


MDP 3.0 - Market By Order Limited Depth Book Processing

This section outlines Market by Order Limited Depth (MBOLD) functionality for the CME MDP Conflated UDP and CME MDP Conflated TCP market data groups. MBOLD sends the top 10 bid and ask orders on an order book for a given instrument. MBOLD allows clients to view top position(s) while preserving market participant anonymity. Within a [market event](#), MBOLD order books are sent before Market by Price (MBP) order books.

 Current CME Globex [Market by Order \(MBO\)](#) functionality will be re-branded to "Market By Order Full Depth (MBOFD)" to better differentiate it from "Market by Order Limited Depth (MBOLD)".

Unlike standard [CME Globex MDP incremental book processing](#), MBOLD uses an overlay approach to book management. Overlay book management completely restates the MBOLD book with each new Market Data Snapshot Full Refresh (tag 35-MsgType=W) message. The MBOLD orders are sorted by price and priority within a price level. Bid-ask encoding is interleaved (first bid, followed by first ask, followed by second bid, followed by second ask, etc). Order Priority (tag 37707-MDOrderPriority), from lowest to highest values, is used to position the order against other orders of the same instrument side, and price.

Book Priority	MDOrderPriority	OrderID	Quantity	Price	Side
1	653654	111	10	100	Buy
2	703699	759	120	100	Buy
3	765935	201	30	100	Buy
4	524123	901	50	98	Buy

MBOLD order priority is based on the sequence of iLink orders received by a CME Globex market segment (tag 1300-MarketSegmentID) and will be sent accordingly, regardless of the match algorithm. [Implied order book](#) information is not sent in MBOLD format.

MBOLD Processing Examples

The examples below illustrate how an order book is built and updated for MBOLD processing. The quantity and order count are provided.

Example 1 - Single Update

This example shows a new limit bid order accepted and added to the second level of the book. The following examples assume there are no other updates within a conflation interval and the book price processing is non-inverted. For more information on conflation processing see [Conflated Market Data Processing](#).

Starting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	50	101	1	102	5	107	833653

New Order Entered

A new order is entered to bid 10 @ 100. A Snapshot (tag 35-MsgType=W) book update is generated:

Snapshot (35=W) Book Update

Tag Number	FIX Name	Value	Description
48	SecurityID	12345	A unique instrument ID value will not be reused until the next trade date following an instrument expiration or deletion.
268	NoMDEntries	3	
Data Block 1 - Bid			
37	OrderID	557	Order ID
37707	MDOrderPriority	723766	Order priority for execution on the order book
270	MDEntryPx	101	Order price of the Market Data Entry
37706	MDDisplayQty	50	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type
Data Block 2 - Ask			

37	OrderID	107	Order ID
37707	MDOOrderPriority	833653	Order priority for execution on the order book
270	MDEntryPx	102	Order price of the Market Data Entry
37706	MDDisplayQty	5	Visible Order Qty
269	MDEntryType	1	Ask - Market Data entry type
Data Block 3 - Bid			
37	OrderID	709	Order ID
37707	MDOOrderPriority	583672	Order priority for execution on the order book
270	MDEntryPx	100	Order price of the Market Data Entry
37706	MDDisplayQty	10	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type

Resulting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	50	101	1	102	5	107	833653
583672	709	10	100	2				

Example 2 - Single Update with Same Price

This example shows a new limit bid with the same price as the top bid order accepted and added to the second level of the book. The following examples assume there are no other updates within a conflation interval and the book price processing is non-inverted. For more information on conflation processing see [Conflated Market Data Processing](#).

Starting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	50	101	1	102	5	107	833653
583672	709	10	100	2				

New Order Entered

A new bid order is entered to bid 30 @ 101. A Snapshot (tag 35-MsgType=W) book update is generated:

Snapshot (35=W) Book Update

Tag Number	FIX Name	Value	Description
48	SecurityID	12345	A unique instrument ID value will not be reused until the next trade date following an instrument expiration or deletion.
268	NoMDEntries	4	
Data Block 1 - Bid			
37	OrderID	557	Order ID
37707	MDOOrderPriority	723766	Order priority for execution on the order book
270	MDEntryPx	101	Order price of the Market Data Entry
37706	MDDisplayQty	50	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type
Data Block 2 - Ask			
37	OrderID	107	Order ID
37707	MDOOrderPriority	833653	Order priority for execution on the order book
270	MDEntryPx	102	Order price of the Market Data Entry
37706	MDDisplayQty	5	Visible Order Qty
269	MDEntryType	1	Ask - Market Data entry type
Data Block 3 - Bid			
37	OrderID	809	Order ID

37707	MOrderPriority	923768	Order priority for execution on the order book
270	MEntryPx	101	Order price of the Market Data Entry
37706	MDDisplayQty	30	Visible Order Qty
269	MEntryType	0	Bid - Market Data entry type
Data Block 4 - Bid			
37	OrderID	709	Order ID
37707	MOrderPriority	583672	Order priority for execution on the order book
270	MEntryPx	100	Order price of the Market Data Entry
37706	MDDisplayQty	10	Visible Order Qty
269	MEntryType	0	Bid - Market Data entry type

Resulting Book MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	50	101	1	102	5	107	833653
923768	809	30	101	2				
583672	709	10	100	3				

Example 3 - Multiple Updates

This example shows multiple MBOLD updates within a [Conflated Market Data](#) interval sent on a single Snapshot (35=W) message. The book price processing in this example is non-inverted.

Starting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	50	101	1	102	5	107	833653
923768	809	30	101	2				
583672	709	10	100	3				

Multiple Updates

The following updates occur within the Conflated Market Data Interval interval:

- A new bid order is entered to 50 @ 100
- A new ask order is entered to 25 @ 103
- Bid Order ID 557 quantity is updated to 10
- Bid Order ID 709 price is updated to 99

A Snapshot (tag 35-MessageType=W) book update is generated:

Snapshot (35=W) Book Update

Tag Number	FIX Name	Value	Description
48	SecurityID	12345	A unique instrument ID value will not be reused until the next trade date following an instrument expiration or deletion.
268	NoMDEntries	6	
Data Block 1 - Bid			
37	OrderID	557	Order ID
37707	MOrderPriority	923768	Order priority for execution on the order book
270	MEntryPx	101	Order price of the Market Data Entry
37706	MDDisplayQty	30	Visible Order Qty
269	MEntryType	0	Bid - Market Data entry type
Data Block 2 - Ask			
37	OrderID	107	Order ID
37707	MOrderPriority	833653	Order priority for execution on the order book

270	MDEntryPx	102	Order price of the Market Data Entry
37706	MDDisplayQty	5	Visible Order Qty
269	MDEntryType	1	Ask - Market Data entry type
Data Block 3 - Bid			
37	OrderID	809	Order ID
37707	MOrderPriority	923768	Order priority for execution on the order book
270	MDEntryPx	101	Order price of the Market Data Entry
37706	MDDisplayQty	30	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type
Data Block 4 - Ask			
37	OrderID	923	Order ID
37707	MOrderPriority	933072	Order priority for execution on the order book
270	MDEntryPx	103	Price of the Market Data Entry.
37706	MDDisplayQty	25	Visible Order Qty
269	MDEntryType	1	Ask - Market Data entry type
Data Block 5 - Bid			
37	OrderID	955	Order ID
37707	MOrderPriority	583672	Order priority for execution on the order book
270	MDEntryPx	100	Order price of the Market Data Entry
37706	MDDisplayQty	50	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type
Data Block 6 - Bid			
37	OrderID	709	Order ID
37707	MOrderPriority	583672	Order priority for execution on the order book
270	MDEntryPx	99	Order price of the Market Data Entry
37706	MDDisplayQty	10	Visible Order Qty
269	MDEntryType	0	Bid - Market Data entry type

Resulting Book MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
723766	557	10	101	1	102	5	107	833653
923768	809	30	101	2	103	25	923	933072
933281	955	50	100	3				
583672	709	10	99	4				

Example 4 - No MBOLD Message Update

In this example, a bid order is added greater than the maximum 10 MBOLD depth. Consequently, only a Market by Price (MBP) book update will be sent. The following examples assume there are no other updates within a conflation interval and the book price processing is non-inverted. For more information on conflation processing see [Conflated Market Data Processing](#).

Starting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
923768	809	30	101	1	102	5	107	833653
1090103	557	90	101	2	103	10	303	671011
1090555	905	15	101	3				
1091202	1000	10	101	4				
1092237	888	5	101	5				
702018	630	25	100	6				
801001	723	10	100	7				

831827	782	25	100	8				
641800	302	20	99	9				
781872	701	15	99	10				

New Order Entered

A new order is entered to bid 10 @ 98. No MBOLD message is generated due to the update is outside of the maximum MBOLD book depth of 10. An MBP book update will be sent to reflect the new order.

Example 5 - All Orders Removed

In this example, an order is canceled to create an empty book. Consequently, an empty Snapshot (tag 35-MessageType=W) book update is generated.

Starting MBOLD Book

Order Priority	Bid OrderID	Bid Quantity	Bid Book Price	Book Priority	Ask Book Price	Ask Quantity	Ask OrderID	Order Priority
923768	809	30	101	1				

Order Canceled

Order 809 is canceled. An empty snapshot (tag 35-MessageType=W) book update is generated:

Snapshot (35=W) Book Update

Tag Number	FIX Name	Value	Description
48	SecurityID	12345	A unique instrument ID value will not be reused until the next trade date following an instrument expiration or deletion.
268	NoMDEntries	0	