LME
An HKEX Company

LMEsource

Client Interface Specification v4.13

THE LONDON METAL EXCHANGE

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Document History

Version	Date	Changes
4.12	19 Jul 2024	3.7.1 TaS/TaR and LIS option publication 4.1.3 Daily price limit application 4.2.2 TOM example added 4.2.3 and 6.4.3.1 guidance on Market State processing 4.3 corrected message numbers 4.3.4 correction 4.3.6 implied orders 5.3.3 removed Text 5.4.1 removed reference to Average price type Appendix D - Channel Matrix and Messages and Channels
4.12.1	14 Aug 2024	Appendix D - Messages and Channels – Algo Refresh channels
4.13	30 Oct 2024	2.1.2 correction 2.2.1 clarification 2.4 Technical Halt, cross-referenced in 4.2 4.2.3 and 6.4.3.1 clarification 4.3.1, 4.3.2 and 4.3.3 TimeOfEvent clarification 5.1.2 option tradable instrument publication and BusinessDaysToExpiry 5.4.2 indicative prices published for Aluminium Premiums, PromptDate2 description 5.4.3 description reworded 6.4.1 ordering of the price levels in Aggregate Order Book (322) in the RFS snapshot 8.9, 8.10 and 8.11 updates and corrections 10.1 Daily prompt date label 12.1 Order Trade Statistics (350) not available for Growth

For changes to previous versions, see Document Version History

Contents

1 Introduction

1.1 Purpose

The LME has embarked on a program to fully rebuild its trading platform, LMEselect, and to upgrade the technology of its market data platform, LMEsource. LMEsource will be the LME's sole market data platform, disseminating incremental updates for bid, ask, trade, statistics and provide recovery and supporting services for client processing of this market data.

This document specifies the binary interface for LMEsource v4, which will disseminate electronic market data from LMEselect v10 and non-electronic market data from Ring and Inter Office venues.

1.2 Delivery Phasing for Electronic Market Data

This document covers all the functionality available in LMEselect v10 and LMEsource v4 however some functionality will be delivered in phased releases.

Functionality and/or data that will be included in a later release is specified in the following table and shown throughout the document in *dark grey italics*. The initial release of LMEselect v10 and LMEsource v4 will contain all functionality that is not specified in the table below.

Function	Reference
Option Instruments	Outright Definition (301) Strategy Definition (302)
Speedbump Orders	Order Add (323) Order Amend (324)
Cancelled Trades	Order Executed (326) Market Data Trade (341)
Quote Requests	Quote Request (329)
Strategy Types	Strategy Type Code All strategy types except Carry
Options	Options
TAPOs	Traded Average Price Options (TAPOs)

1.3 Products

A range of products are provided catering for the varying needs of LMEsource clients. Each product may contain multiple distinct multicast channels and will contain data for both futures and options. The set of products will encompass Level 1 Top-of-Book, Level 2 15 Levels Price Book and Level 3 Full book offerings for electronic market data.

1.3.1 Electronic Product Summary Table

The table below shows the market data products and the specific chapters in this document that are relevant to each individual product.

Section	Message Formats	Level 1 Top of Book	Level 2 15 Levels Price Book	Level 3 Full Book
3.1	Data Types	◆	◆	◆
3.2	Packet Structure	◆	◆	◆
3.2.1	Packet Header	◆	◆	◆
3.4	Control Messages	◆	◆	◆
3.5	Retransmission	◆	◆	◆
3.6	Refresh	◆	◆	◆
4.1.1	Contract Definition (300)	◆	◆	◆
4.1.2.1	Outright Definition (301)	◆	◆	◆
4.1.2.2	Strategy Definition (302)	◆	◆	◆
4.1.3	Price Limits (305)	◆	◆	◆
4.2.1	Market State - Contract (311)	◆	◆	◆
4.2.2	Market State - Instrument (312)	◆	◆	◆
4.3.1	Top of Book (321)	◆		
4.3.2	Aggregate Order Book		◆	

Section	Message Formats	Level 1 Top of Book	Level 2 15 Levels Price Book	Level 3 Full Book
	(322)			
4.3.3	Order Add (323)			◆
4.3.4	Order Amend (324)			◆
4.3.5	Order Cancel (325)			◆
4.3.6	Order Executed (326)			◆
4.3.7	Order Book Clear (327)	◆	◆	◆
4.3.8	Quote Request (329)	◆	◆	◆
4.3.9	Indicative Opening Price (320)	◆	◆	◆
3.7.1	Market Data Trade (341)	◆	◆	
4.4.1	Trade Statistics - End of Day (351)	◆	◆	◆
4.4.2	Trade Statistics - Intraday (352)		◆	◆
6	Recovery	◆	◆	◆
7	Level 2 Aggregate Order Book Management		◆	
8	Level 3 Full Order Book Management			◆

1.3.2 Non-Electronic Product Summary Table

Section	Message Formats
5.1.1	Instrument Definition (303)

Section	Message Formats
5.1.2	Tradable Instrument Definition (304)
5.2.1	Market State – Product (310)
5.3.1	Market Data Order (328)
5.3.2	Indicative Trade Price (340)
3.7.1	Market Data Trade (341)
5.3.3	Business Event – Pre-TT Auction (342)
5.3.4	Order Statistics - Intraday (350)
5.4.1	Reference Price (401)
5.4.2	Reference Forward Curve Price (402)
5.4.3	Reference FX Rate (403)
5.4.4	Reference Volatility Price (404)
5.4.5	Reference Auction Price (405)
5.5.1	Open Interest (420)
5.5.2	Open Interest Band (421)
5.5.3	Position Band (422)
5.5.4	Warrant Band (423)
5.5.5	Trading Volume (424)
5.5.6	Warehouse Stock Movement (426)

2 System Overview

2.1 Scope

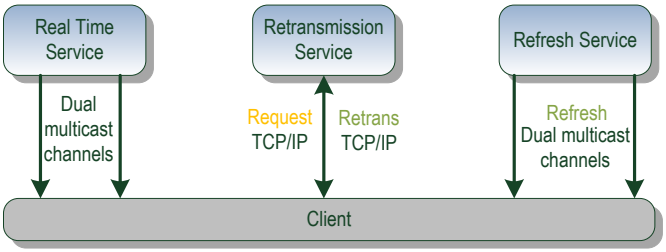


Figure 1: Access to Market Data

LMEsource provides market data represented in an efficient binary message format for all instruments traded on the LME 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 sequence. 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 the IP addresses and port numbers corresponding to the multicast channels) can be found in the LME Systems Connectivity Guide.

2.1.3 Recovery Mechanisms

LMEsource provides two recovery mechanisms:

- A retransmission server which provides an on-request gap-fill retransmission of lost messages. The retransmission requests and gap-fill replies are a point-to-point (TCP/IP connection), see section 3.5 and 6.3.
- A refresh server provides snapshots of the market state at regular intervals throughout the business day, see section 3.6 and 6.4. Snapshots are sent using multicast on separate channels for the real time messages. The time period between snapshots is 45 seconds, but this may vary across multicast channels.

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.

2.2.1 Start of Day

LMEsource will normally be brought up at around 00:15 – 00:30. This start up time is not rigid and the LME has the right to adjust this time according to different trading situations.

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

At start-up, LMEsource will disseminate reference data for outright and strategy tradable instruments.

If a client starts listening after the start of the 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.

The following table provides an overview of the Electronic market data messages published by LMEsource at start of day with indicative times:

Event	Time	Activity / Messages Published
Maintenance Window	00:00 onwards	LMEsource housekeeping and maintenance operations are performed. LMEsource may be started up and shutdown intermittently. Sequence Reset (100) messages may be published on some multicast channels.
LMEsource starts	00:30	Sequence Reset (100) message published. Contract Definition (300) published if a contract has been pre-listed. Outright Definition (301) and Strategy Definition (302) reference data messages published. Price Limits (305) messages published.
Trading session moves to Pre-Open	00:45	1. Market State - Contract (311) and Market State - Instrument (312) messages published 2. Indicative Opening Price (320) messages are published
Uncrossing	01:00	Level 1 and Level 2 Participants 1. LMEsource publishes Market Data Trade (341) messages for

Event	Time	Activity / Messages Published
		orders that match during uncrossing. Level 2 Participants 2. Trade Statistics - Intraday (352) messages are published for the matched trades during uncrossing.
		Level 3 Participants 1. Order Executed (326) messages are published. 2. Trade Statistics - Intraday (352) messages are published for the matched trades during uncrossing.
Trading session moves to Open	01:00	Level 1 and Level 2 Participants 1. Market State - Contract (311) and Market State - Instrument (312) messages published. 2. Order Book Clear (327) message published. 3. Top Of Book (321) and Aggregate Order Book (322) messages are published to reflect the current state of the order book. This includes any resting implied orders. 4. Market Data Trade (341) messages are published.
		Level 3 Participants 1. Market State - Contract (311) and Market State - Instrument (312) messages published. 2. Order Book Clear (327) message published. 3. Order Add (323) messages are published to reflect the current state of the order book. No implied orders are published. 4. Order Executed (326) messages are published.
Continuous Trading – Order Entry and Amendment	01:00 onwards	Level 1 and Level 2 Participants 1. Top Of Book (321) and Aggregate Order Book (322) messages are published to reflect the current state of the order book, including implied orders.
		Level 3 Participants 1. Order Add (323), Order Amend (324) and Order Cancel

Event	Time	Activity / Messages Published
		(325) messages are published to reflect the current state of the order book. No implied orders are published.
Continuous Trading – Matched Trades	01:00 onwards	Level 1 and Level 2 Participants 1. LMEsource publishes Market Data Trade (341) messages as orders are matched in real-time. Level 2 Participants 2. Trade Statistics - Intraday (352) messages are published. Level 1 and Level 2 Participants 3. Top Of Book (321) and Aggregate Order Book (322) messages are published to reflect the current state of the order book, including implied orders.
		Level 3 Participants 1. LMEsource publishes Order Executed (326) messages as they are matched in real-time. 2. Trade Statistics - Intraday (352) messages are published.

The following table provides an overview of the Non-Electronic market data messages published by LMEsource at start of day:

Event	Time	Activity / Messages Published
Maintenance Window	00:00 onwards	LMEsource housekeeping and maintenance operations are performed. LMEsource may be started up and shutdown intermittently. Sequence Reset (100) messages may be published on some multicast channels.
LMEsource starts	00:30	Sequence Reset (100) message published. Instrument Definition (303) and Tradable Instrument Definition (304) reference data messages published.

See section 5.6 for a summary of the publication schedule.

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 at regular intervals (currently set at every 2 seconds) on each channel when there is no activity. The LME may adjust this interval.

2.2.3 End of Day

LMEsource will typically shut down at around 21:00 London time after the clearing procedure has completed. A later shutdown may occur due to special circumstances. The shutdown time is not rigid and the LME has the right to adjust this time according to different trading situations.

2.2.4 Error Recovery

2.2.4.1 System Component Failure

If a system component fails that results in a small amount of packet loss and requires a failover or restart, there will be a short interruption in multicast dissemination from either Line A or Line B. The system is deployed in an active-active configuration with Line A and Line B being generated independently and so line arbitration will allow the client to continue receiving messages – see section 6 for more information about recovery.

2.2.4.2 Disaster Recovery

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

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

A Sequence Reset message will be sent on each channel when LMEsource is brought up.

A Disaster Recovery (DR) Signal message indicating the DR status will also be sent on its dedicated channel when LMEsource is brought up – see section 3.4.3 for more information about the DR Signal message.

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

2.3 Trading Sessions

Trading on LMEselect is conducted in a single continuous trading session every trading day. The Ring operates multiple trading sessions. There may be circumstances when there is a change to the trading schedule however LMEsource will continue to provide real time data as long as the trading system is available.

2.4 Technical Halt

In the event of a system component failure, a technical halt will be applied and LMEsource will publish Market State messages with TradingState = '6' Technical Halt. On receipt of this and Order Book Clear (327) messages, market participants are required to clear their public and private order books of all orders including persisted orders.

2.5 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 the potential for a race condition.

As an example, suppose an Instrument State message is sent showing a change to state ‘Post Trade’, however for a very short time after this message the regular order and trade information for this instrument may continue to arrive.

3 Common Message Formats

3.1 Data Types

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

Format	Description
String	ASCII characters which are left aligned and padded with spaces, unless otherwise specified.
Uint8	8 bit unsigned integer.
Uint16	Little-Endian encoded 16 bit unsigned integer.
Uint32	Little-Endian encoded 32 bit unsigned integer.
Uint64	Little-Endian encoded 64 bit unsigned integer.
Int8	Little-Endian encoded 8 bit signed 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.

3.1.1 Null Values

From time to time certain fields cannot be populated and specific values are used to represent null. The table below shows the values used to represent null for different data types.

Format	Null representation (Hex 2's complement)
Int8	0x80
Int32	0x8000 0000
Int64	0x8000 0000 0000 0000
Uint8	0xFF

Format	Null representation (Hex 2's complement)
Uint16	0xFFFF
Uint32	0xFFFF FFFF
Uint64	0xFFFF FFFF FFFF FFFF

3.1.2 Implied Decimal

In order to avoid decimal calculation in LMEsource, the number of implied decimals will be specified for a field for example Price as shown below. Clients are required to perform the actual scaling for data value.

Constant Name	Type	Implied Decimal places	Example
PRICE	Int64	6	123456789 = 123.456789

3.1.3 Timestamp Precision

Constant Name	Type	Format
TIME	Uint64	UTC timestamp in nanoseconds since epoch. Precision is provided to the nearest microsecond.

3.2 Packet Structure

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.

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

3.2.1 Packet Header

All packets will begin with a common packet header. 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.

Offset	Field	Format	Len	Description
0	PktSize	Uint16	2	Size of the packet (including this field)
2	MsgCount	Uint8	1	Number of messages included in the packet
3	Filler	String	1	
4	SeqNum	Uint32	4	Sequence number of the first message in the packet
8	SendTime	Uint64	8	The UTC timestamp for the time this message.
Header length			16	

3.3 Message Structure

The format of each message within a packet will vary according to the 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.

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 105 Disaster Recovery Signal 201 Retransmission Request 202 Retransmission Response 203 Refresh Complete 300 Contract Definition 301 Outright Definition 302 Strategy Definition 303 Instrument Definition 304 Tradable Instrument Definition

Field	Format	Len	Description
			305 Price Limits
			310 Market State - Product
			311 Market State - Contract
			312 Market State - Instrument
			320 Indicative Opening Price
			321 Top Of Book
			322 Aggregate Order Book
			323 Order Add
			324 Order Amend
			325 Order Cancel
			326 Order Executed
			327 Order Book Clear
			328 Market Data Order
			329 Quote Request
			340 Indicative Trade Price
			341 Market Data Trade
			342 Business Event - Pre-TT Auction
			350 Order Statistics - Intraday
			351 Trade Statistics - End of Day
			352 Trade Statistics - Intraday
			401 Reference Price
			402 Reference Forward Curve Price
			403 Reference FX Rate
			404 Reference Volatility Price
			405 Reference Auction Price
			420 Open Interest
			421 Open Interest Band
			422 Position Band
			423 Warrant Band
			424 Trading Volume
			426 Warehouse Stock Movement

3.4 Control Messages

3.4.1 Heartbeat

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

The Heartbeat message will be identical for all the services.

3.4.2 Sequence Reset (100)

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

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 Market and then subscribe to the refresh channels to receive the current state of the market.

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 is triggered intraday. In normal situations, the dedicated DR channel only carries heartbeats until the end of the business day.

When site failover begins, a 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, a DR Signal will be sent with “DRStatus=2”, thereupon clients can start to rebuild the latest market image from the refresh service. The same DR Signal will be sent periodically until the end of the business day. If the DR instance of LMEsource is started as the primary on the following day and subsequent days, the DR Signal is not sent

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	105 = DR Message

Offset	Field	Format	Len	Description	Values
4	DRStatus	Uint32	4	Status during site failover	1 = DR in progress 2 = DR completed
Total length			8		

3.5 Retransmission

Section 6.3 Retransmission service provides details on the retransmission messages.

When the Logon (101) or Retransmission Request (201) messages are sent to the LMEsource server, the client must also include a packet header as shown below.

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

There is no Logoff required for the Retransmission service. The client can simply disconnect from the session.

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. When sent by the RTS, this will contain 16 bytes for this header, plus either 8 bytes for the Logon Response (102) or 16 bytes for the Retransmission Response (202)
2	MsgCount	Uint8	1	1	One message only
3	Filler	String	1		Empty Filler
4	SeqNum	Uint32	4	0	This field is not used
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.

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: The client sends a Logon message containing username to LMEsource, which responds with a Logon Response message with the SessionStatus set to 0 (Session Active).

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)

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)

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	201 = Retransmission Request

Offset	Field	Format	Len	Description	Values
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)

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 to which the retransmission relates	
6	RetransStatus	Uint8	1	Status of the Retransmission response	See section 6.3.2
7	Filler	String	1		
8	BeginSeqNum	Uint32	4	First sequence number of the Retransmission. Only populated when RetransStatus is 0	
12	EndSeqNum	Uint32	4	Last sequence number of the Retransmission. Only populated when RetransStatus is 0	
Total length			16		

3.6 Refresh

3.6.1 Refresh Complete (203)

This message is published to mark the end of a refresh cycle, see section 6.4 for a full description of refresh.

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 in the real-time channel with which the refresh is synchronised	Numerical
Total length			8		

3.7 Trades

3.7.1 Market Data Trade (341)

The Market Data Trade message is generated each time a trade has been performed in either the Electronic, Inter Office[1] or Ring venues. When an incoming order matches against multiple resting orders, there will be one Market Data Trade message published for each matched trade.

At market open on LMEselect, Market Data Trade messages will be published for orders entered during Pre-Open that matched.

A Market Data Trade message in a TaS/TaR tradable instrument in the Electronic venue will be published on Electronic channels with the differential price when the trade is transacted on LMEselect and published on the Non-Electronic channel when the price is substituted in LMEsmart, see section 15.1. Market Data Trades in TaS/TaR tradable instruments in the Ring and Inter Office venues will be published with only substituted prices.

A Market Data Trade in a strategy tradable instrument in the Electronic venue will contain the strategy price and not leg prices. Strategy trades entered in LMEsmart will contain leg prices.

[1] Note: Publication of Large in Scale (LIS) option trades will be deferred to next business day at 19:00, see https://www.lme.com/en/Trading/Contract-types/Options/Large-in-scale-options.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	341 = Market Data Trade
4	TimeOfEvent	Uint64	8	The time at which the transaction occurred. For Inter Office and Ring venues, this represents the time the contract was agreed between counterparties.	
12	TradableInstrumentID	Uint64	8	Tradable Instrument ID of the trade	
20	TradingVenue	String	2	Trading venue on which the trade was executed	IO = Inter Office RK = Ring EL = Electronic
22	MatchedTime	Uint64	8	Time the trade was matched in LMEsmart, null until such time.	
30	RingSession	String	2	This identifies the ring trading session. Otherwise space if not applicable.	R1 = First morning ring R2 = Second morning ring R3 = First afternoon ring K1 = Morning kerb session K2 = Afternoon kerb session C1 = Basis Ring

Offset	Field	Format	Len	Description	Values
					1 C2 = Basis Ring 2 C3 = Basis Ring 3 D1 = Basis Kerb 1 D2 = Basis Kerb 2
32	TradeCancelFlag	Uint8	1	Trade Cancel Flag	0 = False 1 = True
33	Price	Int64	8	The price of the trade. For TaS/TaR either the differential or substituted price. Null for a strategy from a non-electronic venue. Implicit 6 decimal place format.	
41	Volume	Uint32	4	Trade volume. Null for a strategy from a non-electronic venue.	
45	MatchID	Uint64	8	Assigned trade match identifier for the matched trade.	
53	TradeAtReferencePriceType	String	1	For a TaR indicates whether the price is Differential or Substituted.	D = Differential S = Substituted Default = Space (i.e. not applicable)

Offset	Field	Format	Len	Description	Values
54	SubTypeOfTrade	Uint8	1	Sub type of trade	1 = The trade resulted from an explicit order 2 = The trade resulted from uncrossing 7 = The trade resulted from an implied order 8 = The trade resulted from two implied orders matching
55	RemainingRecords	Uint16	2	Number of remaining records to be published. The value is updated as messages are published. When the value of RemainingRecords = RecordCount it indicates that this is the last message. 0 for the Electronic venue	
57	RecordCount	Uint16	2	The number of records in this message. 0 for the Electronic venue	
59	StrategyLegCount	Uint32	4	Number of legs present 0 for the Electronic venue	

Offset	Field	Format	Len	Description	Values
	LegPrice	Int64	8	Price allocated to this leg of the strategy Implicit 6 decimal place format.	
	LegVolume	Uint32	4	Quantity allocated to this leg of the strategy	
	LegMatchID	Uint64	8	Trade match identifier assigned to the matched trade leg	
	LegTradeAtReferencePrice Type	String	1	Indicates whether the price is Differential or Substituted for a TaR leg.	D = Differential S = Substituted Default = Space (i.e. not applicable)
Total length			63 + $21n_o$		

(n_o = value of RecordCount)

4 Electronic Message Formats

4.1 Reference Data

The diagram in section 9 shows the levels in the product hierarchy which includes Contract and Tradable Instrument.

4.1.1 Contract Definition (300)

This message is published for a new contract prior to its first trading date to enable participants to configure risk management parameters before the contract becomes tradable.

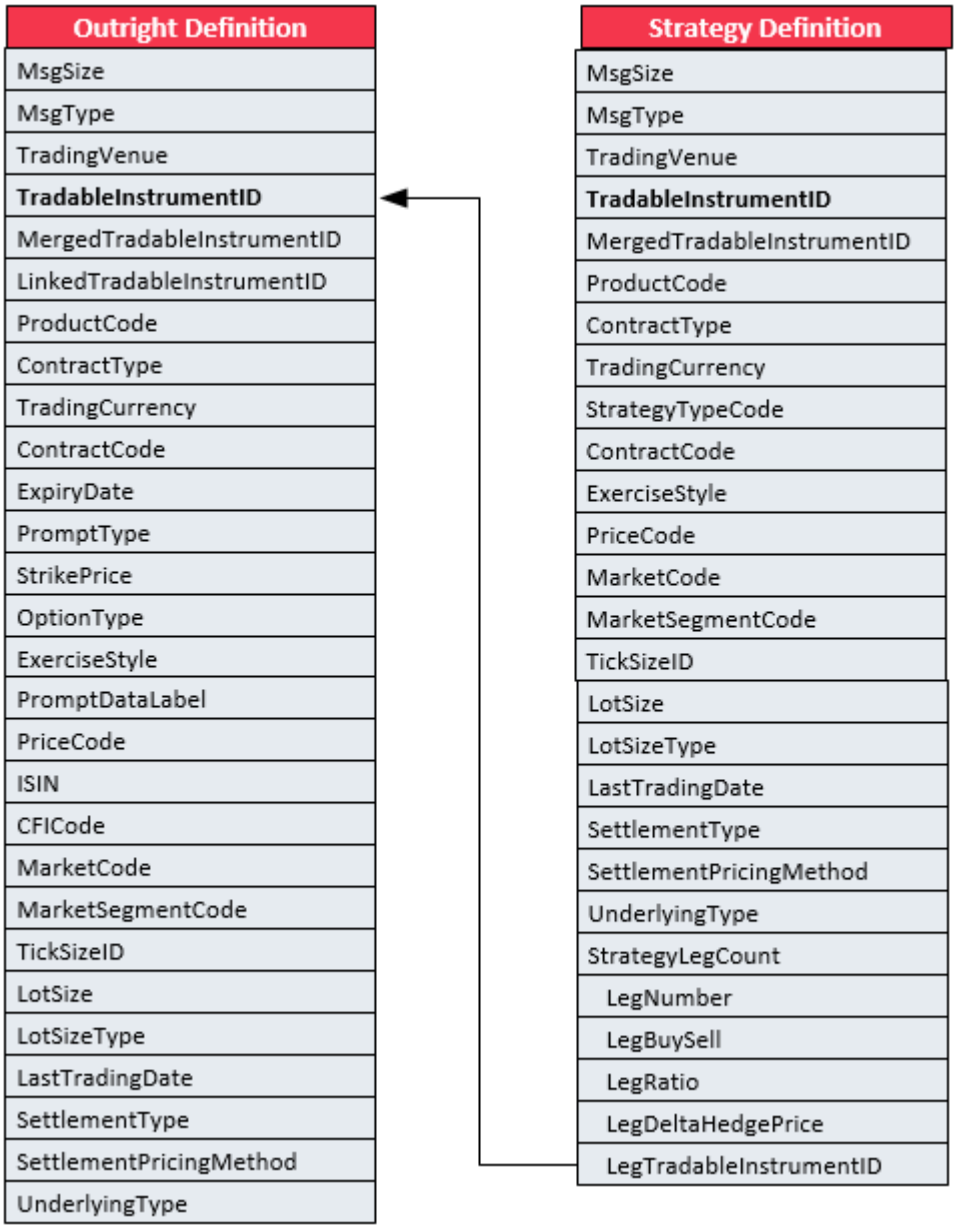
Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	300 = Contract Definition
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	ContractCode	String	12	A unique code to identify the contract.	
18	Name	String	64	Name of the contract	
82	ContractType	String	1	Constant contract type	F = Future *O = Option*
83	ProductCode	String	2	Product code	e.g. ‘AA’, ‘AH’,’CA’
85	UnderlyingType	String	1	Underlying Type	C = Commodity *F = Future*
86	UnderlyingContractCode	String	12	Reference to the underlying contract	
98	TradingCurrency	String	3	The currency code according to ISO 4217	e.g. ‘USD’
101	SettlementType	String	1	Settlement Type	C = Cash

Offset	Field	Format	Len	Description	Values
					P = Physical
102	SettlementPricingMethod	String	1	Settlement Pricing Method	D = Daily M = Monthly Average
103	ExerciseStyle	Int8	1	Exercise Style	*0 = European* *1 = American* *2 = Asian* NULL for Futures
104	LotUnit	String	20	Lot Unit	e.g. tonne
124	LotSize	Uint64	8	The lot size for this tradable instrument	e.g. '20', '25', '5000'
132	LotSizeType	String	1	Lot Size Type	S = Standard M = Mini
133	*PriceType*	*String*	*1*	*Price for futures, premium or volatility for options*	*P = Premium* *V = Volatility* *Space for Futures*
134	FirstTradingDate	Uint32	4	First Trading Date	YYYYMMDD
Total length			138		

4.1.2 Tradable Instruments

Static reference data for tradable instruments is organised into two messages that provide a full list of all securities/tradable instruments available on the LMEselect electronic market. The two messages are shown in the entity relationship diagram below. The bold field(s) form the primary key for each message type.

This section is only applicable to reference data for instruments traded on the LMEselect electronic market.



The TradableInstrumentID field is used to link order and trade messages to a tradable instrument in an Outright or Strategy Definition. This also applies to Market State - Instrument (312) messages that are only applicable to one tradable instrument.

Tradable instruments are the lowest level in the product hierarchy as shown in section 9.

4.1.2.1 Outright Definition (301)

Describes an individual outright tradable instrument available from LMEsource.

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

Offset	Field	Format	Len	Description	Values
2	MsgType	Uint16	2	Type of message	301 = Outright Definition
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TradableInstrumentID	Uint64	8	The id of the security for which trades in this tradable instrument are held	
14	MergedTradableInstrumentID	Uint64	8	The TradableInstrumentID of merged tradable instrument NULL means no merged tradable instrument	
22	LinkedTradableInstrumentID	Uint64	8	The TradableInstrumentID of linked tradable instrument. This will be populated on TaS/TaR instruments with the TradableInstrumentID of the parent instrument NULL means no linked tradable instrument	
30	ProductCode	String	2	Product code. This identifies the metal for the instrument	e.g. ‘AA’, ‘AH’,’CA’
32	ContractType	String	1	Constant contract type	F = Future *O = Option*
33	TradingCurrency	String	3	The currency code according to ISO 4217	e.g. ‘USD’
36	ContractCode	String	12	A unique code to identify the contract	e.g. ‘PBDF’, ‘OCDF’, ‘AADO’,

Offset	Field	Format	Len	Description	Values
					'NADT'
48	ExpiryDate	Uint32	4	The expiry date for this tradable instrument, see section 11	YYYYMMDD
52	PromptType	String	1	Identifies whether the prompt is a single or a rolling prompt	S = Single R = Rolling
53	StrikePrice	Int64	8	The strike price for this tradable instrument Implicit 6 decimal place format.	NULL for futures
61	OptionType	String	1	For option tradable instruments, whether this tradable instrument represents a call or a put option	*C = Call* *P = Put* Default - Space (not applicable)
62	ExerciseStyle	Int8	1	Exercise Style	*0 = European* *1 = American* *2 = Asian* NULL for Futures
63	PromptDateLabel	String	6	Prompt Date Label	See section 10.1
69	PriceCode	String	2	A code to represent the 'Trade at Reference' or 'Trade at Settlement' price. See section 10.4	e.g. 'TC', 'TS' Default = Space (i.e. not applicable)
71	ISIN	String	12	ISIN Code Not applicable if the tradable instrument belongs to an algorithmic test	Space (i.e. not applicable)

Offset	Field	Format	Len	Description	Values
				contract	
83	CFICode	String	6	The instrument classification according to ISO 10962.	e.g. ‘FCEPSX’, ‘FCECSX’, ‘OCAFPS’
89	MarketCode	String	4	Market Code	LME = the base metals market
93	MarketSegmentCode	String	12	A string identifier for the individual market segment to which the outright belongs	e.g. ‘Base’, ‘Ferrous’, ‘Minor’
105	TickSizeID	Uint32	4	Tick Size ID.	See section 10.3
109	LotSize	Uint64	8	The lot size for this tradable instrument	e.g. ‘20’, ‘25’, ‘5000’
117	LotSizeType	String	1	Lot Size Type	S = Standard M = Mini
118	LastTradingDate	Uint32	4	Last Trading Date	YYYYMMDD
122	SettlementType	String	1	Settlement Type	C = Cash P = Physical
123	SettlementPricingMethod	String	1	Settlement Pricing Method	D = Daily M = Monthly Average
124	UnderlyingType	String	1	Underlying Type	C = Commodity *F = Future*
Total length			125		

4.1.2.2 Strategy Definition (302)

Describes individual strategy tradable instruments available from LMEsource.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	302 = Strategy Definition
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TradableInstrumentID	Uint64	8	The id of the security for which trades in this tradable instrument are held	
14	MergedTradableInstrumentID	Uint64	8	The TradableInstrumentID of merged tradable instrument NULL means no merged tradable instrument	
22	ProductCode	String	2	The product code. This identifies the metal for the instrument	e.g. ‘AA’, ‘AH’,’CA’
24	ContractType	String	1	Constant contract type	F = Future ***O*** *= Option*
25	TradingCurrency	String	3	The currency code according to ISO 4217	e.g. ‘USD’
28	StrategyTypeCode	Uint32	4	Strategy Type	See section 10.2
32	ContractCode	String	12	A unique code to identify the contract. This is the contract code for the near leg of the strategy.	e.g. ‘PBDF’, ‘OCDF’, ‘AADO’, ‘NADT’
44	ExerciseStyle	Int8	1	Exercise Style	*0 =*

Offset	Field	Format	Len	Description	Values
					European *1 = American* *2 = Asian* NULL for Futures
45	PriceCode	String	2	A code to represent the 'Trade at Reference' or 'Trade at Settlement' price code	e.g. 'TC', 'TS' Default = Space (i.e. not applicable)
47	MarketCode	String	4	Market Code	LME = the base metals market
51	MarketSegmentCode	String	12	A string identifier for the individual market segment to which the outright belongs	e.g. 'Base', 'Ferrous', 'Minor'
63	TickSizeID	Uint32	4	Tick Size ID, see section 10.3	
67	LotSize	Uint64	8	Lot Size	
75	LotSizeType	String	1	Lot Size Type	S = Standard M = Mini
76	LastTradingDate	Uint32	4	Last Trading Date	YYYYMMDD
80	SettlementType	String	1	Settlement Type	C = Cash P = Physical
81	SettlementPricingMethod	String	1	Settlement Pricing Method	D = Daily M = Monthly Average

Offset	Field	Format	Len	Description	Values
82	UnderlyingType	String	1	Underlying Type	C = Commodity *F = Future*
83	StrategyLegCount	Uint32	4	Number of Legs of this Strategy instrument	2 to 13
	LegNumber	Uint32	4	An identifier for each leg in the strategy	Starts from 1, increments by 1 for each leg
	LegBuySell	String	1	Leg direction	B = Buy S = Sell
	LegRatio	Uint64	8	Leg ratio of the strategy leg Implicit 3 decimal place format. Where strategy type code = 9, it represents the delta value for each delta hedge leg e.g. 0.413 delta (413).	
	LegDeltaHedgePrice	Int64	8	*Underlying price for a futures leg in a delta-hedge custom strategy.* *NULL value otherwise.* *Implicit 6 decimal place format.*	
	LegTradableInstrumentID	Uint64	8	TradableInstrumentID of the strategy leg	Reference to the outright definition of this leg
Total length			87 + 29n_o		

(n_o = value of StrategyLegCount)

4.1.2.3 Merged Instruments

There are occasions when multiple tradable instruments in a contract share the same actual prompt date. On the trading date on which tradable instruments share the same actual prompt date, the order books for these tradable instruments will be merged. Similarly, Carry strategies with corresponding legs sharing the same prompt date will also be merged, see section 4.1.2.3.2.

All market data updates, orders, trades and statistics, will be published for the merged tradable instrument using the TradableInstrumentID of the rolling prompt as shown in the following examples.

4.1.2.3.1 Merged Outrights

Example 1 – 3M merges with a monthly prompt

Assume the business date 16 May 2023, the 3M rolling prompt instrument coincides with a single prompt tradable instrument, a monthly 3rd Wednesday. This results in two Outright Definition messages being published by LMEsource, one for each tradable instrument. In each of these Outright Definition messages, the field MergedTradableInstrumentID will contain the TradableInstrumentID for tradable instrument of the rolling prompt.

TI	TradableInstrumentID	MergedTradableInstrumentID	Prompt Date
3M	125	125	20230816
M3	458	125	20230816

4.1.2.3.2 Merged Strategies

Carry strategies that include a leg in a merged order book will also merge. This can occur if a leg or legs share the same actual prompt date as shown in the following examples for the business date 16 May 2023:

Example 1 – Carry with a single rolling prompt merges with a Carry of two single prompts

3M-M4 contains a rolling prompt which shares the same prompt date in the first leg of a second Carry, M3-M4. Both legs M3-M4 have the same actual prompt dates as the legs in 3M-M4.

In each Strategy Definition, the MergedTradableInstrumentID will contain the TradableInstrumentID of the Carry with the rolling leg.

TI	TradableInstrumentID	MergedTradableInstrumentID	Prompt Date
3M-M4	124	124	20230816 vs 20230920
M3-M4	457	124	20230816 vs 20230920

Example 2 – Carry with two rolling prompts merges with multiple Carries containing dated equivalent legs

A Carry with two rolling legs, Cash-3M, has legs that have single prompt equivalents.

In each Strategy Definition, the MergedTradableInstrumentID will contain the TradableInstrumentID of the tradable instrument with two rolling legs.

TI	TradableInstrumentID	MergedTradableInstrumentID	Prompt Date
Cash-3M	123	123	20230518 vs 20230816
Cash-M3	456	123	20230518 vs 20230816
Single dated equivalent of Cash-3M	789	123	20230518 vs 20230816
Single dated equivalent of Cash-M3	999	123	20230518 vs 20230816

4.1.3 Price Limits (305)

Describes the upper and lower price limits for an outright tradable instrument. Where Daily Price Limits are enabled for a contract, they are published for electronic tradable instruments and the same limits are also applicable to non-electronic tradable instruments.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	305 = Price Limit
4	TradableInstrumentID	Uint64	8	Tradable instrument ID	
12	UpperPriceLimit	Int64	8	Upper price limit for the outright tradable instrument for the current trading day Implicit 6 decimal place format.	
20	LowerPriceLimit	Int64	8	Lower price limit for the outright tradable instrument for the current trading day Implicit 6 decimal place format.	
28	TransactionTime	Uint64	8	The time at which the	

Offset	Field	Format	Len	Description	Values
				price limits were created.	
Total length			36		

4.2 Status Data

The following messages are generated whenever there is a change to the trading state or trading state condition at contract or tradable instrument level.

The following trading state conditions can be imposed:

- Pause – order books remain active, order submission and amendment is not permitted only cancellation.
- Halt – order books are cleared, order submission and management is not permitted.

Order Book Clear (327) messages can be generated in response to market state changes, see section 4.3.7.

Note a Technical Halt will occur in the event of a site failover, see sections 2.2.4.2 and 2.4.

4.2.1 Market State - Contract (311)

This message indicates the trading state of instruments at the contract level, e.g. Copper Futures, Aluminium Options. The ContractCode field is common across the Contract State (311), Outright Definition (301) and Strategy Definition (302) messages and is used to link the contract state to individual tradable instruments.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	311 = Market State Contract
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	Time of event.	
14	ContractCode	String	12	A string that combines the contract symbol, contract type and currency	e.g. ‘PBDF, OCDF, AADO, NADT’
26	TradingState	Uint8	1	Trading State	1 = Pre-Open

Offset	Field	Format	Len	Description	Values
					2 = Open 3 = Post Trade 4 = Close 6 = Technical Halt
27	StartTime	Uint64	8	Trading State Start Time 0 (not applicable) for Technical Halt	
35	EndTime	Uint64	8	Trading State End Time 0 (not applicable) for Technical Halt	
43	TradingStateCondition	String	1	Current trading state condition	P = Pause H = Halt Blank = Active (or when pause/halt has been lifted)
44	Filler	String	2		
Total length			46		

4.2.2 Market State - Instrument (312)

This message indicates the trading state of an individual tradable instrument and is sent when the instrument state differs from that at contract level, for example when TOM goes into Post Trade before the contract.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	312 = Market State Instrument
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	Time of event.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	

Offset	Field	Format	Len	Description	Values
22	TimetableControlType	String	1	Timetable Control Type	A = Automatic (default trading schedule) M = Manual (temporary trading schedule)
23	TradingState	Uint8	1	Trading State	1 = Pre-Open 2 = Open 3 = Post Trade 4 = Close 6 = Technical Halt
24	StartTime	Uint64	8	Trading State Start Time 0 (not applicable) for Technical Halt	
32	EndTime	Uint64	8	Trading State End Time 0 (not applicable) for Technical Halt	
40	TradingStateCondition	String	1	Current trading state condition	P = Pause H = Halt Blank = Active (or when pause/halt has been lifted)
41	Filler	String	3		
Total length			44		

4.2.3 Market State Processing

For a tradable instrument if Market State - Instrument (312) and Market State – Contract (311) messages with the same TimeOfEvent have been received, the Market State - Instrument (312) message should be used to determine the current order book state for the tradable instrument. The Market State – Contract (311) messages should be ignored only for that instrument until the end of the day.

On receipt of a Market State – Instrument (312) message for a tradable instrument any subsequent Market State – Contract (311) messages in the parent contract should be ignored for the tradable instrument until the end of the day.

4.3 Order Book Data

With the exception of the Quote Request (329) and Indicative Opening Price (320) messages described in sections 4.3.8 and 4.3.9 the messages in this section are only published when the market is in the 'Open' state.

4.3.1 Top Of Book (321)

The Top of Book message is generated when the top price level has been modified. There are no 'New', 'Change' or 'Delete' actions for the Top of Book. Whenever the price, quantity or the number of orders at the Top of Book changes, a new message is sent.

Whenever an order book is emptied as a result of market activity, a Top of Book message with price fields set to Null and aggregate quantity / number of orders set to zero will be sent.

The TimeOfEvent is assigned the latest incoming event timestamp regardless of the event that caused the update to the Top of Book. For orders submitted during Pre-Open and reloaded GTC and GTD orders, the TimeOfEvent will reflect the uncrossing event time at market open.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	321 = Top of Book
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect updated the order book, triggering a Top of Book message.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
22	AggregateBidVolume	Uint64	8	Aggregated quantity available on the bid side	
30	AggregateAskVolume	Uint64	8	Aggregated quantity available on the ask side	

Offset	Field	Format	Len	Description	Values
38	BidPrice	Int64	8	The bid price Implicit 6 decimal place format.	
46	AskPrice	Int64	8	The ask price. Implicit 6 decimal place format.	
54	NumberBidExplicitOrders	Uint32	4	The total number of Bid orders in the best price level for Explicit Orders	
58	BidQtyExplicitOrders	Uint64	8	The total quantity of Bid orders in the best price level for Explicit Orders	
66	NumberAskExplicitOrders	Uint32	4	The total number of Ask orders in the best price level for Explicit Orders	
70	AskQtyExplicitOrders	Uint64	8	The total quantity of Ask orders in the best price level for Explicit Orders	
78	NumberBidImpliedOrders	Uint32	4	The total number of Bid orders in the best price level for Implied Orders	
82	BidQtyImpliedOrders	Uint64	8	The total quantity of Bid orders in the best price level for Implied Orders	
90	NumberAskImpliedOrders	Uint32	4	The total number of Ask orders in the best price level for Implied Orders	

Offset	Field	Format	Len	Description	Values
94	AskQtyImpliedOrders	Uint64	8	The total quantity of Ask orders in the best price level for Implied Orders	
Total length			102		

4.3.2 Aggregate Order Book (322)

The aggregate order book is sent whenever there is an order book change within the top 15 price levels. The TimeOfEvent is assigned the latest incoming event timestamp that resulted in any price level being updated or removed. For orders submitted during Pre-Open and reloaded GTC and GTD orders, the TimeOfEvent will reflect the uncrossing event time at market open.

Refer to Section 7 - Aggregate Order Book Management for details on the Aggregate Order Book message.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	322 = Aggregate Order Book
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect updated the order book, triggering an Aggregate Order Book message.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
22	NoEntries	Uint8	1	Number of book entries within the message	
	AggregateVolume	Uint64	8	Total quantity of orders in this price level and side	

Offset	Field	Format	Len	Description	Values
	Price	Int64	8	Price Implicit 6 decimal place format.	
	NumberOfExplicitOrders	Uint32	4	Number of Explicit orders in this price level and side	
	TotalQtyOfExplicitOrders	Uint64	8	Total quantity of Explicit orders in this price level and side	
	NumberOfImpliedOrders	Uint32	4	Number of Implied orders in this price level and side	
	TotalQtyOfImpliedOrders	Uint64	8	Total quantity of Implied orders in this price level and side	
	BuySell	String	1	Side of the order	B = Buy S = Sell
	PriceLevel	Uint8	1	Indicates the price level (within top 15) of the information carried in the message	1 to 15
	UpdateAction	Uint8	1	Type of market data update action	0 = New 1 = Change 2 = Delete
Total length			$23 + 43n_o$		

(n_o = value of NoEntries)

4.3.3 Order Add (323)

The Order Add message is generated when an order is placed in order book. An incoming, aggressing order that matches against one or more resting orders will not be published as an Order Add message, unless it has residual volume after matching.

For orders submitted during Pre-Open and reloaded GTC and GTD orders, the TimeOfEvent will reflect the uncrossing event time at market open.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	323 = Order Add
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect added this order to the order book. For reloaded GTC/GTD orders this is the uncrossing event time.	
14	T1	Uint64	8	The time of the order request from the LMEselect gateway	NULL for GTC/GTD reloaded / Stop loss / *Speedbump* orders
22	T2	Uint64	8	The time when LMEselect captured the order request	NULL for GTC/GTD reloaded / Stop loss / *Speedbump* orders
30	T3	Unit64	8	The time when LMEselect published this order request to LMEsource	NULL for GTC/GTD reloaded / Stop loss / *Speedbump* orders
38	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
46	OrderID	Uint64	8	Order ID assigned by	

Offset	Field	Format	Len	Description	Values
				LMEselect	
54	BuySell	String	1	Side of order	B = Buy S = Sell
55	Volume	Uint32	4	Order Quantity	
59	Price	Int64	8	Price of order Implicit 6 decimal place format.	
67	OrderBookPosition	Uint32	4	Relative order position within this side of the order book based upon price and time priority, see section 8.2.	
71	Filler	String	1		
Total length			72		

4.3.4 Order Amend (324)

The Order Amend message is generated when an order amendment updates the volume downward or position in the order book.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	324 = Order Amend
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect amended this order in the order book.	
14	T1	Uint64	8	The time of the order amend from the LMEselect gateway	NULL for Stop loss / *Speedbump* orders

Offset	Field	Format	Len	Description	Values
22	T2	Uint64	8	The time when LMEselect captured the order amend request	NULL for Stop loss / *Speedbump* orders
30	T3	Unit64	8	The time when LMEselect published this order amend request	NULL for Stop loss / *Speedbump* orders
38	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
46	OrderID	Uint64	8	Order ID of amended order	
54	BuySell	String	1	Side of order	B = Buy S = Sell
55	Volume	Uint32	4	Absolute outstanding volume	
59	Price	Int64	8	Price of order Implicit 6 decimal place format.	
67	OrderBookPosition	Uint32	4	Relative order position within the order book / price / side	
71	Filler	String	1		
Total length			72		

4.3.5 Order Cancel (325)

The Order Cancel message is generated when an order is cancelled in the order book.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	325 = Order Cancel

Offset	Field	Format	Len	Description	Values
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect cancelled this order from the order book.	
14	T1	Uint64	8	The time of the order request from the LMEselect gateway	NULL for mass cancellations / trade halt
22	T2	Uint64	8	The time when LMEselect captured the order request	NULL for mass cancellations / trade halt
30	T3	Unit64	8	The time when LMEselect cancelled this order	
38	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
46	OrderID	Uint64	8	Order ID for the cancelled order	
54	BuySell	String	1	Side of order	B = Buy S = Sell
55	Filler	String	1		
Total length			56		

4.3.6 Order Executed (326)

The Order Executed message is generated when an order is executed. An Order Executed message will not be published for an aggressing order unless it matches with a resting implied order. Publishing an Order Executed message for a resting implied order will only occur when two implied orders are matched.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	326 = Order Executed
4	TradingVenue	String	2	Trading venue	EL = Electronic

Offset	Field	Format	Len	Description	Values
6	TimeOfEvent	Uint64	8	The time LMEselect created the trade that executed this order.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID of the trade	
22	Price	Int64	8	The price of the trade Implicit 6 decimal place format.	
30	Volume	Uint32	4	Trade volume.	
34	OrderID	Uint64	8	Order ID assigned by LMEselect. The OrderID will be NULL if the order has not previously been published.	
42	MatchID	Uint64	8	An id that can be used to identify all orders that matched against each other	
50	TradeCancelFlag	Uint8	1	Trade Cancel Flag	0 = False ***1*** = *True*
51	SubTypeOfTrade	UiInt8	1	Sub type of trade	1 = The trade resulted from an explicit order 2 = The trade resulted from uncrossing 7 = The trade resulted from an implied order 8 = The trade resulted from two implied orders matching

Offset	Field	Format	Len	Description	Values
52	TradeBuySell	String	1	The side of the trade for this order	B = Buy S = Sell
53	StrategyLegCount	Uint32	4	Number of legs present	
	LegTradableInstrumentID	Uint64	8	Leg Tradable Instrument ID	
	LegBuySell	String	1	Leg side as applicable depending on the trade side	B = Buy S = Sell
	LegPrice	Int64	8	Price allocated to this leg of the strategy Implicit 6 decimal place format.	
	LegVolume	Uint32	4	Quantity allocated to this leg of the strategy	
	LegMatchID	Uint64	8	Leg Match ID	
Total length			57 + 29n_o		

(n_o = value of StrategyLegCount)

4.3.7 Order Book Clear (327)

The Order Book Clear message is generated when order book is required to be clear, for example after the transition between certain market states, or when an instrument's Trading State Condition is 'Trade Halt'.

The market state transitions that result in an Order Book Clear message are:

1. Pre-Open to Open. Any order events entered during Pre-Open that did not match during uncrossing are published after the Order Book Clear message.
2. Open to Post-Trade.

Following an 'Order Book Clear' message, if an instrument is subsequently open for trading any resting orders will be sent as Top of Book / Aggregate Order Book / Order Add messages to allow clients to rebuild the order book.

An Order Book Clear message will not be published when an instrument enters or leaves 'Trade Pause'.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	327 = Order Book Clear
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time the trading state of the instrument changed, resulting in the Order Book Clear message.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
Total length			22		

4.3.8 Quote Request (329)

The Quote Request message is generated when a request for quote is accepted by the Matching Engine.

Offset	Field	Format	Len	Description	Values
0	*MsgSize*	*Uint16*	*2*	*Size of the message*	
2	*MsgType*	*Uint16*	*2*	*Type of message*	*329 = Quote Request*
4	*TradingVenue*	*String*	*2*	*Trading venue*	*EL = Electronic*
6	*TimeOfEvent*	*Uint64*	*8*	*The time LMEselect created this quote request.*	
14	*TradableInstrumentID*	*Uint64*	*8*	*Tradable Instrument ID*	
22	*QuoteRequestType*	*Uint8*	*1*	*Type of Quote Request*	*1 = Manual (a single quote request)* *2 = Auto (a streaming quote request)*

Offset	Field	Format	Len	Description	Values
23	*BuySell*	*String*	*1*	*Side of order*	*B = Buy* *S = Sell* *NULL = Two sided quote*
24	*Volume*	*Uint32*	*4*	*Amended delta quantity*	
28	*Filler*	*String*	*2*		
Total length			*30*		

4.3.9 Indicative Opening Price (320)

The Indicative Opening Price (IOP) is the predicted opening trade price which is calculated using the uncrossing algorithm during Pre-Open. If there are no crossed prices, no IOP is calculated or disseminated. If a tradable instrument does not have a crossed order book but does have both a bid and offer price then a mid-price (IOMP) will be calculated and published instead of the IOP.

An IOP and IOMP are mutually exclusive, i.e. when an IOP is available the IOMP is not applicable, and will be set to null, and vice versa.

At the market state transition from Pre-Open to Open, an IOP message is published for every tradable instrument with IndicativeOpeningPrice, and IndicativeOpeningMidPrice set to null and IndicativeOpeningVolume set to 0 to indicate the IOP and IOMP prices are no longer valid.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	320 = Indicative Opening Price
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect computed or derived the IOP/IOMP.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
22	IndicativeOpeningPrice	Int64	8	Indicative Opening Price Implicit 6 decimal	Default = NULL

Offset	Field	Format	Len	Description	Values
				place format.	
30	IndicativeOpeningVolume	Uint32	4	Indicative Opening Volume	Default = 0
34	IndicativeOpeningMidPrice	Int64	8	Indicative Opening Mid Price Implicit 6 decimal place format.	Default = NULL
42	Filler	String	2		
Total length			44		

4.4 Trade Statistics

4.4.1 Trade Statistics - End of Day (351)

The Trade Statistics - End of Day message is generated when the market moves to the Post-Trade session for instruments that have traded. LMEsource will publish the LMEselect Opening and Closing Prices, LMEselect Trading High, and LMEselect Trading Low for all contracts that have traded during the day. The LMEselect Opening Price is the price of the first trade of the day.

Note: due to sequence of message publication the Trade Statistic - End of Day message may be disseminated before the Instrument State (312) message that confirms the instrument as being in the 'Post-Trade' or 'Closed' state.

If there was an intraday restart of the LMEselect the OHL statistics will have been reset at the restart and will reflect the open, high and low prices for the market session after restart.

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message	351 = Trade Statistics - End of Day
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect computed or derived the designated price.	

Offset	Field	Format	Len	Description	Values
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
22	OpenPrice	Int64	8	Opening trade price for the current day. Implicit 6 decimal place format.	
30	TradeHigh	Int64	8	Highest trade price for the current day Implicit 6 decimal place format.	
38	TradeLow	Int64	8	Lowest trade price for the current day Implicit 6 decimal place format.	
46	ClosingPrice	Int64	8	Closing (final) trade price for the current day Implicit 6 decimal place format.	
Total length			54		

4.4.2 Trade Statistics - Intraday (352)

The Trade Statistics - Intraday message contains trade information for completed trades. The trade statistics information is provided on a snapshot basis.

At market open, if there has been any uncrossing activity in the instrument, three messages will be published, one each for open price, high price and low price. Each of these three messages will include any previously published OHL price. The opening price is the price of the first trade of the day.

If there was no uncrossing activity in the instrument, a single Trade Statistics - Intraday message is published, with the OpenPrice, TradeHigh and TradeLow fields set to null. Upon the first trade of the day, three messages will be published, one each for open price, high price and low price.

If there is an intraday restart of the LMEselect the OHL statistics will be reset and will reflect the open, high and low prices after the restart.

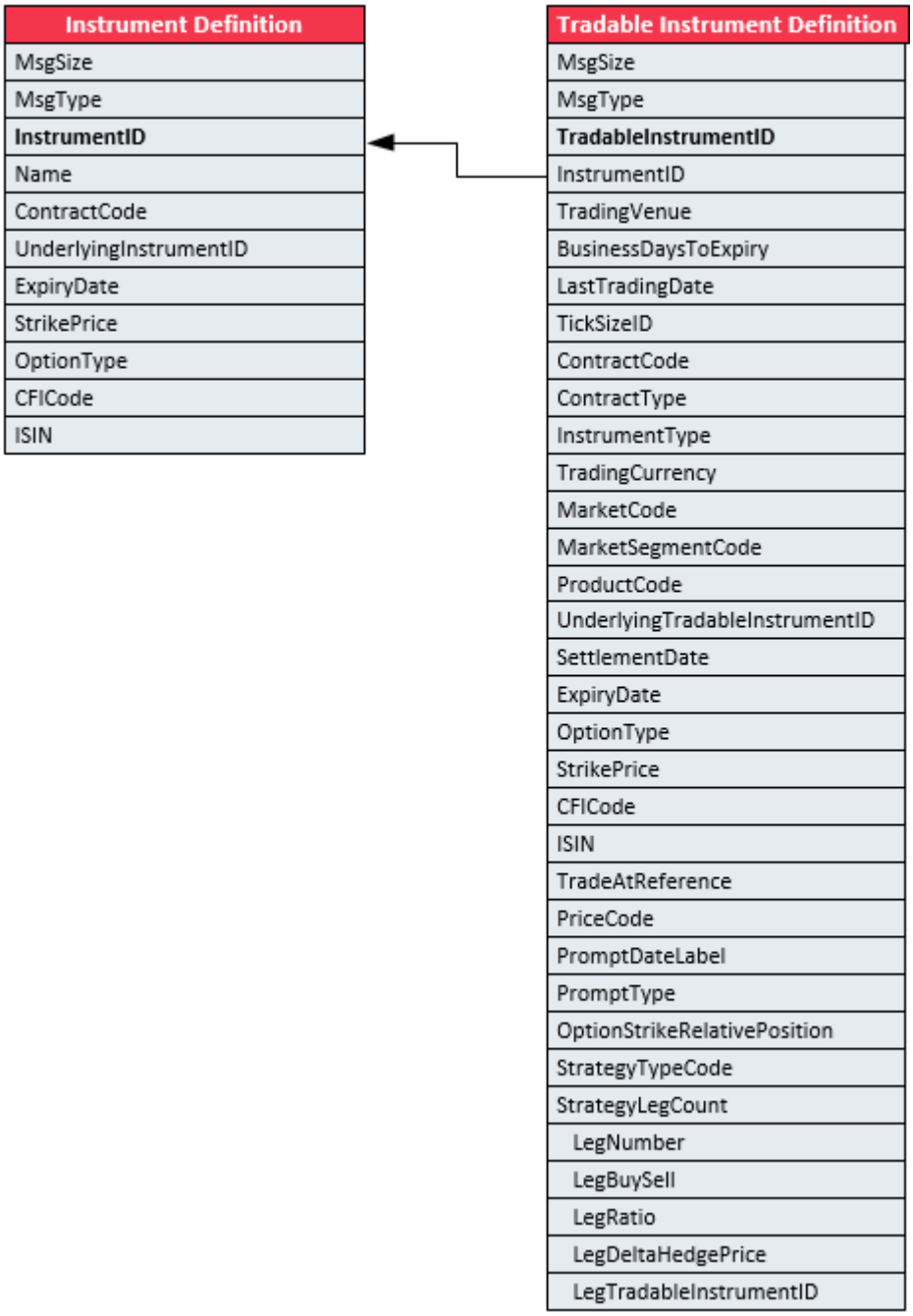
Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	

Offset	Field	Format	Len	Description	Values
2	MsgType	Uint16	2	Type of message	352 = Trade Statistics - Intraday
4	TradingVenue	String	2	Trading venue	EL = Electronic
6	TimeOfEvent	Uint64	8	The time LMEselect computed or derived the designated price.	
14	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
22	OpenPrice	Int64	8	Opening trade price for the current day. Implicit 6 decimal place format.	
30	TradeHigh	Int64	8	Highest trade price for the current day Implicit 6 decimal place format.	
38	TradeLow	Int64	8	Lowest trade price for the current day Implicit 6 decimal place format.	
Total length			46		

5 Non-Electronic Message Formats

5.1 Reference Data

Non-electronic static reference data is published in two messages which are shown in the entity relationship diagram below. The bold field(s) form the primary key for each message type.



The diagram in section 9 shows the levels in the product hierarchy which includes Instrument and Tradable Instrument.

The InstrumentID links the tradable instrument and instrument. The InstrumentID is also used to link reference prices, open interest and trading volume to an instrument.

For an electronic tradable instrument, the ContractCode, ExpiryDate and ISIN in the Outright Definition (301) can be mapped to the ContractCode, ExpiryDate and ISIN in the Instrument Definition (303) to obtain the InstrumentID and a lookup into the Reference Price (401), Open Interest (420) or Trading Volume (424).

Note multiple tradable instruments in both the electronic and non-electronic markets can map to a single InstrumentID, as shown in the following example:

Venue	TradableInstrumentID	Tradable Instrument	InstrumentID
Electronic	86236	3M	11111
Electronic	31963	Dated equivalent of 3M	11111
Electronic	31970	3M TaS/TaR	11111
Ring	96200	3M	11111
Inter Office	97300	3M	11111

5.1.1 Instrument Definition (303)

Describes a futures outright prompt date or option call or put strike.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	303 = Instrument Definition
4	InstrumentID	Uint64	8	Unique Instrument Identifier	
12	Name	String	40	Instrument name	
52	ContractCode	String	12	Contract to which the instrument belongs	e.g. ‘PBDF’, ‘OCDF’, ‘AADO’, ‘NADT’
64	UnderlyingInstrumentID	Uint64	8	A reference to the underlying Instrument. NULL value otherwise	

Offset	Field	Format	Len	Description	Value
72	ExpiryDate	Uint32	4	Expiry date, see section 11	YYYYMMDD
76	StrikePrice	Int64	8	Option Exercise Price. Implicit 6 decimal place format.	NULL for futures
84	OptionType	String	1	Call or Put. Space if Contract Type = Future.	C = Call P = Put
85	CFICode	String	6	The instrument classification according to ISO 10962.	e.g. 'FCEPSX', 'FCECSX', 'OCAFPS'
91	ISIN	String	12	ISIN Code Not applicable if the Instrument belongs to an algorithmic test contract	Space (i.e. not applicable)
Total length			103		

5.1.2 Tradable Instrument Definition (304)

Describes an individual outright, strategy or Trade at Reference tradable instrument on the Ring or Inter Office venue.

An option tradable instrument will be published only once on the day of creation and will be published at the start of day on the next business day.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	304 = Tradable Instrument Definition
4	TradableInstrumentID	Uint64	8	Tradable instrument ID	
12	InstrumentID	Uint64	8	The linkage between Tradable	

Offset	Field	Format	Len	Description	Value
				Instrument and Instrument. See section 5.1.1. NULL if InstrumentType = Strategy	
20	TradingVenue	String	2	Trading venue	RK = Ring IO = Inter Office
22	BusinessDaysToExpiry	Uint32	4	Numeric indicator of the number of Business Days to Expiry used as a measure of how far the instrument is down the curve. Set to one on the expiry day, set to the youngest leg if Instrument Type = Strategy. NULL if Contract Type = Option	
26	LastTradingDate	Uint32	4	Last Trading Date	YYYYMMDD
30	TickSizeID	Uint32	4	Tick Size ID	See section 10.3
34	ContractCode	String	12	A unique code to identify the contract	e.g. ‘PBDF’, ‘OCDF’, ‘AADO’, ‘NADT’
46	ContractType	String	1	Constant contract type	F = Future O = Option
47	InstrumentType	String	1	Instrument Type	O = Outright S = Strategy

Offset	Field	Format	Len	Description	Value
48	TradingCurrency	String	3	The currency code according to ISO 4217	e.g. ‘USD’
51	MarketCode	String	4	Market Code	LME = the base metals market
55	MarketSegmentCode	String	12	A string identifier for the individual market segment to which the tradable instrument belongs	e.g. ‘Base’, ‘Ferrous’, ‘Minor’
67	ProductCode	String	2	Product code. This identifies the metal.	e.g. ‘AA’, ‘AH’,’CA’
69	UnderlyingTradableInstrumentID	Uint64	8	Underlying Tradable Instrument ID	NULL when no underlying Tradable Instrument exists or the Tradable Instrument is a strategy.
77	SettlementDate	Uint32	4	Settlement Date	YYYYMMDD NULL for a rolling prompt or strategy
81	ExpiryDate	Uint32	4	The expiry date for this tradable instrument, see section 11.	YYYYMMDD NULL for a strategy
85	OptionType	String	1	For option tradable instruments, whether this tradable instrument represents a call or a put option. Not applicable for a	C = Call P = Put Default = Space (i.e. not applicable)

Offset	Field	Format	Len	Description	Value
				future or strategy.	
86	StrikePrice	Int64	8	The strike price for this tradable instrument. Implicit 6 decimal place format.	NULL for a future or strategy
94	CFICode	String	6	The instrument classification according to ISO 10962. Not applicable for a strategy	e.g. 'FCEPSX', 'FCECSX', 'OCAFPS' Space (i.e. not applicable)
100	ISIN	String	12	ISIN Code Not applicable for a strategy	Space (i.e. not applicable)
112	TradeAtReference	Uint8	1	A flag to indicate that the instrument is a TaS/TaR type.	0 = False 1 = True
113	PriceCode	String	2	The price code that specifies the type of TaS/TaR instrument. Not applicable for non-Trade at Reference tradable instruments.	See section 10.4 Default = Space (i.e. not applicable)
115	PromptDateLabel	String	6	Prompt Date Label Not applicable for a strategy	See section 10.1 Default = Space (i.e. not applicable)
121	PromptType	String	1	Identifies whether the prompt is a single or a rolling prompt.	S = Single R = Rolling Default =

Offset	Field	Format	Len	Description	Value
				Not applicable for a strategy.	Space (i.e. not applicable)
122	OptionStrikeRelativePosition	Uint32	4	ATM Strike = 0, ITM relative positions are positive, OTM positions are negative. May not be contiguous.	NULL if Contract Type = Future or Instrument Type = Strategy NULL for an intraday created strike
126	StrategyTypeCode	Uint32	4	Strategy Type NULL for an outright	See section 10.2
130	RemainingRecords	Uint16	2	Number of remaining records to be published. The value is updated as messages are published. When the value of RemainingRecords = RecordCount it indicates that this is the last message.	
132	RecordCount	Uint16	2	The number of records in this message.	
134	StrategyLegCount	Uint32	4	Number of strategy legs	
	LegNumber	Uint32	4	Leg number	
	LegBuySell	String	1	Buy or sell indicator for the strategy leg	B = Buy S = Sell

Offset	Field	Format	Len	Description	Value
	LegRatio	Uint64	8	Leg ratio of the strategy leg. Implicit 3 decimal place format. Where strategy type code = 9, it represents the delta value for each delta hedge leg e.g. 0.413 delta (413).	
	LegDeltaHedgePrice	Int64	8	The requested price for the delta hedge leg of the strategy. Only non-null for the delta hedge leg of a strategy. Implicit 6 decimal place format.	
	LegTradableInstrumentID	Uint64	8	Tradable Instrument Id of the strategy leg.	
Total length			138 + $29n_o$		

(n_o = value of Record Count)

5.2 Status Data

5.2.1 Market State - Product (310)

This message indicates the trading state of the product on the Ring and includes the ring session.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	310 = Market State Product

Offset	Field	Format	Len	Description	Value
4	TradingVenue	String	2	Trading venue	RK = Ring
6	TimeofEvent	Uint64	8	Time of event.	
14	ProductCode	String	2	Product code	e.g. ‘AA’, ‘AH’,’CA’
16	TradingState	Uint8	1	Trading State	2 = Open 4 = Close
17	RingSession	String	2	This identifies the ring trading session.	R1 = First morning ring R2 = Second morning ring R3 = First afternoon ring K1 = Morning kerb session K2 = Afternoon kerb session
Total length			19		

5.3 Inter Office and Ring Data

5.3.1 Market Data Order (328)

This message is generated each time there is a new order price and when Ring prices are withdrawn or deleted. Prices can be withdrawn if they are no longer being quoted by traders in the Ring. Prices can be deleted if incorrectly entered.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	328 = Market Data Order
4	TimeOfEvent	Uint64	8	The time at which the transaction occurred.	
12	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
20	TradingVenue	String	2	Trading venue	IO = Inter Office

Offset	Field	Format	Len	Description	Value
					RK = Ring
22	RingSession	String	2	This identifies the Ring trading session. Otherwise space if not applicable.	R1 = First morning ring R2 = Second morning ring R3 = First afternoon ring K1 = Morning kerb session K2 = Afternoon kerb session C1 = Basis Ring 1 C2 = Basis Ring 2 C3 = Basis Ring 3 D1 = Basis Kerb 1 D2 = Basis Kerb 2
24	CancellationReason	String	2	Indicates that the event relates to an order cancellation. Otherwise space if not applicable.	WD = Withdrawn DL = Deleted
26	ProductCode	String	2	Product code	e.g. ‘AA’, ‘AH’,’CA’
28	BuySell	String	1	Buy or Sell	B = Buy S = Sell
29	Price	Int64	8	Price of the order Can be null for a strategy market data order originating from LMEsmart Implicit 6 decimal place format.	
37	Volume	Uint32	4	Order quantity Can be null for a strategy market data	

Offset	Field	Format	Len	Description	Value
				order originating from LMEsmart	
41	RemainingRecords	Uint16	2	Number of remaining records to be published. The value is updated as messages are published. When the value of RemainingRecords = RecordCount it indicates that this is the last message.	
43	RecordCount	Uint16	2	The number of records in this message.	
45	StrategyLegCount	Uint32	4	Number of legs present	
	LegBuySell	String	1	Buy or sell for the strategy leg	B = Buy S = Sell
	LegPrice	Int64	8	Price allocated to this leg of the strategy Implicit 6 decimal place format.	
	LegVolume	Uint32	4	Quantity allocated to this leg of the strategy	
Total length			$49 + 13n_o$		

$(n_o$ = value of RecordCount)

5.3.2 Indicative Trade Price (340)

This message is generated each time there is a trade price and when a price has been deleted.

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

Offset	Field	Format	Len	Description	Value
2	MsgType	Uint16	2	Type of message.	340 = Indicative Trade Price
4	TimeOfEvent	Uint64	8	The time at which the transaction occurred.	
12	TradableInstrumentID	Uint64	8	Tradable Instrument ID	
20	TradingVenue	String	2	Trading venue	RK = Ring
22	RingSession	String	2	This identifies the ring trading session.	R1 = First morning ring R2 = Second morning ring R3 = First afternoon ring K1 = Morning kerb session K2 = Afternoon kerb session
24	IndicativePriceType	Uint8	1	Indicative trade price type	0 = Indicative trade price 1 = Indicative trade price deleted
25	IndicativeTradePrice	Int64	8	The price of the trade. Implicit 6 decimal place format.	
Total length			33		

5.3.3 Business Event - Pre-TT Auction (342)

Under the MiFIR (Markets in Financial Instruments and Amending Regulation) pre-trade transparency requirements, current bid and offer prices entered in the Inter Office market are published in a Systematic Fixed Price Auction (SFPA).

This message is generated whenever there is a change in Auction status.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	342 = Business Event – Pre-TT Auction
4	TimeOfEvent	Uint64	8	The time at which the transaction occurred.	
12	Headline	String	256	Auction event summary and details	
Total length			268		

5.3.4 Order Statistics - Intraday (350)

This message is generated at the end of each Ring trading session for instruments that have traded.

Two messages will be published, one for each high price and low price. If no price has been received the field will be set to null.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	350 = Order Statistics - Intraday
4	TimeOfEvent	Uint64	8	The time at which the transaction occurred.	
12	TradableInstrumentID	Uint64	8	Tradable Instrument ID.	
20	TradingVenue	String	2	Trading venue	RK = Ring
22	RingSession	String	2	This identifies the ring trading session.	
24	OrderHigh	Int64	8	Highest 3M bid price for the current Ring session Implicit 6 decimal place format.	

Offset	Field	Format	Len	Description	Value
32	OrderLow	Int64	8	Lowest 3M ask price for the current Ring session Implicit 6 decimal place format.	
Message length			40		

5.4 Reference Price Data

5.4.1 Reference Price (401)

Reference prices are published for instruments with an InstrumentID for the following price types:

- Official
- Settlement
- Closing
- Index.

Instruments are published in the Instrument Definition (303), see section 5.1.1.

Reference prices are provided according to the following schedule:

Time	Description
09:00 – 17:00	Indicative 3M Prices An early indication of the closing price
12:20 - 13:25	Official Prices The last bid and ask price quoted during the second Ring session Settlement Prices The last cash ask price
13:30 - 14:30	Monthly Moving Average Price (MMAP) This is made up of known LME Official Cash Settlement Prices from the current month. These prices are totalled and averaged over the number of business days to date in the current month. On the last business day of the current calendar month after the Official Cash Settlement Price is known and included in the averaging calculation, the MMAP becomes the Monthly Average Settlement Price (MASP). Monthly Average Settlement Price (MASP)

Time	Description
	Based on LME Official Cash Settlement Prices available in the month which are totalled and averaged over the number of business days in the month. It is stated in US dollars per metric tonne. The MASP is the settlement price for Monthly Average Futures contracts.
17:00 - 17:50	Provisional Closing Prices Evening Evaluations are determined by the LME Quotations Committee (Market Operations) with regard to trading on LMEselect as well as trades, bids and offers transacted throughout the whole day.
17:50 - 18:15	Final Closing Prices
18:00 - 18:15	Notional Average Prices (NAP) The closing price for forward Monthly Average Future months published at the end of each day. The NAP is made up of known LME Official Cash Settlement prices and LME Closing Prices taken from each of the prompt dates for the pricing period. These prices are totalled and averaged over the number of business days in the calendar month. Where there are no LME Closing Prices for a date as when there are only weekly and monthly LME prices available, linear interpolation is used to derive a daily price for averaging. NAP is used by LME Clear in margin calculations.
	Index Price The index price is based on the Closing Price and relative weighting of the index constituent commodities. The index value is calculated as the sum of the prices for the three qualifying months multiplied by the corresponding weights, multiplied by a constant. The constituents of the index are: Aluminium, Copper, Lead, Nickel, Tin and Zinc (with each having their own weighting). Weightings of the six metals are derived from global production volume and trade liquidity averaged over the preceding five-year period.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	401 = Reference Price

Offset	Field	Format	Len	Description	Value
4	TimeOfEvent	Uint64	8	The time at which the price was established	
12	Category	String	1	Category of the reference price	I = Instrument P = Product
13	PriceType	String	32	Reference price type	Official Settlement Closing Index
45	PriceStatus	String	12	The status of reference price	Indicative Provisional Final ReFinalised
57	BusinessDate	Uint32	4	The business date on which the price was established.	YYYYMMDD
61	InstrumentID	Uint64	8	Unique Instrument Identifier. NULL for PriceType = Index	
69	ProductCode	String	2	The product code. This identifies the metal for the instrument.	e.g. ‘AA’, ‘AH’, ‘CA’
71	CurrencyCode	String	3	The currency code according to ISO 4217	e.g. ‘USD', 'GBP', 'EUR', 'JPY'
74	Bid	Int64	8	A reference bid price. Represents the average bid price for a reference price categorised as	

Offset	Field	Format	Len	Description	Value
				such. Implicit 6 decimal place format.	
82	Price	Int64	8	A reference price. For an Average represents the mean of bid ask averages. Implicit 6 decimal place format.	
90	Ask	Int64	8	A reference ask price. Represents the average ask price for a reference price categorised as such. Implicit 6 decimal place format.	
Total length			98		

5.4.1.1 Reference Price Identification

For a particular reference price the following table shows the data populated in specific fields in the message. See section 13 for examples.

Reference Price	Category	PriceType	PriceStatus	Bid	Price	Ask	Notes
Indicative 3M	I (Instrument)	Closing	Indicative	NULL		NULL	
Official	I (Instrument)	Official	Final ReFinalised		NULL		
Settlement	I (Instrument)	Settlement	Final ReFinalised	NULL		NULL	For Cash
Monthly Moving Average Price (MMAP)	I (Instrument)	Settlement	Provisional	NULL		NULL	For MAF contracts every business day except for the last business day of the month
Monthly Average Settlement Price (MASP)	I (Instrument)	Settlement	Final ReFinalised	NULL		NULL	For MAF contracts on the last business day of the month
Closing	I (Instrument)	Closing	Provisional Final ReFinalised	NULL		NULL	
Notional Average Price (NAP)	I (Instrument)	Closing	Final	NULL		NULL	For MAF contracts only

Reference Price	Category	PriceType	PriceStatus	Bid	Price	Ask	Notes
			ReFinalised				
Index	P (Product)	Index	Final	NULL		NULL	

5.4.2 Reference Forward Curve Price (402)

Indicative and closing prices for Carries and indicative prices for the Aluminium Premiums are published according to the following schedule:

Time	Description
09:00 – 17:00	Indicative Prices An early indication of the closing price
17:00 - 17:50	Provisional Closing Prices
17:50 - 18:15	Final Closing Prices

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	402 = Reference Forward Curve Price
4	TimeOfEvent	Uint64	8	The time at which the price was established.	
12	BusinessDate	Uint32	4	The business date on which the price was established.	YYYYMMDD
16	ProductCode	String	2	The product code. This identifies the metal for the instrument.	e.g. ‘AA’, ‘AH’, ‘CA’
18	PriceStatus	String	12	The status of reference price	Indicative Provisional Final ReFinalised
30	CurrencyCode	String	3	The currency code according to ISO 4217	e.g. ‘USD', 'GBP', 'EUR', 'JPY'
33	RemainingRecords	Uint16	2	Number of remaining prices to be published. The value is updated as	

Offset	Field	Format	Len	Description	Value
				messages are published for a product. When the value of RemainingRecords = RecordCount it indicates that this is the last message for the product.	
35	RecordCount	Uint16	2	The number of reference prices in this message.	
	Price	Int64	8	The price for the given date(s). Implicit 6 decimal place format.	
	PromptDate1	Uint32	4	The date to which the price relates. For a spread this is the first leg.	YYYYMMDD
	PromptDateLabel1	String	6	The label representing date1. Not applicable for all dates.	e.g. ‘CASH’, ‘3M’, ‘15M’
	PromptDate2	Uint32	4	The date to which the price relates. For a spread this is the second leg. NULL if not applicable	YYYYMMDD
	PromptDateLabel2	String	6	The label representing date2. For a spread the date label associated with the second leg (if there is one). Not applicable for all dates.	Default = Space (i.e. not applicable)
Total length			$37 + 28n_o$		

$(n_o$ = value of NumPrices)

5.4.3 Reference FX Rate (403)

Exchange FX rates are published for the Cash prompt. Daily and Monthly Moving Average Exchange FX rates are published each day, with the Monthly Average Exchange FX rate published on the last business day of the month.

Closing FX rates are published for all prompt dates for physically deliverable metals, and for the last business day of each month out to 63 month.

FX rates are provided according to the following schedule:

Time	Description
13:00	Exchange FX Rates (Officials)
	Closing FX Rates

Note: MonthlyMovingAverage and MonthlyAverage will only be published for the Exchange category.

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	403 = Reference FX Rate
4	Category	String	1	FX rate category	E = Exchange C = Closing
5	Type	String	2	FX rate type	DY = Daily MM = Monthly Moving Average MA = Monthly Average
7	BusinessDate	Uint32	4	The business date on which the rate was confirmed.	YYYYMMDD
11	MaturityDate	Uint32	4	The business date to which the rate applies.	YYYYMMDD
15	BaseCurrencyCode	String	3	The currency code according to ISO 4217	'GBP', 'EUR', 'USD'
18	TargetCurrencyCode	String	3	The currency code according to ISO 4217	'USD', 'JPY'
21	ConversionRate	Int64	8	The conversion rate between base and target currencies. Implicit 6 decimal place format.	
Total length			29		

5.4.4 Reference Volatility Price (404)

The Reference Volatility Price message provides 'raw' strikes. LME volatilities are quoted in Delta space. The strikes for which LME provide volatilities correspond to +/-5, +/-10, +/-25, 50 deltas, the "at-the-money" and tradable strikes for the instrument. The volatilities for all deltas in both the strike space and the delta space, other than the 50 and the ATM are reported as differentials from the absolute value for the 50 in the delta space. For each of these strikes put and call premiums are calculated. For computation of premiums, the LME uses Black76.

The calculated Call Premium and Put Premium are also provided for each volatility / strike price for both Traded Options and TAPOs.

Prices are provided according to the following schedule:

Time	Description
18:15	Reference Volatility Price

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	404 = Reference Volatility Price
4	TimeOfEvent	Uint64	8	Time at which the volatility surface was benchmarked.	
12	BusinessDate	Uint32	4	Business date for which the volatility surface was benchmarked.	YYYYMMDD
16	ContractCode	String	12	Contract code of the Option or TAPO.	e.g. 'AADO, NADT'
28	ExpiryDate	Uint32	4	Option expiry date	YYYYMMDD
32	RemainingRecords	Uint16	2	Number of volatilities to be published. The value is updated as messages are published. When the value of RemainingRecords = RecordCount it indicates that this is the last	

Offset	Field	Format	Len	Description	Value
				message for the expiry date in the contract.	
34	RecordCount	Uint16	2	Number of reference volatility points which describes the reference volatility curve for the expiry date in this contract.	
	SurfaceDomain	String	1	Indicates whether the reference volatility was created in Delta or Strike space.	S = Strike D = Delta
	Delta	Int64	8	Option delta for the volatility point. Implicit 6 decimal place format.	
	StrikePrice	Int64	8	Strike price for the volatility point. Implicit 6 decimal place format.	
	ATM	Uint8	1	Identifies the ATM strike (1) or delta point (0).	1 or 0
	CallVolatility	Int64	8	Implicit 6 decimal place format.	
	PutVolatility	Int64	8	Implicit 6 decimal place format.	
	CallPremium	Int64	8	Implicit 6 decimal place format.	
	PutPremium	Int64	8	Implicit 6 decimal place format.	
Total length			$36 + 50n_o$		

(n_o = value of NumVolatilityRecords)

5.4.5 Reference Auction Price (405)

This message provides daily and monthly average prices from the Platinum and Palladium auction.

Reference bullion prices are provided according to the following schedule:

Time	Description
09:55	First auction prices
14:10	Second auction prices

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	405 = Reference Auction Price
4	TimeOfEvent	Uint64	8	The time at which the price was confirmed.	
12	Category	String	1	The category of auction.	B = Bullion
13	BusinessDate	Uint32	4	The business date on which the price was established.	YYYYMMDD
17	Commodity	String	2	The commodity to which the auction price(s) relate.	PD = Palladium PT = Platinum
19	Session	String	2	Auction session.	AM = Morning PM = Afternoon
21	BidVolume	Uint16	2	Buy side volume interest.	
23	AskVolume	Uint16	2	Sell side volume interest.	
25	NumPriceType	Uint16	2	The number of price type items.	
	AuctionPriceType	String	1	Auction price type.	D = Daily M = Monthly Average

Offset	Field	Format	Len	Description	Value
	NumCurrencyPrices	Uint16	2	Number of currency price records.	
	CurrencyCode	String	3	The auction price currency.	'USD','EUR','GBP'
	Price	Uint64	8	The confirmed auction price. Implicit 6 decimal place format.	
Total length			27 + NumPriceType*3+ (∑ NumCurrencyPrices)*11		

∑ NumCurrencyPrices means:

NumCurrencyPrices(1)+ NumCurrencyPrices(2)+ …+NumCurrencyPrices(n)

Where n = NumPriceType

5.5 Daily Summary Data

5.5.1 Open Interest (420)

This message reports Exchange and Market Open Interest for open positions in futures and options contracts. Exchange open interest volumes are provided per currency (contract code) and not aggregated across currencies whereas market open interest volumes are aggregated across currencies and reported against USD denominated instruments.

Exchange Open Interest is based on open positions in registered contracts between LME clearing members only recorded on LMEsmart.

Market Open Interest is the reported gross, based on both open exchange positions and open client positions for a particular contract.

Open interest is provided according to the following schedule:

Time	Description
08:45	Market Open Interest from two business days in arrears
09:10	Previous business day Futures Exchange Open Interest detail
09:10	Previous business day Options Exchange Open Interest detail

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	420 = Open Interest
4	BusinessDate	Uint32	4	The business date for which the open interest is being reported.	YYYYMMDD
8	Type	String	1	Type of open interest	E = Exchange M = Market
9	InstrumentID	Uint64	8	Instrument to which the open interest applies.	
17	ProductCode	String	2	The product code. This identifies the metal for the instrument.	e.g. ‘AA’, ‘AH’, ‘CA’
19	ContractCode	String	12	Contract to which the instrument belongs	e.g. ‘PBDF, OCDF, AADO, NADT’
31	ContractType	String	1	Constant contract type	F = Future O = Option
32	Volume	Uint32	4	Number of open positions expressed in lots	
Total length			36		

5.5.2 Open Interest Band (421)

This message reports open interest for all futures trades by product between given dates. Open interest volumes are provided per currency (contract code) and not aggregated across currencies.

Open interest band is provided according to the following schedule:

Time	Description
09:10	Previous business day Futures Exchange Open Interest summary

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	421 = Open Interest Band
4	BusinessDate	Uint32	4	The business date for which the open interest is being reported.	YYYYMMDD
8	ProductCode	String	2	The product code	e.g. ‘AA’, ‘AH’, ‘CA’
10	ContractCode	String	12	Contract to which the open interest belongs	e.g. ‘PBDF’, ‘OCDF’
22	ContractType	String	1	Constant contract type	F = Future
23	CurrencyCode	String	3	The currency code according to ISO 4217	e.g. ‘USD', 'GBP', 'EUR', 'JPY'
26	DateBandCount	Uint32	4	Number of open interest date bands	
	FromDate	Uint32	4	The date from which open interest volume for the period is calculated (inclusive)	YYYYMMDD
	ToDate	Uint32	4	The date to which open interest volume for the period is calculated (inclusive)	YYYYMMDD
	Volume	Uint32	4	Number of open positions expressed in lots between the given dates	
Total length			$30 + 12n_o$		

(n_o = value of DateBandCount)

5.5.3 Position Band (422)

This message reports the number of market participants holding futures positions as a percentage of Market Open Interest.

Position band data is provided according to the following schedule:

Time	Description
11:00	Position Band figures from two business days in arrears

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	422 = Position Band
4	BusinessDate	Uint32	4	The business date for which the position band values is being reported.	YYYYMMDD
8	ProductCode	String	2	Product code	e.g. ‘AA’, ‘AH’,’CA’
10	LongPositionBandCount	Uint32	4	Number of bands for long position.	
14	ShortPositionBandCount	Uint32	4	Number of bands for short position.	
	LongPositionLowerValue	Int64	8	Long position lower band percentage value. Implicit 6 decimal place format.	
	LongPositionUpperValue	Int64	8	Long position upper band percentage value. Implicit 6 decimal place format.	

Offset	Field	Format	Len	Description	Value
	LongPositionPromptDateCount	Uint32	4	Number of prompt dates.	
	PromptDateLabel	String	6	Prompt date label, see section 10.1.	
	ExpiryDate	Uint32	4	Expiry date, see section 11.	YYYYMMDD
	ParticipantCount	Uint32	4	Number of market participants holding long positions in the given band and prompt.	
	ShortPositionLowerValue	Int64	8	Short position lower band percentage value. Implicit 6 decimal place format.	
	ShortPositionUpperValue	Int64	8	Long position upper band percentage value. Implicit 6 decimal place format.	
	ShortPositionPromptDateCount	Uint32	4	Number of prompt dates.	
	PromptDateLabel	String	6	Prompt date label, see section 10.1	
	ExpiryDate	Uint32	4	Expiry date, see section 11.	YYYYMMDD
	ParticipantCount	Uint32	4	Number of market participants holding short positions in the given band and prompt.	

Offset	Field	Format	Len	Description	Value
Total length			18 + LongPositionBandCount*20 + (∑ LongPositionPromptDateCount)*14 + ShortPositionBandCount*20 + (∑ ShortPositionPromptDateCount) *14		

∑ LongPositionPromptDateCount means:

LongPositionPromptDateCount(1)+ LongPositionPromptDateCount(2)+…+ LongPositionPromptDateCount(m)

Where n = LongPositionBandCount

∑ ShortPositionPromptDateCount means:

ShortPositionPromptDateCount(1)+ ShortPositionPromptDateCount(2)+… ShortPositionPromptDateCount(n)

Where n = ShortPositionBandCount

5.5.4 Warrant Band (423)

This message reports the number of market participants holding a significant percentage of warrants and positions along the front of the curve (Tom, Cash and Cash plus one day).

Warrant band data is provided according to the following schedule:

Time	Description
11:00	Warrant Band (WB) figures from two business days in arrears
11:00	Warrant Band Cash (WC) figures from two business days in arrears
11:00	Warrant Band Tom (WT) figures from two business days in arrears

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	423 = Warrant Band
4	BusinessDate	Uint32	4	The business date for which the warrant band values is being reported.	YYYYMMDD
8	Type	String	4	Type of warrant band	WB = Warrant Band WC = Warrant Band

Offset	Field	Format	Len	Description	Value
					Cash WT = Warrant Band Tom
12	ProductCode	String	2	The product code	e.g. ‘AA’, ‘AH’, ‘CA’
14	UnreportedWarrants	Int64	8	Percentage of total live (on warrant) stock that remains unreported. Applicable to Type = WB otherwise NULL Implicit 6 decimal place format.	
22	BandCount	Uint32	4	Number of warrant bands	
	LowerValue	Int64	8	Lower band percentage value Implicit 6 decimal place format	
	UpperValue	Int64	8	Upper band percentage value NULL for Type = WC or WT if 100.000000 Implicit 6 decimal place format	
	ParticipantCount	Uint32	4	Number of market participants with LME warrant concentrations falling within the given percentage band	
Total length			$26 + 20n_o$		

(n_o = value of BandCount)

5.5.5 Trading Volume (424)

This message provides the traded volume in lots for matched trades in futures and options instruments.

Trading volume data is provided according to the following schedule:

Time	Description
10:00	Previous business day Trading Volume including Large In Scale (LIS) options from two business days in arrears, see also https://www.lme.com/en/Trading/Contract-types/Options/Large-in-scale-options
12:00	Intraday snapshot
15:00	Intraday snapshot
18:00	Intraday snapshot

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	424 = Trading Volume
4	BusinessDate	Uint32	4	The business date for which the trading volume is being reported.	YYYYMMDD
8	TradeDate	Uint32	4	The trade date for which the trading volume is being reported	YYYYMMDD
12	CalculationType	String	1	Trading volume calculation type.	D = Daily I = Intraday
13	InstrumentID	UInt64	8	Unique Instrument Identifier.	
21	ProductCode	String	2	The product code	e.g. ‘AA’, ‘AH’, ‘CA’
23	ContractCode	String	12	Contract to which the instrument belongs	e.g. ‘PBDF’, ‘OCDF’, ‘AADO’, ‘NADT’
35	ContractType	String	1	Constant contract type	F = Future O = Option
36	Volume	Uint32	4	Trading volumes	

Offset	Field	Format	Len	Description	Value
				expressed in lots.	
Total length			40		

5.5.6 Warehouse Stock Movement (426)

This message provides stock movement data from LME approved warehouses by product, grade, stock status and location in tonnes.

Warehouse stock movement data is provided according to the following schedule:

Time	Description
09:00	Previous business day stock movement figures

Stock figures for one location (or port) are actually the aggregate of all the stocks in all the warehouses in that one location.

The following report levels are published in the order specified:

- Summary (by product and status, all locations and all grades)
- Location (by product, location and status, all grades)
- Grade (by product, grade and status, all locations)
- Detailed (by product, grade, location and status)

Offset	Field	Format	Len	Description	Value
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	426 = Warehouse Stock Movement
4	ReportDate	Uint32	4	The business date for which the stock movement is being reported.	YYYYMMDD
8	ReportLevel	String	12	Indicates the level at which the stock movement quantity is being reported.	Summary Grade Location Detailed
20	RemainingRecords	Uint16	2	Number of remaining records to be published. The value is updated as	

Offset	Field	Format	Len	Description	Value
				messages are published for a product. When the value of RemainingRecords = RecordCount it indicates that this is the last message for the report level.	
22	RecordCount	Uint16	2	Number of repeating records in this message	
	ProductCode	String	2	Product code. This identifies the commodity.	e.g. ‘AA’, ‘AH’,’CA’
	Location	String	4	Location where the commodity exists. 4 Character Code, see section 14.2. Space if ReportLevel = Summary Space if ReportLevel = Grade	
	GradeCode	String	4	Grade of the commodity, see section 14.1. Space if ReportLevel = Summary Space if ReportLevel = Location	
	StockStatus	String	3	Stock status	CLS = Closing stock OPN = Opening stock DIN = Stock delivered in DOT = Stock delivered out MOV = Stock movement

Offset	Field	Format	Len	Description	Value
					COW = Closing stock on warrant CCW = Closing stock on cancelled warrant
	StockQuantity	Int32	4	Stock quantity	
Total length			24 + 17n_o		

(n_o = value of NoOfRecords)

5.5.6.1 Aluminium Stock Data

Stock reporting for Primary (High Grade) Aluminium and the related the regional Aluminium Premium Future contracts operates as follows:

Primary (High Grade) Aluminium (AH) stock amounts include metal stock which is designated as Primary (High Grade) Aluminium or as Premium Aluminium:

- High Grade Aluminium
- LME US Aluminium Premium (AN)
- LME Western Europe Aluminium Premium (AW)
- LME Eastern Asia Aluminium Premium (AE)
- LME South-Eastern Asia Aluminium Premium (AS)

This is true at all levels of detail or summary in the message.

For example:

A specific location, ‘ANTW’ contains opening stock of:

900 tonnes of Primary (High Grade) Aluminium

Of which 400 tonnes is LME Western Europe Aluminium Premium

This will be reported as:

Metal = AH, Location = ANTW, Stock = 900

Metal = AW, Location = ANTW, Stock = 400

In the above example, the ‘AH’ holding of 900 is calculated as:

500 Primary (High Grade) Aluminium + 400 LME Western Europe Aluminium Premium

The ‘AW’ holding of 400 is reported in its own right.

5.6 Publication Schedule Summary

Time	Data	Description
08:45	T+2	Market Open Interest in Open Interest (420)
09:00	T+1	Warehouse Stock Movement (426)
09:00 - 17:00		Indicative prices in Reference Price (401) and Reference Forward Curve (402)
09:10	T+1	Exchange Open Interest in Open Interest (420) and Open Interest Band (421)
09:55		Reference Auction Price (405) first Bullion auction
10:00	T+1	Trading Volume (424) for previous business date
11:00		Warrant Band (422) and Position Band (423)
12:00		Trading Volume (424) intraday snapshot
12:20 - 13:25		Official and Settlement prices in Reference Price (401)
13:00		Exchange FX Rates (Officials) in Reference FX Rate (403)
13:30 - 14:30		Monthly Moving Average Price (MMAP) / Monthly Average Settlement Price (MASP) in Reference Price (401)
14:10		Reference Auction Price (405) second Bullion auction
15:00		Trading Volume (424) intraday snapshot
17:00 - 17:50		Provisional Closing Prices in Reference Price (401) and Reference Forward Curve (402)
17:50 - 18:15		Final Closing Prices in Reference Price (401) and Reference Forward Curve (402)
18:00		Trading Volume (424) intraday snapshot
18:00 - 18:15		Notional Average Prices (NAP) in Reference Price (401)
18:15		Reference Volatility Price (404)

No scheduled time for Index price in Reference Price (401) and Closing FX Rates in Reference FX Rate (403).

6 Recovery

LMEsource provides three different mechanisms for recovering missed data:

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

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

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.

6.1 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 the table below:

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.

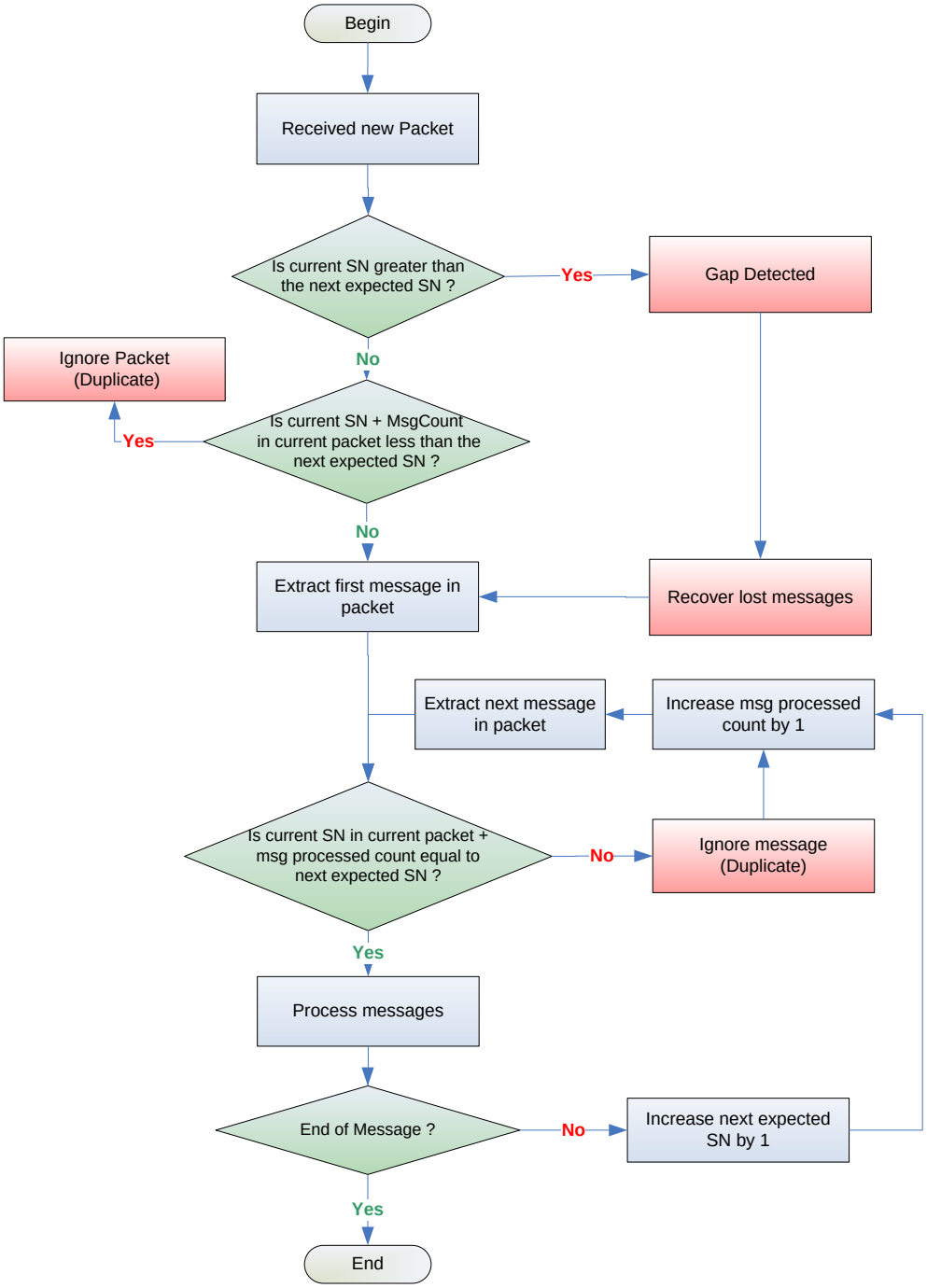


Figure 2: Gap Detection using the Sequence Number (SN)

6.2 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 the packet content between Line A and Line B will be the same. For example the third packet of the day from the Line A could contain SN 10 with MC 3, whereas the third packet of the day from Line B could contain SN 9 with MC 4. For this reason clients must arbitrate on SN (at the message level) rather than packet content. Client applications should listen to both Line A and Line B in real-time. Clients should look at packets coming from both lines and process the ones that arrive first, regardless of whether they came from Line A or Line B. It is advisable to apply the “first come – first served” rule.

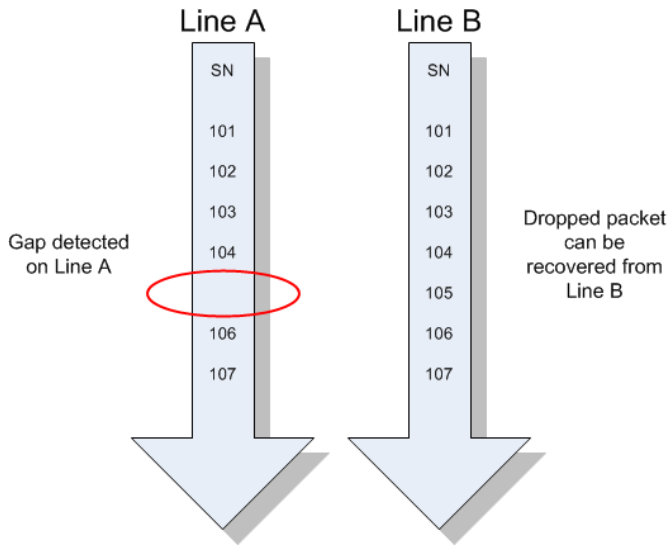


Figure 3 – Detecting Missing Packets

Additional Notes:

- The above example of a dropped packet is a simplified example assuming 1 message per packet, in reality each packet is likely to contain multiple messages

- Whilst the order of individual messages between Line A and Line B will be identical, there is no guarantee that the packets will contain exactly the same messages.

- In the example below, three packets are sent on each line, but message ‘OrderUpdate3’ appears in one packet from Line A but in the subsequent packet on Line B.

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

Figure 4 – Normal Message Delivery

6.3 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 service 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:

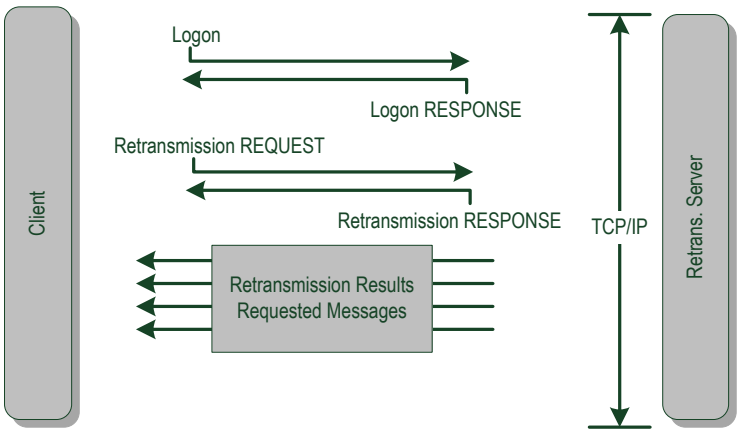


Figure 5: Retransmission Request

6.3.1 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
- Packet is in the wrong format

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

6.3.2 Making a Request

The client can make a retransmission request by sending the Retransmission Request message. The server will respond with a Retransmission Response message to indicate whether the request has been accepted or not. The following values for RetransStatus can be returned:

Value	Description
0	Request Accepted
1	Unknown/Unauthorized channel ID
2	Messages not available
100	Exceeds maximum sequence range
101	Exceeds maximum requests in a day

In the case of a successful request the server will send the requested messages immediately after the Retransmission 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.

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 Retransmission Response message.

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

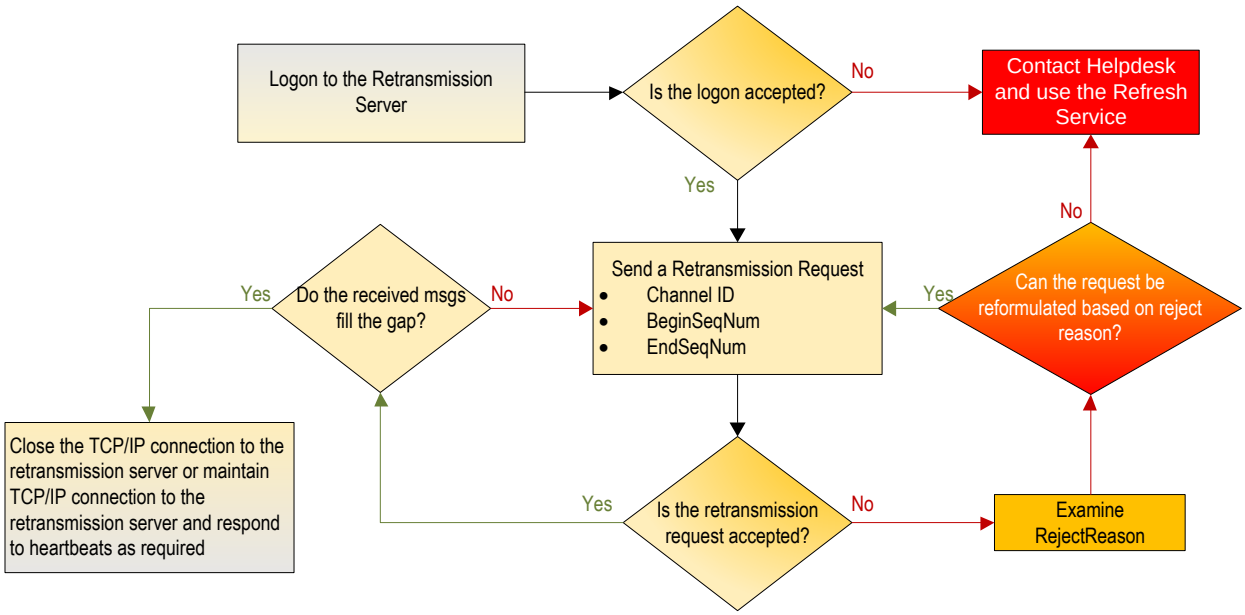


Figure 6: Requesting Dropped Packets

6.3.3 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.

6.3.4 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.

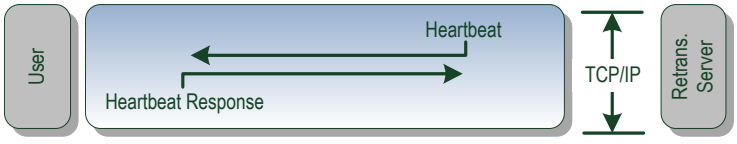


Figure 7: Retransmission Server Heartbeat Message

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

6.3.5 Closing the Session

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

6.3.6 System Limits

The system limits mentioned above are set as follows:

System Limit	Value
Maximum sequence range that can be requested	10,000
Maximum number of requests per day	1,000
Logon timeout (seconds)	5
Logon attempts allowed (60 seconds)	6
Heartbeat interval (seconds)	30
Heartbeat response timeout (seconds)	5

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

6.3.7 High Availability

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

The LME will provide a Fully Qualified Domain Name (FQDN) to access the retransmission service. Under normal operation the FQDN will resolve to the high availability retransmission service at the Active Production site. Clients may connect to the retransmission service at the start of the day and maintain the connection during the day by responding to heartbeats.

6.3.8 Disaster Recovery

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

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

6.4 Refresh Service (RFS)

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.

Synchronisation is on a per channel basis. For each real time multicast channel there exists a corresponding refresh multicast channel on which snapshots of the market state are sent at regular intervals throughout the business day. No ordering should be assumed between the various different data types unless otherwise stated – this is due to the nature of using multiple different multicast channels for refresh.

6.4.1 Snapshot

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

Electronic:

Message Category	Snapshot Description
Reference Data	A full list of all Outright Definition, which includes any modifications or additions made intraday. The order is sent as: Outright Definition (301), Strategy Definition (302), Price Limits (305) Contract Definition (300) for a pre-listed contact prior to its first trading day
Market Status	The most recent Market State - Instrument (312) message of declared TradableInstrumentID.
	The most recent Market State - Contract (311) messages of declared ContractCode.
Orders	For L1 clients: the latest level 1 Price book via Top of Book (321) messages. For L2 clients: the latest 15 levels of Price book via Aggregate Order Book (322) messages. The ordering of the price levels in the Aggregate Order Book (322) message in the RFS snapshot will be from best to worst. For L3 clients: the snapshot of the full order book via Order Add (323) messages. The OrderbookPosition field and the T1, T2 and T3 timestamp fields will not be populated in the RFS snapshot.
Trade Statistics	The latest Trade Statistics - Intraday (352) message of declared TradableInstrumentID.
	The latest Trade Statistics - End of Day (351) message of declared TradableInstrumentID.
Trades	A replay of all Market Data Trade (341) messages from start of day.
Indicative Opening Price	The latest Indicative Opening Price (320) message of declared TradableInstrumentID. IOP/IOMP messages are only included in RFS snapshots in Pre-Open. Once the markets transition to Open and the IOP/IOMP clear messages have been published, there are no IOP/IOMP messages in the RFS snapshots thereafter.
Quote Request	*The latest Quote Request (329) message of declared Tradable Instrument ID.*

Non-Electronic:

Message Category	Snapshot Description
Reference Data	A full list of all Instrument Definition (303) messages and any additions made intraday A full list of all Tradable Instrument Definition (304) messages which includes any modifications or additions made intraday
Reference Prices	Reference Price (401) of declared PriceType and PriceStatus for the InstrumentID: • Official • Settlement • Closing • Index Messages with PriceType = Settlement and PriceStatus = Provisional (MMAP) will be published independent of any other price status. Once a message with PriceStatus = Provisional has been published for the InstrumentID, there are no further messages with PriceType = Indicative in the RFS snapshot. Once a message with PriceStatus = Final has been published for the InstrumentID, there are no further messages with PriceType = Provisional in the RFS snapshot. Once a message with PriceStatus = ReFinalised is published for an InstrumentID in a particular price type, no further messages will be published with PriceStatus = Final.
	The latest Reference Forward Curve Price (402) of declared PriceStatus for the ProductCode. Once a message with PriceStatus = Provisional has been published, there are no further messages with PriceType = Indicative in the RFS snapshot. Once a message with PriceStatus = Final has been published, there are no further messages with PriceType = Provisional in the RFS snapshot. Once a message with PriceStatus = ReFinalised is published, no further messages will be published with PriceStatus = Final.
	The latest Reference Volatility Price (404) of declared ContractCode.

Message Category	Snapshot Description
	The Reference Auction Price (405) of declared Commodity and Session.
Reference FX Rates	The latest Reference FX Rate (403) of declared Exchange Category, Type, base currency and target currency. The latest Reference FX Rate (403) of Closing Category, Type, MaturityDate, base currency and target currency.
Market Status	The most recent Market State - Product (310) messages of declared ProductCode.
Ring Orders	All Market Data Order (328) messages
Indicative Trades	All Indicative Trade Price (340) messages
Trades	All Market Data Trades (341) messages
Order Statistics	All Order Statistics - Intraday (350) messages
Warehouse Stock Movement	All Warehouse Stock Movement (426) messages
Business Event	All Business Event – Pre-TT Auction (342) messages
Open Interest	All Open Interest (420) and Open Interest Band (421) messages
Positions	All Position Band (422) and Warrant Band (423) messages
Trading Volume	All Trading Volume (424) messages of declared Daily CalculationType. The latest Trading Volume (424) of declared Intraday CalculationType.

The ordering of refresh message types within the multicast channels is detailed below:

Electronic:

Channel	Refresh Sequence
Instrument Definition and End of Day Statistics	Outright Definition (301), Strategy Definition (302), Price Limits (305), Contract Definition (300) for a pre-listed contact prior to its first trading day, Trade Statistics - End of Day (351)

Channel	Refresh Sequence
Order (L1 clients)	Market State - Instrument (312), Market State - Contract (311), Indicative Opening Price (320), Quote Request (329), Top of Book (321)
Order (L2 clients)	Market State - Instrument (312), Market State - Contract (311), Indicative Opening Price (320), Quote Request (329), Aggregate Order Book (322)
Order (L3 clients)	Market State - Instrument (312), Market State - Contract (311), Indicative Opening Price (320), Quote Request (329), Order Add (323)
Trade Statistics	Trade Statistics - Intraday (352)
Trade Replay	Market Data Trade (341)

Non-Electronic:

Channel	Refresh Sequence
Reference Data and Intraday Statistics	Instrument Definition (303), Tradable Instrument Definition (304), Order Statistics - Intraday (350)
Reference Prices	Reference Price (401), Reference Forward Curve Price (402), Reference FX Rate (403), Reference Volatility Price (404), Reference Auction Price (405)
All trades, orders	Market State - Product (310), Market Data Order (328), Indicative Trade Price (340), Market Data Trade (341)
PTT Auction	Business Event - Pre-TT Auction (342)
Daily Summaries (Positions)	Open Interest (420), Open Interest Band (421), Position Band (422), Warrant Band (423), Trading Volume (424)
Daily Summaries (WSM)	Warehouse Stock Movement (426)

6.4.2 Refresh Complete

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

6.4.3 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.

6.4.3.1 Market State Snapshot Processing

If a Market State - Instrument (312) message exists in the RFS snapshot for a tradable instrument, use the Market State - Instrument (312) message to determine the current order book state for the tradable instrument and ignore any Market State – Contract (311) messages received for the parent contract of the tradable instrument until the end of the day.

If no Market State - Instrument (312) message for a tradable instrument exists in the RFS snapshot use the Market State – Contract (311) message to determine the current order book state for all tradable instruments within the contract until the end of the day.

6.4.4 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.

7 Level 2 Aggregate Order Book Management

7.1 Book Identification

A book is uniquely identified by TradableInstrumentID. TradableInstrumentID is an unsigned integer representation of 8 bytes, from Outright Definition (301) messages and Strategy Definition (302) messages.

7.2 Partial Price Depth

The price level within the Aggregate Order Book 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.

LMEsource provides a view of 15 price depths of aggregate order book for the LME Markets. This view can be visualized as a number of rows in a table for each of the buy and sell sides. On each side there are a number of rows showing the aggregate quantity available at a number of price levels.

For brevity, the below examples use 5 levels of price depths to demonstrate the aggregate order book update mechanism. The same principles apply to 15 levels of price depths.

The table below shows the starting position of the order book.

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	1	2	700	9730	9760	500	1	2	1
2	0	1	350	9720	9770	300	2	0	2
3	0	1	150	9710	9780	100	1	0	3
4	0	1	250	9700	9790	150	1	0	4
5	-	-	-	-	-	-	-	-	5

7.3 Book Updates

Book update messages are generated by LMEsource as delta messages defined in section 4.3.2 Aggregate Order Book (322). Each message may contain any combination of new, changed, or deleted entries for a book. The nature of an entry is defined by its UpdateAction.

UpdateAction	Meaning	Value
New	Create/insert a new price level	0
Change	Update aggregate quantity at a price level	1
Delete	Remove a price level	2

7.4 Example 1 – Quantity reduction and explicit addition

For example suppose one of the explicit ask orders at price level 9770 is reduced in quantity such that the total quantity is now 200, and at the same time a new explicit ask order is added with a price of 9850 and quantity of 300, then the following message is sent:

Offset	Field Name	Value
0	MsgSize	109
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	2
23	AggregateVolume	200
31	Price	9770
39	NumberOfExplicitOrders	2
43	TotalQtyOfExplicitOrders	200
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	S
64	PriceLevel	2

Offset	Field Name	Value
65	UpdateAction	1
66	AggregateVolume	300
74	Price	9850
82	NumberOfExplicitOrders	1
86	TotalQtyOfExplicitOrders	300
94	NumberOfImpliedOrders	0
98	TotalQtyOfImpliedOrders	0
106	BuySell	S
107	PriceLevel	5
108	UpdateAction	0

The resulting order book should now be as follows:

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	1	3	700	9730	9760	500	3	2	1
2	0	1	350	9720	9770	200	2	0	2
3	0	1	150	9710	9780	100	1	0	3
4	0	1	250	9700	9790	150	1	0	4
5	-	-	-	-	9850	300	1	0	5

7.5 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 the Aggregate Order Book message.

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

Offset	Field Name	Value
0	MsgSize	66
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	1
23	AggregateVolume	50
31	Price	9740
39	NumberOfExplicitOrders	1
43	TotalQtyOfExplicitOrders	50
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	B
64	PriceLevel	1
65	UpdateAction	0

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

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	0	1	50	9740	9760	500	3	2	1

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
2	1	3	700	9730	9770	200	2	0	2
3	0	1	350	9720	9780	100	1	0	3
4	0	1	150	9710	9790	150	1	0	4
5	0	1	250	9700	9850	300	1	0	5

The price levels for the existing Bid orders must all be incremented even though there will not be Aggregate Order Book messages sent for these increments. The implied bid order at a price of 9730 at (new) price level 2 remains in the order book, even though it is no longer at the best price.

7.6 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 5 price levels away from the best price), the client must delete the excess entry. If the book shrinks again, LMEsource resends the entries that have temporarily fallen out.

For example, if a bid order at price 9750 and quantity 250 is added to the book above, and the bid quantity at price 9710 is reduced from 150 to 110, it will cause the following message to be sent:

Offset	Field Name	Value
0	MsgSize	109
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	2
23	AggregateVolume	250
31	Price	9750

Offset	Field Name	Value
39	NumberOfExplicitOrders	1
43	TotalQtyOfExplicitOrders	250
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	B
64	PriceLevel	1
65	UpdateAction	0
66	AggregateVolume	110
74	Price	9710
82	NumberOfExplicitOrders	1
86	TotalQtyOfExplicitOrders	110
94	NumberOfImpliedOrders	0
98	TotalQtyOfImpliedOrders	0
106	BuySell	B
107	PriceLevel	5
108	UpdateAction	1

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

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	0	1	250	9750	9760	500	3	2	1

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
2	0	1	50	9740	9770	200	2	0	2
3	1	3	700	9730	9780	100	1	0	3
4	0	1	350	9720	9790	150	1	0	4
5	0	1	110	9710	9850	300	1	0	5

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

Price 9710 quantity must be reduced to 110. The AOB messages uses the price level 5 to reflect the new price level of the price 9710 after the addition of the new price level at price of 9750.

7.7 Example 4 – Explicit additions

If orders are removed so that there are now less than 5 levels visible then the server will also automatically send the additional level(s) that are now revealed.

For example, if the bid order at price 9750 and quantity 250 is now removed from the book above each price level will shift up one position, and this reveals a 5th level which needs to be disseminated. This will cause the following message to be sent:

Offset	Field Name	Value
0	MsgSize	109
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	2
23	AggregateVolume	250

Offset	Field Name	Value
31	Price	9750
39	NumberOfExplicitOrders	1
43	TotalQtyOfExplicitOrders	250
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	B
64	PriceLevel	1
65	UpdateAction	2
66	AggregateVolume	250
74	Price	9700
82	NumberOfExplicitOrders	1
86	TotalQtyOfExplicitOrders	250
94	NumberOfImpliedOrders	0
98	TotalQtyOfImpliedOrders	0
106	BuySell	B
107	PriceLevel	5
108	UpdateAction	0

The resulting order book should now be:

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	0	1	50	9740	9760	500	3	2	1
2	1	3	700	9730	9770	200	2	0	2
3	0	1	350	9720	9780	100	1	0	3
4	0	1	110	9710	9790	150	1	0	4
5	0	1	250	9700	9850	300	1	0	5

7.8 Example 5 – Additional order at an existing price level

If a new order is entered into the book at an existing price level, the number of orders and the quantity at that level is incremented.

For example, if an ask order at price 9780 and quantity 200 is added to the book above the following message will be sent:

Offset	Field Name	Value
0	MsgSize	66
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	1
23	AggregateVolume	300
31	Price	9780

Offset	Field Name	Value
39	NumberOfExplicitOrders	2
43	TotalQtyOfExplicitOrders	300
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	S
64	PriceLevel	3
65	UpdateAction	1

The resulting order book should now be as follows:

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	0	1	50	9740	9760	500	3	2	1
2	1	3	700	9730	9770	200	2	0	2
3	0	1	350	9720	9780	300	2	0	3
4	0	1	110	9710	9790	150	1	0	4
5	0	1	250	9700	9850	300	1	0	5

7.9 Example 6 – An existing order has its quantity amended

An amendment to an order's quantity is published as a price level update, irrespective of whether the quantity is increased or decreased, or how many orders there are at the price level.

For example, if one of the ask orders at price 9770 is revised such that the aggregate quantity at that price level is 150, the following message will be sent:

Offset	Field Name	Value
0	MsgSize	109
2	MsgType	322
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	NoEntries	2
23	AggregateVolume	150
31	Price	9770
39	NumberOfExplicitOrders	2
43	TotalQtyOfExplicitOrders	0
51	NumberOfImpliedOrders	0
55	TotalQtyOfImpliedOrders	0
63	BuySell	S
64	PriceLevel	2
65	UpdateAction	1

The resulting order book should now be:

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
1	0	1	50	9740	9760	500	3	2	1
2	1	3	700	9730	9770	150	2	0	2

Bid Side					Ask Side				
Price Level	No. Of Implied Orders	No. of Explicit Orders	Agg. Volume	Price	Price	Agg. Volume	No. of Explicit Orders	No. of Implied Orders	Price Level
3	0	1	350	9720	9780	300	2	0	3
4	0	1	110	9710	9790	150	1	0	4
5	0	1	250	9700	9850	300	1	0	5

8 Level 3 Full Order Book Management

8.1 Book Identification

A book is uniquely identified by TradableInstrumentID. TradableInstrumentID is an unsigned integer representation of 8 bytes from Outright Definition (301) messages and Strategy Definition (302) messages.

8.2 Book Updates

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

- Order Add (323)
- Order Amend (324)
- Order Cancel (325)
- Order Executed (326)

Orders are ranked by order book position based upon price and time priority, with 1 denoting the highest ranked order. When an order is cancelled or fully filled, all existing orders below it should shift their position up one step to fill the “void”.

The Order Add (323) message signals that a new order is placed in the order book. If there are already orders in that position, recipients should check the price of existing orders (with the same order book position). If the price of the existing order(s) is worse than the price of new order, all existing orders below the new order should shift down one position. If the price of the existing order(s) is better than the price of new order, it signifies an error (something has gone wrong with the order book).

The Order Amend (324) message signals that the order has been modified. The current rank may or may not be lost in the process. The OrderBookPosition field will show the new rank within the book. The order must be removed from its previous position and inserted at the new OrderBookPosition if the new position is not the same as previous one. Removal of an order causes existing orders below it to shift their position up one level. An order inserted at an existing position should be handled as per an Order Add (323).

The Order Cancel (325) message tells the recipient to remove the order referenced. If the order cancelled or fully filled is the last order at that position, the deleted order causes all existing orders below it to shift their position up one step to fill the “void”.

The Order Executed (326) messages tells the recipient to deduct the traded order from the order book. If the order is fully filled, the associated order (OrderID) should be removed from the order lists. If it was the only remaining order at that order position, all existing orders below it should shift their position up one step to fill the “void”. If the order is partially executed, the executed quantity should be deducted from the associated order in the order lists.

In certain failure scenarios LMEsource may send an 'Order Book Clear' message at which point clients should clear all orders in the book for the specified instrument.

Following an 'Order Book Clear' message any existing orders for the instrument will be resent as Order Add (323) messages to rebuild the current image.

The table below shows the starting position of the order book for the following examples:

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	500	1004	1
2	0004	200	9730	9770	100	1001	2
3	0002	350	9720	9770	200	1002	3
4	0001	150	9710	9780	100	1003	4
5	0005	250	9700	9790	150	1005	5

8.3 Example 1 – Addition of a new order

A new Bid order with price 9720 is received. The following message is published by LMEsource:

Offset	Field Name	Value
0	MsgSize	72
2	MsgType	323
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	T1	123456789
22	T2	123456789
30	T3	123456789
38	TradableInstrumentID	1234
46	OrderID	0006

Offset	Field Name	Value
54	BuySell	B
55	Volume	75
59	Price	9720
67	OrderBookPosition	4
71	Filler	-

The new Bid order 0006 is inserted into the order book at position 4. The existing order 0002 at the same price of 9720 remains in its higher position of 3 due to its time priority. Orders 0001 and 0005 must have their order book positions adjusted down one step by the client.

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	500	1004	1
2	0004	200	9730	9770	100	1001	2
3	0002	350	9720	9770	200	1002	3
4	0006	75	9720	9780	100	1003	4
5	0001	150	9710	9790	150	1005	5
6	0005	250	9700	-	-	-	-

8.4 Example 2 – A resting order has its quantity decreased

The Bid order with OrderID 0002 and price of 9720 has its quantity reduced from 350 to 300. The following message is published by LMEsource:

Offset	Field Name	Value
0	MsgSize	72
2	MsgType	324

Offset	Field Name	Value
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	T1	123456789
22	T2	123456789
30	T3	123456789
38	TradableInstrumentID	1234
46	OrderID	0002
54	BuySell	B
55	Volume	300
59	Price	9720
67	OrderBookPosition	3
71	Filler	-

The quantity of Bid order 0002 is reduced from 350 to 300. It remains at order book position 3.

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	500	1004	1
2	0004	200	9730	9770	100	1001	2
3	0002	300	9720	9770	200	1002	3
4	0006	75	9720	9780	100	1003	4
5	0001	150	9710	9790	150	1005	5

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
6	0005	250	9700	-	-	-	-

8.5 Example 3 – A resting order has its quantity increased

A Bid order with OrderID 0001 and a price of 9710 has its quantity increased from 150 to 165. The following messages are published by LMEsource:

Offset	Field Name	Value
0	MsgSize	72
2	MsgType	325
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	T1	123456789
22	T2	123456789
30	T3	123456789
38	TradableInstrumentID	1234
46	OrderID	0001
54	BuySell	B
55	Filler	-

Offset	Field Name	Value
0	MsgSize	72
2	MsgType	323

Offset	Field Name	Value
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	T1	123456789
22	T2	123456789
30	T3	123456789
38	TradableInstrumentID	1234
46	OrderID	0001
54	BuySell	B
55	Volume	165
59	Price	9710
67	OrderBookPosition	5
71	Filler	-

No Order Amend message is published and the order remains at order book position 5.

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	500	1004	1
2	0004	200	9730	9770	100	1001	2
3	0002	300	9720	9770	200	1002	3
4	0006	75	9720	9780	100	1003	4
5	0001	165	9710	9790	150	1005	5

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
6	0005	250	9700	-	-	-	-

8.6 Example 4 – Cancellation of an order

The Ask order with OrderID 1001 and price of 9770 is pulled by the originating trader. The following message is published by LMEsource:

Offset	Field Name	Value
0	MsgSize	72
2	MsgType	325
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	T1	123456789
22	T2	123456789
30	T3	123456789
38	TradableInstrumentID	1234
46	OrderID	1001
54	BuySell	S
55	Filler	-

The client must remove OrderID 1001 from their order book and adjust the order book position for the remaining Ask Orders up by one step.

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	500	1004	1
2	0004	200	9730	9770	200	1002	2
3	0002	300	9720	9780	100	1003	3
4	0006	75	9720	9790	150	1005	4
5	0001	150	9710	-	-	-	-
6	0005	250	9700	-	-	-	-

8.7 Example 5 – An aggressing order executes against a resting order

An aggressing Bid Order with an OrderID of 0007, a price of 9760 and quantity 100 is entered by a trader. This order fully executes against the resting ask order with the OrderID of 1004.

The aggressing order is not published. An Order Executed message for the resting Ask Order with OrderID 1004 is published. No Order Amend for OrderID 1004 is published.

Offset	Field Name	Value
0	MsgSize	53
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	Price	9760
30	Volume	100
34	OrderID	1004

Offset	Field Name	Value
42	MatchID	9988
50	TradeCancelFlag	0
51	SubTypeOfTrade	1 (Explicit)
52	TradeBuySell	S
53	StrategyLegCount	0

The client must update the quantity for OrderID 1004 in their order book. The order book should now look like:

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0003	500	9730	9760	400	1004	1
2	0004	200	9730	9770	200	1002	2
3	0002	300	9720	9780	100	1003	3
4	0006	75	9720	9790	150	1005	4
5	0001	150	9710	-	-	-	-
6	0005	250	9700	-	-	-	-

8.8 Example 6 – An aggressing order executes against multiple resting orders at different price levels

An aggressing Ask Order with an OrderID of 1006, a price of 9720 and quantity 800 is entered by a trader. This order fully executes against the resting bid orders with OrderIDs of 0003, 0004 and 0002. Orders 0003 and 0004 are fully filled, and Order 0002 partially filled.

The aggressing order is not published. Three Order Executed messages for the resting Bid Orders are published. No Order Amend for OrderID 0002 is published.

The following messages are published:

Offset	Field Name	Value
0	MsgSize	53
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	Price	9730
30	Volume	500
34	OrderID	0003
42	MatchID	7766
50	TradeCancelFlag	0
51	SubTypeOfTrade	1 (Explicit)
52	TradeBuySell	B
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	53
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	Price	9730

Offset	Field Name	Value
30	Volume	200
34	OrderID	0004
42	MatchID	7767
50	TradeCancelFlag	0
51	SubTypeOfTrade	1 (Explicit)
52	TradeBuySell	B
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	53
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	1234
22	Price	9720
30	Volume	100
34	OrderID	0002
42	MatchID	7768
50	TradeCancelFlag	0
51	SubTypeOfTrade	1 (Explicit)
52	TradeBuySell	B

Offset	Field Name	Value
53	StrategyLegCount	0

The client must remove Orders 0003 and 0004, and update the quantity for OrderID 0002 in their order book. The remaining Bid orders have their order book position updated. The order book should now look like:

Bid Side				Ask Side			
Orderbook Position	OrderID	Volume	Price	Price	Volume	OrderID	Orderbook Position
1	0002	200	9720	9760	400	1004	1
2	0006	75	9720	9770	200	1002	2
3	0001	150	9710	9780	100	1003	3
4	0005	250	9700	9790	150	1005	4
-	-	-	-	-	-	-	-

8.9 Example 7 – A trade results from an Implied order

The following orders are submitted:

- Order 2001: An explicit outright Bid Order in Month 1 with a price of 9400 and quantity of 10
- Order 3002: An Ask Carry Order in Month1/Month2 with a price of 20 and a quantity of 12.

Order 2003: Implied Bid is generated in Month 2 from Order 2001 and Order 3002 with a quantity of 10.

A subsequent order is submitted:

- Order 3004: An explicit outright Ask order in Month 2 at a price of 9380 and a quantity of 9.

Order 3004 trades with the Implied Bid in Month 2 (Order 2003) at a price of 9380 for 9 lots.

The following Order Executed messages are published:

Aggressing order 3004 is published as it trades against a resting implied order. The OrderID is not published.

Offset	Field Name	Value
0	MsgSize	54

Offset	Field Name	Value
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	5053
22	Price	9380
30	Volume	9
34	OrderID	NULL
42	MatchID	7799
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	S
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	54
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	5085
22	Price	9400
30	Volume	9

Offset	Field Name	Value
34	OrderID	2001
42	MatchID	7850
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	B
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	112
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	23358
22	Price	20
30	Volume	9
34	OrderID	3002
42	MatchID	7862
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	S
53	StrategyLegCount	2

Offset	Field Name	Value
	LegTradableInstrumentID	5085
	LegBuySell	S
	LegPrice	9400
	LegVolume	9
	LegMatchID	7850
	LegTradableInstrumentID	5053
	LegBuySell	B
	LegPrice	9380
	LegVolume	9
	LegMatchID	7799

8.10 Example 8 – Two implied orders trade

The following orders are submitted:

- Order 2005: An explicit outright Bid Order in Month 1 with a price of 9400 and quantity 10.
- Order 3006: An Ask Carry Order in Month1/Month2 with a price of 10 and a quantity of 10

Order 2007: Implied Bid is generated in Month 2 from Order 2005 and Order 3006 with a quantity of 10

Subsequent orders are submitted:

- Order 3008: An Ask Carry Order in Month2/Month3 with a price of 10 and a quantity of 10
- Order 3009: An explicit outright Ask Order in Month 3 with a price 9380 and a quantity of 7

Order 3010: Implied Ask is generated in Month 2 from Order 3008 and Order 3009 with a quantity of 7

The implied orders trade at a price of 9390 for 7 lots.

The following Order Executed messages are published:

Offset	Field Name	Value
0	MsgSize	54

Offset	Field Name	Value
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	5085
22	Price	9390
30	Volume	7
34	OrderID	NULL
42	MatchID	8065
50	TradeCancelFlag	0
51	SubTypeOfTrade	8 (Two Implieds)
52	TradeBuySell	B
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	112
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	23358
22	Price	10
30	Volume	7

Offset	Field Name	Value
34	OrderID	3008
42	MatchID	8066
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	S
53	StrategyLegCount	2
	LegTradableInstrumentID	5085
	LegBuySell	S
	LegPrice	9390
	LegVolume	7
	LegMatchID	1
	LegTradableInstrumentID	5053
	LegBuySell	B
	LegPrice	9380
	LegVolume	7
	LegMatchID	2

Offset	Field Name	Value
0	MsgSize	54
2	MsgType	326
4	TradingVenue	EL

Offset	Field Name	Value
6	TimeOfEvent	123456789
14	TradableInstrumentID	5053
22	Price	9380
30	Volume	7
34	OrderID	3009
42	MatchID	8067
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (implied)
52	TradeBuySell	S
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	54
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	5144
22	Price	9400
30	Volume	7
34	OrderID	2005
42	MatchID	8068

Offset	Field Name	Value
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	B
53	StrategyLegCount	0

Offset	Field Name	Value
0	MsgSize	112
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	23357
22	Price	10
30	Volume	7
34	OrderID	3006
42	MatchID	8069
50	TradeCancelFlag	0
51	SubTypeOfTrade	7 (Implied)
52	TradeBuySell	S
53	StrategyLegCount	2
	LegTradableInstrumentID	5144
	LegBuySell	S

Offset	Field Name	Value
	LegPrice	9400
	LegVolume	7
	LegMatchID	4
	LegTradableInstrumentID	5085
	LegBuySell	B
	LegPrice	9390
	LegVolume	7
	LegMatchID	8

8.11 Example 9 – A trade resulted from uncrossing

The following orders are submitted in Pre-Open:

- Order 2011: An explicit outright Bid Order in Month 1 with a price of 9400 and quantity 15
- Order 3012: An explicit outright Ask Order in Month 1 with a price of 9405 and quantity 15
- Order 3013: An explicit outright Ask Order in Month 1 with a price of 9400 and quantity 16

Order 2011 trades with Order 3013 when the market moves into Open.

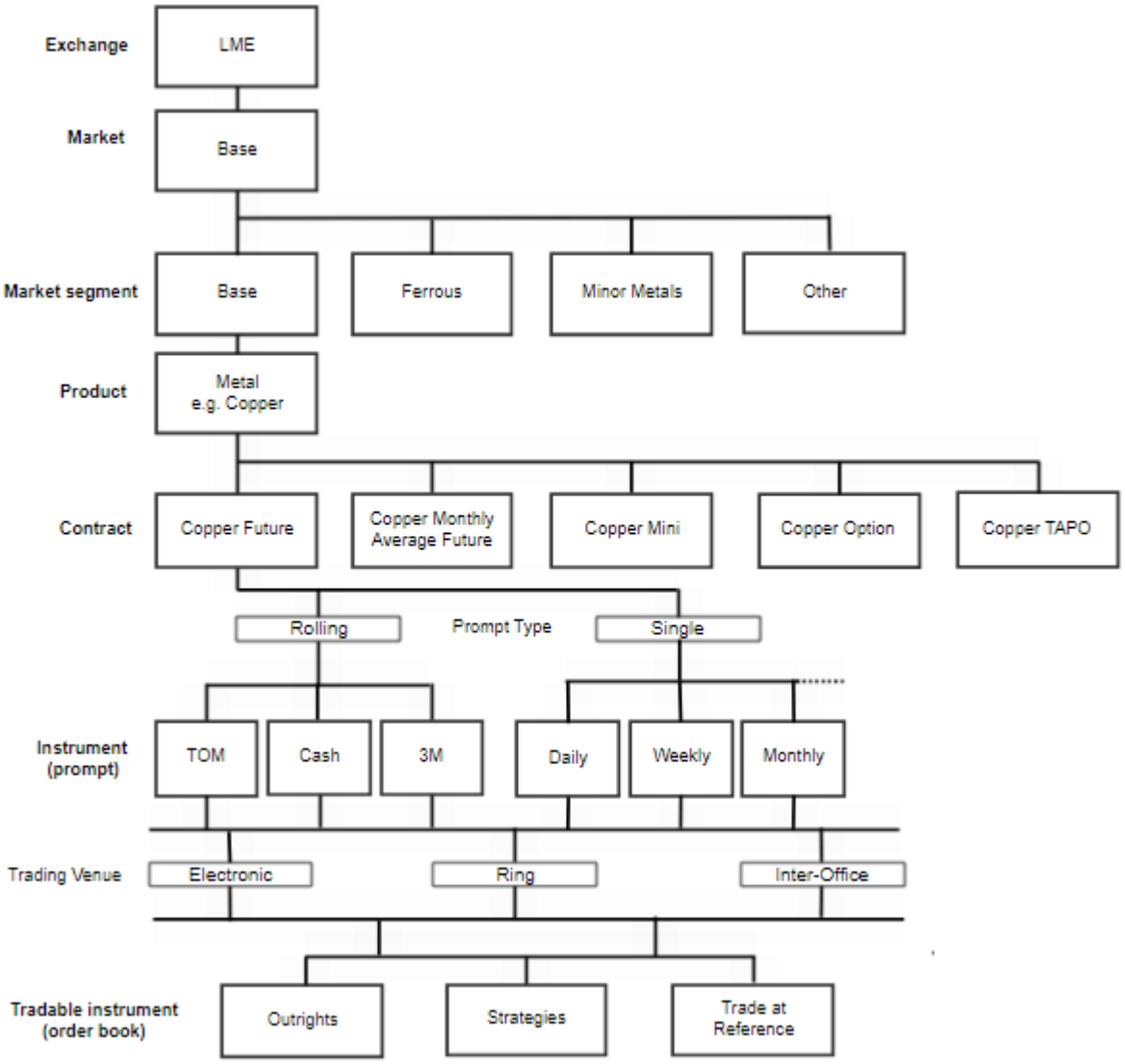
The following Order Executed message is published:

Offset	Field Name	Value
0	MsgSize	54
2	MsgType	326
4	TradingVenue	EL
6	TimeOfEvent	123456789
14	TradableInstrumentID	5085
22	Price	9400
30	Volume	15

Offset	Field Name	Value
34	OrderID	NULL
42	MatchID	8099
50	TradeCancelFlag	0
51	SubTypeOfTrade	2 (Uncrossing)
52	TradeBuySell	B
53	StrategyLegCount	0

9 Appendix A – Product Hierarchy

The following diagram shows the levels in the product hierarchy for a Copper Futures contract:



10 Appendix B – Reference Data Values

10.1 Prompt Date Label

The prompt date label can be one of the following, depending upon the contract and type of prompt. Note: precedence rules are used to determine which prompt date label is published.

Prompt Type	Possible Values
Daily	Sequential contiguous labels: D1, D2, D3...published out to the 3M prompt date
Weekly	Sequential contiguous labels: W1, W2, W3...W26
Monthly	Sequential contiguous labels: M1, M2, M3…M124.
Quarterly prompts	Sequential contiguous labels: Q1, Q2, Q3…Q36. Q is always March, June, September and December, with Q1 being the nearest of these after the Cash prompt.
Semi-annual prompts	Sequential contiguous labels: S1, S2, S3…S20. S is always June or December, with S1 being the nearest of these after the Cash prompt.
Annual prompts	Sequential contiguous labels: A1, A2, A3…A10. A is always December, with A1 being the nearest December prompt after the Cash prompt.
Specific Prompts	DEC1 - the December monthly in the next calendar year according to the current trading day DEC2 - the December monthly in the second next calendar year according to the current trading day DEC3 - the December monthly in the third next calendar year according to the current trading day 15M - the 3rd Wednesday (monthly) prompt that falls in the month 15 months from the current month 27M - the 3rd Wednesday (monthly) prompt that falls in the month 27 months from the current month 63M - the 3rd Wednesday (monthly) prompt that falls in the month 63 months from the current month 123M - the 3rd Wednesday (monthly) prompt that falls in the month 123 months from the current month

Prompt Type	Possible Values
Second Business Day	nM2BD - the second LME business day of the month: 4M2BD…25M2BD
Rolling Prompts	TOM, CASH, 3M

10.1.1 Prompt Date Label Precedence

It is possible for a tradable instrument to have more than one prompt date label, however the Outright Definition (301) and Tradable Instrument Definition (304) message will only include one prompt date label. The precedence for which prompt date label is published is:

1. A rolling prompt date label has the highest precedence, see section 11.1.1
2. A specific label (DEC1, DEC2, DEC3, 15M, 27M, 63M, 123M) takes precedence over duration labels (e.g. annual, semi-annual, quarterly, monthly, weekly, daily).
3. Annuals duration labels take precedence over semi-annual / quarterly / monthly / weekly / daily duration labels.
4. Semi-annual duration labels take precedence over quarterly / monthly / weekly / daily duration labels.
5. Quarterly labels take precedence over monthly / weekly / daily duration labels.
6. Monthly duration labels take precedence over weekly / daily duration labels.
7. Weekly duration labels take precedence over daily duration labels.
8. Daily duration label take precedence over second business days of the month labels.

For example, on 15 March 2022 AA May 22 can have the following prompt date labels - D43, M2, W10. The prompt date label published would be M2.

10.2 Strategy Type Code

Strategy Type	Value
Carry	1
Custom (Futures)	2
Three Month Average	3
Six Month Average	4
Twelve Month Average	5

Strategy Type	Value
Carry Average	6
Call Spread	7
Put Spread	8
Custom (Delta Hedge)	9
Custom (Options)	10

10.3 Tick Size ID

The following table shows the current mapping between TickSizeID which is published in Outright Definition (301), Strategy Definition (302) and Tradable Instrument Definition (304) messages and the tick size:

TickSizeID	Tick Size
1	0.01
2	0.05
3	0.50
4	5
5	10
6	0.005
7	50
10	0.10
11	0.25
12	1

10.4 Trade at Reference Price Code

Value	Description
YS	Yesterday's Settlement Price
V	Yesterday's Closing Price (Valuation Price)
S	Settlement Price
C	Closing Price
B	Basis Price
MC	Mean Cash Price
M3	Mean 3 Month Price
TC	Trade at Close
TS	Trade at Settlement

Note prices in Trade at Reference tradable instruments in the Electronic venue are a differential to the reference price. The trade price will be substituted with the reference price once it becomes available, see section 15.1.

Trade prices in Inter Office and Ring venue are published as the substituted actual price.

11 Appendix C – Expiry Dates

11.1 Futures

An LME future is defined by a symbol, and the prompt date. For LME futures, prompt date is analogous to expiry date and is present in the ExpiryDate field in the Outright Definition (301) and Tradable Instrument Definition (304) messages. A prompt date will have a prompt type of either rolling or single. The prompt type is present in the PromptType field in the Outright Definition (301) and Tradable Instrument Definition (304) messages

11.1.1 Rolling Prompts

Prompt dates that are of prompt type rolling are relative to the current trading day. When trades in these contracts are sent to clearing, the date is “frozen” into a calendar date. The principal rolling prompts are:

- 3M (Three months) – this prompt date represents the settlement business day three months from today.
- CASH – this prompt date represents the settlement business day after tomorrow.
- TOM (Tomorrow) – this prompt date represents tomorrow.

Rolling prompts are present in the PromptDateLabel field in the Outright Definition (301) and Tradable Instrument Definition (304) messages. The actual calendar date is included in the ExpiryDate field. Not all LME Metal Futures have rolling prompt dates.

11.1.2 Single Prompts

Prompt dates that are of prompt type single are calendar dates, written in the format YYYYMMDD, where YYYY is the year, MM is the month (01-12) and DD is the day (01-31). The LME uses the concept of “Monthly”, “Weekly”, “Daily” contracts, but all these contract types represent a single prompt date, and there is no difference between them in LMEsource. (For “Monthly” contracts, the prompt date is either the 3rd Wednesday in the month or the last Business Day in the month. For “Weekly” contracts, the prompt date is the Wednesday in each week).

Single prompt dates are present in the ExpiryDate field in the Outright Definition (301) and Tradable Instrument Definition (304) messages.

11.1.3 LME Calendar

To know what prompt dates that are available, it is necessary to have access to an LME trading calendar. A quick and incomplete summary of the trading calendar is:

For a Future on a physically delivered metal, 3M and CASH are always present, and TOM is usually present. TOM is not present if that date is a US national holiday. There is one prompt date per settlement business day between the TOM and the 3M contract, thereafter a prompt date every Wednesday until the end of the month that is six months after the current month and then prompt dates on the 3rd Wednesday of each month for a number of months, depending on the underlying product. There are also prompt dates on the second business day of each month, the number of these Second Business Day (2BD) prompt dates depends on the underlying product.

For LMEminis, there is one prompt date every 3rd Wednesday in the month for 12 months. There are no rolling prompt dates for LMEminis.

For LME Monthly Cash Settled Futures (CSFs), there is one prompt date on the last working day of each month. The CSF prompt date does not need to fall on a settlement business day.

For LME Monthly Average Futures (MAFs), there is one prompt date on the last working day of each month. The MAF prompt date does not need to fall on a settlement business day.

11.2 Options

An Option on a physically delivered metal is defined by a symbol, an option type, a strike price and an expiration date.

Expiration dates are calendar dates, written in the format YYYYMMDD, where YYYY is the year, mm is the month (01-12) and DD is the day (01-31). There is one expiration date per month: the first Wednesday in the month. The expiration date is rolled forward one day if the expiration date is a non-business day. The expiration date for options does not need to fall on a settlement business day.

11.3 Traded Average Price Options (TAPOs)

A TAPO is defined by a symbol (only metals), an option type, a strike price and an expiration date. For TAPOS, the only allowed expiration date is the single expiration date in format YYYYMMDD. There is one expiration date per month on the last trading day of the month.

12 Appendix D – Channel Matrix

Commercial packages		Electronic-Futures				Electronic-Algo		Inter-office and ring (Non-Electronic)		Premium (Non-Electronic)			Reference data			Global
		Level 1	Level 2	Level 3	Trade Replay (Refresh)	Level 2	Level 3	All trades, orders & status	PTT Auction	Reference Prices	Daily Summaries (Positions)	Daily Summaries (WSM)	Electronic Ref Data + EOD Stats	Electronic Intra Stats	Non-Electronic Ref Data + Intra Stats	DR Signal
		Top of book	Aggregate depth	Order by order		Aggregate depth	Order by order									
Core	Core 1	111	-	-	614	-	-	-	-	-	-	-	115 (F)	-	200	81
	Core 2	-	112	-		-	-	205	206	207	208	209		116 (F)		
	Core 3	-	-	113		-	-									
						-	-									
Growth	Growth 1	131	-	-	634	-	-	215	216	217	218	-	135 (F)	-		
	Growth 2	-	132	-		-	-							136 (F)		
	Growth 3	-	-	133		-	-									
LBMA	LBMA 1	-	-	-	-	-	-	-	-	307	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ALGO	ALGO 1	-	-	-	-	102	103	-	-	-	-	-	105	106	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

LBMA Platinum & Palladium Ref Prices

Key

- Algo
- Core (Base Metals)
- Growth (Ferrous Metals)
- LBMA (Pt & Pd)

12.1 Messages and Channels

Category	Message	Channel	CORE Commercial Package		GROWTH Commercial Package		LBMA Commercial Package		ALGO Commercial Package	
			Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID
Electronic Futures	Top of Book (321)	Level1	111	611	131	631	-	-	-	-
	Order Book Clear (327)									
	Market Data Trade (341)									
	Indicative Opening Price (320)									
	Market State - Contract (311)									
	Market State - Instrument (312)									
	Aggregate Order Book (322)	Level2	112	612	132	632	-	-	-	-
	Order Book Clear (327)									
	Market Data Trade (341)									
	Indicative Opening Price (320)									
	Market State - Contract (311)									
	Market State - Instrument (312)									
	Order Add (323)	Level3	113	613	133	633	-	-	-	-
	Order Amend (324)									
	Order Cancel (325)									
	Order Book Clear (327)									
	Order Executed (326)									
	Indicative Opening Price (320)									
	Market State - Contract (311)									

Category	Message	Channel	CORE Commercial Package		GROWTH Commercial Package		LBMA Commercial Package		ALGO Commercial Package	
			Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID
	Market State - Instrument (312)									
	Market Data Trade (341)	Trade Replay (Refresh)	N/A	614	N/A	634	N/A	-	-	-
Electronic Algos	Aggregate Order Book (322)	Level2	-	-	-	-	-	-	102	602
	Order Book Clear (327)									
	Market Data Trade (341)									
	Indicative Opening Price (320)									
	Market State - Contract (311)									
	Market State - Instrument (312)									
	Order Add (323)	Level3	-	-	-	-	-	-	103	603
	Order Amend (324)									
	Order Cancel (325)									
	Order Book Clear (327)									
	Order Executed (326)									
	Indicative Opening Price (320)									
	Market State - Contract (311)									
	Market State - Instrument (312)									
Inter Office and Ring (Non-Electronic)	Market State - Product (310)	All trades, orders & status	205	705	N/A	N/A	-	-	-	-
	Indicative Trade Price (340)									
	Market Data Order (328)				215	715				
	Market Data Trade (341)									

Category	Message	Channel	CORE Commercial Package		GROWTH Commercial Package		LBMA Commercial Package		ALGO Commercial Package	
			Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID
	Business Event - Pre-TT Auction (342)	PTT Auction	206	N/A	216	N/A	-	-	-	-
Premium	Reference Price (401)	Reference Prices	207	707	217	717	N/A	N/A	-	-
	Reference FX Rate (403)									
	Reference Forward Curve Price (402)				N/A	N/A				
	Reference Volatility Price (404)									
	Reference Auction Price (405)		N/A	N/A	N/A	N/A	307	807	-	-
	Open Interest (420)	Daily Summaries	208	708	218	718	-	-		
	Trading Volume (424)									
	Open Interest Band (421)				N/A	N/A	-	-		
	Position Band (422)									
	Warrant Band (423)									
	Warehouse Stock Movement (426)		209	709	N/A	N/A	-	-		
Reference Data	Contract Definition (300)	Electronic Futures	115	615	135	635	-	-		
	Outright Definition (301)									
	Strategy Definition (302)									
	Price Limits (305)									
	Trade Statistics - End of Day (351)									
	Trade Statistics - Intraday (352)		116	616	136	636	-	-		
	Outright Definition (301)	Electronic Algos	-	-	-	-	-	-	105	605
	Strategy Definition (302)									
	Trade Statistics - End of Day (351)									
	Trade Statistics - Intraday (352)		-	-	-	-	-	-	106	606

Category	Message	Channel	CORE Commercial Package		GROWTH Commercial Package		LBMA Commercial Package		ALGO Commercial Package	
			Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID	Real Time Channels ID	Refresh Channels ID
Reference Data	Instrument Definition (303)	Non-Electronic Reference Data	200	700	200	700	-	-	-	-
	Tradable Instrument Definition (304)									
	Order Statistics Intraday (350)				N/A	N/A				
DR Signal			81	N/A	81	N/A	81	N/A	81	N/A

Notes:

Order Amend (324), Order Cancel (325), Order Executed (326), Order Book Clear (327) and Market Data Trade (341) not available in refresh channel for Core, Growth and Algo packages

Market State - Product (310) available for Core Packages only

Indicative Trade Price (340) available for Core packages only

Regarding Market Data Order (328) message, Ring orders for Core packages only and PTT Auction for both Core & Growth packages

Reference Volatility Price (404) available for Core packages only

Reference Auction Price (405) available for LMBA package only

13 Appendix E – Reference Price Examples

13.1 Indicative Closing Price

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Closing
45	PriceStatus	Indicative
57	BusinessDate	20220504
61	InstrumentID	53160 (3M)
69	ProductCode	CA
71	CurrencyCode	USD
74	Bid	NULL
82	Price	9489500000
90	Ask	NULL

13.2 Official Price

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)

Offset	Field	Value
13	PriceType	Official
45	PriceStatus	Final
57	BusinessDate	20220504
61	InstrumentID	18227 (JUL23)
69	ProductCode	AE
71	CurrencyCode	USD
74	Bid	2842000000
82	Price	NULL
90	Ask	2847000000

13.3 Settlement Price

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Final
45	PriceStatus	Settlement
57	BusinessDate	20220504
61	InstrumentID	43520 (Cash)
69	ProductCode	AH
71	CurrencyCode	USD
74	Bid	NULL

Offset	Field	Value
82	Price	2708000000
90	Ask	NULL

13.4 Monthly Moving Average Price (MMAP)

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Settlement
45	PriceStatus	Provisional
57	BusinessDate	20220504
61	InstrumentID	2634 (OA MAY22)
69	ProductCode	AH
71	CurrencyCode	USD
74	Bid	NULL
82	Price	2843880000
90	Ask	NULL

13.5 Monthly Average Settlement Price (MASP)

Published on the last business day of the month

Offset	Field	Value
0	MsgSize	102

Offset	Field	Value
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Settlement
45	PriceStatus	Final
57	BusinessDate	20220504
61	InstrumentID	2634 (OA MAY22)
69	ProductCode	AH
71	CurrencyCode	USD
74	Bid	NULL
82	Price	2836950000
90	Ask	NULL

13.6 Closing Price

Note the same closing price would also apply to a TaS/TaR tradable instrument.

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Closing
45	PriceStatus	Final
57	BusinessDate	20220504

Offset	Field	Value
61	InstrumentID	64765 (3M)
69	ProductCode	NI
71	CurrencyCode	USD
74	Bid	NULL
82	Price	24950000000
90	Ask	NULL

13.7 Notional Average Price (NAP)

Offset	Field	Value
0	MsgSize	102
2	MsgType	401
4	TimeOfEvent	123455789
12	Category	I (Instrument)
13	PriceType	Closing
45	PriceStatus	Final
57	BusinessDate	20220504
61	InstrumentID	52272 (OA JUL22)
69	ProductCode	AH
71	CurrencyCode	USD
74	Bid	NULL
82	Price	2767190000
90	Ask	NULL

14 Appendix F - Warehouse Stock Data

14.1 Grade

Metal	Grade	Grade Code
Cobalt (CO)	Briquettes	BRIQ
	Cathodes	CATS
	Coarse Grain Powder	CGPO
	Rounds	ROUN
Copper (CA)	Cathodes	CATS
Aluminium (AH)	Ingots	INGO
	T-Bar	TBAR
	Sows	SOWS
Nickel (NI)	Bagged Briquettes	BBRI
	Bagged Pellets	BPEL
	Briquettes	BRIQ
	Cathodes	CAT1 - (100x100mm)
	Cathodes	CAT2 - (25x25mm)
	Cathodes	CAT5 - (50x50mm)
	Pellets	PLTS
	Full plate cathode	FPCS
	Rounds	NRDR
	Rounds Bagged	NRBA
Tin (SN)	Ingots	INGO
Lead (PB)	Ingots	INGO

Metal	Grade	Grade Code
Zinc (ZS)	Ingots	INGO
	Jumbo	JUMB
Aluminium Alloy (AA)	Ingots	IN26
	Ingots	IN80
	Ingots	I121
	Large sows	LS26
	Large sows	LS80
	Large sows	L121
	Small sows	SS26
	Small sows	SS80
	Small sows	S121
	T-Bar	TB26
	T-Bar	TB80
	T-Bar	T121
NASAAC (NA)	Ingots	INGO
	Large sows	LSOW
	Small sows	SSOW
	T-Bar	TBAR
Premium Future Aluminium, East Asia (AE)	Ingots	INGO
	T-Bar	TBAR
	Sows	SOWS
Premium Future Aluminium,	Ingots	INGO

Metal	Grade	Grade Code
US (AN)	T-Bar	TBAR
	Sows	SOWS
Premium Future Aluminium, South East Asia (AS)	Ingots	INGO
	T-Bar	TBAR
	Sows	SOWS
Premium Future Aluminium, Western Europe (AW)	Ingots	INGO
	T-Bar	TBAR
	Sows	SOWS

14.2 Location

Country	Location Code	Description	Delivery Point for
Belgium	ANTW	Antwerp	AA, AH, AW, CA, CO, NI, PB, SN, ZS
Germany	HAMB	Hamburg	AA, AH, AW, CA, NI, PB, SN, ZS
Holland	AMST	Amsterdam	AA, AH, NI, PB, SN, ZN
	MOER	Moerdijk	AA, AH, AW, CA, CO, NI, PB, SN, ZS
	ROTT	Rotterdam	AA, AH, AW, CA, CO, NI, PB, SN, ZS
	VLIS	Vlissingen	AA, AH, CA, NI, PB, SN, ZS
Italy	GENO	Genoa	AA, AH, NI, PB, SN, ZS
	LEGH	Leghorn	AA, AH, CA, NI, PB, ZS
	TRIE	Trieste	AA, AH, CA, NI, PB, SN, ZS
Japan	NAGO	Nagoya	AE, AH
	YOKO	Yokohama	AE, AH

Country	Location Code	Description	Delivery Point for
Korea	BUSA	Busan	AA, AE, AH, CA, NI, PB, SN
	GWAN	Gwangyang	AA, AE, AH, CA, NI, PB, SN
	INCH	Incheon	AA, AH, CA, NI, PB
Malaysia	JOHO	Johor	AA, AH, AS, CA, NI, PB, SN, ZS
	POKL	Port Klang	AA, AH, AS, CA, NI, PB, SN, ZS
Singapore	SING	Singapore	AA, AH, AS, CA, CO, NI, PB, SN, ZS
Spain	BARC	Barcelona	AA, AH, CA, NI, PB, SN, ZS
	BILB	Bilbao	AA, AH, CA, NI, PB, SN, ZS
Sweden	HELS	Helsingborg	AH, CA, NI, PB, ZS
Taiwan	KAOH	Kaohsiung	AA, AE, AH, CA, NI, PB, SN, ZS
United Kingdom	HULL	Hull	AA, AH, CA, NI, PB, SN, ZS
	LIVE	Liverpool	AA, AH, CA, NI, PB, SN, ZS
UAE	DUBA	Dubai	CA, NI, PB, ZS
USA	BALT	Baltimore	AH, AN, CA, CO, NI, NA, PB, SN, ZS
	CHIC	Chicago	AH, AN, CA, NI, NA, PB, ZS
	DETR	Detroit	AH, AN, NI, NA, PB, ZS
	LOSA	Los Angeles	AH, NI, NA, PB, SN, ZS
	MOBI	Mobile	AH, AN, CA, NI, NA, PB, SN, ZS
	NEWO	New Orleans	AH, AN, CA, NI, NA, PB, SN, ZS
	OWEN	Owensboro	AH, NA
	TOLE	Toledo	AH, NI, NA, PB, ZS

15 Appendix G - Market Data Trade Examples

15.1 Trade at Reference Price Trade

A TaS/TaR trade is executed in the Electronic venue. The TradeAtReferencePriceType shows that the price is a differential of the reference price.

Offset	Field	Value
0	MsgSize	62
2	MsgType	341
4	TimeOfEvent	123455789
12	TradableInstrumentID	9999 (Nickel 3M TC)
20	TradingVenue	EL
22	MatchedTime	Null
30	RingSession	Null
32	TradeCancelFlag	0
33	Price	2
41	Volume	10
45	MatchID	3456
53	TradeAtReferencePriceType	D = Differential
54	SubTypeOfTrade	1 = Explicit order
55	RemainingRecords	0
57	RecordCount	0
59	StrategyLegCount	0

The TradeAtReferencePriceType shows that the price has been substituted with the closing price. For a substituted trade MatchedTime will be provided.

Offset	Field	Value
0	MsgSize	62
2	MsgType	341
4	TimeOfEvent	123455789
12	TradableInstrumentID	9999 (Nickel 3M TC)
20	TradingVenue	EL
22	MatchedTime	123466789
30	RingSession	Null
32	TradeCancelFlag	0
33	Price	9872
41	Volume	10
45	MatchID	3456
53	TradeAtReferencePriceType	S = Substituted
54	SubTypeOfTrade	1 = Explicit order
55	RemainingRecords	0
57	RecordCount	0
59	StrategyLegCount	0

Document Version History

Version	Date	Changes
4.00	11 Jun 2020	Initial release of document for electronic market data from the new LMEselect v10
4.01 – 4.03		LME internal updates
4.04	28 May 2021	Changes to message definitions for the following messages: • Outright Definition (301) and Strategy Definition (302) Day 2 functionality identified in grey and italic font. New messages defined: • Order Cancel (335), Order Executed (350) and Match Trade (360) Updated details for Intraday Trade Statistics (352) message. Update definition for TimeOfEvent fields. Extra detail on IOP (354) message. Additional Order update examples added in sections 7 and 8.
4.05	09 Jun 2021	LME internal updates
4.06	28 Jan 2022	Added an overview of the messages published at start of day to section 2.2.1 Correct NULL values in section 3.1.1 Changes to Outright Definition (301) Change data type for LegSide in Strategy Definition message to Int8 Change list of valid price codes Remove PromptType = 'O' Changes to Contract State (311) message, removal of TradingState values for SOD and EOD TimeofEvent assignment details added to Top of Book (355) and Aggregate Order Book Update (353) Additional field for SubtypeOfTrade in Order Executed (350) message Additional values for SubTypeOfTrade in OrderExecuted (350) and Matched Trade (360) messages for trades resulting from uncrossing and trades resulting from two implied orders matching

Version	Date	Changes
		Additional information for OrderID during uncrossing in OrderExecuted (350) Appendix C - Channel Matrix table removed Added Appendix D - TickSizeID mapping Additional information for DR Signal (105) Additional information on the Retransmission Service
4.07	23 Nov 2022	Timestamp Precision included in Data Types Updates related to the inclusion of Non-Electronic messages Changes to Electronic message naming and numbering: • Renamed 311, 312, 351, 352 Renamed and renumbered: • IOP (354) - Indicative Opening Price (320) and Matched Trade (360) - Market Data Trade (341) Renumbered: • Top of Book (321), Aggregate Order Book (322). Order Add (323), Order Amend (324), Order Cancel (325), Order Executed (326), Order Book Clear (327) and Quote Request (329) Changes to field names: • TradableInstrumentID replaces SecurityID permutations, TradingCurrency replaces CurrencyCode for reference data, MarketSegmentCode replaces MarketSegment, ExpiryDate replaces MaturityDate, OptionType replaces CallPut, StrategyTypeCode replaces StrategyType, StrategyLegCount replaces NumberofLegs, LegNumber replaces LegID, BuySell replaces Side permutations, LegDeltaHedgePrice replaces LegPrice, Volume replaces Quantity permutations (Qty unchanged), Trade High replaces High Price and Trade Low replaces Low Price Changes to data types: • PromptDateLabel String 6, LegDeltaHedgePrice Int64, StrategyTypeCode, StrategyLegCount, LegNumber Uint32, LegRatio Uint64, BuySell String 1 Change to field values: • BuySell – B/S replaces 1/2

Version	Date	Changes
		301 MergedTradableInstrumentID and LinkedTradableInstrumentID null value replaces 0 302 corrected values for UnderlyingType 4.1.3 prompt date precedence included 4.3.1 – 4.3.3 TimeOfEvent for reloaded GTC/GTD orders 4.3.3 – 4.3.4 removed Iceberg replenishment 4.3.6 OrderID null when an aggressing order matches against a resting implied order 4.3.7 included Top of Book Added Non-Electronic messages: • Instrument Definition (303), Tradable Instrument Definition (304), Market State – Product (310), Market Data Order (328), Indicative Trade Price (340), Order Statistics - Intraday (350), Reference Price (401), Reference Forward Curve Price (402), Reference FX Rate (403), Reference Volatility Price (404), Reference Auction Price (405) and Warehouse Stock Movement (426) 8 additional examples Added Appendix A Product Hierarchy diagram Appendix B included Tick Size ID and added Price Code 10.1 and 10.1.1 included second business day and prompt date precedence example
4.08	31 Mar 2023	Revised 2.3 Trading Session and 3.1.2 Implied Decimal Updated Market Data Trade (341) to a common message format Added Contract Definition (300), Business Event – Pre TT Auction (342), Open Interest (420), Open Interest Band (421), Position Band (422) Warrant Band (423) and Trading Volume (424) MDSource changed to TradingVenue Updated description for ISINCode Strategy Definition (302) added MergedTradableInstrumentID, reordered LegTradableInstrumentID and corrected offsets Merged Instruments updated to include merged strategy order books Corrected offsets in Market State – Contract (311 and Aggregate Order Book (322)

Version	Date	Changes
		Removed TransactionTime from Non-Electronic messages 310, 328, 340, 342, 350, 401, 402, 404, 405 Removed TimeOfEvent from Non-Electronic messages 403, 420, 421, 422, 423, 426 BuySell changed to LegBuySell in Tradable Instrument (304) Revised Market Data Order (328) Reordered Order Statistics – Intraday (350) InstrumentID changed to Uint64 in Reference Price (401) RemainingRecords / RecordCount harmonised naming convention in 402, 404 and 426 Warehouse Stock Movement (426) clarified report level order TradeCancelFlag updated description of valid values Updated Refresh snapshot Corrected MsgType in Aggregate Order Book Management examples Revised Appendix C
4.09	23 Jun 2023	Added Price Limits (305) Revised description of SubTypeOfTrade in 341 RemainingRecords / RecordCount added to Market Data Trade (341), Market Data Order (328) and Tradable Instrument Definition (304) Added Char to data types String and Char fields cannot be null, replaced with space if not applicable Harmonised description of LegRatio in 302 and 304 and removed example Removed references to TAPO for MMAP and MASP 5.4.4 clarification added for strikes and deltas Updated Market Open Interest schedule 10.3 additions to Tick Size ID table Updated Appendix D Removed TransactionTime from Reference Price Examples

Version	Date	Changes
4.10	13 Sep 2023	1.1, 1.2 and 1.3.2 descriptions 2.2.1, 2.2.4.2 and 2.3 descriptions203 LastSeqNum description 341 message description and added Appendix G and H 302 ContractType default space removed 4.2 and 312 message description 324 generated when order updates price or volume or position 325 T1 and T2 null values 320, 326, 352, 401 and 424 message description 5.1 description, 304 fields not applicable to a strategy 304, 328 and 341 message length updated to value of RecordCount 328 RingSession values for Basis 402 PromptDateLabel1 value for Cash, PromptDate2 description 421 message updated, PromptDateLabel and InstrumentID fields removed Date format included in 421, 422, 423, 424 426 StockQuantity data type changed to Int32 8.9 and 8.10 10.1 123M corrected 10.2 0 = Outright removed 14.1 grades added for Tin, Lead and Zinc
4.11	29 Feb 2024	Implied decimal format added to price fields Char (1) replaced by String (1) 2.2.1 Contract Definition (300) included for Electronic. Details added for Non-Electronic 341 message description, added TradeAtReferencePriceType and LegTradeAtReferencePriceType and included in examples. RemainingRecords, RecordCount and StrategyLegCount values for Electronic venue 301 and 303 ISIN space if not applicable, 301 and 302 PriceCode space if not applicable, 341 TradeAtReferencePriceType and LegTradeAtReferencePriceType space if not applicable 311 and 312 StartTime and EndTime not applicable to Technical Halt

Version	Date	Changes
		326 OrderID description updated 420, 421, 351 and 352 description 405 and 422 description of total length Removed Unofficial prices, updated timings for Indicative prices in 401 and 402 Publication Schedule Summary included 8.10 example corrected Product Hierarchy diagram 10.1.1 prompt label precedence also applicable to 304 10.4 guidance on differential and substituted prices 12.1 removed Refresh channels from Elec Algos, removed Growth package from Open Interest Band (421), Position Band (421) and Warrant Band (422) 14.1 updated grade codes Removed Market Data Trade Inclusion Rules