INTERFACE SPECIFICATIONS

HKEx Orion Market Data Platform
Securities Market & Index Datafeed Products

FIX/FAST Protocol

Version 1.0

20 April 2012

Related Documentation

- FIX5.0 SP2 Specifications (available on the FIX organization website)
- FAST version 1.2 Specifications (available on the FIX organization website)

DOCUMENT HISTORY

Distribution Version

Version	Date of Issue	Comments
V1.0	20 April 2012	First Distribution Issue

CONTENTS

1. INTRODUCTION

1.1 PURPOSE

This document specifies the FIX/FAST interface of the HKEx Orion Market Data Platform ("OMD").

This document is the Transmission Specification(s) of the relevant Datafeed(s) under your Market Data Vendor Licence Agreement or the Market Data End-User Licence Agreement ("Licence Agreement"). Please refer to Section 1.2 and the summary table at Section 1.3 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: FIX/FAST Template [To be provided at a later stage]

Appendix B: List of Indices under OMD Index

All chapters and appendices except Chapter 3 and Appendix B 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 B 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	OMD Securities Standard (SS)	OMD Securities Premium (SP)	OMD Securities FullTick (SF)	OMD Index (Index)
3.1	●	●	●	●
3.2	●	●	●	●
3.3	●	●	●	●
3.4	●	●	●	●
3.5	●	●	●	●
3.6	●	●	●	
3.7	●	●	●	
3.8	●	●	●	
3.9.1	▲ (odd lot)	▲ (odd lot)	● (board lot orders) ▲ (odd lot)	
3.9.2	●	●		
3.9.3	●	▲		
3.10.1		●	●	
3.10.2	●			
3.10.3	●	●		
3.10.4	●	●		
3.10.5	●	●	●	
3.11.1	●	●		
3.11.2	●	●		
3.11.3	●	●		
3.12	●	●		
3.13				●

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

▲ Complimentary service to the Datafeed(s)

1.4 FIX/FAST DISCLAIMER

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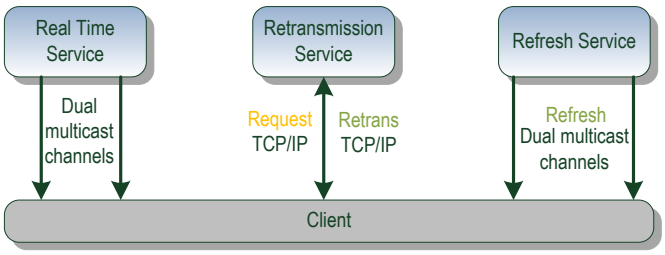
2. SYSTEM OVERVIEW

2.1 SCOPE

Figure 1: Access to Market Data



OMD provides market data formatted in the industry standard protocol FIX for all instruments listed on the Securities Market. It has been designed for high throughput and low latency, and to be easily scalable.

2.1.1 Multicast

Real time market data is disseminated via the UDP IP multicast protocol on a set of multicast channels. 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) will be found in a Connectivity Guide which will be provided at a later stage.

2.1.3 Recovery Mechanisms

OMD provides two recovery services:

- 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 FIX AND FAST

2.2.1 FIX Session Protocol

OMD uses the FIXT 1.1 session protocol.

2.2.2 FIX Application Protocol

OMD uses FIX 5.0 SP2 with extension packs for data distribution. In addition to the standard FIX tags, OMD introduces some user defined messages and tags.

2.2.3 FAST

The FIX messages are FAST encoded. FIX Adapted for Streaming (FAST) is an efficient data compression technique that eliminates much of the overhead associated with regular FIX messages.

The compression instructions are defined in a FAST template.

OMD relies on FAST version 1.2. The FAST Session Control Protocol (SCP) is not used in OMD.

OMD will publish FIX/FAST messages in blocks as per section 10 of the FAST specification document, see the section on Related Documentation at the top of this document for details.

2.3 SESSION MANAGEMENT

Each multicast channel maintains its own session. A session is limited to one business day. During the day the message sequence number strictly increases by 1 and is therefore unique within the channel.

2.3.1 Start of Day

OMD will normally be brought up around 1:30am. This start up time, however, is not rigid and the Exchange has the right to adjust this time according to the different trading situations.

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 on this message, the client must clear all cached data for all instruments.

The reference data for all markets, securities and liquidity providers 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 realtime channels.

2.3.2 Normal Transmission

Normal message transmission is expected between when the market opens for trading and when the market is closed. Heartbeats are sent every 2 seconds on each channel when there is no activity.

2.3.3 End of Day

OMD will normally be shut down at 6:30pm. This shutdown time, however, is not rigid and the Exchange has the right to adjust this time according to the different trading situations.

At the end of the business day, the server will stop sending messages (including heartbeats) on each channel. This is normally at 6.30pm.

2.3.4 Error Recovery

2.3.4.1 System Component Failure

If a system component fails and requires a failover or restart, there will be a short interruption in multicast dissemination from either Line A or Line B. The system is deployed in an active-active configuration with Line A and Line B being generated independently and so line arbitration will allow the client to continue receiving messages – see section 4 for more information about recovery.

2.3.4.2 Disaster Recovery

In the unlikely event of a disaster recovery situation at the primary site, OMD will be brought up at the disaster recovery site.

During the interruption, no data will be sent including heartbeats.

A Sequence Reset message will be sent on each channel when OMD is brought up. This will be followed by a snapshot of each channel. After the snapshot the market data feed will return to normal operations.

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

2.4 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), or a trading session is suspended due to a typhoon etc. OMD is not affected by the number of trading sessions and will continue to provide real time data as long as the Exchange's trading system is available.

2.5 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 suppose a Security Status (f) message is sent marking a security as suspended, however for a very short time after this message, the regular order and trade information for this security may continue to arrive. As a second example the Trading Session Status (h) messages and market activity are also decoupled; e.g. for a short time after a TradSesStatus 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 and formats used in FIX

Table 1: FIX Data Types Used

Format	Base Type	Description
Int		Sequence of digits without commas or decimals and optional sign character (ASCII characters "-" and "0" – "9"). The sign character utilizes one byte (i.e. positive int is "99999" while negative int is "-99999"). Note that int values may contain leading zeros (e.g. "00023" = "23"). Examples: 723 in field 21 would be mapped int as |21=723|. -723 in field 12 would be mapped int as |12=-723|.
SeqNum	Int	Int field representing a message sequence number. Value must be positive.
NumInGroup	Int	Int field representing the number of entries in a repeating group. Value must be positive.
Float		Sequence of digits with optional decimal point and sign character (ASCII characters "-", "0" – "9" and "."); the absence of the decimal point within the string will be interpreted as the float representation of an integer value. All float fields must accommodate up to fifteen significant digits. The number of decimal places used should be a factor of business/market needs and mutual agreement between counterparties. Note that float values may contain leading zeros (e.g. "00023.23" = "23.23") and may contain or omit trailing zeros after the decimal point (e.g. "23.0" = "23.0000" = "23" = "23."). Note that fields which are derived from float may contain negative values unless explicitly specified otherwise. The following data types are based on float.
Qty	Float	Float field capable of storing either a whole number (no decimal places) of "shares" (securities denominated in whole units) or a decimal value containing decimal places for non-share quantity asset classes (securities denominated in fractional units).
Price	Float	Float field representing a price. Note the number of decimal places may vary. For certain asset classes prices may be negative values. For example, prices for options strategies can be negative under certain market conditions.
Percentage	Float	Float field representing a percentage (e.g. 0.05 represents 5% and 0.9525 represents 95.25%). Note the number of decimal places may vary.
Char		Single character value, can include any alphanumeric character or punctuation except the delimiter. All char fields are case sensitive (i.e. m != M).
String		Alpha-numeric free format strings, can include any character or punctuation except the delimiter. All String fields are case sensitive (i.e. morstatt != Morstatt).
MultipleCharValue	String	String field containing one or more space delimited single character values (e.g. |18=2 A F|).
Currency	String	String field representing a currency type using ISO 4217 Currency code (3 character) values. Currently the following values are used; 'HKD' – Hong Kong dollars, 'USD' – US dollars, 'EUR' – Euro, 'JPY' – Japanese Yen, 'GBP' – United Kingdom Sterling, 'CAD' – Canadian Dollars, 'SGD' – Singapore Dollars, 'CNY' – Chinese Renminbi. HKEx may add or delete currency code(s), whenever applicable, in the future.
LocalMktDate	String	String field representing a Date of Local Market (as oppose to UTC) in YYYYMMDD format. This is the "normal" date field used by the FIX Protocol. Valid values: YYYY = 0000-9999, MM = 01-12, DD = 01-31.
UTCTimestamp	String	String field representing Time/date combination represented in UTC (Universal Time Coordinated, also known as "GMT") in either YYYYMMDD-HH:MM:SS (whole seconds) or YYYYMMDD-HH:MM:SS.sss (milliseconds) format, colons, dash, and period required.

Format	Base Type	Description
		Valid values: • YYYY = 0000-9999, MM = 01-12, DD = 01-31, HH = 00-23, MM = 00-59, SS = 00-60 (60 only if UTC leap second) (without milliseconds). • YYYY = 0000-9999, MM = 01-12, DD = 01-31, HH = 00-23, MM = 00-59, SS = 00-60 (60 only if UTC leap second), sss=000-999 (indicating milliseconds). Leap Seconds: Note that UTC includes corrections for leap seconds, which are inserted to account for slowing of the rotation of the earth. Leap second insertion is declared by the International Earth Rotation Service (IERS) and has, since 1972, only occurred on the night of Dec. 31 or Jun 30. The IERS considers March 31 and September 30 as secondary dates for leap second insertion, but has never utilized these dates. During a leap second insertion, a UTCTimestamp field may read "19981231-23:59:59", "19981231-23:59:60", "19990101-00:00:00". (see http://tycho.usno.navy.mil/leapsec.html)
UTCTimeOnly	String	String field representing Time-only represented in UTC (Universal Time Coordinated, also known as "GMT") in either HH:MM:SS (whole seconds) or HH:MM:SS.sss (milliseconds) format, colons, and period required. This special-purpose field is paired with UTCDateOnly to form a proper UTCTimestamp for bandwidth-sensitive messages. Valid values: • HH = 00-23, MM = 00-60 (60 only if UTC leap second), SS = 00-59. (without milliseconds) • HH = 00-23, MM = 00-59, SS = 00-60 (60 only if UTC leap second), sss=000-999 (indicating milliseconds).
UTCDateOnly	String	Date represented in UTC (Universal Time Coordinated, also known as "GMT") in YYYYMMDD format. This special-purpose field is paired with UTCTimeOnly to form a proper UTCTimestamp for bandwidth-sensitive messages. Valid values: YYYY = 0000-9999, MM = 01-12, DD = 01-31.
Language	String	Identifier for a national language – uses ISO 639-1 standard.
data	String	String field containing raw data with no format or content restrictions. Data fields are always immediately preceded by a field length. The length field specifies the number of bytes of the value of the data (up to but not including the terminating character). This data type is currently only used for tag 351 "EncodedSecurityDesc" within the Security Definition (d) message

Note on user defined values:

The following are user defined (not currently defined by Fix Protocol Ltd.):

1. Field tags that are greater than or equal to 29000
2. Field values that are greater than or equal to 100
3. See Section 3.8.1 for user defined MDEntryType values

3.1.1 Null Values

Where non-mandatory fields are not available they are simply not published. This is equivalent to the usage of Null values within the Binary specification.

3.2 STANDARD HEADER

The information supplied in this section 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	●	●	●	●

The standard header component is pre-pended to all OMD FIX messages.

All fields are mandatory with the exception of tag 369 'LastMsgSeqNumProcessed' which is only provided within the 'Application Message Report' message, which marks the end of a refresh cycle. See Application Message Report (BY) for further details.

The 'A.P.' column denotes fields that must always be populated.

Header Fields

Tag	Field	Format	Description	Values	A.P.
8	BeginString	String	Beginning message identifier.	FIXT.1.1	✓
35	MsgType	String	Message identifier.	(See field description)	✓
52	SendingTime	UTCTimeOnly	Time of message transmission.	HH:MM:SS.sss	✓
34	MsgSeqNum	SeqNum	Message sequence number.	> 0	✓
369	LastMsgSeqNumProcessed	SeqNum	The last MsgSeqNum on the real-time channel with which the snapshot is synchronised	Numerical	

3.3 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)
3.3	●	●	●	●

3.3.1 Heartbeat (0)

The heartbeat message body is empty.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓

3.3.2 Sequence Reset (4)

The sequence reset message is sent on each multicast channel at start of day. It may also be sent intraday in case of a disaster recovery.

The client must ignore MsgSeqNum of the SequenceReset message itself, and set the next expected sequence number to NewSeqNo. The client must also clear all cached data for all instruments.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
36	NewSeqNo	SeqNum	New sequence number	Numerical	✓

3.4 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)
3.4	●	●	●	●

Refer to Retransmission service for details on the retransmission messages.

3.4.1 Logon (A)

The Login 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

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
98	EncryptMethod	Int	Method of encryption.	0 None/other	✓
108	HeartBtInt	Int	Heartbeat interval (seconds)	Numerical	✓
553	Username	String	Client username	Alphanumerical	
1137	DefaultApplVerID	String	Service pack release.	FIX50SP2	✓
1409	SessionStatus	Int	Status of a FIX session.	0 Session Active 5 Invalid username 100 User already connected	

3.4.2 Application Message Request (BW)

NoApplIDs must be set to 1. Multiple requests cannot be made within one message.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1346	ApplReqID	String	Request ID.	Alphanumerical	✓
1347	ApplReqType	Int	Request type.	0 Retransmission	✓
1351	NoApplIDs	NumInGroup	Number of application ID occurrences.	1	
1355	RefApplID	String	Real-time multicast channel ID.	Alphanumerical	
1182	ApplBegSeqNum	SeqNum	Message sequence number of first message in a range to be resent.	Numerical	
1183	ApplEndSeqNum	SeqNum	Message sequence number of last message in a range to be resent.	Numerical	

3.4.3 Application Message Request Ack (BX)

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓

Tag	Field	Format	Description	Values	A.P.
1353	ApplResponseID	String	Identifier for the Application Message Request Ack.	Alphanumerical	✓
1346	ApplReqID	String	Request ID.	Alphanumerical	
1347	ApplReqType	Int	Request type.	0 Retransmission	
1348	ApplResponseType	Int	Type of acknowledgement.	0 Request fully processed 1 Unknown RefApplID 2 Messages not available 100 Exceeds maximum sequence range 101 Exceeds maximum requests in a day	

3.5 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)
3.5	●	●	●	●

Refer to refresh service for details on the Application Message Report message.

3.5.1 Application Message Report (BY)

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

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1356	ApplReportID	String	Report ID.	Alphanumerical	✓
1426	ApplReportType	Int	Report Type.	3 Application message re-send completed	

3.6 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)
3.6	●	●	●	

3.6.1 Market Definition (BU)

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

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓

Tag	Field	Format	Description	Values	A.P.
1394	MarketReportID	String	Market Definition message identifier.		
1301	MarketID	String	Market identifier.	XHKG Hong Kong Exchange	✓
1300	MarketSegmentID	String	Market segment identifier.	MAIN GEM NASD ETS	✓
1396	MarketSegmentDesc	String	Description or name of Market segment	Market segment name	✓
29015	NumberOfSecurities	Int	Number of securities in the market segment.		✓
15	Currency	Currency	Base currency code..	See section 3.1 (Currency data type) for full details.	

3.6.2 Security Definition (d)

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

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
22	SecurityIDSource	String	Identifies source of SecurityID	(See message structure) 4 ISIN number	✓
48	SecurityID	String	Security Identifier value for SecurityIDSource	ISIN number	✓
1227	ProductComplex	String	Identifier of an entire suite of products for a given market.	Instrument type	✓
107	SecurityDesc	String	Security short name.	Alphanumerical	✓
870	NoInstAttr	NumInGroup	Indication of dummy or test instrument.	> 0	
871	InstAttribType	String	Type of instrument attribute.	35 Dummy instrument or 34 Test instrument	
872	InstAttribValue	Char	Value appropriate to the type of instrument attribute.	Y/N	
1150	TradingReferencePrice	Price	Previous closing price.	Numerical	✓
561	RoundLot	Qty	Trading lot size.	Quantity	✓
29013	CCASSFlag	Char	Indicates if CCASS security or not.	N Non CCASS security Y CCASS security	✓
6575	StampTax	Char	Indicates if stamp duty is required or not.	N Not required Y Required	✓
1787	RefTickTableID	Int	Spread table code	Numeric values for the time being Spread table as per Second Schedule of Rules of the Exchange: 01 Part A 03 Part B	✓
15	Currency	Currency	Security currency code of the market.	See section 3.1 (Currency data type) for full details.	✓
58	Text	String	Free text	Alphanumerical	✓
1687	ShortSaleRestriction	String	Indicates whether a restriction applies to short selling a security.	0 No restriction 1 Security is not shortable	✓

Tag	Field	Format	Description	Values	A.P.
29008	NbSecurityNames	NumInGroup	Number of security names occurrences in the following group	0 to 2	✓
29009	EncodedSecurityDescTyp	String	Indicates which character set is the following encoded representation of SecurityDesc.	Alphanumerical, one of: GB (Simplified) GCCS (Traditional)	✓
350	EncodedSecurityDescLen	Int	byte length of following encoded 351 tag content	Numerical	✓
351	EncodedSecurityDesc	data	Encoded representation of SecurityDesc in Unicode.		✓
864	NoEvents	NumInGroup	Number of events to follow.	0 – 2	✓
865	EventType	Int	Indicates if the following event is a listing or a delisting.	5 activation (listing) 6 deactivation (de listing)	
866	EventDate	LocalMktDate	Effective Date of the event.	Local date Value is 19000101 for unknown listing date.	
1310	NoMarketSegments	NumInGroup	FIX ▸ *Number of market segments on which a security may trade.*	> 0	✓
1301	MarketID	String	Market identifier.	XHKG Hong Kong Exchange	
1300	MarketSegmentID	String	Market segment identifier.	MAIN GEM NASD ETS	
Bonds specific data					
223	CouponRate	Percentage	Coupon rate for a bond.	Numerical	
159	AccruedInterestAmt	Amt	Accrued Interest.	Amount	
29018	EFNFlag	String	Indicates whether the security is an Exchange Fund Notes security or not.	Y Yes N No	
Warrants, Basket Warrants and Structured Product specific data					
711	NoUnderlyings	NumInGroup	Number of underlyings that make up the security.	> 0. Set to 1 for Warrants	
311	UnderlyingSymbol	String	Underlying security's symbol.	Alphanumerical	
246	UnderlyingFactor	Float	Weight of underlying security.		
541	MaturityDate	LocalMktDate	Maturity Date	Date	
202	StrikePrice	Price	Strike Price	Price	
201	PutOrCall	Int	Put or Call indicator	0 Put 1 Call	
1194	ExerciseStyle	Int	Type of exercise style for basket warrants	0 European 1 American	
29021	ConversionRatio	Int	Conversion Ratio	Numeric	✓

3.6.3 Liquidity Provider (U2)

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

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
55	Symbol	String	Security Identifier	Alphanumerical	✓

Tag	Field	Format	Description	Values	A.P.
1018	NoInstrumentParties	NumInGroup	Number of repeating parties.	> 0	✓
1019	InstrumentPartyID	String	PartyID value.	Alphanumerical	✓
1050	InstrumentPartyIDSource	Char	PartyID source (ie category).	C Market participant	✓
1051	InstrumentPartyRole	Int	Party role.	35 Liquidity Provider	✓

3.6.4 Currency Rate (U8)

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 HK,
- Currency Factor will be 3 *(1000 JPY)*
- Currency Rate will be 906780 (*4 decimals implied*)

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
15	Currency	Currency	Currency code..	See section 3.1 (Currency data type) for full details.	✓
29012	Currency Factor	Int	Currency factor.	integer	✓
29022	Currency Rate	Int	Currency rate.	integer	✓

3.7 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)
3.7	●	●	●	

3.7.1 Trading Session Status (h)

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 to order and trade data and therefore may not be synchronized.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1301	MarketID	String	Market identifier.	XHKG Hong Kong Exchange	✓
1300	MarketSegmentID	String	Market segment identifier.	MAIN GEM	✓

Tag	Field	Format	Description	Values	A.P.
				NASD ETS	
336	TradingSessionID	String	Identifier for Trading Session.	1 Day	✓
625	TradingSessionSubID	String	Trading status of the session.	<*Field Absent*> *Day Close (DC)* 1 Pre-trading (Order Input OI) 2 Opening or opening auction (Matching MA) 3 Continuous trading (Continuous CT) 7 Quiescent (Blocking BL) 100 Not yet open (NO) 101 No cancel/modification (NC) 102 Exchange Intervention (EI) 103 Close (CL) 104 Order Cancel (OC)	
340	TradSesStatus	Int	State of the current trading session for the given market segment.	0 Unknown (for NO) 1 Halted (for BL, EI) 2 Open (for OI, NC, MA, CT, OC) 3 Closed (for CL) 100 Day closed (for DC)	✓
1785	TradSesControl	Int	Indicates how control of trading session and sub-session transitions are preformed.	0 Automatic (Default) 1 Manual (this invalidates the normal schedule for the day)	
341	TradSesStartTime	UTCTimestamp	Trading session start time.	YYYYMMDD-HH:MM:SS If the tags are not populated, no start and end times are available	
345	TradSesEndTime	UTCTimestamp	Trading session end time.	YYYYMMDD-HH:MM:SS If the tags are not populated, no start and end times are available	

3.7.2 Security Status (f)

The Security Status message is generated

- At the start of the business day if the security is halted.
- Whenever a security state changes.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
326	SecurityTradingStatus	Int	Suspension flag.	2 Trading halt 3 Resume	✓

3.8 MARKET DATA INCREMENTAL REFRESH (X)

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	●	●	●	

Most of the Market data update messages are based on the generic MarketDataIncrementalRefresh message.

We describe here first the template of the generic message. Then we provide descriptions of this message contents for each type of market update.

3.8.1 Market Data Incremental Refresh (X)

The following is the generic message description. Certain tags only are used with certain types of updates – this will be detailed in each type of update described after this section.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1021	MDBookType	Int	Type of broadcasted book.	1 Top of book 2 Price depth 3 Order depth	
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New 1 Change 2 Delete	✓
269	MDEntryType	Char	Type of market data entry.	0 Bid 1 Offer 2 Trade 4 Opening price 5 Closing price 7 High price 8 Low price 9 VWAP B Trade Volume J Reset Order Book t Yield u Shortsell Quantity v EAS w Shortsell Turnover x Turnover y LTP z Nominal (Values t through z are user defined)	✓
278	MDEntryID	String	Market data entry identifier.	Unique identifier	
1093	LotType	Char	Lot type definition	1 Odd Lot 2 Round Lot	
55	Symbol	String	Security Identifier	Alphanumerical	

Tag	Field	Format	Description	Values	A.P.
236	Yield	Percentage	Yield percentage. Only provided for bond securities.		
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	
277	TradeCondition	Char	Condition describing trade. Only set for trade cancels	0 Cancel	
273	MDEntryTime	UTCTimeOnly	Time of market data entry.	HH :MM :SS	
40	OrdType	Char	Order type.	1 Market 2 Limit	
346	NumberOfOrders	Int	Number of orders represented in the aggregated quantity published for a bid or offer.	>= 0	
1023	MDPriceLevel	Int	Level of a bid or offer at a given price.	> 0	
828	TrdType	Int	Type of trade.	0 Automatch normal (AMS <space>) 4 Late Trade (Off-exchange previous day) (AMS "P") 22 Non-direct Off-Exchange Trade (AMS "M") 100 Automatch internalized (AMS "Y") 101 Direct off-exchange Trade (AMS "X") 102 Odd-Lot Trade (AMS "D") 103 Auction Trade (AMS "U") 104 Overseas Trade (AMS "V")	
286	OpenCloseSettleFlag	MultipleCharValue	IEP indicator.	5 Theoretical price value	
451	NetChgPrevDay	Price	Variation versus Previous day closing price (used for closing price)	Price	
453	NoPartyIDs	NumInGroup	Number of party IDs.	> 0	
448	PartyID	String	Party identifier.	Broker number	
447	PartyIDSource	Char	Identifies class or source of the PartyID	D Proprietary/custom code	
452	PartyRole	Int	Identifies the type of role of the PartyID	1 Executing Firm (entry contains a BrokerID)	

3.9 ORDER BOOK DATA

3.9.1 Order (X)

The information supplied in this sub-section 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	▲ (via complimentary odd lot order feed)	▲ (via complimentary odd lot order feed)	● (board lot orders) ▲ (via complimentary odd lot order feed)	

▲ Complimentary service to the Datafeed(s)

The Order message is generated when an order is added, modified or deleted. The full order book information is not available in auction session until the completion of auction.

The NoPartyIDs, PartyID, PartyIDSource and PartyRole fields are only provided for Odd Lot orders.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1021	MDBookType	Int	Type of broadcasted book.	3 – Order depth	✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New 1 Change 2 Delete	✓
269	MDEntryType	Char	Type of market data entry.	0 Bid 1 Offer	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	
278	MDEntryID	String	Market data entry identifier.	Host Order Sequence number	✓
1093	LotType	Char	Lot type definition.	1 Odd lot 2 Round lot	✓
40	OrdType	Char	Order type.	1 Market 2 Limit	
453	NoPartyIDs	NumInGroup	Number of party IDs.	> 0	
448	PartyID	String	Party identifier.	Broker number	
447	PartyIDSource	Char	Identifies class or source of the PartyID	D Proprietary/custom code	
452	PartyRole	Int	Identifies the type of role of the PartyID	1 Executing Firm (entry contains a BrokerID)	

3.9.2 Aggregate Order Book Update (X)

The information supplied in this sub-section 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	●	●		

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.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1021	MDBookType	Int	Type of broadcasted book.	2 – Price depth	✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New 1 Change 2 Delete	✓
269	MDEntryType	Char	Type of market data entry.	0 Bid 1 Offer	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	
1023	MDPriceLevel	Int	Level of a bid or offer at a given price.	> 0	✓
346	NumberOfOrders	Int	Number of orders represented in the aggregated quantity published for a bid or offer.	>= 0	

3.9.3 Broker Queue (U5)

The information supplied in this sub-section 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	●	▲ (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 after every Aggregate Order Book Update message. The Broker Queue message only applies to Board Lots.

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

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
54	Side	Char	Order side.	1 Buy 2 Sell	✓

Tag	Field	Format	Description	Values	A.P.
29007	BQMoreFlag	Int	Flag indicating –in case the BrokerQ message has 40 entries – if the 40th one is the last, or if there are more limits/Brokers behind	Y More entries exist N 40th entry is the last	✓
453	NoPartyIDs	NumInGroup	Number of party IDs.	> 0	
448	PartyID	String	Party identifier.	Broker number	
447	PartyIDSource	Char	Identifies class or source of the PartyID	D Proprietary/custom code	
452	PartyRole	Int	Identifies the type of role of the PartyID	1 Executing Firm (entry contains a BrokerID) 99 Not a regular party (entry set to SpreadLevel)	

3.10 Trade And Price Data

3.10.1 Trade (X)

The information supplied in this sub-section 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 or when a trade is cancelled.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	2 Trade	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	
278	MDEntryID	String	Market data entry identifier.	Trade Sequence number	✓

Tag	Field	Format	Description	Values	A.P.
828	TrdType	Int	Type of trade.	0 Automatch normal (AMS <space>) 4 Late Trade (Off-exchange previous day) (AMS "P") 22 Non-direct Off-Exchange Trade (AMS "M") 100 Automatch internalized (AMS "Y") 101 Direct off-exchange Trade (AMS "X") 102 Odd-Lot Trade (AMS "D") 103 Auction Trade (AMS "U") 104 Overseas Trade (AMS "V")	
273	MDEntryTime	UTCTimeOnly	Time of market data entry.	HH :MM :SS	
277	TradeCondition	Char	Condition describing trade. Only set for trade cancels.	0 – Cancel	

3.10.2 Trade Ticker (X)

The information supplied in this sub-section 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 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 MDEntryID set to the ticker which contains the cancelled trade, and with the MDEntrySize set to remaining quantity outstanding.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	2 Trade	✓
55	Symbol	String	Security Identifier	Alphanumerical	
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	
278	MDEntryID	String	Market data entry identifier.	Trade Ticker ID	

Tag	Field	Format	Description	Values	A.P.
828	TrdType	Int	Type of trade.	0 Automatch normal (AMS <space>) 4 Late Trade (Off-exchange previous day) (AMS "P") 22 Non-direct Off-Exchange Trade (AMS "M") 100 Automatch internalized (AMS "Y") 101 Direct off-exchange Trade (AMS "X") 102 Odd-Lot Trade (AMS "D") 103 Auction Trade (AMS "U") 104 Overseas Trade (AMS "V")	
273	MDEntryTime	UTCTimeOnly	Time of market data entry.	HH :MM :SS	
277	TradeCondition	Char	Condition describing trade. Only set for trade cancels.	0 Cancel	

3.10.3 Closing Price (X)

The information supplied in this sub-section 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 Closing Price message is generated near the end of the business day for each security. If the closing price is set to 0, it is not applicable. Note that the 'MDEntrySize' field carries the total number of trades for SP (OMD Securities Premium) clients but is not populated for SS (OMD Securities Standard) clients.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	5 Closing price	✓
271	MDEntrySize	Qty	Quantity represented by the market data entry. *(Total number of trades)*	Trade Count	
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	✓

3.10.4 Nominal Price (X)

The information supplied in this sub-section 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 Nominal message may be generated when an order is added, deleted or modified in a book or when trade or trade cancel is performed. Note: Nominal Price may be 0 in specific cases (e.g. no reference price).

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	z Nominal	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	✓

3.10.5 Indicative Equilibrium Price (X)

The information supplied in this sub-section 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 Indicative Equilibrium Price (IEP) message indicates an instrument's theoretical opening price during the pre-opening phases of the market (prior to an auction). An IEP message is generated when the indicative matching price or volume varies. If the Price set to 0, the IEP is no longer applicable.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	4 Opening price	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	✓
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity	✓
286	OpenCloseSettleFlag	MultipleCharValue	IEP indicator.	5 Theoretical price value	✓

3.11 VALUE ADDED DATA

3.11.1 Statistics (X)

The information supplied in this sub-section 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 after every trade or trade cancel.

MDEntryType can be set to a variety of values depending on the data being provided:

MDEntryType	Meaning
7	High Price
8	Low Price
9	VWAP *(only available for SP (OMD Securities Premium) clients)*
u	ShortSell Quantity (This is a user defined value, not the standard enum from FPL (Fix Protocol Ltd.))
w	ShortSell Turnover (This is a user defined value, not the standard enum from FPL (Fix Protocol Ltd.))
x	Turnover (This is a user defined value, not the standard enum from FPL (Fix Protocol Ltd.))
y	Last Traded Price (This is a user defined value, not the standard enum from FPL (Fix Protocol Ltd.))

Note that the VWAP (when MDEntryType = '9') is not provided for SS (OMD Securities Standard) clients.

The ShortSell Quantity and ShortSell Turnover (when MDEntryType = 'u' and MDEntryType = 'w' respectively) are only updated twice each day – at the end of the morning session and the end of the afternoon session.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓
269	MDEntryType	Char	Type of market data entry.	7 High price 8 Low price 9 VWAP u Shortsell Quantity w Shortsell Turnover x Turnover y LTP	✓
271	MDEntrySize	Qty	Quantity represented by the market data entry.	Quantity Only applies when MDEntryType = u, w or x	
55	Symbol	String	Security Identifier	Alphanumerical	✓
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	

Tag	Field	Format	Description	Values	A.P.
				Only applies when MDEntryType = 7, 8, 9 or y	

3.11.2 Market Turnover (U3)

The information supplied in this sub-section 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 is generated at regular intervals throughout the day and contains the total turnover for all securities on a given market segment for a given trading currency.

When the Currency (tag 15) is not provided, the turnover represents the total turnover traded on the given market segment for all trading currencies, expressed in HKD.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1301	MarketID	String	Market identifier.	XHKG Hong Kong Exchange	✓
1300	MarketSegmentID	String	Market segment identifier.	MAIN GEM NASD ETS	✓
15	Currency	Currency	Currency code of all securities of which the market turnover is derived.	See section 3.1 (Currency data type) for full details.	
8504	TotalValueTraded	Amt	Total Traded Turnover of the index components	Numerical	✓

3.11.3 Yield (X)

The information supplied in this sub-section 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

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
268	NoMDEntries	NumInGroup	Number of entries in market data update message.	> 0	✓
279	MDUpdateAction	Char	Type of market data update action.	0 New	✓

Tag	Field	Format	Description	Values	A.P.
269	MDEntryType	Char	Type of market data entry.	t Yield	✓
55	Symbol	String	Security Identifier	Alphanumerical	✓
236	Yield	Percentage	Yield percentage. Only provided for bond securities.		✓

3.12 NEWS

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	●	●		

3.12.1 News (B)

The News message is generated whenever a news update occurs. The message indicates which markets and/or securities the news is applied to. If no market segments and no security codes are present, the news applies to all markets.

The news may be fragmented across multiple consecutive messages. The FinalSegmentFlag field will be set to 'Y' in the message that contains the last fragment.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
1472	NewsID	String	Unique News message identifier	Alphanumerical	✓
148	Headline	String	Headline of a News message.	Alphanumerical	✓
1474	LanguageCode	Language	Language used for the news item.	ISO 639-1 standard en English Exchange news zh Chinese Exchange news	
29014	NoMktSegments	NumInGroup	Number of following Market segments	> 0	
1300	MarketSegmentID	String	Market segment identifier.	MAIN GEM NASD ETS	
146	NoRelatedSym	NumInGroup	Number of repeating symbols specified.	> 0	
55	Symbol	String	Security Identifier	Alphanumerical	
42	OrigTime	UTCTimestamp	Time of message origination.	YYYYMMDD-HH:MM:SS	
6564	IsCancelled	Char	Indicates whether or not a textual message, sent from the exchange has been cancelled by the exchange.	N Not cancelled Y Cancelled	
29002	FinalSegmentFlag	Char	Final segment indicator.	Y Complete N Not complete	
33	NoLinesOfText	NumInGroup	Number of lines of text body.	> 0	✓
58	Text	String	Free text	Alphanumerical	✓

[Chinese Exchange news Tag to be provided in due course]

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 B, as it may be amended from time to time.

3.13.1 Index Definition (U4)

The Index Definition message contains the static referential data for the given index and is generated at the start of the business day.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
29016	IndexCode	String	Index indentifier.	Alphanumerical	✓
29017	IndexSource	String	Index source indentifier.	Alphanumerical	✓
1301	MarketID	String	Market identifier.	XHKG Hong Kong Exchange	✓
15	Currency	Currency	Currency code of Index Turnover.	See section 3.1 (Currency data type) for full details.	✓

3.13.2 Index Data (U6)

The Index Data message contains all the real-time data for a given index.

Message Fields

Tag	Field	Format	Description	Values	A.P.
Message Header					✓
29016	IndexCode	String	Index indentifier.	Index code	✓
29006	IndexStatus	Char	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	✓
29023	IndexTime	UTCTimestamp	Publisher Timestamp.	YYYYMMDD-HH:MM:SS	
270	MDEntryPx	Price	Price of the Market Data Entry.	Price	✓
451	NetChgPrevDay	Price	Variation versus Previous day closing price (used for closing price)	Price	
29004	NetChgPrevDayPct	Percentage	Variation versus Previous day closing price (used for closing price), in percentage	signed percentage	
332	HighPx	Price	Daily Highest Index value	Numerical	
333	LowPx	Price	Daily Lowest Index value	Numerical	

Tag	Field	Format	Description	Values	A.P.
29005	EASPx	Price	Estimated Average Settlement Price/Value – used for indexes	Numerical	
1025	FirstPx	Price	Daily First (opening) Index value	Numerical	
31	LastPx	Price	Daily Last (closing) Index value	Numerical	
140	PrevClosPx	Price	Previous session closing Index value	Numerical	
8504	TotalValueTraded	Amt	Total Traded Turnover of the index components	Numerical	
387	TotalVolumeTraded	Int	Total Traded Volume of the index components	Numerical	
29003	Exception	Char	Exception indicator (used only for HSI indexes).	# Index with HSIL defined exceptional rule applied ' ' Normal index	

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 packets
- 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 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 packet(s) from the Retransmission Server.
Late start up or extended intraday outage	Waits for a refresh of the current market state and then continue with real time messages.

4.1 GAP DETECTION

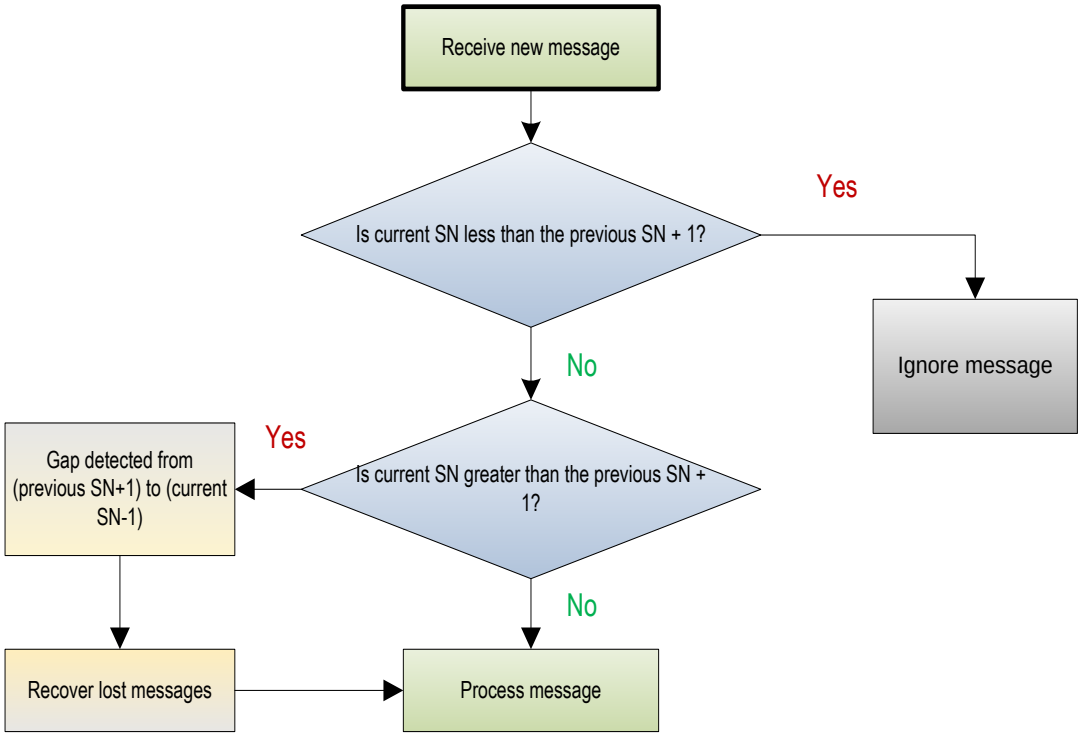
Every FIX message has a sequence number (SN). This sequence number starts at 1 and increases one by one with each subsequent message, on a given multicast channel.

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

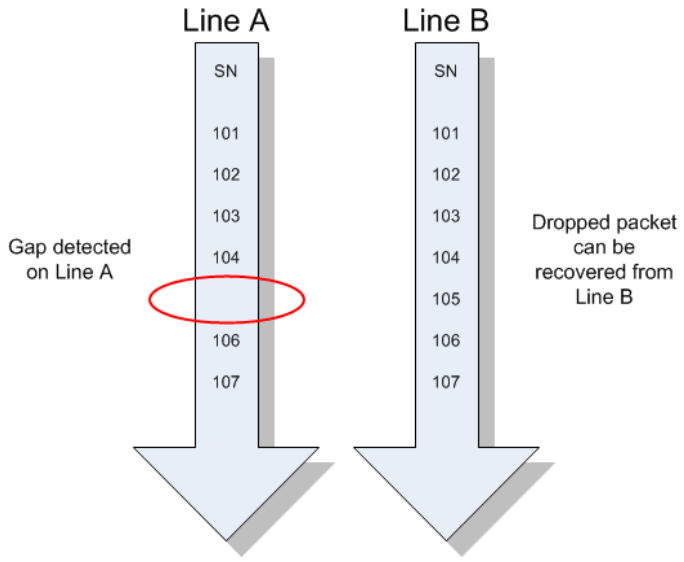
Client applications should check the sequence number (SN) for every packet received. SNs are unique and increase monotonically for each service.

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 messages from SN 10 to 12; where as the third packet of the day from Line B could contain messages from SN 9 to 12. 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 (and so the SNs shown are sequential), 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 'MDIncrementalRefresh3' appears in one packet from Line A but in the subsequent packet on Line B.

Figure 4 - Normal Message Delivery

Primary		Secondary	
Messages	**SN**	**SN**	**Messages**
MDIncrementalRefresh1	101	101	MDIncrementalRefresh1
MDIncrementalRefresh2	102	102	MDIncrementalRefresh2
MDIncrementalRefresh3	103		
		103	MDIncrementalRefresh3
MDIncrementalRefresh4	104	104	MDIncrementalRefresh4
MDIncrementalRefresh5	105	105	MDIncrementalRefresh5
MDIncrementalRefresh6	106	106	MDIncrementalRefresh6

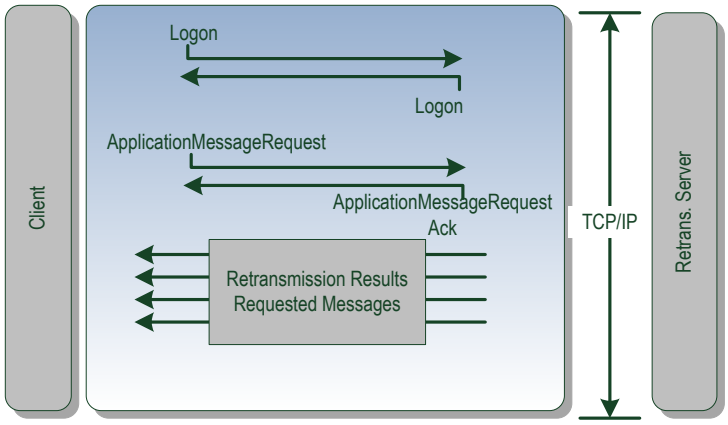
4.3 RETRANSMISSION SERVICE

The retransmission service is provided via the TCP/IP protocol and is designed to allow the user 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 are also limited.

The following diagram illustrates the message flow during a FIX 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 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 message.

Making a request

The client can then make a retransmission request by sending the ApplicationMessageRequest message. The server will respond with a ApplicationMessageRequestAck 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 Ack 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.

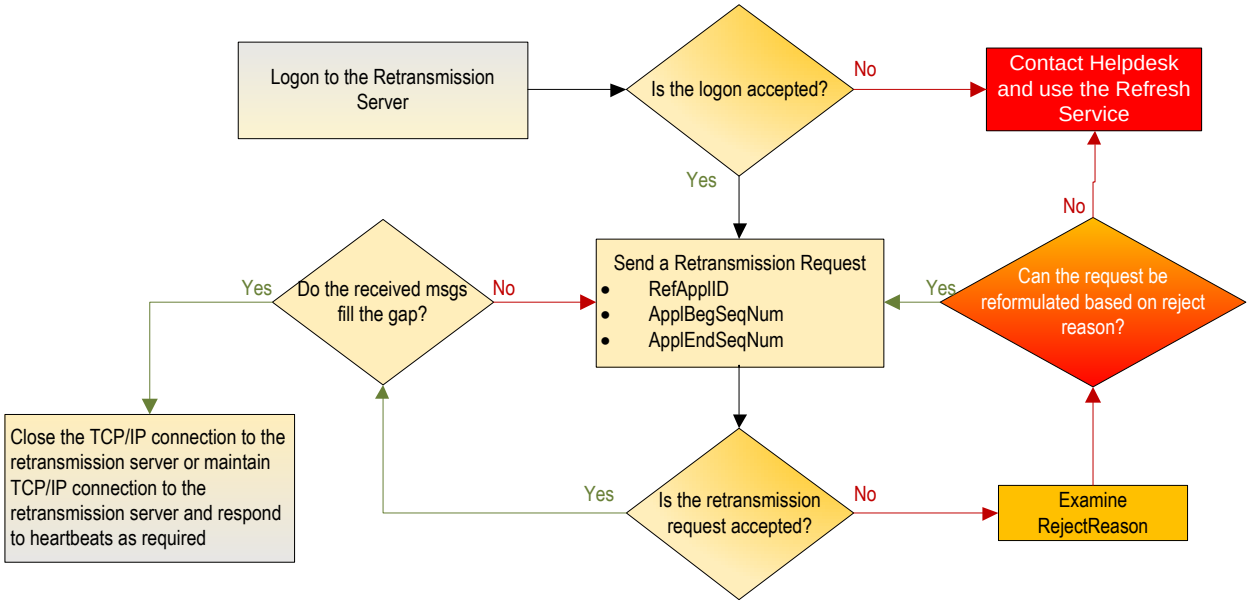
Retransmission requests may be rejected for the following reasons:

- 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 Ack message.

The following diagram illustrates the process of requesting dropped packets from the Retransmission Server:

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 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 messages to the user. The heartbeat frequency is 30 seconds. The client application must respond with a heartbeat messages. The time out for this heartbeat message response is set at 5 seconds. If no response is received by the server within this timeframe, the TCP/IP session will be closed.

Figure 7 : Retransmission Server Heartbeat Message

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

Closing the session

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

System parameters

The system parameters 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

For each site, two IP addresses and ports are provided for the retransmission service, this is to facilitate high availability. Clients may connect to both retransmission servers at the start of the day and maintain the connection during the day, by responding to heartbeats.

In the event that Retransmission Server A (RTS A) does not respond to a logon or retransmission request, Retransmission Server B (RTS B) should be used.

In the event of a failure of either RTS A or RTS B, there may be a short period of unavailability. This failure should be detected by clients through the loss of connection. In this case the other RTS should be used.

RTS B should not be used as a means of requesting from two sources at the same time.

Disaster recovery

Two sets of backup IP address and port are also provided for the disaster site's retransmission service.

During normal conditions the retransmission service at the disaster site is not available. If clients attempt to connect, this will fail.

In the unlikely event of a disaster recovery situation, the retransmission service at the disaster site will be brought up and clients may connect via the backup IP addresses and ports.

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 are sent periodically throughout the business day.

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.
Order	Snapshot for all non-empty books.
Aggregate Order Book Update	Snapshot for all non-empty books.
Broker Queue	Snapshot for all non-empty books.
Trade	Latest non-cancel trade message for each security.
Trade Ticker	Latest non-cancel trade ticker message for each security.
Closing Price	Closing price message if available for each security.
IEP	Latest IEP message for each security if during auction phase.

Message	Snapshot description
Nominal Price	Latest nominal price message for each security.
Statistics	Latest statistics message for each security.
Market Turnover	Latest market turnover message for each market.
Currency Rate	Latest rates 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

Refresh complete

An ApplicationMessageReport 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 ApplicationMessageReport message is received.
- Process received messages until the next ApplicationMessageReport message is received.
- Store the LastMsgSeqNumProcessed from the header of the ApplicationMessageReport message.
- Unsubscribe to the refresh multicast channel.
- Discard the cached real time messages with sequence number less than or equal to LastMsgSeqNumProcessed.
- 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 Symbol (Security Code)

Partial Price Depth

OMD provides a view of depth 10 of the aggregate order book. 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.

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

Book Updates

Book update messages are generated by OMD as delta messages defined in section 3.9.2 (Aggregate Order Book Update (X)). 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

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 9810, then the following message is sent;

(For this example we use a board lot order where each price level is defined as being one tick away from the next price level, and in this case the spread is 10 units)

Tag	Field Name	Value
1021	MDBookType	2 (Price Depth)
268	NoMDEntries	2
279	MDUpdateAction	1 (Change)
269	MDEntryType	1 (Offer)
55	Symbol	1234
270	MDEntryPx	9770

	271	MDEntrySize	200
	1023	MDPriceLevel	2
	346	NumberOfOrders	1
	279	**MDUpdateAction**	**0 (New)**
	269	**MDEntryType**	**1 (Offer)**
	55	**Symbol**	**1234**
	270	**MDEntryPx**	**9810**
	271	**MDEntrySize**	**300**
	1023	**MDPriceLevel**	**5**
	346	**NumberOfOrders**	**1**

The resulting book should now be as follows (red text shows the changes);

Bid Side			Ask Side		
PriceLevel	**AggregateQuantity**	**Price**	**Price**	**AggregateQuantity**	**PriceLevel**
1	700	9730	9760	500	1
2	350	9720	9770	200	2
3	150	9710	9780	100	3
4	250	9700	9790	150	4
5	100	9690	**9810**	**300**	**5**
6	150	9680			
7	50	9670			
8	200	9660			
9	100	9650			

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:

Tag	Field Name	Value
1021	MDBookType	2 (Price Depth)
268	NoMDEntries	1
279	MDUpdateAction	0 (New)
269	MDEntryType	0 (Bid)
55	Symbol	1234
270	MDEntryPx	9470
271	MDEntrySize	50
1023	MDPriceLevel	1
346	NumberOfOrders	1

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

Bid Side			Ask Side		
PriceLevel	**AggregateQuantity**	**Price**	**Price**	**AggregateQuantity**	**PriceLevel**
1	50	9740	9760	500	1
2	700	9730	9770	200	2
3	350	9720	9780	100	3
4	150	9710	9790	150	4
5	250	9700	9810	300	5
6	100	9690			
7	150	9680			
8	50	9670			
9	200	9660			
10	100	9650			

Price levels of the other 9 Bid orders must all be incremented.

Example 3 – Implicit Deletions

If a new book entry causes the bottom entry of a book to be shifted out of the book, 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:

Tag	Field Name	Value
1021	MDBookType	2 (Price Depth)
268	NoMDEntries	2
279	MDUpdateAction	0 (New)
269	MDEntryType	0 (Bid)
55	Symbol	1234
270	MDEntryPx	9750
271	MDEntrySize	250
1023	MDPriceLevel	1
346	NumberOfOrders	1
279	**MDUpdateAction**	**1 (Change)**
269	**MDEntryType**	**0 (Bid)**
55	**Symbol**	**1234**
270	**MDEntryPx**	**9660**
271	**MDEntrySize**	**150**
1023	**MDPriceLevel**	**10**
346	**NumberOfOrders**	**1**

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

Bid Side			Ask Side		
PriceLevel	**AggregateQuantity**	**Price**	**Price**	**AggregateQuantity**	**PriceLevel**
1	250	9750	9760	500	1

2	50	9740	9770	200	2
3	700	9730	9780	100	3
4	350	9720	9790	150	4
5	150	9710	9810	300	5
6	250	9700			
7	100	9690			
8	150	9680			
9	50	9670			
10	**150**	9660			

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 because the individual entries are applied sequentially.

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:

Tag	Field Name	Value
1021	MDBookType	2 (Price Depth)
268	NoMDEntries	2
279	MDUpdateAction	2 (Delete)
269	MDEntryType	0 (Bid)
55	Symbol	1234
270	MDEntryPx	9750
271	MDEntrySize	250
1023	MDPriceLevel	1
346	NumberOfOrders	1
279	**MDUpdateAction**	**0 (New)**
269	**MDEntryType**	**0 (Bid)**
55	**Symbol**	**1234**
270	**MDEntryPx**	**9650**
271	**MDEntrySize**	**100**
1023	**MDPriceLevel**	**10**
346	**NumberOfOrders**	**1**

The resulting order book should now be;

Bid Side			Ask Side		
PriceLevel	**AggregateQuantity**	**Price**	**Price**	**AggregateQuantity**	**PriceLevel**
1	50	9740	9760	500	1
2	700	9730	9770	200	2
3	350	9720	9780	100	3

4	150	9710	9790	150	4
5	250	9700	9810	300	5
6	100	9690			
7	150	9680			
8	50	9670			
9	200	9660			
10	**100**	**9650**			

APPENDIX A - FIX/FAST TEMPLATES

[FIX / FAST templates will be provided at a later stage]

APPENDIX B – LIST OF INDICES UNDER OMD INDEX

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

The indices supplied under the OMD Index are described in the table below, as it may be amended from time to time by HKEx-IS 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.

Name of the Index disseminated under the OMD Index	Third Party Content under the Licence Agreement
CSI 300 Index	●
CSI China Mainland Consumer Index	●
CSI Cross-Straits 500 Index	●
CSI HK Mainland Enterprises Index	●
CSI Hong Kong 100 Index	●
CSI Hong Kong Dividend Index	●
CSI Hong Kong Listed Tradable Mainland Consumption Index	●
CSI Hong Kong Listed Tradable Mainland Real Estate Index	●
CSI Hong Kong Middle Cap Select Index	●
CSI Hong Kong Private-owned Mainland Enterprises Index	●
CSI Hong Kong State-owned Mainland Enterprises Index	●
CSI Overseas Mainland Enterprises Index (HKD)	●
CSI RAFI Hong Kong 50 Index	●
Hang Seng China Affiliated Corporations Index (HSCCI)	●
Hang Seng China Enterprises Index (HSCEI)	●
Hang Seng Index (HSI)	●
HSI Sub Indices (HSI-Finance, HSI-Utilities, HSI-Property, HSI-Commerce & Industry)	●
HSI Volatility Index (VHSI)	●
SSE 50 Index	●
SSE 180 Governance Index	●
SSE 180 Index	●
SSE 380 Index	●
SSE Commodity Equity Index	●
SSE Composite Index	●
SSE Dividend Index	●
SSE Mega-cap Index	●
SSE Mid Cap Index	●
SSE Industry Top Index	●
S&P/HKEx LargeCap Index	
S&P/HKEx GEM Index	