tech 100 Total Return Index
X	HKEXTN	HKEX Tech 100 Net Total Return Index
X	HKEXTR	HKEX Tech 100 Index (CNY)
X	HKEXTU	HKEX Tech 100 Index (USD)
X	HKEXTTR	HKEX Tech 100 Total Return Index (CNY)

X	HKEXTTU	HKEX Tech 100 Total Return Index (USD)
X	HKEXTNR	HKEX Tech 100 Net Total Return Index (CNY)
X	HKEXTNU	HKEX Tech 100 Net Total Return Index (USD)
X	HKEXUST	HKEX Tech & US Tech 100 Index
X	HKEXUSU	HKEX Tech & US Tech 100 Index (USD)
X	HKEXUSTT	HKEX Tech & US Tech 100 Total Return Index
X	HKEXUSTU	HKEX Tech & US Tech 100 Total Return Index (USD)
X	HKEXUSTN	HKEX Tech & US Tech 100 Net Total Return Index
X	HKEXUSNU	HKEX Tech & US Tech 100 Net Total Return Index (USD)
X	HKEXBML	HKEX Bursa Malaysia Large Cap Index
X	HKEXBMM	HKEX Bursa Malaysia Large Cap Index (MYR)
X	HKEXBMU	HKEX Bursa Malaysia Large Cap Index (USD)
X	HKEXBMLT	HKEX Bursa Malaysia Large Cap Total Return Index
X	HKEXBMTM	HKEX Bursa Malaysia Large Cap Total Return Index (MYR)
X	HKEXBMTU	HKEX Bursa Malaysia Large Cap Total Return Index (USD)
X	HKEXBMLN	HKEX Bursa Malaysia Large Cap Net Total Return Index
X	HKEXBMNM	HKEX Bursa Malaysia Large Cap Net Total Return Index (MYR)
X	HKEXBMNU	HKEX Bursa Malaysia Large Cap Net Total Return Index (USD)
X	HKEXKRXS	HKEX KRX Semiconductor Index
X	HKEXKRW	HKEX KRX Semiconductor Index (KRW)
X	HKEXKRU	HKEX KRX Semiconductor Index (USD)
X	HKEXKRXT	HKEX KRX Semiconductor Total Return Index
X	HKEXKRTW	HKEX KRX Semiconductor Total Return Index (KRW)
X	HKEXKRTU	HKEX KRX Semiconductor Total Return Index (USD)
X	HKEXKRXN	HKEX KRX Semiconductor Net Total Return Index
X	HKEXKRNW	HKEX KRX Semiconductor Net Total Return Index (KRW)
X	HKEXKRNU	HKEX KRX Semiconductor Net Total Return Index (USD)
X	HKEXAI	HKEX Artificial Intelligence Index
X	HKEXAIR	HKEX Artificial Intelligence Index (CNY)
X	HKEXAIU	HKEX Artificial Intelligence Index (USD)
X	HKEXAIT	HKEX Artificial Intelligence Total Return Index
X	HKEXAITR	HKEX Artificial Intelligence Total Return Index (CNY)
X	HKEXAITU	HKEX Artificial Intelligence Total Return Index (USD)
X	HKEXAIN	HKEX Artificial Intelligence Net Total Return Index
X	HKEXAINR	HKEX Artificial Intelligence Net Total Return Index (CNY)
X	HKEXAINU	HKEX Artificial Intelligence Net Total Return Index (USD)
X	HKEXSEMI	HKEX Semiconductor Index
X	HKEXSER	HKEX Semiconductor Index (CNY)
X	HKEXSEU	HKEX Semiconductor Index (USD)
X	HKEXSET	HKEX Semiconductor Total Return Index
X	HKEXSETR	HKEX Semiconductor Total Return Index (CNY)
X	HKEXSETU	HKEX Semiconductor Total Return Index (USD)
X	HKEXSEN	HKEX Semiconductor Net Total Return Index
X	HKEXSENR	HKEX Semiconductor Net Total Return Index (CNY)
X	HKEXSENU	HKEX Semiconductor Net Total Return Index (USD)

Note 1: The stop time of repective index channels can refer to Section 2.2.2 Normal Transmission.

Note 2: For indices with the index source = C, in the event there is service outage in the HKEX primary data center and restart of OMD-C at the secondary data center, real-time dissemination of CSI and CES index data will be suspended until service resumption of the HKEX primary data center.

Abbreviation:

CES	=	China Exchanges Services Company Limited
CSI	=	China Securities Index Company Limited
HSDS	=	Hang Seng Data Services Limited
HSI	=	Hang Seng Indexes Company Limited

APPENDIX B – REFERENCE PRICE, PRICE BAND FOR ORDER INPUT, INDICATIVE EQUILIBRIUM PRICE AND ORDER IMBALANCE DURING PRE-OPENING SESSION

Below chart illustrates messages related to trading session, reference price, price limits, IEP and order imbalance in the pre-opening session. There will be other messages (e.g., order book data, status data, news, etc) to be disseminated in the pre-opening session based on the events.

Timeline	**OMD-C Start Trading Session = Not Yet Open**		**Trading Session change to Order Input**		**Trading Session change to No Cancellation**		**Trading Session change to Random Matching**		**Trading Session change to Order Matching**		**Trading Session change to Blocking**	
Message	**Trading Session Status (20)**		**Trading Session Status (20)**		**Trading Session Status (20)**		**Trading Session Status (20)**		**Trading Session Status (20)**		**Trading Session Status (20)**	
Key field	*TradingSessionSubID*	100 (Not Yet Open)	*TradingSessionSubID*	1 (OI)	*TradingSessionSubID*	101 (NW)	*TradingSessionSubID*	108 (RM)	*TradingSessionSubID*	2 (MA)	*TradingSessionSubID*	7 (BL)
Message	**Security Definiton (11)**				**Reference Price (43)**						**Reference Price (43)**	
Key fields	*POSFlag*	"Y" / "N" for POS applicable or not			*Reference price*	Reference price of all orders in POS period					*Reference price*	0, reset value
	PreviousClosingPrice	Reference price of all orders in POS period			*UpperLimit*	Upper price limit of at-auction Limit buy order in POS No Cancellation and Random Matching periods					*UpperLimit*	0, reset value
	POSUpperLimit	Upper price limit of all orders in POS Order Input period, and At-auction Limit sell order in POS No Cancellation and Random Matching periods			*LowerLimit*	Lower price limit of at-auction Limit sell order in POS No Cancellation and Random Matching periods					*LowerLimit*	0, reset value
	POSLowerLimit	Lower price limit of all orders in POS Order Input period, and At-auction Limit buy order in POS No Cancellation and Random Matching periods										
Message			**Indicative Equilibrium Price (41)**		**Indicative Equilibrium Price (41)**		**Indicative Equilibrium Price (41)**		**Indicative Equilibrium Price (41)**			
Key fields			*Price*	Indicative Equilibrium Price	*Price*	Indicative Equilibrium Price	*Price*	Indicative Equilibrium Price	*Price*	0, reset value		
			AggregateQuantity	Indicative Equilibrium Volume	*AggregateQuantity*	Indicative Equilibrium Volume	*AggregateQuantity*	Indicative Equilibrium Volume	*AggregateQuantity*	0, reset value		
Message			**Order Imbalance (56)**		**Order Imbalance (56)**		**Order Imbalance (56)**		**Order Imbalance (56)**			
Key fields			*OrderImbalanceDirection*	Imbalance direction when the matchable buy quantity and sell quantity at IEP are not equal	*OrderImbalanceDirection*	matchable buy quantity and sell quantity at IEP are not equal	*OrderImbalanceDirection*	Imbalance direction when the matchable buy quantity and sell quantity at IEP are not equal	*OrderImbalanceDirection*	<space>, reset value		
			OrderImbalanceQuantity	Absolute difference between the matchable buy quantity and the sell quantity at IEP	*OrderImbalanceQuantity*	Absolute difference between the matchable buy quantity and the sell quantity at IEP	*OrderImbalanceQuantity*	Absolute difference between the matchable buy quantity and the sell quantity at IEP	*OrderImbalanceQuantity*	0, reset value		

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DOCUMENT HISTORY

Version	Date of Issue	Comments
v1.0	20 April 2012	First Distribution Issue
v1.1	31 July 2012	Revised Edition with the following updates; • Add additional notes on Sections 3.4.2, 3.9.7 • Section 3.7.2 – refine encoded method used in SecurityNameGB & SecurityNameGCCS to be Unicode UTF-16LE & the values for Style & NoUnderlyingSecurities • Sections 3.9.1 – 3.9.6 – align to industry practice to use " 0 for bid, 1 for offer" instead of "1 for buy & 2 for sell" • Section 3.9.6 – add new UpdateAction "74 for Orderbook Clear" for the clients to clear their aggregate order books • Section 3.12.1 – provision for Chinese Exchange news • Section 4.1 – refine the diagram for gap detection mechanism • Section 5 – elaborate more on aggregate order book management with more typical examples for different book operations • Addition of 3 new indices in Appendix A
v1.2	31 October 2012	Revised Edition with the following updates: • Section 3.2 – packet sizing notes expanded for better clarity • Section 3.9.3 – Add a filler field to Delete Order (33) • Section 3.10.3 – add notes to state that "TradeTime" and "TrdType" are not applicable when TrdCancelFlag = Y • Section 3.10.3 – remove "104 Overseas Trade" from Trade Ticker (52) message • Section 4.4 – Remove Trade and Trade Ticker rows in RFS • Section 4.4 – Refine the wording for IEP in refresh • Section 5 – update example 5 for the correct message sent
v1.2.1	6 December 2012	Revised Edition with the following updates: • Section 3.1 – clarify string to be padded with spaces. • Section 3.5.2 – clarify that SessionStatus 5 covers both invalid username or invalid IP address • Section 3.9.7– add indicator to extend the optional Broker Queue to SF client • Section 3.11.1 – elaborate more on the update logic of Short sell fields • Appendix A – add index codes information and 1 new index to the list of indexes table
v1.3	9 May 2013	Revised Edition with the following updates: • Section 1.3 – Message Formats column added • Section 3.1 – ASCII clarification added • Section 3.5 – Add opening phrase for retransmission • Section 3.7.2 – Values column of field 'UnderlyingSecurityWeight' added with a note • Section 3.7.2 – Note (1) clarification added • Section 3.9.1-3.9.5 – Revise wordings for description of OrderID • Section 3.11.1 – Clarification added in the first paragraph • Section 3.11.2 – Clarification added in the first paragraph • Section 3.11.2 – Values column of field "Currency Code" added with a note • Section 3.12.1 – Clarification added in the second paragraph • Section 4.4 – Revise snapshot description for Security Status • Appendix A – Index table added with 2 new indices and more content
V1.4	24 July 2013	Revised Edition with the following updates: • Section 4.4 – Revised snapshot description for Aggregated Order Book and Broker Queue • Appendix A – Index code for CES China HK Mainland Index rectified
V1.5	7 Oct 2013	Revised Edition with the following updates: • Section 3.10.5 – Add notes on Nominal Price • Section 3.11.1 – Add notes on trading statistics during auction session • Section 2.2.1 – Updated system startup time • Section 4.4 – Updated snapshot notes for market turnover
V1.5A	Jun 30, 2014	Revised Edition with the following updates: • Appendix A – adding one new indices CES China 280 Index
V1.6	04 Jul 2014	Revised Edition with the following updates: • Sections 1.1 and 1.4 – Add description and section for Scope of Information • Section 2.2 – Add notes on the possible test data transmission during non-production hours. • Section 2.2.2 –Clarify the heartbeat interval being "about every 2 seconds"

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<table>
<tr><td></td><td></td><td>• Sections 3.13, 3.13.1, 3.13.2 & Appendix A – Add information on the new market information (Northbound Daily Quota Balance) via IndexSource “C”</td></tr>
<tr><td>V1.7</td><td>25 Jul 2014</td><td>Revised Edition with the following updates:
• Sections 3.13.2 –Update the Note for Northbound Daily Quota Balance and add note to the value of IndexVolume field</td></tr>
<tr><td>V1.8</td><td>21 Nov 2014</td><td>Revised Edition with the following updates:
• Appendix A – adding two new indices CES Stock Connect Hong Kong Select 100 Index and CES Shanghai-Hong Kong Stock Connect 300 Index</td></tr>
<tr><td>V1.9</td><td>3 Feb 2015</td><td>Revised Edition with the following updates:
• Section 3.13.1 – Add description for index definition dissemination
• Section 3.13.2 – Add note to IndexVolume field for Northbound Daily Quota Balance value</td></tr>
<tr><td>V1.10</td><td>19 May 2015</td><td>Revised Edition with the following updates:
• Section 3.11.1 – Update description for Statistics (60) message</td></tr>
<tr><td>V1.10A</td><td>12 Aug 2015</td><td>Revised Edition with the following updates:
• Section 3.8.2 – Typo Correction
• Appendix A – Update the index name “CSI HK Mainland Enterprises 50 Index” and add six new HSI indices and add six new HSI indices</td></tr>
<tr><td>V1.11</td><td>5 Aug 2015</td><td>Revised Edition with the following updates:
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Phrase 1 of CAS on 25 Jul 2016

VCM on 22 Aug 2016</td><td>Introduction of Closing Auction Session (CAS) & Volatility Control Mechanism (VCM)
• Section 1.3 – Add new messages Order Imbalance (56), Reference Price (43), VCM Trigger (23)
• Section 3.2 – Add New MsgType for Order Imbalance (56), Reference Price (43), VCM Trigger (23)
• Section 3.7.2 – Introduce two fields “VCM Flag” and “CAS Flag” in Securities Definition
• Section 3.8.1 – New field values for new trading sessions in CAS
• Section 3.9.8 – Add new Order Imbalance (56) message
• Section 3.10.6 – Revise description of Indicative Equilibrium Price (41) message
• Section 3.10.7 – Add new Reference Price (43) message
• Section 3.10.8 – Add new VCM Trigger (23) message
• Section 4.4 – Include Order Imbalance (56), Reference Price (43), VCM Trigger (23) in refresh service</td></tr>
</table></td></tr>
<tr><td>V1.11B</td><td>14 Dec 2015</td><td>Revised Edition with the following updates:
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Section 3.11.1 – Revise the description for Statistics (60) message to reflect the change effective in mid 2015 that Statistics message will be sent after every trade including off-exchange trades reported during auction session</td></tr>
<tr><td>Phrase 1 of CAS on 25 Jul 2016</td><td>Other Enhancements
• Section 3.7.2 – Format change to Security Definition (11) message to insert a number of fillers inside the message
• Section 3.7.2 – Add new possible value “O” for others for the data field CallPutFlag in addition to the existing possible values “C” for Call and “P” for Put</td></tr>
</table></td></tr>
<tr><td>V1.12</td><td>19 Feb 2016</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Section 3.4.2 – Revise description for Sequence Reset message
• Section 3.8.2 – Rename the data field “SecurityTradingStatus” (at Offset#8) to “SuspensionIndicator” and revise its description</td></tr>
<tr><td>6 Mar 2017</td><td>Introduction of a new Disaster Recovery (DR) mechanism
• Section 2.2.4.2 – Add paragraphs to describe the new DR mechanisms
• Section 3.2 – Add message type 105 for Disaster Recovery Signal
• Section 3.4.3 – Add Disaster Recovery Signal (105) message</td></tr>
<tr><td>Phrase 1 of CAS on 25 Jul 2016</td><td>Clarifications
• Section 3.9 – Revise description for Order Book Data
• Section 3.10.7 – Revise description for Reference Price message</td></tr>
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<table>
<tr><td>V1.13</td><td>01 Mar 2016</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>18 Apr 2016</td><td>Launch of new Index
• Appendix A – Add new index “CES Gaming Top 10 Index”</td></tr>
</table></td></tr>
<tr><td>V1.14</td><td>13 May 2016</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Sections 3.8.1 and 3.10.8 – Revise descriptions for Time fields to align across the document</td></tr>
<tr><td>23 May 2016</td><td>Renaming of CES Shanghai-Hong Kong Stock Connect 300 Ind
• Appendix A – Rename “CES Shanghai-Hong Kong Stock Connect 300 Index” to “CES Stock Connect 300 Index”</td></tr>
</table></td></tr>
<tr><td>V1.15</td><td>21 Jun 2016</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Section 3.3 and 3.8.1 – Enhance descriptions to clarify Time fields</td></tr>
<tr><td>5 Dec 2016</td><td>Launch of Shenzhen – Hong Kong Stock Connect
• Section 3.13.2 – Include Northbound Daily Quota Balances of Shenzhen Hong Kong Stock Connect
• Appendix A – Add new market information for Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect</td></tr>
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<tr><td>V1.16</td><td>04 Aug 2016</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Sections 3.13.1 and 3.13.2 – Revise to clarify IndexCode, NetChgPrevDay and NetChgPrevDayPct</td></tr>
<tr><td>29 Aug 2016</td><td>Launch of new Indices
• Sections 2.2.2 and 2.2.3 – Enhance to clarify descriptions
• Section 3.1.2 – Add CNH
• Section 3.13.1 – Add new IndexSource
• Section 3.13.2 – Add TR under descriptions of NetChgPrevDay , PreviousSesClose and NetChgPrevDayPct
• Appendix A – Add 4 new HKEX and Thomson Reuters co-branded indices</td></tr>
</table></td></tr>
<tr><td>V1.17</td><td>24 Aug 2016</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>29 Aug 2016</td><td>Launch of new Indices
• Appendix A – HKEX and Thomson Reuters co-branded indices are listed as Third Party Content under the Licence Agreement</td></tr>
</table></td></tr>
<tr><td>V1.18</td><td>4 Jan 2017</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>6 Mar 2017</td><td>Updates on the DR mechanism
• Section 2.2.4.2 – Remove DR mechanism based on Sequence Reset message
• Section 3.4.2 – Enhance descriptions to clarify Sequence Reset message</td></tr>
</table></td></tr>
<tr><td>V1.19</td><td>03 Feb 2017</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
Section 3.11.2 – Revise description for Market Turnover message</td></tr>
<tr><td>24 Jul 2017</td><td>Launch of Stock Connect Market Feed
• Section 1.3 – Include Stock Connect Data in Summary Table
• Section 1.4 – Include Stock Connect Data in Scope of Information
• Section 3.2 – Include Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81) in MsgType list
• Section 3.14 – Introduce new messages on Stock Connect Data including Stock Connect Daily Quota Balance (80) and Stock Connect Market Turnover (81)
• Section 4.4 – Include Stock Connect Data in Refresh Service</td></tr>
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<table>
<tr><td>V1.20</td><td>27 Feb 2017</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>1 Apr 2017</td><td>Removal of Index
• Appendix A – Remove “H11124 – CSI Overseas Mainland Enterprises Index (HKD)”</td></tr>
</table></td></tr>
<tr><td>V1.21</td><td>27 Mar 2017</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Section 2.2.1 – Revise description to clarify Start of Day</td></tr>
</table></td></tr>
<tr><td>V1.22</td><td>20 Oct 2017</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>30 Oct 2017</td><td>Remove Daily Quota Balance (DQB) from Index
• Section 3.13.2 – Remove all description related to “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”
• Appendix A – Remove “CSCSHQ Northbound Daily Quota Balance of Shanghai-Hong Kong Stock Connect” and “CSCSZQ Northbound Daily Quota Balance of Shenzhen-Hong Kong Stock Connect”</td></tr>
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<tr><td>V1.23</td><td>9 Mar 2018</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>30 Apr 2018</td><td>OMD-C Reference Data Enrichment :

More product attributes are added to Security Definition (11)
• Section 3.7.2 – Redefine Securities Definition (11) message with the following changes:
a) Replace reserved fillers with new reference data :
a) Product Type;
b) Upper Strike Price;
c) Warrant Type;
d) Call Price;
e) Entitlement; and
f) Number of Warrants per Entitlement
b) Revise description of existing attributes to reflect the enlarged coverage after the enrichment
g) Conversion Ratio
h) Style
c) Replace obsolete data fields with fillers
i) Test Security Flag
j) Underlying Security Weight
d) Remove reference to basket warrants

Include more indices in the Index Feed
• Appendix A – Add Index Code for the following new index:
a) CES Stock Connect Hong Kong Premier 50 Index

Other housekeeping changes:
• Section 1.1 – Include Market Data Application Service Provider Licence Agreement
• Section 2.4 – Revise the example of race conditions
• Section 3.1.1 – Present Null Values in table format
• Section 3.1.2 – Present Currency Codes in table format
• Section 3.7.1, 3.7.2, 3.11.2, 3.12.1 – Change all references to “market” to “market segment”
• Section 3.8.1 – Replace obsolete Trading Session ID with filler
• Section 3.10.1, 3.10.3 – Update reference to Public trade type</td></tr>
</table></td></tr>
<tr><td>V1.24</td><td>12 Sep 2018</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarifications
• Section 3.1.2 – Revise description for Currency Value
• Appendix A – Update the note for CSI and CES index data</td></tr>
<tr><td>27 Oct 2018</td><td>Include more indices in the Index Feed
• Appendix A – Add Index Code for the following new indices:
a) Hang Seng Index (Gross Total Return Index)
b) Hang Seng Finance Sub-Index (Gross Total Return Index)
c) Hang Seng Utilities Sub-Index (Gross Total Return Index)
d) Hang Seng Properties Sub-Index (Gross Total Return Index)</td></tr>
</table></td></tr>
</table>

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		e) Hang Seng Index Commerce & Industry Sub-Index (Gross Total Return Index) f) Hang Seng China Enterprises Index (Gross Total Return Index) g) Hang Seng Index (Net Total Return Index) h) Hang Seng Finance Sub-Index (Net Total Return Index) i) Hang Seng Utilities Sub-Index (Net Total Return Index) j) Hang Seng Properties Sub-Index (Net Total Return Index) k) Hang Seng Index Commerce & Industry Sub-Index (Net Total Return Index) l) Hang Seng China Enterprises Index (Net Total Return Index)
V1.25	7 Nov 2018	Revised Edition with the following updates **Effective Date**: 1 Dec 2018 **Changes**: **Change of indices in the Index Feed** • Appendix A Add Index Code for the following new index: a) CES HK Biotechnology Index Remove Index Code for the following index: b) CSI Cross-Straits 500 Index
V1.26	21 May 2019	Revised Edition with the following updates **Effective Date**: Immediate **Changes**: **Clarification** • Section 3.9.1 – Remove description of Market Order for AddOrder (31) message • Section 3.11.1 – Update description for Statistics (60) message **Effective Date**: 24 Jun 2019 **Changes**: **Include more indices in the Index Feed** • Appendix A – Add Index Code for the following new indices: a) CES China Semiconductor Index b) HKEX CNH Gold Futures – Excess Return Index c) HKEX CNH Gold Futures – Total Return Index d) HKEX CNH Gold Futures – Spot Price Index e) HKEX USD Gold Futures – Excess Return Index f) HKEX USD Gold Futures – Total Return Index g) HKEX USD Gold Futures – Spot Price Index • Appendix A – Additional Note for Dissemination time of Indices with index source = T **Change of System Operation Window** • Section 2.2.2 – Provide further details on the stop sending time for the real-time and refresh channels. • Section 2.2.3 – Adjust OMD shutdown time • Section 4.4 – Clarify on the refresh service available time for various channels.
V1.27	19 Jun 2019	Revised Edition with the following updates **Effective Date**: Immediate **Changes**: **Introduction of Inline Warrant** • Section 1.4 – Remove instrument list from this section • Section 3.7.2 – Additional Product Type – 15 Warrant – Inline Warrant
V1.28	31 Oct 2019	Revised Edition with the following updates **Effective Date**: 10 Feb 2020 **Changes**: **Introduction of New Spread Table Code** • Section 3.7.2 – Add Spread Table Code
V1.29	26 Nov 2019	Revised Edition with the following updates **Effective Date**: Immediate **Changes**: **Removal of Indexes** • Appendix A – Remove "0200900 Hang Seng Mainland Healthcare Index", "0201100 Hang Seng IT Hardware Index" and "0201200 Hang Seng Software & Services Index"
V1.30	4 Dec 2019	Revised Edition with the following updates **Effective Date**: 1 Jun 2020 **Changes**: **Introduction of New Spread Table Code** • Section 3.7.2 – Add Spread Table Code "05"

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V1.31	9 Mar 2020	Revised Edition with the following updates **Effective Date:** 10 Mar 2020 **Changes:** **Change of index code in the Index Feed** • Appendix A – Index code change for following index: a) CES China Semiconductor Index
V1.32	6 Apr 2020	Revised Edition with the following updates **Effective Date:** 19 Oct 2020 **Changes:** **Introduction of POS enhancement** • Section 3.7.2 – Add new fields POSFlag, POSUpperLimit, POSLowerLimit and extra fillers • Section 3.8.1 – Update TradingSessoinSubID value a) Modifiy description of TradingSessionSubID 101 b) Add TradingSessionSubID 108 c) Modify field value for all TradingSecStatus values • Section 3.9.8 – Modifiy description of Order Imbalance for Pre-opening session • Section 3.10.7 – Modify description to add information related to POS random matching • Appendix B – Add session for Reference price, Price band for order input, IEP and Order Imbalance information during Pre-Opening Session (POS)
V1.33	20 May 2020	Revised Edition with the following updates **Effective Date:** 18 Jan 2021 **Changes:** **Introduction of Resilience Model enhancement** • Section 2.2.4.1 – Modify description to provide more details on System Component Failure • Section 2.2.4.2 – Update disaster scenario behaviour • Section 4.3 – Updated High Availability and Disaster recovery • Section 6 – New session for missing index report
V1.33a	1 Jun 2020	Revised Edition with the following updates **Effective Date:** 15 Jun 2020 **Changes:** **Change of index name in the Index Feed** • Appendix A – Index name change for following index: a) CES China Semiconductor Index is renamed as CES China Semiconductor Chips Index
V1.33b	3 Aug 2020	Revised Edition with the following updates **Effective Date:** 17 Aug 2020 **Changes:** **Include more indices in the Index Feed** • Appendix A – Add Index Code for the following new indices: a) 0205000 - HSI ESG Index b) 0205100 - HSCEI ESG Index c) 0208300 - Hang Seng TECH Index
V1.33c	24 Sep 2020	Revised Edition with the following updates **Effective Date:** 12 Apr 2021 **Changes:** **Update on Resilience Model enhancement** • Section 6 – Add hyperlink for sample file of missing index report
V1.33d	5 Oct 2020	Revised Edition with the following updates **Effective Date:** 19 Oct 2020 **Changes:** **Updates on Introduction of POS enhancement** • Section 3.7.2 – Additional description of message field "PreviousClosingPrice" in Security Definition (11) message to support Net asset value per unit (NAV) for ETFs and L&I Products on the first day of listing
V1.33e	17 Dec 2020	Revised Edition with the following updates **Effective Date:** 12 Apr 2021 **Changes:** **Update on Resilience Model enhancement** • Section 3.4.3 – Further elaboration of the DR Signal (105) message

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<table>
<tr><td>V1.34</td><td>26 Apr 2021</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>31 May 2021</td><td>Update on Introduction of new fields for Bonds Reference Data and change of ETF Product Type in Security Definition (11)
• Section 3.7.2 – Add new Bonds specific fields: FaceValue, DecimalsInFaceValue, FaceValueCurrency, MaturityDate and InvestorType
• Section 3.7.2 – Add new ETF Product Types:
16 – Trust – Equity ETF;
17 – Trust – Fixed Income and Money Market ETF; and
18 – Trust – Commodities ETF
Remove ETF Product Type: 5 – Trust – Other ETF</td></tr>
</table></td></tr>
<tr><td>V1.35</td><td>19 Nov 2021</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Clarification
Section 3.7.2 – Clarification on “0” value for ConversionRatio</td></tr>
<tr><td>20 Mar 2023</td><td>Update on Increase the Transaction Time Precision
• Section 3.10.1 – Update trade time precision from second to microsecond for “TradeTime” data field in Trade (50) message
• Section 3.10.3 – Update trade time precision from second to microsecond for “TradeTime” data field in Trade Ticker (52) message</td></tr>
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<tr><td>V1.35a</td><td>7 Jan 2022</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Update on Introduction of SPAC Shares and SPAC Warrants
• Section 3.7.2 – Add new Product Types in Security Definition (11) message:
21 – Warrant – SPAC Warrants; and
24 – Equity – SPAC Shares</td></tr>
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<tr><td>V1.35b</td><td>28 Jan 2022</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>21 Mar 2022</td><td>Include more index in the Index Feed
• Appendix A – Add Index Code for the following new index:
a) 0215000 - HSI ESG Enhanced Index</td></tr>
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<tr><td>V1.35c</td><td>30 May 2022</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>13 Jun 2022</td><td>Remove indices in the Index Feed
• Appendix A – Remove Index Codes for the following indices:
a) RXYH - TR/HKEX RXY Global CNH
b) RXYY - TR/HKEX RXY Global CNY
c) RXYRH - TR/HKEX RXY Reference CNH
d) RXYRY - TR/HKEX RXY Reference CNY</td></tr>
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<tr><td>V1.36</td><td>24 Apr 2023</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Housekeeping
• Sections 1.1, Appendix A – Remove the wording “HKEX-IS” and added description for target readers
• Section 1 - Add description for target readers</td></tr>
</table></td></tr>
<tr><td>V1.37</td><td>15 Aug 2023</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Housekeeping
• Sections 3.10.1 and 3.10.3 – Remove Note 1 as trade time precision in microsecond is already effective</td></tr>
<tr><td>25 Sep 2023</td><td>Remove HKEX Gold Futures Indices
• Sections 2.2.2 and 2.2.3 – Update the shutdown time
• Section 3.13.1 & Appendix A – Remove HKEX Gold Futures Indices
a) HKGDUER - HKEX USD Gold Futures – Excess Return Index
b) HKGDUTR - HKEX USD Gold Futures – Total Return Index
c) HKGDUSP - HKEX USD Gold Futures – Spot Price Index
d) HKGDRER - HKEX CNH Gold Futures – Excess Return Index
e) HKGDRTR - HKEX CNH Gold Futures – Total Return Index
f) HKGDRSP - HKEX CNH Gold Futures – Spot Price Index</td></tr>
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<tr><td>V1.38</td><td>12 April 2024</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Upon the implementation of Adjustment to Stock Connect Data Dissemination</td><td>Update on the Adjustment to Stock Connect Data Dissemination
• Section 3.1.1 – Indicate possible NULL value in Stock Connect Data
• Section 3.14.1 – Further elaboration of the Stock Connect Daily Quota Balance (80) message
• Section 3.14.2 – Further elaboration and remove Northbound Buy Turnover and Northbound Sell Turnover in Stock Connect Market Turnover (81) message</td></tr>
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<tr><td>V1.39</td><td>21 June 2024</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>22 Jul 2024</td><td>Include more index in the Index Feed
• Appendix A – Add Index Code for the following new index:
CESCPD - CES CRIC Leading Mainland Property Developer Index
CESFHY - CES Forecast High Dividend Yield Index</td></tr>
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<tr><td>V1.40</td><td>18 October 2024</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>By June 2025 (Upon the launch of single tranche multiple counter arrangement)</td><td>Introduction of Single Tranche Multiple Counter Arrangement
Section 3.7.2 – Add a new field “DomainStmtSecurityCode” in Security Definition (11) message</td></tr>
</table></td></tr>
<tr><td>V1.41</td><td>15 Nov 2024</td><td>Revised Edition with the following update
<table>
<tr><th>Effective Date</th><th>Change</th></tr>
<tr><td>Immediate</td><td>Clarification
• Sections 3.4.2 – Update the wordings for the arrangement of clearing cached data to align with Developer’s Guide</td></tr>
<tr><td>16 Dec 2024</td><td>Include more index in the Index Feed
• Appendix A – Add Index Code for the following new index:
0216200 – Hang Seng HKEX Stock Connect China Enterprises Index</td></tr>
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<tr><td>V1.42</td><td>19 Dec 2024</td><td>Revised Edition with the following updates
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Changes of index name in the Index Feed
• Appendix A – Index name change for the following indexes:
a) CES CRIC Leading Mainland Property Developer Index is renamed as CES China Mainland Property Developer Index
b) CSI HK Mainland Enterprises 50 Index is renamed as CSI Hong Kong Mainland Enterprises 50 Index
c) CSI Hong Kong Listed Tradable Mainland Real Estate Index is renamed as CSI Hong Kong Connect Mainland Real Estate Index</td></tr>
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<tr><td>V1.43</td><td>7 Mar 2025</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Mid 2025 (Upon the launch of reduction of minimum spreads)</td><td>Updates for Reduction of Minimum Spreads
• Section 3.7.2 - Add new spread table code in Security Definition (11) message:
06 – Part E</td></tr>
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<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>25 Aug 2025</td><td>Include more index in the Index Feed
• Appendix A – Add Index Code for the following new index: 0207700 – Hang Seng Biotech Index</td></tr>
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<tr><td>V1.45</td><td>9 Jan 2026</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>Immediate</td><td>Housekeeping
• Section 2.1.2 – Update the paragraph for Dual Multicast Channels
• Section 2.3 -- Update the paragraph for Trading Sessions
• Section 3.7.2 – Remove “14 Warrant – Equity Linked Instrument (ELI)” in ProductType field
• Section 3.7.2 – Update the description of value “04” in SpreadTableCode field
• Move the Document History section to the end of the document</td></tr>
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<tr><td>V1.46</td><td>21 Aug 2026</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>31 October 2026</td><td>Remove S&P Indices
• Section 3.13.1 & Appendix A – Remove S&P Indices
a) S&P/HKEX LargeCap Index
b) S&P/HKEX GEM Index</td></tr>
<tr><td>Upon the launch of HKEX Indices</td><td>Introduction of HKEX Indices in the Index Feed
• Section 3.13.1 & Appendix A – Add HKEX Indices (33 new Indices)</td></tr>
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<tr><td>V1.47</td><td>3 Nov 2026</td><td>Revised Edition with the following updates
<table>
<tr><th>Effective Date</th><th>Changes</th></tr>
<tr><td>16 Nov 2026</td><td>Introduction of HKEX Artificial Intelligence Index and HKEX Semiconductor Index in the Index Feed
• Appendix A – Add HKEX Indices (18 new indices)</td></tr>
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