

BrokerTec U.S. Treasury Market Data

Market Data Platform supports a Simple Binary Encoding (SBE) Market Data Platform (MDP) channel for BrokerTec U.S. Treasury Data.

This market data channel distributes comprehensive BrokerTec U.S. Treasury price discovery market data.

This channel includes:

- top 5 levels of the order book for active benchmark products (2 Year - 30 Year)
- trade indicators
- market statistics including calculated analytics such as Volume Weighted Average Yield (VWAY).



This market data channel is distinct from the CME Globex BrokerTec Market Data.

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Supported Products and Available Data

BrokerTec U.S. Treasury market data supports the product types listed below.



Only the benchmark active notes and bonds support multiple book depth (5 levels).

List of available products and most valuable data. Refer to Market Data Incremental Refresh Specification for a complete list of available data.

Products	Available Data
Active Benchmark Bills <ul style="list-style-type: none"> • 1 Month Bills – 1 Year Bills 	<ul style="list-style-type: none"> • Top Of Book in Yield Terms • Trade Information • Statistics
Active Benchmark Notes and Bonds <ul style="list-style-type: none"> • 2 Year Note – 30 Year Bond 	<ul style="list-style-type: none"> • Top Five Levels of the Book • Price Level Update Action (New Price Level, Size Update on Existing Price Level, Delete Price Level) • Top Of Book in Yield Term • Trade Information • Statistics

When Issued Bills, Notes & Bonds <ul style="list-style-type: none"> • 1 Month Bill – 30 Year Bonds 	<ul style="list-style-type: none"> • Top Of Book in Yield Terms
Once Old & Twice Old Off-the-Run Notes and Bonds <ul style="list-style-type: none"> • 2 Year Notes – 30 Year Bonds 	<ul style="list-style-type: none"> • Top Of Book in Yield Terms

Data Availability

The data will be disseminated 6 days a week, Sunday 5:30 pm – Friday 4:30 pm CT.

- Standard Time: 6:30pm EST open - 5:30pm EST close.
- Daylight Savings Time: 7:30pm EDT open - 5:30pm EDT close.

Testing and Certification

Certification for BrokerTec U.S. Treasury Data is mandatory.

Customers can certify their applications using the BrokerTec U.S. Treasury Data test suite in Autocert+.

Market Data Technology Overview

This section provides an overview of the BrokerTec U.S. Treasury market data technology.

Simple Binary Encoding (SBE)

The BrokerTec U.S. Treasury market data channel uses compact [Simple Binary Encoding \(SBE\)](#) optimized for low latency of encoding and decoding while keeping bandwidth utilization reasonably small. Concise message sizes are used without the processing cost of compression. All FIX semantics are supported. The encoding standard is complimentary to other FIX standards for session protocol and application level behavior.

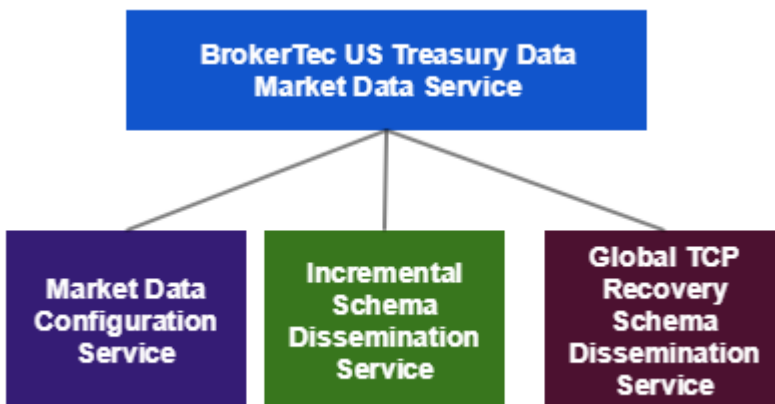


New customers developing to a non-Globex market data channel for the first time should familiarize themselves with [MDP 3.0 - Simple Binary Encoding](#) and [MDP 3.0 - Message Schema](#) topics.

Market Data Support Services

BrokerTec will use a separate Market Data Configuration Service, Incremental Schema Dissemination Service, and Global TCP Recovery Schema Dissemination Service. A separate schema and configuration file will be required for this channel and is available at <https://www.cmegroup.com/ftp> or [sftp.png.cmegroup.com](https://www.cmegroup.com/ftp).

Market Data Services Architecture



Market Data Configuration Service

Customers can obtain channel definitions, UDP configurations, and TCP Historical Replay configurations.

Incremental Schema Dissemination Service

Customers can use the incremental schema dissemination service to obtain the Broker U.S. Treasury Data incremental message templates.

Global TCP Recovery Schema

BrokerTec U.S. Treasury Data utilize a separate schema dedicated to TCP recovery templates. However, client systems utilize the common replay component for the retrieval of actual messages.

FTP Locations

CME provides an FTP (<https://www.cmegroup.com/ftp>) and SFTP (sftpng.cmegroup.com) site to disseminate schema and market data configuration information. This FTP/SFTP site contains the Schema and Configuration files for all events. Schema and Market Data configuration details for the Production environment are only available to customers after the certification process is complete.

Environment	Service	FTP/SFTP Site	Directory Location	Client System Update Schedule
New Release	Incremental Schema	https://www.cmegroup.com/ftp or sftpng.cmegroup.com	/SBEMix/NRCert/BrokerTecUST /Templates/	Sunday prior to market open
New Release	Configuration File		/SBEMix/NRCert/BrokerTecUST /Configuration/	Daily
New Release	Global TCP Recovery Schema		/SBEMix/NRCert/GlobalTCPRecovery /Templates/	Sunday prior to market open
Production	Incremental Schema		/SBEMix/Production/BrokerTecUST /Templates/	Sunday prior to market open
Production	Configuration File		/SBEMix/Production/BrokerTecUST /Configuration/	Daily
Production	Global TCP Recovery Schema		/SBEMix/Production/GlobalTCPRecovery /Templates/	Sunday prior to market open

Market Data Channel

The following market data channel is available for BrokerTec U.S. Treasuries market data.

Channel Name	ChannelID
BrokerTec U.S. Treasury Data	215

Customers can obtain channel network configurations from the config.xml file located at the new ftp location <https://www.cmegroup.com/ftp>.

Incremental Book Management



For customers not familiar with Incremental Book Management, you should familiarize yourself with [MDP 3.0 Market by Price Multiple Book Depth](#).

Client systems use the Market Data Incremental Refresh (tag 35-MsgType=X) message to update and maintain aggregate book depth, trades, and statistical data views with the following data blocks:

- Add - create/insert a new price at a specified price level (tag 279 MDUpdateAction=0)
- Change - change quantity for a price at a specified price level (tag 279 MDUpdateAction=1)
- Delete - remove a price at a specified price level (tag 279 MDUpdateAction=2)


An Aggregate book is built from a series of data blocks which indicate whether an entry is to be inserted (Add), changed (Change), or removed (Delete). All data blocks are issued for a specified entry type (tag 269), price (tag 270), and price level (tag 1023).

- The 'Add' data block is sent if there is a new price level. Client systems should then shift price levels down and delete any price levels past the defined depth.
- The 'Change' data block is sent to update characteristics of a price level without changing the price itself or impacting any other prices on the book. The 'Change' data block is sent to update the quantity for a price level per volume.
- The 'Change' data block is not sent when the price changes at a given price level.

- The 'Delete' data block is sent to remove a price level in the book. Client systems should shift prices below the data block up to the price level vacated by the deleted price level. If available, an add data block will be sent to fill in the last price level.

Recovery

Missed messages can be recovered using [TCP Recovery](#) or Natural Refresh.

 Natural Refresh is not guaranteed and should not be considered a definitive substitute for recovering lost data.

The client system must track the state of the book at all times with the FIX Market Data Incremental Refresh message (tag 35-MessageType=X) book update data blocks. It is possible, though not guaranteed, that a set of these book update data blocks can be used to construct the current, correct state of a book without prior book state knowledge. While client systems wait for the recovery of missing data, they may opt to also use a natural refresh algorithm to recover book state prior to recovering the lost data. Natural refresh can also be used to re-instate the top-of-book. Prior to beginning a natural refresh, the entire book should be emptied. Natural refresh assumes no prior knowledge of book state.

TCP Recovery

The TCP historical replay component allows systems to request a replay of a set of messages already published on the UDP Incremental Market Data Channel. The request specifies messages to replay.

Client systems will use the new Global TCP Replay Templates located at the new ftp location; however, client systems will utilize the common replay component for the retrieval of actual messages.

The request uses the SBE [Market Data Request \(tag 35-MessageType=V\)](#) message.

This type of request is sent through a new TCP connection established by client systems. The responses are sent by CME Group through this same connection and the connection is then closed by CME Group once the resend is complete. All responses are SBE encoded (including the reject response).

The TCP Replay feed supports the following FIX message formats:


- Logon (tag 35-MessageType=A) - Customer to CME Group
- Logout (tag 35-MessageType=5) - Customer to CME Group
- FIX Market Data Request message (tag 35-MessageType=V).
- CME Group to Customer, Heartbeat (tag 35-MessageType=0).

TCP Replay

The following restrictions apply when requesting messages via TCP Historical Replay:

- A maximum of 2,000 messages can be requested per Market Data Request (35=V) message.
- Only the current day's messages can be requested and resent.

Book Reset

 BrokerTec U.S. Treasury Data is the only non-Globex market data channel to send Instrument level Book Reset (tag 35-MessageType=X, tag 55-Symbol, tag 269-MDEntryType=J) messages.

A Book Reset message (tag 35-MessageType=X, tag 55-Symbol, tag 269-MDEntryType=J) is an instruction to reset (empty) the book. A Book Reset message is sent for individual instrument books:

- At system startup
- In the event of a CME Group system failure or failover.

FIX Syntax for Instrument level Book Reset – Market Data Incremental Refresh (tag 35-MessageType=X)

- Tag 55-Symbol
- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=J (Book Reset)

The following process is used on startup to ensure that all necessary market data is received:

1. Download the configuration files and schema files from the ftp site. Refer to [FTP Site Information](#) Information for more information.
2. Listen to the Incremental feed for incremental market data and start normal processing.
 - For products that support multilevel instrument books, the full state book (Top 5 levels) will be published only on startup or in the event of a CME Group system failure or failover.



CME Recommends client systems connect on Sunday Startup and stay connected throughout the week.

The book reset message will be followed by Incremental Refresh messages containing data blocks that are used to build and maintain the order book.

Binary Packet Header

Name	Binary Type (Size)	Number of Bytes	Req	Description
MsgSeq Num	uint32	4	Y	Packet sequence number. A unique sequence number given to each packet sent. Each channel will have its own separate set of sequence numbers that will increment sequentially with each packet and reset weekly.
Sending Time	uint64	8	Y	UTC Time of message transmission by the Gateway. UTC Timestamps are sent in number of nanoseconds since Unix epoch synced to a master clock to microsecond accuracy.

Market Data Incremental Refresh (tag 35-MsgType=X) Specification

The symbol indicates a repeating group tag.

Header				
Tag	FIX Name	Format	Valid Values	Description
35	MsgType	STRING	X=Market Data Incremental Refresh	Defines message type.
Body				
75	TradeDate	LOCAL MKT DATE		Trade Date in number of days since Unix epoch
60	TransactTime	UTC_TIMESTAMP	-	UTC Timestamps are sent in number of nanoseconds since Unix epoch synced to a master clock to microsecond accuracy.
268	NoMDEntries	NUM_IN_GROUP		Number of FIX Market Data Incremental Refresh Data Blocks in the Market Data Incremental Refresh message.
Repeating Group				
279	MDUpdateAction	CHAR	0 = New 1 = Update 2 = Delete	Indicates the type of Market Data update action.
269	MDEntryType	CHAR	0 = Bid 1 = Ask 2 = Trade 4 = Opening Price 5 = Closing Price 7 = High Trade 8 = Low Trade 9 = Yield J = Book Reset	Indicates the type of Market Data entry.
270	MDEntryPx	PRICE		Price of the Market Data Entry
271	MDEntrySize	QTY		Quantity of the MD Entry. <ul style="list-style-type: none"> In a Book Entry – order quantity In a Trade Entry – traded quantity

1023	MDPriceLevel	INT		Price Level in the book
1020	TradeVolume	QTY		Total traded volume since the beginning of the session. If this tag is not present, then there is no volume.
55	Symbol	STRING	1M - 30Y	Contract Symbol
541	MaturityDay	LOCAL MKT DATE		Instrument Maturity Date
455	SecurityAltID	STRING		CUSIP
456	SecurityAltIDSource	STRING	1 = CUSIP	Identifies class or source of the SecurityAltID (455) value.
223	CouponRate	PERCENTAGE		The rate of interest that, when multiplied by the principal, par value, or face value of a bond, provides the currency amount of the periodic interest payment.
277	TradeCondition	CHAR	H = Hit T = Take	List of conditions describing a trade. In this case the field is reporting when BTEC trade is from Hit or Take.
423	PriceType	INT	9 = Yield	This tag will only contain a value if price in tag 270-MDEntryPx is in Yield terms.

Incremental Refresh Messaging Examples

This section provides examples for building various types of books using the Incremental Refresh message.

Multiple Depth Order Book by Natural Refresh

This example shows the process to build the book by processing the Incremental Refresh (tag 35-MessageType=X) message. This process can be used real-time if client system loses connection or joins after the complete book has been published.

Starting book:

	2 YEAR	Bid	Ask	2 YEAR	
Level	Quantity	Price	Price	Quantity	Level
1					1
2					2
3					3
4					4
5					5

Process book update data blocks for the given instrument with a 5-deep book.

1. Update at Bid book level 3, price 99.03, quantity 15.

FIX Syntax example of Update at Bid book level 3, price 99.03, quantity 15:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 3
- tag 269-MDEntryType = 0 (Bid)
- tag 271-MDEntrySize = 15
- tag 270-MDEntryPx = 99.03

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1					1
2					2
3	15	99.03			3
4					4
5					5

2. Update at Ask book level 3, price 99.93, quantity 40.

FIX Syntax for Updating at Ask book level 3, price 99.93, quantity 40:

- tag 279-MDUpdateAction = 1 (change)

- tag 1023-MDPriceLevel = 3
- tag 269-MDEntryType = 1 (Offer)
- tag 271-MDEntrySize = 40
- tag 270-MDEntryPx = 99.93

Bid	2 YEAR			2 YEAR	Bid
Level	Quantity	Price	Price	Quantity	Level
1					1
2					2
3	15	99.03	99.93	40	3
4					4
5					5

3. Update at Bid book level 2, price 99.04, quantity 25.

FIX Syntax for Updating at Bid book level 2, price 99.04, quantity 25:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 2
- tag 269-MDEntryType = 0 (Bid)
- tag 271-MDEntrySize = 25
- tag 270-MDEntryPx = 99.04

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1					1
2	25	99.04			2
3	15	99.03	99.93	40	3
4					4
5					5

4. Update at Ask book level 2, price 99.92, quantity 40.

FIX Syntax for Updating at Ask book level 2, price 99.92, quantity 40:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 2
- tag 269-MDEntryType = 1 (Offer)
- tag 271-MDEntrySize = 40
- tag 270-MDEntryPx = 99.92

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1					1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4					4
5					5

5. Update at Ask book level 1, price 99.91, quantity 25.

FIX Syntax for Updating at Ask book level 1, price 99.91, quantity 25:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 1
- tag 269-MDEntryType = 1 (Offer)
- tag 271-MDEntrySize = 25
- tag 270-MDEntryPx = 99.91

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1			99.91	25	1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4					4
5					5

6. Update Bid book level 1, price 99.05, quantity 20.

FIX Syntax for Updating Bid book level 1, price 99.05, quantity 20:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 1
- tag 269-MDEntryType = 0
- tag 271-MDEntrySize = 20
- tag 270-MDEntryPx = 99.05

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1	20	99.05	99.91	25	1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4					4
5					5

7. Update Bid book level 4, price 99.02, quantity 30.

FIX Syntax for Updating Bid book level 4, price 99.02, quantity 30:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 4
- tag 269-MDEntryType = 0
- tag 271-MDEntrySize = 30
- tag 270-MDEntryPx = 99.02

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1	20	99.05	99.91	25	1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4	30	99.02			4
5					5

8. Update Ask book level 4, price 99.94, quantity 15.

FIX Syntax for Updating Ask book level 4, price 99.94, quantity 15:

- tag 279-MDUpdateAction = 1 (change)
- tag 1023-MDPriceLevel = 4
- tag 269-MDEntryType = 1
- tag 271-MDEntrySize = 15
- tag 270-MDEntryPx = 99.94

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1	20	99.05	99.91	25	1

2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4	30	99.02	99.94	15	4
5					5

9. Insert Bid book level 5, price 99.01, quantity 20.

FIX Syntax for Inserting Bid book level 5, price 99.01, quantity 20:

- tag 279-MDUpdateAction = 0 (new)
- tag 1023-MDPriceLevel = 5
- tag 269-MDEntryType = 0
- tag 271-MDEntrySize = 20
- tag 270-MDEntryPx = 99.01

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1	20	99.05	99.91	25	1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4	30	99.02	99.94	15	4
5	20	99.01			5

10. Insert Ask book level 5, price 99.95, quantity 10.

FIX Syntax for Inserting Ask book level 5, price 99.95, quantity 10:

- tag 279-MDUpdateAction = 0 (new)
- tag 1023-MDPriceLevel = 5
- tag 269-MDEntryType = 0
- tag 271-MDEntrySize = 10
- tag 270-MDEntryPx = 99.95

Bid	2 YEAR			2 YEAR	Ask
Level	Quantity	Price	Price	Quantity	Level
1	20	99.05	99.91	25	1
2	25	99.04	99.92	40	2
3	15	99.03	99.93	40	3
4	30	99.02	99.94	15	4
5	20	99.01	99.95	10	5

Trade Condition with Volume

FIX Syntax for Trade Condition – Market Data Incremental Refresh (35=X)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=2 (Trade)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel (null)
- Tag 271-MDEntrySize (Last Trade Size)
- Tag 270-MDEntryPx (Price of the Market Data Entry)
- Tag 277-TradeCondition (Hit or Take)
- Tag 1020-TradeVolume (Total traded volume)

Example of Take Trade Condition built using incremental refresh messages:

30 Year	Last Trade Size	Last Trade Price	Trade Condition	Last Traded Volume
Symbol	2	100.03125	T	1262

Top of Book (TOB) in Yield Terms



For Yield books, prices are inverted, i.e., the best Bid price can be lower than the best Ask.

FIX Syntax for 1 Level 2-Year Yield Book – Market Data Incremental Refresh (35=X):

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=0 (Bid)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel=1 (Level 1)
- Tag 271-MDEntrySize null
- Tag 270-MDEntryPx (Price of the Market Data Entry)
- Tag 423-PriceType =9, else null (only if price is quoted in yield)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=1 (Ask)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel=1 (Level 1)
- Tag 271-MDEntrySize null
- Tag 270-MDEntryPx (Price of the Market Data Entry)
- Tag 423-PriceType =9, (Yield) else null (only if price is quoted in yield)

Example built using incremental refresh messages:

	2 Year 1	Bid Yield	Ask Yield	2 Year 1	
Level	Price Type	Price	Price	Price Type	Level
1	Yield	1.910	1.906	Yield	1

Statistical Information

This section provides examples of FIX Syntax for statistical information such as low trades, opening prices, VWAY, and VWAP.

Low Trade Price

FIX Syntax for Statistical Information Low Trade – Market Data Incremental Refresh (35=X)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=8 (Low Trade)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel (null)
- Tag 271-MDEntrySize (null)
- Tag 270-MDEntryPx (Price of the Market Data Entry)

Example - Statistical Information Low Trade

7 YEAR
Low Trade Price
100.7812

Opening Price

FIX Syntax for Statistical Information Opening Price – Market Data Incremental Refresh (35=X)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=4 (Opening Price)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel (null)
- Tag 271-MDEntrySize (null)
- Tag 270-MDEntryPx (Price of the Market Data Entry)

Example - Statistical Information Opening Price

7 YEAR
Opening Price
100.7343

Volume Weighed Average Yield (VWAY)

FIX Syntax for Statistical Information Volume Weighed Average Yield (VWAY) – Market Data Incremental Refresh (35=X)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=9 (Yield)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel (null)
- Tag 270-MDEntryPx= (Price of the Market Data Entry)
- Tag 423-PriceType=9

Example - Statistical Information Volume Weighed Average Yield (VWAY)

7 YEAR WI	
Yield	Price Type
3.10043	Yield

Volume Weighed Average Price (VWAP)

FIX Syntax for Statistical Information Volume Weighed Average Price (VWAP) – Market Data Incremental Refresh (35=X)

- Tag 279-MDEntryAction=0 (New)
- Tag 269-MDEntryType=9 (Yield)
- Tag 55-Symbol (Contract Name)
- Tag 1023-MDPriceLevel (null)
- Tag 270-MDEntryPx= (Price of the Market Data Entry)
- Tag 423-PriceType=null

Example - Statistical Information Volume Weighed Average Yield (VWAP)

7 YEAR WI	
Yield	Price Type
100.475	null

Contact Information

For technical development support, contact [Certification Support for Electronic Trading \(CSET\)](#).

For production requests, please contact the [Global Command Center \(GCC\)](#).

For all other inquiries, please contact [Global Account Management \(GAM\)](#).