CME Group

Market Data Extensions

June 18, 2021

Revision v0.3

Proposal Status: Approved

DISCLAIMER

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Document History

Revision	Date	Author	Revision Comments
v0.1	May 2, 2021	CME Group, Brook Path Partners, Inc.	Initial version
v0.2	May 17, 2021	CME Group, Brook Path Partners, Inc.	Added elaborations for new values.
v0.3	June 18, 2021	Hanno Klein, GTC	Added public review comments and their disposition.
	July 7, 2021	GTC Technical Support	Confirmed requested values and revised document accordingly.

1 Introduction

This gap analysis proposal to address seeks address enhancement needed to the Market Data messages that is needed by CME Group to publish market data for changing market needs and new products' data attributes.

2 Business Requirements

The MDEntryType(269) field in the market data messages today contains many available entry types that can be used to distribute various types of market data. However, as market structures change and evolve there is a requirement for more types of data to be distributed or broadcasted from CME. The following types of market data types have been identified as gaps in FIX Latest:

- MDEntry(269)=(t) - TWAP

- MDEntry(269)=(g) - Threshold limits and price banding

- MDEntry(269)=(h) - Daily financing rate

- MDEntry(269)=(i) - Accrued financing rate

CME requests the following values be assigned due to existing system implementations:

"g" for Threshold limits and price banding

"h" for Daily financing rate

"i" for Accrued financing rate

"t" for TWAP

Additionally to support the conveyance of threshold limits and price banding in CME's market data feed, the existing PriceLimits component and MaxPriceVariation(1143) are also needed in the market data messages' MDFullGrp and MDIncGrp components.

2.1 Threshold limits and price banding

As a regulated exchange CME provides an orderly marketplace for market participants by setting price limits and price banding for futures contracts traded on the exchange. One of the mechanisms of providing an orderly market is through price limits and price banding controls.

Price Limits

Price limits are the maximum price range permitted for a futures contract in each trading session. These price limits are measured in ticks and vary from product to product. When markets hit the price limit, different actions occur depending on the product being traded. Some markets may temporarily halt until price limits can be expanded or trading may be stopped for the day based on regulatory rules. Different futures contracts will have different price limit rules. For example, Equity Index futures have different rules than Agricultural futures.

Example

Equity Indexes futures have a three level expansion: 7%, 13% and 20% to the downside, and a 7% limit up and down in overnight trading.

When price reaches any of those levels the market will go limit up or limit down.

Calculating Price Limits

Price limits are re-calculated daily and remain in effect for all trading days except in certain physically-deliverable markets, where price limits are lifted prior to expiration so that futures prices are not prevented from converging on prices for the underlying commodity.

Typically, Agricultural futures will go limit up or down most often compared to Equity Index futures which very rarely if ever go limit up or down. When trading a specific product, it is important to be aware of price limits when limits are hit. Traders also know that it is possible for limits to be reached for more than one session in a row, however the expansion of limit thresholds over the last few years have reduced this occurrence.

Price Banding

Price banding is a similar mechanism which subjects all orders to price validation and rejects orders outside the given band to maintain orderly markets. Bands are calculated dynamically for each product based on the last price, plus or minus a fixed band value. Thus, if markets quickly move in one direction, the price bands dynamically adjust to accommodate new trading ranges.

CME market data Implementation for price limits and price banding

Security Definition messages provide initial values for High Limit, Low Limit, Base Band (MaxPriceVariation) at the time instrument definitions are published on Sunday start-up prior to weekly open or when a new Instrument is listed mid-week.

However, initial values provided in security definitions are accurate only at the time of instrument listing or weekly reference data publication. During the week many products have updates to daily limits and band variations, sometimes multiple times a day and in order to avoid the resend of many Security Definitions messages just to update three attributes, CME requires the MarketDataIncremental message to be able to provide real-time update to the High and Low Limit Base Band value changes for many securities in the same message. Series of these messages that include all impacted SecurityIDs are generated for the following business scenarios:

- Daily high/ low limits are re-calculated for most future products with the mid-point reference being instrument settlement price of the previous Trade Date. Updated daily limits are disseminated prior to market open in preparation for the next trading session (next Trade date)

- Daily high/ low limits or a band value is manually adjusted by CME Globex Control Center specialists due to market conditions

- Daily high/ low limits or a band value is manually disabled by CME Globex Control Center specialist or automatically disabled some duration due to product rules. In this scenario MDP Incremental message is generated with NULL values to reflect limits/ band were disabled

    o Another message is generated at the time when limits and or banding is enabled again for the market (in this case parameters are sent with non-NULL values)

- Circuit breakers reached and updates to price limits are disseminated for impacted instruments.

Example scenarios

Scenario 1 – Globex Control Center (GCC) manually updates MaxPriceVariation (Band value)

Given

- Instrument 123456 is a Future

- Security definition for the instrument specified related attributes as follows:

Low limit=50, High limit=1000, Initial Base Banding Value = 45

When GCC changes Base Banding Value to 50

Then SBE market data message is sent for Instrument 123456:

35=X

279=0 269=g 48=123456 1148=50 1149=1000 **1143=50**

Scenario 2 - GCC changes High Limit Price for a single instrument

Given

- Instrument 123456 is a Future

- Security definition for the instrument specified related attributes as follows:

  Low limit=50, High limit=1000, Banding Value=50

  When GCC changes High Limit for given instrument to 2000

  Then SBE market data message is sent for Instrument 123456

  35=X 268=1

  279=0 269=g 48=123456 1148=50 **1149=2000** 1143=50

Scenario 3 - GCC disables (manually or via automatic rule configured for the product) High and Low Limits for many instruments

Given

- Future Group has many instruments

- High and Low Limits are set to different values for each instrument

  When GCC pulls 25 instruments in the group and disabled limits

  Then SBE market data message is sent

  35=X 268=25 - 25 blocks/instances

  279=0 269=g 48=123456 1148=null 1149=null 1143=50

  ....

  279=0 269=g 48=452346 1148=null 1149=null 1143=45

2.2 Daily and Accrued financing values

Adjusted Interest Rate (AIR) Futures is a new CME futures product that provide floating rate exposure analogous to a total return swap (TRS), and typically trade at a differential from a floating interest rate benchmark value such as SOFR, Fed Funds or SONIA. This "traded-as" value is then converted into a cleared price for a futures contract which represents the total return on an asset, less the financing cost of that asset.

CME publishes on a daily basis for AIR Futures the day's funding cost ("Daily funding value/rate") presuming the deal was struck at the exact value of the reference benchmark, and the accrued funding value ("Accrued funding value/rate") which is the total amount accrued since the contract's inception. These two values are then used by traders to price their own deals according to their own differential from the benchmark interest rate.

The purpose of disseminating the daily financing value and accrued financing values associated with each AIR futures contract as they change is to provide data that traders can utilize for their own analytics.

2.3 TWAP

MDEntryType(269) in FIX Latest has support for VWAP (volume weighted average price), but there is no support for TWAP (time weighted average price). VWAP and TWAP are statistics that generally published hand-in-hand. As such there is a requirement for a new MDEntryType(269) to indicate TWAP entries.

VWAP and TWAP statistics can be calculated for the duration of trading session any time trade is received, in some implementation they are calculated and re-published real-time and in other implementations calculations are done only for trades in the publication interval.

Previous day values may also be disseminated in some implementations by adding OpenCloseSettlFlag(286)=4 (Previous Day).

VWAP and TWAP are calculated by collecting all trade prices with associated traded quantities for each instrument or security over the trade date or the publication interval in some implementations.

Difference in TWAP and VWAP calculations are as follows:

> *VWAP= SUM(TradePrice*TradeQty)/Total amount*
>
> *TWAP= SUM(TradePrice)/Number of Trades*

TWAP and VWAP may be paired for publication in some of the implementations because they both are calculated and can be published if there is at least one Trade reported for the instrument over the applicable time period.

Example of MD Incremental Refresh message generated with both values calculated:

Given input of trades in the calculation interval:

- Px=0.1234 Qty=2
- Px=0.1233 Qty=12
- Px=0.1233 Qty=12
- Px=0.1233 Qty=8
- Px=0.1232 Qty=3

Calculation details VWAP:

- SUM (0.1234 * 2, 0.1233" 12, 0.1233*12, 0.1233*8, 0.1232* 3) / SUM (2, 12, 12, 8, 3)
- VWAP =0.12397,

- Rounded to instrument PricePrecision = 4, VWAP=0.1240

Calculation details TWAP:

- SUM (TradePrice)/ Number of Transactions

- SUM (0.1234, 0.1233, 0.1233, 0.1233, 0.1232)/ Number of Trade = 5 = 0.1233

- Rounded to instrument PricePrecision =4, TWAP=0.1233

MD Incremental message snippet published:

35="X" | 60=<*Calculation Time*> | 268="2"

- 279="0" | **269="t"** | 48="123456" | 55=<Symbol> | **270="0.1233" | 271="5" | 273=<Last Input Trade Time>**

- 279="0" | **269="9"** | 48="123456" | 55=<Symbol> | **270="0.1240" | 271="37" | 273=< Last Input Trade Time>**

3 Issues and Discussion Points

4 Proposed Message Flow

No changes to FIX message flows.

5 FIX Message Tables

No changes to FIX messages.

6 FIX Component Tables

6.1 Component MDIncGrp

To be completed at the time of the proposal – all information provided will be included in the repository	
Component Name	MDIncGrp
Component Abbreviated Name (for FIXML)	<Inc>
Component Type	_X__ Block Repeating ___ Block
Category	[enter the category name here]
Action	__New _X_Change
Component Synopsis	[enter the component synopsis here]
Component Elaboration	[enter the component elaboration here]
To be finalized by FPL Technical Office	
Repository Component ID	

Component FIXML Abbreviation: *<Inc>*					
Tag	Field Name		Req'd	Action	*Mappings and Usage Comments*	*FIX Spec Comments*
268	NoMDEntries		***			
→	279	MDUpdateAction				
→	1173	MDSubBookType				
→	264	MarketDepth				
→	268	MDEntryType				
→	<...truncated...>					
→	1020	TradeVolume				
→	*PriceLimits component*		N	ADD		
→	1143	MaxPriceVariations	N	ADD		
→	731	SettlPriceType				
→	<...truncated...>					
</Inc>						

6.2 Component MDFullGrp

To be completed at the time of the proposal – all information provided will be included in the repository	
Component Name	MDFullGrp
Component Abbreviated Name (for FIXML)	<Full>
Component Type	__X_ Block Repeating ___ Block
Category	[enter the category name here]
Action	__New _X_Change
Component Synopsis	[enter the component synopsis here]
Component Elaboration	[enter the component elaboration here]
To be finalized by FPL Technical Office	
Repository Component ID	

Component FIXML Abbreviation: *<Full>*					
Tag	*Field Name*		*Req'd*	*Action*	*Mappings and Usage Comments*	*FIX Spec Comments*
268	NoMDEntries		***			
→	268	MDEntryType	N			
→	<...truncated...>					
→	1020	TradeVolume				
→	*PriceLimits component*			ADD		
→	1143	MaxPriceVariations		ADD		
→	731	SettlPriceType				
→	<...truncated...>					
</Full>						

7 Category Changes

No changes to categories.

Appendix A - Data Dictionary

Tag	FieldName	Action	Datatype	Description	FIXML Abbreviation	Add to / Deprecate from Message type or Component block
269	MDEntryType	Change	char	Type of market data entry. *requested values are in red* 9 = ~~Trading session~~ Volume Weighted Average Price ~~(VWAP)~~ [Elaboration: VWAP.] [Symbolic name: ~~TradingSession~~VWAP~~Price~~] g = Threshold limits and price banding [Elaboration: Conveys incremental real time change to pre-configured or previously disseminated pricing thresholds and/or banding parameters.] [Symbolic name: ThresholdLimitPriceBanding] h = Daily financing value [Elaboration: The financing cost of rolling an analogous total return swap from the previous business day to the current business day. In the context of Adjusted Interest Rate (AIR) futures this is a component of the cleared futures price.] [Symbolic name: DailyFinancingValue]		

				i = Accrued financing value [Elaboration: The total of the daily funding values or amounts from a contract's first day of trading to the current day. In the context of Adjusted Interest Rate (AIR) futures this is a component of the cleared futures price.] [Symbolic name: AccruedFinancingValue] t = Time Weighted Average Price [Elaboration: TWAP.] [Symbolic name: TWAP]		

Appendix B - Glossary Entries

Term	Definition	Field where used

Appendix C - Abbreviations

Term	Proposed Abbreviation	Proposed Messages, Components, Fields where used

Appendix D - Usage Examples

[Examples may be entered below this line]

Appendix E – Disposition of Public Comments

Public comments from Christoph John:

1. Business Requirements – Page 7: is there a reason why the new values for 269 should be g, h, i and t instead of continuing with b (the next free value for tag 269, with all other existing values ascending)? Do I understand correctly that these values were chosen "due to existing system implementations"?

   I don't know how many existing system implementations of this already exist but in my opinion the priority should be to make this somewhat consistent with the already existing standard values for that field.

   Response CME: FIXmate shows 269 values c. d. e are already taken, and g, h, i are the next available. t= TWAP have been chosen, as you said, due to "existing system implementation", we hope this is ok.

   Resolution GTC: No change. The GTC normally follows the rule of taking the next available number or character(s) in the alphabet. We assess requests for specific characters on a case-by-case basis. Obviously we encourage users to come forward with a Gap Analysis before finalizing their roll-out and implementation. We do understand that it is very hard for an exchange to alter values once they have been implemented by their membership.

The "gaps" in the sequence of values are not pretty but should not be a real problem either. We also have gaps due to deprecated values, albeit we avoid to re-use any of them as they may still be used (deprecated does not mean deleted).

2. CME market data Implementation for price limits and price banding – Pages 8, 9: is there a reason why disabling these limits needs to send null for fields 1148, 1149? Can't the fields just be omitted in that case? These are no required fields after all.

   If not, null feels like a bad choice for a field of type Price or float respectively. (But 0 is probably also a bad choice since it could be a valid price.) Would some kind of boolean flag be helpful in that case that conveys that limits have been disabled?

   Response CME: Since CME market data is SBE encoded, a single SBE template contains all three fields for high, low limits and band differential that are independently updatable, this is one way to represent there are no longer standing limits for the contract, while band value may sill be in place.

   The more traditional FIX way would be to use tag 279=2 MDUpdateAction=Delete and resend previous limits. For SBE implementations it makes more sense to send 279=0 MDUpdateAction=new and null values in tags 1148, 1149 or 1143.

   Resolution GTC: No change. Usage of null values is specific to a binary encoding, in the case of CME this is SBE and does not apply to ASCII encodings such as tagvalue. Extension Packs of the application layer are agnostic to the encoding.