HKEX
香港交易所

INTERFACE SPECIFICATIONS

HKEX Orion Market Data Platform
Derivatives Market Datafeed Products (OMD-D)
Binary Protocol

Version 2.0
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CONTENTS

1. INTRODUCTION

1.1 PURPOSE

This document specifies the Binary interface of the HKEX Orion Market Data Platform "OMD" for the Derivatives Market.

This document is the Transmission Specification(s) of the relevant Datafeed(s) under your Market Data Vendor License Agreement or the Market Data End-User License Agreement ("License 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 License 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: FullTick Order Book Management

Chapter 6: Aggregated Order Book Management

Chapter 7: Auction Period Special Handling

Chapter 8: HKEX Derivatives Market

All chapters except Chapter 3 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. Below is an example of the table along with explanations of what each of the datafeeds represent.

The information is also summarised in Section 1.3 Summary Table.

* Example: Section 3.4 is applicable to D-Lite, DS, DP and DF datafeed.

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.4	●	●	●	●

1.3 PRODUCTS

A range of products are provided catering for the varying needs of OMD clients. The products are described below.

Each of the 4 datafeeds described in this section are available by splitting into two separate sets of multicast group channels for the Stock Options Market and the Non-Stock Options Markets to better serve OMD clients on bandwidth consumption planning. Messages are applicable to datafeeds irrespective of whether it belongs to Stock Options Market or non-Stock Options Markets. For the avoidance of doubt, Stock Options Market ("SOM") refer to the market for trading the stock option that is a financial contract based on a single underlying stock which is traded on SEHK and cleared through the SEHK Options Clearing House Limited (SEOCH). Non-Stock Options Markets ("Non-SOM") refer to the markets of trading HKEX derivatives products on HKFE. For the latest list of derivatives products on HKFE, please refer to the HKEX website."

1.3.1 Derivatives Lite ('D-Lite')

This is a conflated feed for Derivatives Market data which provides Level 2 book showing up to 5 aggregated price levels.

1.3.1.1 Complimentary Feed to D-Lite – D-Lite Order Feed ('Order Feed')

Order Feed is a conflated feed providing all outstanding orders of the following selected instruments every second and is offered complimentarily to the D-Lite clients.

Spot month and next month contracts of

- Hang Seng Index Futures
- Mini Hang Seng Index Futures
- Hang Seng China Enterprises Index Futures
- Mini Hang Seng China Enterprises Index Futures
- Hang Seng TECH Index Futures

1.3.2 Derivatives Standard ('DS')

This is a conflated feed for Derivatives Market data which provides Level 2 book showing up to 10 aggregated price levels.

1.3.3 Derivatives Trades ('DT') – *Complimentary Feed to DS and D-Lite*

DT is a streaming trades feed with all Trade and Trade Amendments and is offered complimentarily to the DS and D-Lite clients.

1.3.4 Derivatives Premium ('DP')

This is a streaming feed for Derivatives Market data which provides Level 2 book showing up to 10 aggregated price levels. This datafeed also includes Trades and Trade Amendments. Please see note on trade and order handling.

1.3.5 Derivatives Fulltick ('DF')

This is a streaming feed containing the full order book and which includes individual orders, trades and trade amendments.

1.3.6 Summary Table

The products above are shown below – please note specific chapters that are relevant to the individual products.

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

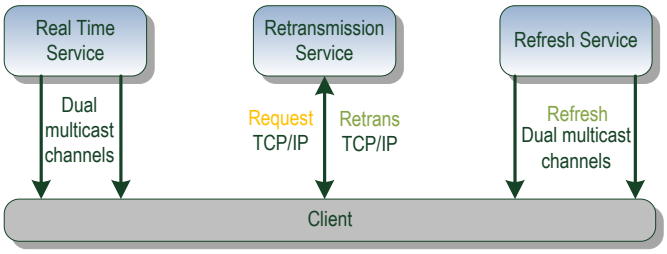
Section	Message Formats	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.1	Data Types	●	●	●	●
3.2	Packet Structure	●	●	●	●
3.3	Packet Header	●	●	●	●
3.4	Control Messages	●	●	●	●
3.5	Retransmission	●	●	●	●
3.6	Refresh	●	●	●	●
3.7	Reference Data (301, 302, 304, 305)	●	●	●	●
3.8	Status Data (320, 321, 322, 324, 325, 326)	●	●	●	●
3.9.1	Add Order (330)	▲			●
3.9.2	Modify Order (331)				●

3.9.3	Delete Order (332)				●
3.9.4	Aggregate Order Book Update (353)	●	●	●	
3.9.5	Orderbook Clear (335)				●
3.9.6	Quote Request (336)	●	●	●	●
3.9.7	Aggregate Implied Order (337)	●	●	●	●
3.10.1	Trade (350)	▲	▲	●	●
3.10.2	Trade Amendment (356)	▲	▲	●	●
3.10.3	Trade Statistics (360)	●	●	●	
3.10.4	Calculated Opening Price (364)	●	●	●	●
3.11.1	Market Alert (323)	●	●	●	●
3.12.1	Open Interest (366)	●	●	●	
3.12.2	Implied Volatility (367)			●	
4	Recovery	●	●	●	●
5	FullTick OrderBook Management	▲			●
6	Aggregate Order Book Management	●	●	●	
7	Auction Period Special Handling	●	●	●	●

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 traded on the Derivatives 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 OMD-D 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-D does not operate on non-trading days of the Hong Kong Derivatives Market where a trading day ends at the close of the after hour trading session. HKEX may perform system testing on Saturdays, Sundays or days when OMD-D is not in operation. Clients should treat data transmitted via OMD-D 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 6:00 a.m. In this regard, Clients are advised to make connection to OMD Derivatives Market ("OMD-D") at or after 6:00 a.m. every business day to ensure that the data received from OMD-D are good for the start of the day. Please also refer to the OMD-D Developers 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 messages sent at start of day are:

- Commodity Definition, Class Definition, Instrument Definition and Combination Definition messages for all tradeable instruments, including combination instruments
- Latest instrument quotation
- Latest market and instrument status snapshot
- Previous day open interest & settlement information for all tradeable instruments if available
- The latest Market message, COP

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 message transmission is expected between when the market opens for trading and when the market is closed. Heartbeats are sent every at regular intervals (currently set at every 2 seconds) on each channel when there is no activity. HKEX may adjust this interval.

2.2.3 End of Day

OMD will typically shut down following the end of after hours trading and later shutdown is possible to cater for special circumstances. Shutdown time is not rigid and the Exchange has the right to adjust this time according to the different trading situations.

Clients should wait for a Market Status (320) message marking "99 - End of Business Day" before disconnecting.

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 [●]

Contents	OMD Derivatives Lite (D-Lite)	OMD Derivatives Standard (DS)	OMD Derivatives Premium (DP)	OMD Derivatives FullTick (DF)
Reference Data (301, 302, 304, 305)	●	●	●	●
Status Data (320, 321)	●	●	●	●
Open Interest (366)	●	●	●	
Aggregate Order Book Update (353)	●	●		
Trade Statistics (360)	●	●	●	
Market Alert (323)	●	●	●	●
Implied Volatility (367)			●	
Trade (350)*	▲	▲	●	●
Trade Amendment (356)	▲	▲	●	●

Add Order (330) (For D-Lite Order Feed only)	▲			

▲ 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 components 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 [●]

Contents	OMD Derivatives Lite (D-Lite)	OMD Derivatives Standard (DS)	OMD Derivatives Premium (DP)	OMD Derivatives FullTick (DF)
Aggregate Order Book Update (353)			●	
Calculated Opening Price (364)	●	●	●	●
Add Order (330)				●
Modify Order (331)				●
Delete Order (332)				●
Quote Request (336)	●	●	●	●
Orderbook Clear (335)				●
Trade (350)*	▲	▲	●	●
Status Data (322, 324, 325, 326)	●	●	●	●
Aggregate Implied Order (337)	●	●	●	●

▲ Complimentary service to the Datafeed(s).

* Trade (350) message is disseminated from different components in different configuration. For details, please refer to OMD-D Connectivity Guide and OMD-D Developer Guide

2.2.4.2 Disaster Recovery

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

During the interruption, there might only be heatbeat 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 brought up – see section 3 for more information about the DR Signal message. *See OMD-D Developers Guide for more details*.

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

2.3 TRADING SESSIONS

In the Derivatives Market, there are Day Session ("T Session") and After-Hours Session ("AHT Session"). In terms of the trading session status, it is indicated by Market States detailed in section 8.1.

The market session status is at market code level, instrument type and instrument class level. The market session status could be different across products with different market codes, especially during half day trading and Holiday Trading where the trading arrangement is different among products.

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

2.4 RACE CONDITIONS

Due to the nature of the dissemination protocol 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 Market Status message is sent showing a change to state 'Closed', however for a very short time after this message the regular order and trade information for this instrument 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	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
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	Little-Endian encoded 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 which are left aligned and padded with binary null.

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 Int32 and Int64 fields of the Trade (350) message, the Aggregate Order Book Update (353) message, the Trade Statistics (360) message, the Calculated Opening Price (364) message, the Trade Amendment (356) message, the Open Interest (366) message as well as the Add / Modify Order messages.

Format	Null representation (Hex 2's complement)
Int32	0x80000000
Int64	0x8000000000000000

3.1.2 Currency Values

See the ISO-3166 Currency Codes for a full list of possible data values. Currently the system uses the following codes; 'HKD', 'USD', 'CNY'. HKEX may add or delete currency code(s), whenever applicable, in the future.

3.1.3 Decimal Values

Decimal values are sent as integers. This is done for efficiency - for example, a price value sent as "12345" and with 3 decimal places should be interpreted as "12.345". See individual fields for number of decimal places used.

3.2 PACKET STRUCTURE

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
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: 100 Sequence Reset 101 Logon 102 Logon Response 201 Retransmission Request 202 Retransmission Response 203 Refresh Complete 301 Commodity Definition 302 Class Definition 304 Instrument Definition 305 Combination Definition 320 Market Status 321 Instrument Status 322 Commodity & Class Status 324 VCM Trigger 325 VCM End 326 THM Trigger 330 Add Order 331 Modify Order 332 Delete Order 323 Market Alert 335 Orderbook Clear 336 Quote Request 337 Aggregate Implied Order 350 Trade 353 Aggregate Order Book Update 356 Trade Amendment 360 Trade Statistics 364 Calculated Opening Price 366 Open Interest 367 Implied Volatility

3.3 PACKET HEADER

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
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	Compression Mode	Uint8	1	0 indicates no compression applied on messages in the packet 1 indicates compression applied on messages in the packet
4	SeqNum	Uint32	4	Sequence number of the first message in the packet
8	SendTime	Uint64	8	UTC Timestamp. The number of nanoseconds since *January 1,* 1970, *00:00:00 GMT*, precision is provided to the nearest millisecond.
Packet length			16	

3.3.1 Compression on Payload Message

Compression is applied on specific real time and refresh channels in OMD-D. Messages delivered in the packet have applied RFC-1950 ZLIB data compression when the Compression Mode field in package header is set to 1. Clients should read the Compression Mode in every packet header and determine if decompression (i.e. RFC-1951 DEFLATE) is required to apply on the received payload messages (i.e. a cargo of all messages within the same packet) before processing the messages. Below are the reference of data compression and decompression method employed in OMD-D.

RFC-1950, ZLIB Compressed Data Format Specification version 3.3

RFC-1951, DEFLATE Compressed Data Format Specification version 1.3

3.4 CONTROL MESSAGES

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.4	●	●	●	●

3.4.1 Heartbeat

Heartbeats consist of a packet header with Compression Mode set to 0 and 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 traded in the Derivatives Market 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-D at the Secondary Data Center, or (2) Derivatives Trading System failure that requires to be bought up at the Secondary Data Center. In normal situation, including OMD-D 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	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
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.

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.

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
2	MsgCount	Uint8	1	1	One message only
3	Compression Mode	Uint8	1		0 indicates no compression applied on messages in the packet 1 indicates compression applied on messages in the packet
4	SeqNum	Uint32	4	0	This field is not used

Offset	Field	Format	Len	Values	Notes
8	SendTime	Uint64	8	0	This field is not used
Total Length			16		

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

Please note that Retranmission service is not available for Add Order (330) message disseminated in the D-Lite – Order Feed which provides a snapshot message refreshed every second.

3.5.1 Logon (101)

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

3.5.5 Compression on Payload Message from Rretransmission

Same as real time and refresh messages mentioned in Section 3.3.1, the Compression Mode in packet header indicates whether the compression has been applied on the payload message returned from the retransmission server. The returned payload, which is from the channel involving the compression feature, would normally have the packet header with the Compression Mode = 1.

Clients should always read the Compression Mode in the packet header and apply DEFALTE on the returned payload before processing the messages. Before applying the DEFLATE, clients should ensure a complete payload is received (i.e. same length as packet size)

3.6 REFRESH

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
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 cycle, see section 4.4 for a full description of refresh.

It is also published to mark the end of a snapshot cycle of Add Order (330) messages disseminated in D-Lite – Order Feed.

Message Fields

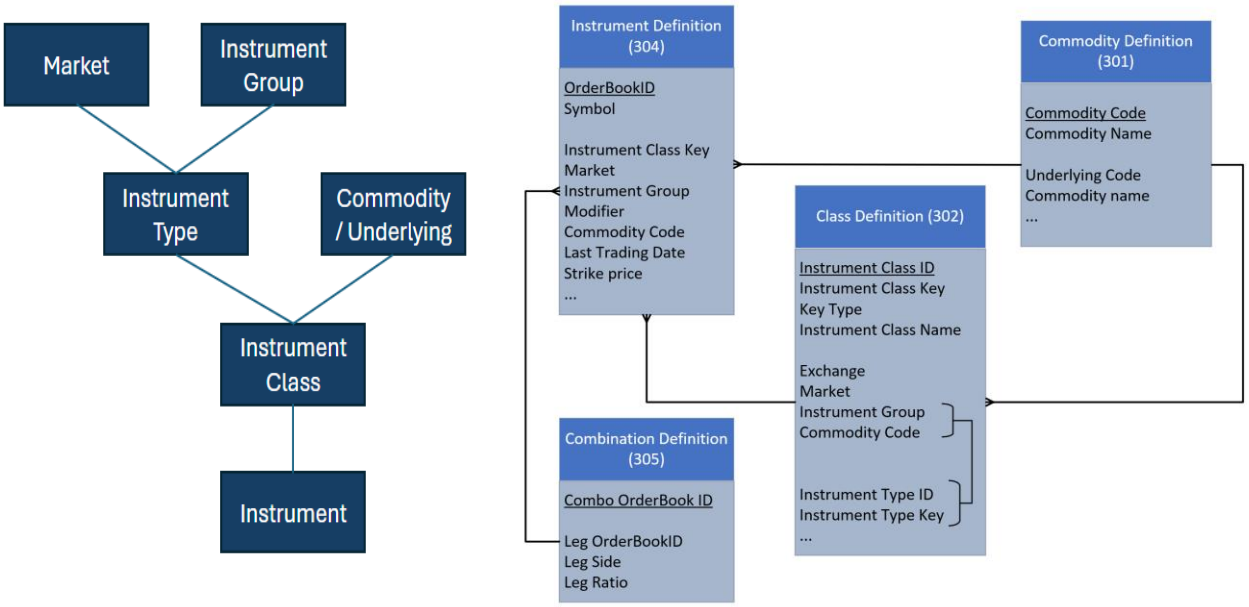
Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	203 Refresh Complete
4	LastSeqNum	Uint32	4	Sequence number with which the refresh is synchronized.	Numerical
Total Length			8		

3.7 REFERENCE DATA

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.7	●	●	●	●

Static Reference data is organized into 4 messages which are shown in the entity relationship diagram below. The underlined field(s) form the primary key for each message type.



3.7.1 Commodity Definition (301)

Describes individual commodities available from the OMD-D system.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	301 Commodity Definition
4	CommodityCode	Uint32	4	Numerical identifier of the Underlying. This is the unique identifier of the message.	

Offset	Field	Format	Len	Description	Values
				The Instrument Definition and the Class Definition are retrieved through this field which links them to the Commodity Definition. E.g. 2005	
8	CommodityName	String	40	Descriptive Name of the underlying E.g. HSBC HOLDINGS PLC	
48	CommodityID	String	6	Commodity ID of the underlying E.g. HKB	
54	UnderlyingCode	String	20	Underlying Code of the Commodity	
74	UnderlyingType	String	1	Type of the underlying	S Stock C Currency I Fixed Income E Energy/Power A Commodity M Metal
75	DecimalInUnderlyingPrice	Uint16	2	Number of implicit decimals in the underlying price received from external sources.	
77	BaseCurrency	String	3	Defines the trading currency for the instrument or the currency for the underlying. The representation of the currency follows the S.W.I.F.T. handbook and ISO 3166 standard.	See Currency Values in section 3.1.2 for full details.
80	EffectiveTomorrow	Uint8	1	This declaration is for instrument to be traded the next day	0 False 1 True
81	Filler	String	5		
Total Length			86		

3.7.2 Class Definition (302)

Describes individual instrument classes available from the OMD-D system. The unique identifier of Instrument Class is InstrumentClassID, composited of Exchange, Market, Instrument Group and Commodity Code. The unique identifier of Instrument Type is InstrumentTypeID, composited of Exchange, Market, Instrument Group.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	302 Class Definition
4	InstrumentClassID	String	14	The ASCII representation of the instrument class.	The key of this instrument class declaration
18	InstrumentClassKey	Uint32	4	A short-cut key of the Instrument Class used in other messages	
22	KeyType	String	1	A indicator of the type of the Class	0 Instrument Class 1 Combo Class
23	InstrumentClassName	String	40	The full ASCII representation. name_short	
63	Exchange	Uint16	2	Exchange Identifier	
65	Market	Uint16	2	Market Code	See section 03 for a list of possible values
67	InstrumentGroup	Uint16	2	Instrument Group. This field together with the Market, forms the unique identifier of the Instrument Type ID	See section 8.2.2 for a list of possible values

Offset	Field	Format	Len	Description	Values
69	CommodityCode	Uint32	4	Numerical identifier of the Underlying This field, together with the InstrumentTypeID forms the unique identifier of the Instrument Class	
73	InstrumentTypeID	String	8	This identifies the instrument type ID	The key assigned for the combination of Instrument Group and CommdityCode
81	InstrumentTypeKey	Uint32	4	A short-cut key of the Instrument Type used the other messages	
85	Filler	Uint8	3		
88	PriceQuotationFactor	UInt32	4	Implies the contracted value of the product / instrument	Decimal places determined from Class Definition field “DecimalInContractSize”
92	ContractSize	Uint32	4	Number of Underlying entities per contract.	Decimal places determined from Class Definition field “DecimalInContractSize”
96	DecimalInContractSize	Uint16	2	Number of implicit decimals in the Contract Size and the Price Quotation Factor fields.	
98	DecimalInStrikePrice	Uint16	2	Number of implicit decimals in the Strike Price.	
100	DecimalInPrice	Uint16	2	Number of implicit decimals in Price fields and Tick Size	
102	TickSize	Int64	8	Minimum Fluctuation of the product / instrument	Decimal places determined from Class Definition field “DecimalInPrice”
110	Tradable	Uint8	1	Defines if the instrument is a tradable instrument or not.	1 Yes 2 No
111	BaseCurrency	String	3	Defines the trading currency for the instrument or the currency for the underlying. The representation of the currency follows the S.W.I.F.T. handbook and ISO 3166 standard.	See Currency Values in section 3.1.2 for full details.
114	SettlementCurrencyID	String	3	Full descriptive name of the Settlement Currency. The representation of the currency follows the S.W.I.F.T. handbook and ISO 3166 standard.	See Currency Values in section 3.1.2 for full details.
117	Effective Tomorrow	Uint8	1	This declaration is for instrument to be traded the next day	0 False 1 True
118	Filler	String	2		
Total Length			120		

3.7.3 Instrument Definition (304)

Describes instrument static data.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	304 Instrument Definition
4	OrderBookID	UInt32	4	Uniquely identifies an instrument available for trading	0 If Not Available

Offset	Field	Format	Len	Description	Values
8	Symbol	String	32	Symbol This is the unique identifier of the message	
40	InstrumentClassKey	Uint32	4	Instrument Class Key in Msg302	
44	Market	Uint16	2	Market Code	See section 0 for a list of possible values
46	InstrumentGroup	Uint16	2	Instrument Group	See section 8.2 for a list of possible values
48	Modifier	Uint16	2	Value is incremented by one each time the instrument is involved in an issue, split, etc. Note that the modifier value can be different for Call and Put options that have the same last trading date, effective last trading date and strike price	
50	CommodityCode	Uint32	4	Numerical identifier of the Underlying This field together with the Market and InstrumentGroup forms the unquie identifier of the Instrument Class	
54	LastTradingDate	Uint32	4	Last trading date of the instrument. The Last Trading Date will not be changed and will continue to hold the original last trading date during the lifetime of the instrument	`YYYYMMDD`
58	LastTradingTime	Uint64	8	The last trading time of the instrument	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
66	StrikePrice	Int64	8	In general, it is the price at which a specific options instrument can be exercised. Zero implies the Strike Price is not applicable, e.g. for futures contracts For combination instrument, this field may not have meaning but can be used with other fields such as CommodityCode, LastTradingDate, InstrumentGroup and Modifier to differentiate the instrument from the others	Decimal places determined from Class Definition field "DecimalInStrikePrice". Not applicable for combination instrument.
74	EffectiveLastTradingDate	Uint32	4	This field sets the effective last trading date of the instrument. The Effective Last Trading Date can be changed during the lifetime of the instrument	`YYYYMMDD` 0 if not available
78	FirstTradingDate	Uint32	4	The first trading date of the instrument For instrument with a non-zero value in this field, the instrument will not be tradable on the days before the Date in this field	`YYYYMMDD` 0 if not available
82	FirstTradingTime	Uint64	8	The first trading time of the instrument	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
90	Filler	String	3		
93	InstrumentStatus	Uint8	1	The actual status of the instrument.	`A` Active `S` Suspended

Offset	Field	Format	Len	Description	Values
94	ContractSize	Int32	4	Number of Underlying entities per contract.	Decimal places determined from Class Definition field "DecimalInContractSize" 0 If Not Available
98	PriceQuotationFactor	Int32	4	Implies the contracted value of the product / instrument	Decimal places determined from Class Definition field "DecimalInContractSize"
102	NumberOfLegs	Uint8	1	Number of legs in the instrument There can be up to 256 legs per instrument	
103	VCM Flag	Uint8	1	Indicate whether Volatility Control Mechanism (VCM) is applicable to the instrument	0 VCM not applicable 1 VCM applicable
104	ISINCode	String	12	A code which uniquely identifies a specific securities issue (International Securities Identification Number). For more information about ISIN code, see the international standard ISO 3166.	0 If Not Available
116	EffectiveTomorrow	Uint8	1	This declaration is for next day instrument	0 False 1 True
117	Filler	String	3		
Total Length			120		

3.7.4 Combination Definition (305)

Describes the composition of a combination instrument.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	305 Combination Definition
4	ComboOrderbookID	Uint32	4	Uniquely identifies a combination instrument available for trading	
8	LegOrderbookID	Uint32	4	Uniquely identifies a leg instrument available for trading	
12	Filler	String	3		
15	LegSide	String	1	Identifies whether the leg within the combination order book is the same side as that defined for the leg in the OrderBook definition Possible values: As Defined or Opposite	B As Defined C Opposite
16	LegRatio	Int32	4	Relative numbers of bid and ask contracts between the combo legs.	
Total Length			20		

3.8 STATUS DATA

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)

3.8	●	●	●	●

3.8.1 Market Status (320)

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	320 Market Status
4	StateLevel	String	1	Indicates the level which a state applies to	E Exchange M Market T Instrument Type t Combo Type C Instrument Class c Combo Class
5	Market	Uint16	4	Market Code	0 If Not Available
9	InstrumentTypeKey	Uint32	4	Instrument Type Key in Msg302	0 If Not Available
13	InstrumentClassKey	Uint32	4	Instrument Class Key in Msg302	0 If Not Available
17	Filler	String	4		
21	ActualStartTime	Uint64	8	Actual start time.	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
29	PlannedStartTime	Uint64	8	Next planned time.	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
37	State	Uint16	2	Numeric identification of the State Type.	See full list of states within section 8.1
39	Filler	String	1		
Total Length			40		

3.8.2 Instrument Status (321)

The Instrument Status message is generated whenever there is a change to suspension indicator or instrument status is changed.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	321 Instrument Status
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	SuspensionIndicator	Uint8	1	Indicates if the instrument is suspended or not.	1 Suspended for trading 2 Not suspended
9	InstrumentStatus	Uint8	1	The actual status of the instrument.	1 Active 2 Suspended 4 Delisted
10	Filler	String	2		
Total Length			12		

3.8.3 Commodity & Class Status (322)

The Commodity & Class Status message is generated whenever a commodity and / or instrument class status changes.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	322 Commodity Status
4	CommodityCode	Uint32	4	Underlying definitions are defined by each exchange. Commodity Code is a part of the Instrument definition. eg. 2005 (HKB).	
8	InstrumentClassKey	Uint32	4	Instrument Class Key in Msg302	0 If Not Available
12	Suspended	String	1	Defines if the commodity or instrument class is suspended or not.	Y Yes N No
13	Filler	String	1		
Total Length			14		

3.8.4 VCM Trigger (324)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.4	●	●	●	●

The VCM Trigger message is generated when VCM is triggered on a particular instrument.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	324 VCM Trigger
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	CoolingOffStartTime	Uint64	8	Time when the cooling off period starts	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
16	CoolingOffEndTime	Uint64	8	Time when the cooling off period ends	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
24	VCMReferencePrice	Int64	8	Reference Price	
32	VCMLowerPrice	Int64	8	Lower price in the price band allowed during the cooling off period	
40	VCMUpperPrice	Int64	8	Upper price in the price band allowed during the cooling off period	
48	Filler	String	2		
Total Length			50		

3.8.5 VCM End (325)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.4	●	●	●	●

The VCM End message is generated when VCM is ended on a particular instrument.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	325 VCM End
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	CoolingOffStartTime	Uint64	8	UTC Start Time. VCM Cooling Off Period Start Time	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
16	CoolingOffEndTime	Uint64	8	UTC EndTime. VCM Cooling Off Period End Time	In UTC timestamp (nanoseconds since 1970) precision to the nearest second
Total Length			24		

3.8.6 THM Trigger (326)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.4	●	●	●	●

The THM Trigger message is generated when trading halt is triggered on a particular instrument class.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	326 THM Trigger
4	InstrumentClassKey	Uint32	4	Instrument Class Key in Msg302	
8	Filler	String	10		
Total Length			18		

3.9 ORDER BOOK DATA

The full order book information is not available in auction session until the completion of auction. However, for D-Lite, DS and DP clients, an uncrossed orderbook will continue to be sent during the pre-auction period – see section 3.9.4 for details.

3.9.1 Add Order (330)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.1	▲ (via D-Lite – Order Feed)			●

For D-Lite – Order Feed

All outstanding orders of the selected instrument will be transmitted through Add Order messages and the interval of this transmission is set at one second. The OrderbookID is unique per instrument but will not increment consecutively. Unique orders are identified by OrderBookID, Side and OrderID. The OrderBookPosition identifies the rank of an order when compared to other orders within the orderbook for each instrument.

For DF

The Add Order message is generated when a new order is inserted into the order book. The OrderbookID is unique per instrument but will not increment consecutively. Unique orders are identified by OrderBookID, Side and OrderID. The OrderBookPosition identifies the rank of an order when compared to other orders within the orderbook for each instrument.

Note that for instrument which have an auction session then DF clients will receive an **Orderbook Clear (335)** message followed by a large quantity of **Add Order (330)** messages representing the uncrossed book after the end of auction.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	330 Add Order
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	OrderID	Uint64	8	Unique identifier per instrument and side for each order performed within the trading system	Values may not be consecutive
16	Price	Int64	8	Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
24	Quantity	Uint32	4	Number of contracts	
28	Side	Uint8	1	Side of the order	0 Bid 1 Offer
29	LotType	Uint8	1	Lot Type	Lot Type. Values: 2 Round Lot
30	OrderType	Uint8	1	Order Type	Additional order attributes. Values: 1 Market 2 Limit 3 Market to Limit – M2L
31	OrderBookPosition	Uint32	4	Order rank information for the order position within the order book for each instrument	Integer
35	Filler	String	1		
Total Length			36		

3.9.2 Modify Order (331)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.2				●

The Modify Order message is generated when an existing order identified by the OrderID is modified.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	331 Modify Order
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	

Offset	Field	Format	Len	Description	Values
8	OrderID	Uint64	8	Unique identifier per instrument and side for each order performed within the trading system	Values may not be consecutive
16	Price	Int64	8	Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
24	Quantity	Uint32	4	Number of contracts – the new quantity of the order	
28	Side	Uint8	1	Side of the order	0 Bid 1 Offer
29	Filler		2		
31	OrderType	Uint8	1	Order Type	Additional order attributes. Values: 1 Market 2 Limit 3 Market to Limit – M2L
32	OrderBookPosition	Uint32	4	Order rank information for the order position within the order book for each instrument	Integer
Total Length			36		

3.9.3 Delete Order (332)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.3				●

The Delete Order message is generated when an existing order identified by the OrderBookID, OrderID and Side 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.	332 Delete Order
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	OrderID	Uint64	8	Unique identifier per instrument and side for each order performed within the trading system	
16	Side	Uint8	1	Side of the order	0 Bid 1 Offer
17	Filler		1		
Total Length			18		

3.9.4 Aggregate Order Book Update (353)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.4	●	●	●	

For D-Lite clients, the aggregate order book is sent whenever there is a orderbook change within the top 5 price levels.

For DS and DP clients, the aggregate order book is sent whenever there is a orderbook change within the top 10 price levels.

For instrument with pre-auction periods the best bid and ask may both be equal to the calculated opening price or may be equal to Null if the book is uncrossed but with market orders present. See Examples 6 and 7 in Section 6 for details.

Refer to Section 6 - Aggregate Order Book Management for details on the Aggregate Order Book Update message.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType		2	Type of message.	353 Aggregate Order Book Update
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
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	Int64	8	Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
28	NumberOfOrders	Uint32	4	Number of orders	
32	Side	Uint8	1	Side of the order	0 Bid 1 Offer
33	Filler	String	1		
34	PriceLevel	Uint8	1	Indicates the price level (within top 10) of the information carried in the message	1 to 10 Level 2 Orderbook Liquidity
35	UpdateAction	Uint8	1	Type of market data update action	0 New 1 Change 2 Delete 74 Clear
Total Length			12 + 24n_O		

(n_O = value of NoEntries)

3.9.5 Orderbook Clear (335)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.5				●

The Orderbook Clear message is used to inform clients that all existing orders should be removed from both the bid and ask sides of the specified orderbook. The message is typically used at the start and end of Auction;

> *At the end of Auction, DF clients will receive an **Orderbook Clear (335)** message followed by a large quantity of **Add Order (330)** messages representing the uncrossed book.*

Clients should clear both bid and ask side orders for the specified orderbook.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	335 Orderbook Clear
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
Total Length			8		

3.9.6 Quote Request (336)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.9.6	●	●	●	●

The Quote Request message is generated whenever market participants request a new quotation.

Clients should ignore the Quote Request message with zero OrderbookID or a negative value in Quantity.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	336 Quote Request
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	Quantity	Int32	4	Quantity	
12	BidAskFlag	Uint8	1	Indicates if the quote request is for a Bid or Ask (or both)	0 Bid 1 Ask 2 Bid and Ask
13	Filler	String	3		
Total Length			16		

3.9.7 Aggregate Implied Order (337)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.4	●	●	●	●

The Aggregate Implied Order message is generated whenever there is an update on implied order at the given implied price.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	337 Aggregate Implied Order
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	

Offset	Field	Format	Len	Description	Values
8	ImpliedPrice	Int64	8	Implied Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
16	ImpliedQuantity	Uint64	8	Aggregated Implied Volume at Implied Price	0 indicates the previously available implied volume is no longer available for the given Implied Price.
24	Side	Uint8	1	Side of the order	0 Bid 1 Offer
25	Filler	String	1		
Total Length			26		

3.10 TRADE AND PRICE DATA

3.10.1 Trade (350)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.1	▲ (via Deriviatives Trade feed)	▲ (via Deriviatives Trade feed)	●	●

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	350 Trade
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	OrderID	Uint64	8	Order ID	0 If Not Available
16	Price	Int64	8	Traded Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
24	TradeID	Uint64	8	Unique trade identification.	
32	MatchID	Uint64	8	An identifier that links all trade which are executed as part of a single execution operation involving an aggressing order.	
40	Side	Uint8	1	Side of Orderbook ID	0 Buy Order 1 Sell Order
41	Trade Sub Type	Uint8	1	Trade Sub Type	0 Continuous Match 1 Opening Uncross 2 Block Trade

Offset	Field	Format	Len	Description	Values
42	TradeCondition	Uint8	1	The condition in which a trade was executed.	0 N/A 1 Explicit Order vs Explicit Order 2 Explicit Order vs Implied Order 3 Implied Order vs Explicit Order 4 Implied Order vs Implied Order 5 Exchange Reported On-Behalf Trade Note: For values "1" to "4", the former is an aggressive order while the later is a passive order
43	Filler	String	3		
46	Quantity	Uint32	4	The quantity being matched in this execution.	
50	TradeTime	Uint64	8	Date and time of the trade	In UTC timestamp (nanoseconds since 1970) precision to the nearest 1/10000th second
Total Length			58		

3.10.2 Trade Amendment (356)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.2	▲ (via Deriviatives Trade feed)	▲ (via Deriviatives Trade feed)	●	●

The Trade Amendment message is generated whenever a trade is amended or cancelled.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	356 Trade Amendment
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	TradeID	Uint64	8	Unique trade identification.	
16	Price	Int64	8	Traded Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
24	Quantity	Uint32	4	Defines number of contracts in a trade	
28	AmendmentExecutionTime	Uint64	8	Date and time of the trade amendment execution	In UTC timestamp (nanoseconds since 1970) precision to the nearest 1/10000th second
36	TradeState	Uint8	1	Trade State	1 Cancelled 2 Amended. The trade has been amended.
37	Filler	String	3		
Total Length			40		

3.10.3 Trade Statistics (360)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.3	●	●	●	

The Trade Statistics message provides the price and turnover information of each instrument, and it is generated whenever there is an update on the statistical information for the respective session.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	360 Trade Statistics
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	LastPrice	Int64	8	Last Traded Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
16	Session	Uint8	1	Session indicator used to distinguish between the T and T+1 sessions	0 Statistics for T Session 1 Statistics for T+1 Session
17	OpenPrice	Int64	8	Price of the first committed Trade in the instrument during the repective Session	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
25	HighPrice	Int64	8	Highest price of normal trades in the session. This is calculated after all Trades, Trades Cancellations and Trade Corrections have been taken into account.	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
33	LowPrice	Int64	8	Lowest price of normal trades in the session. This is calculated after all Trades, Trades Cancellations and Trade Corrections have been taken into account.	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
41	TradeReportVolume	Uint64	8	Total volume of reported trades for the respective Session	
49	Turnover	Uint64	8	Cumulative volume for the respective Session	
57	Filler	String	3		
Total Length			60		

3.10.4 Calculated Opening Price (364)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.10.4	●	●	●	●

The Calculated Opening Price (COP) message indicates an instrument's theoretical opening price during the pre-opening phases of the market (prior to an auction). A COP message is generated when the indicative matching price or volume varies. If the Price set to Null, the COP is no longer applicable.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	364 Calculated Opening Price
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	CalculatedOpeningPrice	Int64	8	Calculated Opening Price	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
16	Filler		4		
20	Quantity	Uint64	8	Shows the quantity available at COP	
Total Length			28		

3.11 NEWS

3.11.1 Market Alert (323)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.11.1	●	●	●	●

The Market Alert message is generated periodically to relay market announcements and alerts. The "AlertID" field provides an unique key for any given announcement. "Source" field indicates the origin of the alert message.

If the size of a single announcement is greater than the maximum supported packet size, then the alert will be sent as multiple messages, each with the same 'AlertID'. These Market Alert (323) messages are disseminated sequentially each with the "LastFragment" field set to "N" except the last message within the alert which has the 'LastFragment' field set to 'Y'. Note that in this case the Header field would be the same for all messages within this announcement.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	323 Market Alert
4	AlertID	Uint64	8	The reference ID for this alert, unique for any given day	
12	Source	String	1	Source ID for this alert message	H Market Alerts sent through the Trading System
13	Header	Binary	320	Header. In the case of multiple fragments, this field is only populated in the first fragment.	Unicode UTF-16LE encoded If Header starts with [C], the Market Alert is in Chinese. Otherwise, it is in English.
333	LastFragment	String	1	Indicates whether this message is the last in a sequence of messages.	Y Complete N Not complete
334	Priority	Uint8	1	Priority	0 Critical 1 Important 2 Normal
335	NoofLines	Uint8	1	Maximum 3 lines	
336	Content	Binary	320	Market Alert Content – number of occurrences according to 'NoLines' field	Unicode UTF-16LE encoded The language will be either English or Chinese
Total Length		336 + 320 n_p			

(n_p = value of NoLines)

3.12 CLEARING INFORMATION

3.12.1 Open Interest (366)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.12.1	●	●	●	

Typically issued at start of day to show the Previous Day settlement price and open interest (for products not tradable in After-Hours Trading session) information. It is also issued around the end of day with the Current Day information. In the event of corrections, this message will be resent.

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	366 Open Interest
4	DayIndicator	Uint16	2	Session indicator used to distinguish between the previous and current business days for Settlement, GrossOI and NetOI*	0 Current Trading Day 1 Previous Trading Day
6	Filler		6		
12	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
16	SettlementPrice	int32	4	If DayIndicator = 1, Settlement Price determined after the T session of the previous business day if DayIndicator = 0, Settlement Price determined after the T session of the current business day	Decimal places determined from Class Definition field "DecimalInPrice" Null means N/A
20	GrossOI	int32	4	If DayIndicator = 1, Gross Open Interest right before the start of the current business day if DayIndicator = 0, Gross Open Interest up to the close of the T session of the current business day	"NULL" means not available
24	NetOI	int32	4	If DayIndicator =1, Net Open Interest right before the start of the current business day If DayIndicator = 0, Net Open Interest up to the close of the T session of the current business day	"NULL" means not available
Total Length			28		

* A business day starts when the market opens in the morning and ends at the close of the after hour trading session of the day.

3.12.2 Implied Volatility (367)

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
3.12.2			●	

Message Fields

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	367 Implied Volatility
4	OrderbookID	Uint32	4	Uniquely identifies an instrument available for trading	
8	ImpliedVolatility	Uint32	4	Implied Volatility	4 implied decimal places
Total Length			12		

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

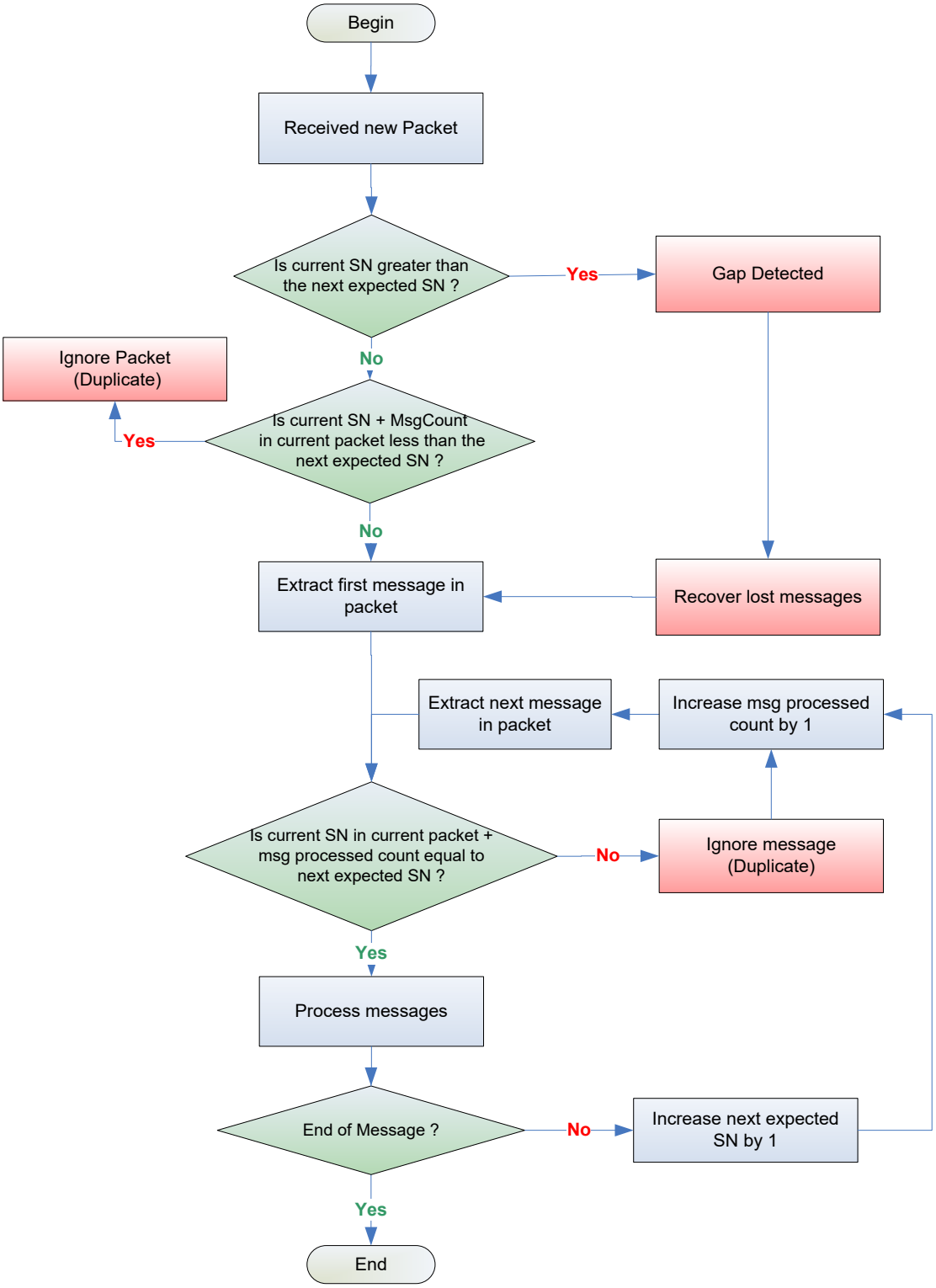
If the client drops the first five packets they would request a gap fill for messages 1-11.

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

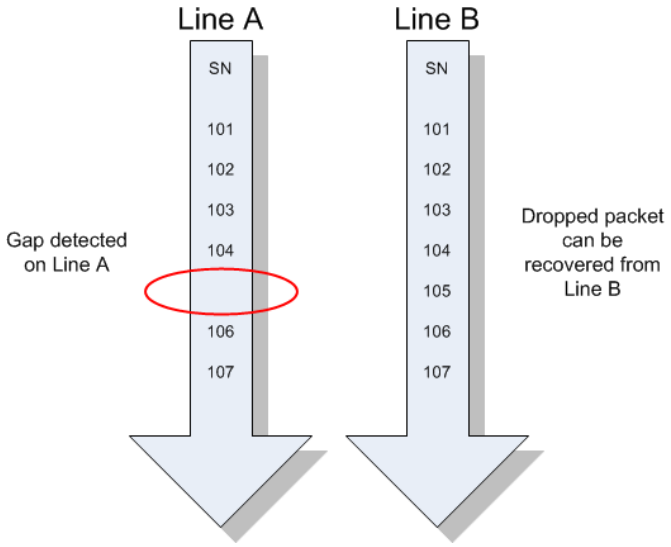
Client applications should check the sequence number (SN) and message count (MC) for every packet received. SNs are unique and increase monotonically for each service, the MC indicates the number of messages within each packet.

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, where as 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

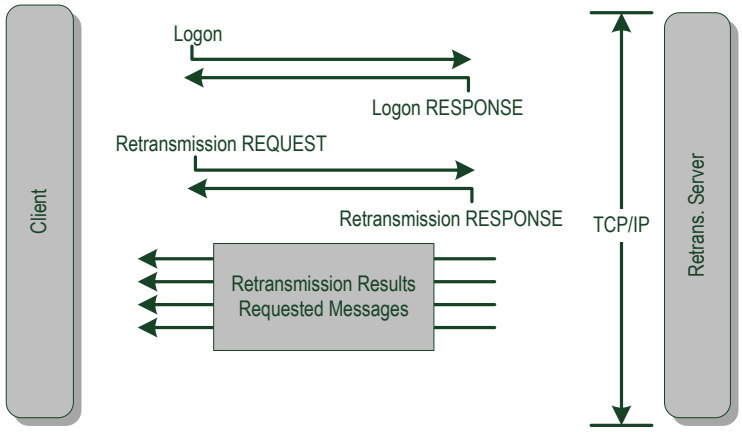
4.3 RETRANSMISSION SERVICE

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 aims to support the retransmission of the data covering the market activities for the last 15-30 seconds only. This figure is indicative only and may be shorter than 15 seconds if a spike happens in the market. 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)

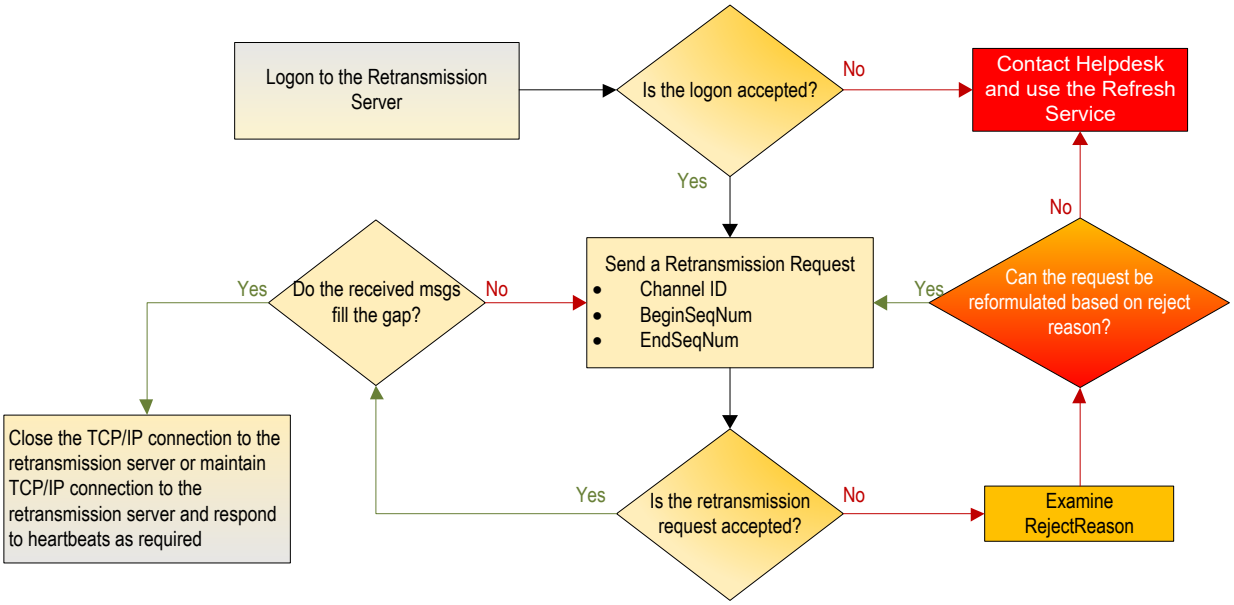
Messages not available

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 (besides those for Trade, Trade Amendment, Quote Request and VCM End which are not recoverable via the Refresh service), there exists a corresponding refresh multicast channel on which snapshots of the market state are sent at regular intervals throughout the business day. No ordering should be assumed between the various dfferent data types unless otherwise stated – this is due to the nature of using multiple different multicast channels for refresh.

Snapshot

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

Message	Snapshot description
Instrument Definition	A full list of all instruments, which includes any instrument modifications or instrument additions made intraday. The order is sent as: • Commodity Definition (301) • Class Definition (302) • Instrument Definition (304) • Combination Definition (305) *NOTE: Next day instruments are not currently included in Refresh* *NOTE: Within the Refresh Service the Commodity Definition (301), Class Definition (302), Instrument Definition (304) and Combination Definition (305) are sent on a dedicated multicast channel and arrive in that order.*

Message	Snapshot description
Market Status	The most recent **Market Status** message(s) – see section 3.8.1 for details about interpreting market state
Instrument Status	The most recent **Instrument Status** message(s) for each instrument
Commodity & Class Status	The most recent **Commodity & Class Status** message(s) for each commodity and class
VCM Trigger	The most recent **VCM Trigger** message(s) for each instrument
THM Trigger	The most recent **THM Trigger** messages(s) for each Instrument class
Orders	For D-Lite, DS and DP clients: the latest level 2 orderbook via **Aggregate Order Book** messages For DF clients : The full order book provided via **Add Order** messages
Aggregate Implied Order	The most recent **Aggregate Implied Order** message(s) for each instrument
Trade Statistics	The latest **Trade Statistics** messages for each instrument in the T and T+1 sessions *NOTE : T+1 may not be available for all instrument and in any event would not be available until after the T+1 session has begun*
COP	The latest **Calculated Opening Price** message for each instrument
Market Alert	The most recent 400 Market Alert messages
Open Interest	Potentially up to 2 latest **Open Interest** message for each instrument – one for the Current Trading Day, and one for the Previous Trading Day
Implied Volatility	The latest **Implied Volatility** message for each instrument

The ordering of refresh messages types within the multicast channels is detailed below;

Channel	Refresh Sequence
Static Base	Commodity Definition (301), Class Definition (302), Instrument Definition (304), Combination Definition (305)
Static Intraday	Instrument Definition (304), Combination Definition (305)
Order (DF)	Calculated Opening Price (364), Add Order (330), Aggregate Implied Order (337)
Order (DP)	Calculated Opening Price (364), Aggregate Order Book Update (353), Aggregate Implied Order (337)
Order (DS)	Calculated Opening Price (364), Aggregate Order Book Update (353), Aggregate Implied Order (337)
Order (D-Lite)	Calculated Opening Price (364), Aggregate Order Book Update (353), Aggregate Implied Order (337)
Class Status	Commodity & Class Status (322), THM Trigger (326), VCM Trigger (324)
Market Status	Market Status (320), Instrument Status (321)
Trade Statistics	Trade Statistics (360)
Market Alert	Market Alert (323)
Open Interest	Open Interest (366)
Implied Volatility	Implied Volatility (367)

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.

4.4.1 Refresh of Market Status

Many of the messages within refresh are singular per instrument and the refresh server simply published the most recent value. However the refresh data will typically include a number of Market Status (320) messages will be sent together and correct processing users should refer the description given in Section 3.8.1 to determine the correct Trading and Instrument Session State.

5. FULLTICK ORDERBOOK MANAGEMENT

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
5	▲ (via D-Lite – Order Feed)			●

The information needed to build an order book view from the message flow is contained within the following messages:

- Add Order (330)
- Modify Order (331)
- Delete Order (332)

Orders shall be ranked by:

- Order Book Position. 1 denotes the highest ranked order. For an Modify Order (331), the order must be removed from its previous position and inserted at new OrderBookPosition. An order inserted at an existing position shifts the order on that position down (and all orders below as well. A deleted or fully filled order causes existing orders below it to shift their position up one step to fill the "void".

The Modify Order (331) message signals that the order has been modified. The current rank may or may not be lost in the process OrderBookPosition field will show the new rank within the book.

The Delete Order (332) message tells the recipient to remove the order referenced.

D-Lite Order Feed only disseminates Add Order (330) message for all outstanding orders of the selected instruments on a snapshot basis and refreshes every second.

6. AGGREGATE ORDER BOOK MANAGEMENT

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

Section	Derivatives Lite (D-Lite)	Derivatives Standard (DS)	Derivatives Premium (DP)	Derivatives FullTick (DF)
6	●	●	●	

Book Identification

A book is uniquely identified by either OrderbookID or Symbol and there is a 1-to-1 map between these two identifiers. OrderbookID is an integer representation of 4 bytes, Symbol is a longer String representation (32 bytes) that gives the short name. Whilst Symbol is 'readable' to human users, the OrderbookID is more efficient when sending market data updates, and therefore OrderbookID is the identifier that appears on every s related message.

Partial Price Depth

The price level within the Aggregate Order Book Update message determines the number of price levels the order price is away from the best price for a given order book. An order with price level 1 means the order's price is the best price, a price level of 2 will be used for orders at the next best price, etc.

Different datafeeds in OMD provide a different view of multiple price depths of aggregate order book for the Derivatives Market. D-Lite provides 5 price depths of aggregate order book while DS and DP provide 10 price depths. 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 5 (**Aggregate Order Book Update (353)**). Each message may contain any combination of new, changed, deleted or orderbook clear 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;

D-Lite, DS and DP		
Offset	Field Name	Value

	0	MsgSize	60	
	2	MsgType	53	
	4	OrderbookID	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:

D-Lite

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	9850	300	5

DS and DP

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	9850	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:

D-Lite, DS and DP		
Offset	**Field Name**	**Value**
0	MsgSize	36
2	MsgType	53
4	OrderbookID	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:

D-Lite					
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	9850	300	5

DS and DP					
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	9850	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 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 4 price levels away from the best price for D-Lite whereas more than 9 price levels away from the best price for DS and DP), the client must delete the excess entry. If the book shrinks again, OMD 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:

D-Lite		
Offset	**Field Name**	**Value**
0	MsgSize	60
2	MsgType	53
4	OrderbookID	1234
8	Filler	NULL
11	NoEntries	1
12	AggregateQuantity	250
20	Price	9750
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:

D-Lite					
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	9850	300	5

Price 9750 and quantity 250 is added according to the message.
Price 9700 and quantity 250 must be deleted by the client.

DS and DP		
Offset	**Field Name**	**Value**
0	MsgSize	60
2	MsgType	53
4	OrderbookID	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:

DS and DP					
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	9850	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 to reflect the new price level of the price 9660 after the addition of the price 9750.

Example 4 – Explicit Additions

If orders are removed so that there are now less than 5 levels for D-Lite and 10 levels for DS and DP 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 6th level for D-Lite and 11th level for DS and DP which need to be disseminated then it will cause the following message to be sent:

	D-Lite		
	Offset	Field Name	Value
	0	MsgSize	60
	2	MsgType	53
	4	OrderbookID	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	250	
	44	Price	9700	
	48	NumberOfOrders	1	
	52	Side	0 (Bid)	
	54	PriceLevel	5	
	55	UpdateAction	0	
	56	Filler	NULL	

The resulting order book should now be;

D-Lite					
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	9850	300	5

	DS and DP		
	Offset	Field Name	Value
	0	MsgSize	60
	2	MsgType	53
	4	OrderbookID	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;

DS and DP					
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	9850	300	5
6	100	9690			
7	150	9680			
8	50	9670			
9	200	9660			
10	100	9650			

Example 6 – Market Orders

Market Orders may arrive during the Pre-Open period. If a Calculated Opening Price (COP) is available then the COP Merge will be applied – see example 7 below. However, if a COP is not available (i.e. the order book is not crossed or not locked), then the following table demonstrates how market orders are displayed.

- One or more market orders are present on the Bid side (since Price Level 1 has a Price which is Null)
- There are no market orders present on the Ask side (since Price Level 1 has a Price which is not Null)
- The best bid limit order is at price 9710 and the best ask limit order is at 9720

D-Lite					
Bid Side			**Ask Side**		
PriceLevel	**Aggregate Quantity**	**Price**	**Price**	**Aggregate Quantity**	**PriceLevel**
1	7900	Null	9720	8200	1
2	7700	9710	9730	2000	2
3	6800	9700	9740	1000	3
4	2000	9690	9750	1500	4
5	200	9680	9860	8000	5

DS and DP					
Bid Side			**Ask Side**		
PriceLevel	**Aggregate Quantity**	**Price**	**Price**	**Aggregate Quantity**	**PriceLevel**
1	7900	Null	9720	8200	1
2	7700	9710	9730	2000	2
3	6800	9700	9740	1000	3
4	2000	9690	9750	1500	4
5	200	9680	9860	8000	5
6	1000	9650			
7	2500	9640			
8	1000	9620			
9	1000	9600			

Example 7 – COP Merge

Certain instruments involve a Pre-Open period during which the order book may be merged to the calculated opening price. Taking the previous example as a starting point, imagine the following two events occur;

- A new bid limit order arrives at price 9720, quantity 1000
- A COP message arrives for price 9720

These two events mean that the order book will be modified as shown below. Note the following points;

- Best bid and best ask are now the same price (this is the COP price)
- Any limit orders at or better than the COP are aggregated into Price Level 1 and this includes any market orders
- Remaining limit orders which are worse than the COP are shown at Price Level 2 and below

D-Lite					
Bid Side			Ask Side		
PriceLevel	Aggregate Quantity	Price	Price	Aggregate Quantity	PriceLevel
1	8900	9720	9720	8200	1
2	7700	9710	9730	2000	2
3	6800	9700	9740	1000	3
4	2000	9690	9750	1500	4
5	200	9680	9860	8000	5

DS and DP					
Bid Side			Ask Side		
PriceLevel	Aggregate Quantity	Price	Price	Aggregate Quantity	PriceLevel
1	8900	9720	9720	8200	1
2	7700	9710	9730	2000	2
3	6800	9700	9740	1000	3
4	2000	9690	9750	1500	4
5	200	9680	9860	8000	5
6	1000	9650			
7	2500	9640			
8	1000	9620			
9	1000	9600			

Example 8 – 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 instrument. An example message is shown below.

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

Field	Value
MsgSize	36
MsgType	353
Orderbook ID	123456
Filler	—
NoEntries	1
AggregateQuantity	0
Price	0
NumberOfOrders	0
Side	0
Filler	—
PriceLevel	0
UpdateAction	74
Filler	—

7. AUCTION PERIOD SPECIAL HANDLING

During the pre-opening period the level 2 orderbook messages that are disseminated are adjusted so that clients do not receive a crossed orderbook. Note that this special handling only applies to instruments which have an opening auction.

During auction session before the matching takes place, a Calculated Opening Price (364) message will be disseminated in the event of crossed book. In such case, Aggregated Order Book Update (353) messages will be sent to update the top price level of both sides with Price equalling the COP, Number of Orders and Aggregate Quantity including those of market orders and orders at prices at or better than the COP. See Example 7 in the previous section for details. If the book is not crossed then a Calculated Opening Price (364) will not be available, and any market orders will be displayed at Price Level 1. See Example 6 in the previous section for details.

In this way:

- D-Lite, DS and DP clients will receive orderbook messages that are adjusted using 'COP Merge' (details below)
- DF clients will not receive any order information as individual orders will not be sent during the auction session

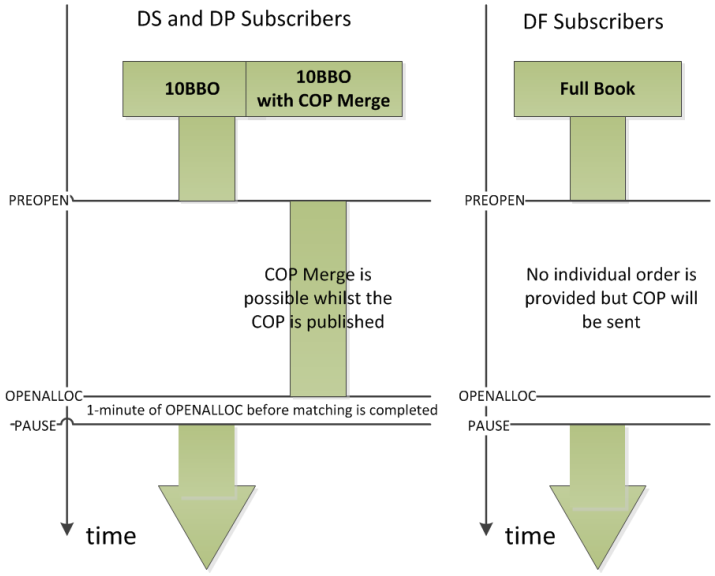


Figure 1 - Auction Period

COP Merge

Bids with a price that is the same or greater than the COP will be shown at the COP price.
Offers with a price that is the same or less than the COP will be shown at the COP price.

8. HKEX DERIVATIVES MARKET

8.1 MARKET STATES

More details of the market states will be provided in the next version.

8.2 List of Instrument Code

The following list of Instrument Code is subject to change and will be further updated if needed

Instrument Code	Description
4	Futures
6	Call (American style)
7	Put (American style)
22	Call (European style)
23	Put (European style)
170	Options Straddle
171	Options Strangle
172	Standard Combination Instrument for Stock Options Market (SOM) – Synthetic Futures
201	Time Spread (level = 01)
202	Time Spread (level = 02)
203	Time Spread (level = 03)
204	Time Spread (level = 04)
205	Time Spread (level = 05)
206	Time Spread (level = 06)
207	Time Spread (level = 07)
208	Time Spread (level = 08)
209	Time Spread (level = 09)
210	Time Spread (level = 10)
211	Time Spread (level = 11)
212	Time Spread (level = 12)
213	Time Spread (level = 13)
214	Time Spread (level = 14)
215	Time Spread (level = 15)
216	Time Spread (level = 16)
217	Time Spread (level = 17)
218	Time Spread (level = 18)
219	Time Spread (level = 19)
220	Time Spread (level = 20)
221	Time Spread (level = 21)
222	Time Spread (level = 22)
223	Time Spread (level = 23)
250	Tailor-made combination
254	Exchange Rate
255	Payment Currency

Note:
Instrument codes 4, 6, 7, 22 and 23 are for normal instrument whereas the remaining are for combination instrument.

8.3 List of Market ID

The following list Market ID is subject to change and will be further updated if needed.

Market ID	Description	Market Type
1	CESC Index Futures / Options	Non-SOM
2	Stock Futures	Non-SOM
3	Three-Year Exchange Fund Note Futures	Non-SOM
16	Mini Hang Seng Index Futures / Options	Non-SOM
20	Stock Options	SOM
24	HIBOR	Non-SOM
27	Dividend Futures	Non-SOM
32	Physically Settled Options on Futures Contracts on Hang Seng Index Futures	Non-SOM
34	Hang Seng Index Futures / Options	Non-SOM
35	Flexible Hang Seng Index Options	Non-SOM
37	Flexible Hang Seng China Enterprises Index Options	Non-SOM
38	Hang Seng China Enterprises Index Futures / Options	Non-SOM
39	Weekly Hang Seng Index Options	Non-SOM
40	Physically Settled Options on Futures Contracts on Hang Seng China Enterprises Index Futures	Non-SOM
51	HSI Volatility Index Futures	Non-SOM
60	Sector Index Futures	Non-SOM
70	Renminbi Currency Futures / Options	Non-SOM
86	Hang Seng TECH Index Futures & Options & Hang Seng Index / Hang Seng China Enterprises Index (Gross / Net Total Return Index) Futures	Non-SOM
87	Weekly Hang Seng China Enterprises Index Options	Non-SOM
93	IBOVESPA Index Futures	Non-SOM
96	S&P BSE Sensex Index Futures	Non-SOM
99	FTSE/JSE Top 40 Index Futures	Non-SOM
102	MICEX Index Futures	Non-SOM
108	MSCI AxJ Futures (NTR)	Non-SOM
111	Physically settled USD Silver Futures	Non-SOM
112	Physically settled CNH Silver Futures	Non-SOM
115	Physically Settled CNH Gold Futures	Non-SOM
116	Physically Settled USD Gold Futures	Non-SOM
117	MOF T-Bond Futures	Non-SOM
118	USD Base and Ferrous Futures	Non-SOM
120	CNH London Metal Mini Futures	Non-SOM
122	Cash-Settled RMB Currency Futures	Non-SOM
125	Cash-Settled CNHUSD Futures	Non-SOM
153	MSCI China A 50 Connect Index Futures	Non-SOM
160	MSCI JPY Index Futures (Price & NTR)	Non-SOM
161	MSCI USD Index Futures (NTR)	Non-SOM
163	MSCI USD Index Futures & Options (Price)	Non-SOM
164	MSCI USD Index Futures & Options (Price)	Non-SOM

166	MSCI USD Index Futures & Options (Price)	Non-SOM
168	MSCI USD Index Futures & Options (Price)	Non-SOM
170	MSCI SGD Index Futures (Price)	Non-SOM

Note:
Clients should ignore the messages with non-zero Market ID other than those listed above.

A. APPENDIX 1 – DIFFERENCE OF MESSAGES BEHAVIOUR BETWEEN NORMAL TRADING DAY AND HOLIDAY TRADING DAY

Data Type	Message	Normal Trading Day – All Products		Holiday Trading Day (H Day) – Holiday Trading Products (H Products)		Holiday Trading Day (H Day) – Non-Holiday Trading Products (Non-H Products)	
		Start of Day	Intraday	Start of Day	Intraday	Start of Day	Intraday
Reference Data	Commodity Definition (301) Class Definition (302) Instrument Definition (304) Combination Definiton (305)	✓	✓ (when new instrument is created)	Same as Normal Trading Day	Same as Normal Trading Day	Same as Normal Trading Day	Same as Normal Trading Day
Status Data	Market Status (320) Instrument Status (321) Commodity Status (322) VCM Trigger (324) VCM End (325) THM Trigger (326)	✓	✓				✓*
Order Book Data	Add Order (330) Modify Order (331) Delete Order (332) Aggregate Order Book Update (353) Orderbook Clear (335) Quote Request (336) Aggregate Implied Order (337)	✓ (GTC Orders if any)	✓				×**
Trade and Price Data	Trade (350) Trade Amendment (356) Calculated Opening Price (364)	×	✓				×
Statistics Data	Trade Statistics (360)	✓ (with Null Price & Zero Turnover)	✓				×
Open Interest	Open Interest (366)	✓ (for previous day)	✓ (for current day)				✓*** (for current day)
Implied Volatility	Implied Volatility (367)	×	✓				Same as Normal Trading Day
News	Market Alert (323)	✓					

Remarks:
* The Market Status on Non-H Products may be different from H Products
** Order removal of GTC orders for Non-HT Products is possible under a contingency scenario
*** Open Interest message for Stock Options would not be available on holiday trading day
The values of Net OI and Gross OI in Open Interest (366) message for Non-HT Products could be changed as settlement is still allowable on holiday trading day

DOCUMENT HISTORY

Version	Date	Changes
1.0	31 Jan 2013	First Distribution Issue under the Derivatives Trading system, HKATS
2.0	16 Sep 2025	First Version under Orion Derivatives Platform (ODP)