Cboe Futures Exchange Multicast Depth of Book (PITCH) Specification

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1 Introduction

1.1 Overview

Note that this specification is the standard Multicast PITCH specification for Cboe US Futures Exchange (CFE) platform. This protocol is essentially the same as the Mulitcast PITCH protocol used by the Cboe US Equities and Options exchanges, with the addition of CFE specific messages.

CFE participants may use CFE Multicast PITCH to receive real-time depth of book quotations and execution information direct from CFE. The Multicast PITCH protocol is more timely than the Multicast TOP protocol.

PITCH cannot be used to enter orders. For order entry, refer to the appropriate CFE FIX or BOE Specification.

All versions of the Multicast PITCH feed are WAN-shaped (maximum 100 Mb/s) and are available from one or both of CFE's datacenters. Participants may choose to take one or more of the following Multicast PITCH feeds depending on their location and connectivity to CFE.

Multicast PITCH Feed Descriptions:

Exchange	Shaping	Served From Data Center (Primary/Secondary)	Multicast Feed ID
CFE	WAN	Primary	FC
CFE	WAN	Primary	FD
CFE	WAN	Secondary	FE

1.2 Feed Hours and System Restart

The PITCH feed starts on Sunday at approximately 10:00 a.m. CT and shuts down on Friday at approximately 4:05 p.m. CT. A daily restart occurs between 4:05 and 4:45 p.m. CT each day at which time sequences will be reset. The daily restart is typically observed between 4:05 and 4:10 p.m. CT, but could occur later if needed for operational reasons. Feed startup and shutdown times may be adjusted without notice.

Under normal operations, it is expected that the order books are cleared (`Delete Order` messages sent for any open orders, including GTC and GTD orders), prior to the daily restart and reset of sequences. Persisted GTC and GTD orders will be added back onto the order books immediately after restart.

1.3 Feed Connectivity Requirements

WAN-Shaped feeds are available to participants who meet the minimum bandwidth requirements to CFE via cross-connect, dedicated circuit, or a supported carrier.

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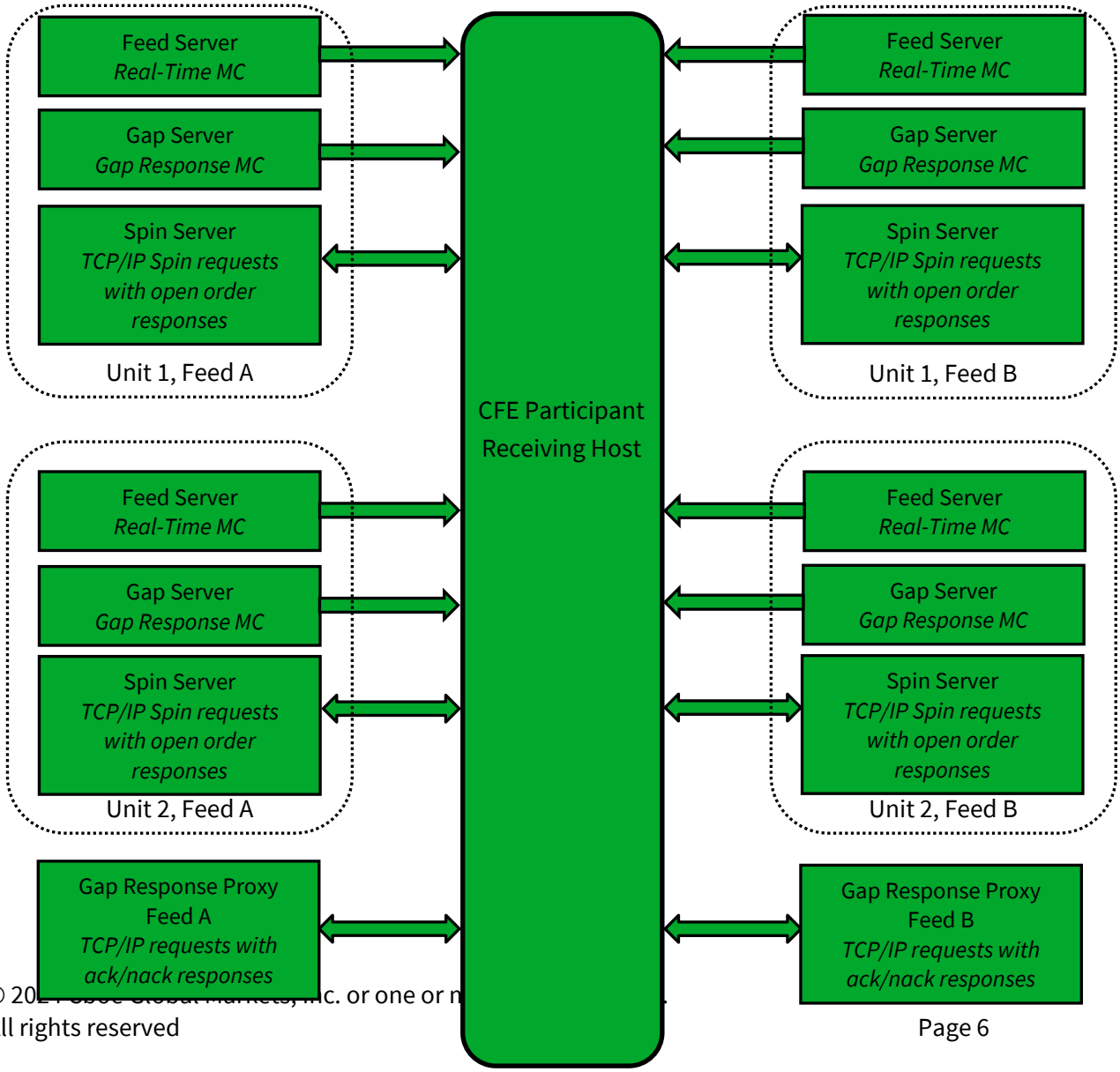
Participants with sufficient connectivity may choose to take both the FC and FD feeds from the CFE's primary datacenter and arbitrate the feeds to recover lost data. Alternatively, participants may choose to arbitrate feeds from both datacenters. It should be noted that feeds from the secondary datacenter will have additional latency for those connected with CFE in the primary datacenter due to proximity and business continuity processing.

CFE Multicast PITCH real-time events are delivered using a published range of multicast addresses divided by symbol range units. A TCP/IP connection to one of CFE's Gap Request Proxy (GRP) servers can be used to request dropped messages. Replayed messages are delivered on a separate set of multicast ranges reserved for packet retransmission. Intraday, a spin of all open orders may be requested from a Spin Server. This allows a client to become current without requesting a gap for all messages up to that point in the day.

The following diagram is a logical representation Multicast PITCH feed message flow between CFE and a participant feed handler that is listening to the A and B instances of two units:



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1.4 Symbol Ranges, Units, and Sequence Numbers

Products will be separated into units by a published distribution. Product distribution will not change intra-day. CFE does, however, reserve the right to add multicast addresses or change the product distribution with 48 hours prior notice to participants. Care should be taken to ensure that address changes, address additions, and product distribution changes can be supported easily.

Message sequence numbers are incremented by one for every sequenced message within a particular symbol unit. It is important to understand that one or more units will be delivered on a single multicast address. As with symbol ranges, unit distribution across multicast addresses will not change intra-day, but may change after notice has been given.

Symbol distribution across units as well as unit distribution across multicast addresses are identical for real-time and gap response multicast addresses.

1.5 Futures Specific Symbol Processing

CFE has implemented a symbol mapping mechanism (`Futures Instrument Definition` message) which maps each specific simple futures contract or spread instrument to a six character, ASCII *Symbol*. For example, the weekly VX11 contract expiring March 14, 2017 might be represented by the *Symbol* '0ab123'. This symbol mapping significantly reduces the size of the Multicast PITCH feed for futures and allows participants to use the same symbol handling mechanisms for the Cboe operated equity, options, and futures exchanges. This symbol mapping is the same as the Multicast TOP feed.

Mapping occurs on a continuous basis on each unit's multicast feed. `Futures Instrument Definition` messages can be both un-sequenced and sequenced. Un-sequenced messages are sent from pre-market through the end of trading in a continuous loop that will complete approximately once every minute. Once the same contract has been seen twice, the user can be certain the full loop has been observed. The rate is variable and will be adjusted as bandwidth allows.

Spread instruments may be occasionally created intra-day. In these cases, the `Futures Instrument Definition` message will be sent as a sequenced message on the real-time feed and from the Spin Server before any other messages that reference an instrument created intra-day are sent.

In addition to the symbol mapping events available on the Multicast TOP feed, a downloadable file with current mappings is available via the CFE website.

Production symbol files:	*Certification symbol files:*
Simple	Simple
Spread	Spread

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1.6 Gap Request Proxy and Message Retransmission

Requesting delivery of missed sequenced data is achieved by establishing a TCP connection to a Multicast PITCH GRP port. This GRP port is specific to Multicast PITCH and is NOT shared with the Multicast TOP GRP port. Participants who do not wish to request missed messages do not need to connect to a GRP port for any reason or listen to the multicast addresses reserved for message retransmission. Participants choosing to request missed data will need to connect to their assigned GRP port, log in, and request gap ranges as necessary. All gap requests will be responded to with a `Gap Response` message. A `Gap Response` message *Status* code of 'A'ccepted signals that the replayed messages will be delivered via the appropriate gap response multicast address. Any other `Gap Response` message *Status* code will indicate the reason that the request cannot be serviced.

Gap requests are limited in message count, frequency, and age by the GRP. Gap requests will only be serviced if they are within a defined sequence range of the current multicast sequence number for the requested unit. Participants will receive a total daily allowance of gap requested messages. In addition, each participant is given renewable one second and one minute gap request limits.

If more than one gap request is received for a particular unit/sequence/count combination within a short timeframe, all requests will receive a successful `Gap Response` message from the GRP, but only a single replayed message will be sent on the gap response multicast address.

If overlapping gap requests are received within a short period of time, the gap server will only send the union of the sequence ranges across grouped gap requests. Participants will receive gap responses for their requested unit/sequence/count, but receivers should be prepared for the gap responses to be delivered via multicast in non-contiguous blocks.

Gap acknowledgements or rejects will be delivered to users for every gap request received by the GRP. Users should be prepared to see replayed multicast data before or after the receipt of the gap response acknowledgement from the GRP.

1.7 Spin Servers

A Spin Server is available for each unit. The server allows participants to connect via TCP and receive a spin of the inside book and symbols with limited trading conditions on that unit. By using the spin, a participant can get the current CFE book quickly in the middle of the trading session without worry of gap request limits. The Spin Server for each unit is assigned its own address and/or TCP port.

Upon successful login and periodically thereafter, a `Spin Image Available` message is sent which contains a sequence number indicating the most recent message applied to the book. Using a `Spin Request` message, a participant may request a spin for the orders up to a sequence number noted within one of the *last ten* `Spin Image Available` messages distributed. If the `Spin Request` message submitted does not present a sequence number that matches one of the last ten `Spin Image Available` messages distributed, the spin will return orders up to the next closest sequence

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number reported through a `Spin Image Available` message that is greater than the sequence number requested.

In the case a Participant sends a sequence number in a `Spin Request` message that is higher than the sequence number reported by the most recent `Spin Image Available` message, the next spin image to be generated will be returned when it is available. If the requested sequence number is still higher at that time, an 'O' (Out of Range) error will be generated.

A spin consists only of `Add Order` (expanded, long and/or short), `Futures Instrument Definition`, `Futures Variance Symbol Mapping` **(effective 09/23/24)**, `Trading Status`, `Settlement`, `Price Limits`, `Time Reference` and `Time` messages. `Trading Status` messages will be sent in spins for all symbols that are not 'S'uspended, which results in at least one message for every symbol that has not been 'S'uspended since system startup. `Futures Instrument Definition` messages will be sent for all symbols on the unit, so a spin may be used to get the current list of all instrument definitions. Spins will not contain any message for an order which is no longer on the book. While receiving the spin, the participant must buffer multicast messages received. If the `Spin Image Available` message sequence number is the participant's reference point, multicast messages with larger sequence numbers should be buffered. If a non-`Spin Image Available` message sequence number is the participant's reference point which they send in their `Spin Request` message, they should buffer from that point on, but note that the spin they will receive sequence numbers beyond that point which they may disregard. When a `Spin Finished` message is received, the buffered messages must be applied to spun copy of the book to bring it current.

Section 4.7 shows an example flow of messages between a participant and CFE's Multicast PITCH feed and Spin Server.

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2 Protocol

CFE users may use the PITCH protocol over multicast to receive real-time full depth of book quotations and execution information direct from CFE.

All orders and executions are reflected via the PITCH feed. All orders and executions are anonymous, and do not contain any participant identity.

2.1 Message Format

The messages that make up the PITCH protocol are delivered using CFE's `Sequenced Unit Header` message header which handles sequencing and delivery integrity. All messages delivered via multicast as well as to/from the Gap Request Proxy (GRP) or Spin Server will use the `Sequenced Unit Header` message header for handling message integrity.

All UDP delivered events will be self-contained. Developers can assume that UDP delivered data will not cross frame boundaries and a single Ethernet frame will contain only one Sequenced Unit Header with associated data.

TCP/IP delivered events from the GRP may cross frames as the data will be delivered as a stream of data with the TCP/IP stack controlling Ethernet framing.

The PITCH data feed is comprised of a series of dynamic length sequenced messages. Each message begins with *Length* and *Message Type* fields. CFE reserves the right to add message types and grow the length of any message without notice. Participants should develop their decoders to deal with unknown message types and messages that grow beyond the expected length. Messages will only be grown to add additional data to the end of a message.

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2.2 Data Types

The following field types are used within the `Sequenced Unit Header` message header, GRP messages, Spin Server messages, and PITCH.

- **Alphanumeric** fields are left justified ASCII fields and space padded on the right.
- **Binary** fields are unsigned and sized to "Length" bytes and ordered using Little Endian convention (least significant byte first).
- **Signed Binary** fields are signed and sized to "Length" bytes and ordered using Little Endian convention (least significant byte first).
- **Binary Price** fields are signed Little Endian encoded 8 byte binary fields with 4 implied decimal places (denominator = 10,000).
- **Binary Short Price** fields are signed Little Endian encoded 2 byte binary fields with 2 implied decimal places (denominator = 100).
- **Bit Field** fields are fixed width fields with each bit representing a Boolean flag (the 0 bit is the lowest significant bit; the 7 bit is the highest significant bit).
- **Printable ASCII** fields are left justified ASCII fields that are space padded on the right that may include ASCII values in the range of 0x20 – 0x7e.
- **Binary Date** fields are 4 byte unsigned Little Endian values where the base-10 representation is the YYYYMMDD representation of that date. For example, October 30, 2023 would be represented as 20,231,030 (20231030).
- **Time Offset** are 4 byte unsigned Little Endian values that represent the number of nanoseconds since the last `Time` message.

2.2.1 Trade Date

Throughout this document, the term "Trade Date" is synonymous with the term "Business Date". The term Trade Date is used within this document to match identically named fields in the CFE FIX and BOE specs.

2.3 Message Framing

Depth of book update messages will be combined into single UDP frame where possible to decrease message overhead and total bandwidth. The count of messages in a UDP frame will be communicated using the CFE `Sequenced Unit Header` message header. Framing will be determined by the server for each unit and site. The content of the multicast across feeds (e.g. A/B) will be identical, but framing will not be consistent across feeds. Receiving processes that receive and arbitrate multiple feeds cannot use frame level arbitration to fill gaps.

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2.4 CFE Sequenced Unit Header Message Fields

The CFE `Sequenced Unit Header` message header is used for all CFE Multicast PITCH messages as well as messages to and from the Gap Request Proxy (GRP) and Spin Servers.

Sequenced and un-sequenced data may be delivered using the `Sequenced Unit Header` message header. Un-sequenced headers will have a '0' value for the *Hdr Sequence* field and potentially for the *Hdr Unit* field. All messages sent to and from the GRP and Spin Server are un-sequenced while multicast may contain both sequenced and un-sequenced messages.

Sequenced messages have implied sequences with the first message having the sequence number contained in the header. Each subsequent message will have an implied sequence one greater than the previous message up to a maximum of count messages. Multiple messages can follow a `Sequenced Unit Header` message header, but a combination of sequenced and un-sequenced messages cannot be sent within one header.

The sequence number for the first message in the next frame can be calculated by adding the *Hdr Count* field to the *Hdr Sequence*. This technique will work for sequenced messages and `Heartbeat` messages.

Sequenced Unit Header				
Field	**Offset**	**Length**	**Value/Type**	**Description**
Hdr Length	0	2	Binary	Length of entire block of messages. Includes this header and messages following *Hdr Count* .
Hdr Count	2	1	Binary	Number of messages to follow this header.
Hdr Unit	3	1	Binary	Unit that applies to messages included in this header.
Hdr Sequence	4	4	Binary	Sequence of first message to follow this header.
Total Length = 8 bytes				

2.5 Heartbeat Messages

The CFE `Sequenced Unit Header` message header with a count field set to '0' will be used for `Heartbeat` messages. During trading hours `Heartbeat` messages will be sent from the GRP, Spin Server, and all multicast addresses if no data has been delivered within 1 second. `Heartbeat` messages never increment the sequence number for a unit, but can be used to detect gaps on the real-time multicast channels during low update rate periods.

`Heartbeat` messages on the real-time multicast addresses during trading hours will have an *Hdr Sequence* value equal to the sequence of the next sequenced message to be sent for the unit. `Heartbeat` messages on gap multicast addresses will always have the *Hdr Sequence* field set to '0'. All `Heartbeat` messages sent to and from the GRP and Spin Server are considered un-sequenced and should have sequence and unit fields set to '0'.

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Outside of trading hours CFE sends `Heartbeat` messages on all real-time and gap channels with a sequence of '0' to help users validate multicast connectivity. `Heartbeat` messages might not be sent from 4:00 PM CST – 4:45 PM CST or during maintenance windows.

CFE expects `Heartbeat` messages to be sent to the GRP on live connections no less than every 5 seconds. Failure to receive two consecutive heartbeat messages will result in the GRP or Spin Server terminating the client connection. With the exception of `Time` messages, each PITCH message reflects the order addition, order deletion, order modification or execution of an order in the system.

2.6 Time Message Fields

A `Time` message is immediately generated and sent when there is a PITCH event for a given clock second. If there is no PITCH event for a given clock second, then no `Time` message is sent for that second. All subsequent time offset fields for the same unit will use the new `Time` message value as the base until another `Time` message is received for the same unit. The *Time* field is the number of seconds relative to midnight Central Time, which is provided in the `Time Reference` message. The `Time` message also includes the *Epoch Time* field, which is the current time represented as the number of whole seconds since the Epoch (Midnight January 1, 1970).

Time				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x20	`Time` message
Time	2	4	Binary	Number of whole seconds from midnight CentralTime.
Epoch Time	6	4	Binary	Number of whole seconds since the Epoch (Midnight January 1, 1970 UTC).
Total Length = 10 bytes				

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2.7 Unit Clear Message Fields

The `Unit Clear` message instructs feed recipients to clear all orders for the CFE book in the unit specified in the `Sequenced Unit Header` message header. It would be distributed in rare recovery events such as a data center fail-over. It may also be sent on system startup (after daily restart) when there are no persisted GTCs or GTDs.

Unit Clear				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x97	`Unit Clear` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Total Length = 6 bytes				

2.8 Time Reference Message Fields

The `Time Reference` message is used to provide a midnight reference point for recipients of the feed. It is sent whenever the system starts up and when the system crosses a midnight boundary. All subsequent `Time` messages for the same unit will the use the last *Midnight Reference* until another `Time Reference` message is received for that unit. The `Time Reference` message includes the *Trade Date*, so most other sequenced messages will not include that information.

`Time Reference` messages will be included in a spin response.

Time Reference				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xB1	`Time Reference` message
Midnight Reference	2	4	Binary	Midnight Central Time reference time for subsequent `Time` messages, expressed as number of whole seconds since the Epoch (Midnight January 1, 1970 UTC).
Time	6	4	Binary	Number of whole seconds from midnight Central Time.
Time Offset	10	4	Binary	Nanosecond offset from last unit timestamp.
Trade Date	14	4	Binary Date	Current Trade Date
Total Length = 18 bytes				

2.9 Futures Instrument Definition Message Fields (Sunset Date 09/23/24)

This section will be replaced with the new message structure detailed in Section 2.10 effective 09/23/24.

The `Futures Instrument Definition` message can be sent as a sequenced message or an un-sequenced message. It is sent as a sequenced message when the system starts up at the beginning of a

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trading session or if an instrument is created or modified during a trading day. A new sequenced message may be sent for a *Symbol* that does not visibly change any attribute. One un-sequenced `Futures Instrument Definition` message for each *Symbol* is also sent in a continuous loop, which completes approximately once every minute.

If the instrument is a spread (*Leg Count* > 0) then the message contains one or more repeating groups of leg definitions beginning at the field indicated by *Leg Offset*. There is a limit of 4 leg definitions.

If the instrument is a variance future (*Variance* bit in *Futures Flags* = 1) then the message contains a block of Variance Future parameters beginning at the offset indicated by *Variance Offset*. A `Futures Instrument Definition` message may have a Variance Futures block or Leg definitions, but not both. If the values for the Variance Future block are not available at the beginning of the trading day, '0' will be sent for those values until they are available. At that point, a sequenced `Futures Instrument Definition` message will be sent with the updated values.

The *Leg Offset* and *Variance Offset* fields are provided to support adding additional fields to this message between the offset fields and the Variance Future block and Leg definitions.

The *Report Symbol* field will contain either the weekly (e.g. VX01) or the monthly (e.g. VX) symbol for any simple futures contract. The *Report Symbol* will always contain the standard futures root symbol (e.g. VX) for all spread instruments.

`Futures Instrument Definition` messages are included in a spin response. Simple leg `Futures Instrument Definition` messages will be disseminated before complex leg `Futures Instrument Definition` messages sent in a spin response.

Futures Instrument Definition				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBB	`Futures Instrument Definition` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp or *Unit Timestamp* in this message if it is non-zero.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Unit Timestamp	12	4	Binary	Unit timestamp expressed as number of whole seconds since the Epoch (Midnight, January 1, 1970 UTC).
Report Symbol	16	6	Alphanumeric	Symbol for product or underlying security.

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Futures Flags	22	1	Bit Field	`Bit 0 –` Variance (1: Variance Future, 0: Standard Future)
Expiration Date	23	4	Binary Date	Expiration Date of Instrument.
Contract Size	27	2	Binary	Contract size of Instrument.
Listing State	29	1	Alphanumeric	`A =` Active `I =` Inactive `T =` Test
Price Increment	30	8	Binary Price	Minimum Price Increment
Leg Count	38	1	Binary	Values greater than 0 indicate this is a spread instrument.
Leg Offset	39	1	Binary	Leg definitions, if any, begin at this offset from the beginning of the message. Possible values are 0 (no legs present) or 45 (spread instrument). Cboe reserves the right to change these values without prior notice.
Variance Block Offset	40	1	Binary	Variance Future parameter block begins at this offset from the beginning of the message. Possible values are 0 (no Variance Block) or 45 (Variance Block present). Cboe reserves the right to change these values without prior notice.
Contract Date	41	4	Binary Date	Populated for single leg instruments only. Zero-filled for spread instruments. The date that should be used in describing the future's third party symbol and the measurement period of the contract. Set to same value as *Expiration Date* for futures that have a *Contract Date* that does not differ from expire date.
The following fields are only present if *Variance* bit in *Futures Flags* = 1.				
Realized Variance	45	8	Signed Binary	Realized Variance to date (signed 64-bit decimal with 8 implied decimal places)

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Num Expected Prices	53	2	Binary	Number of expected S&P500 prices to be used for calculating returns during the life of the contract
Num Elapsed Returns	55	2	Binary	Number of returns elapsed as of the beginning of the trading day
Previous Settlement	57	8	Binary Price	Previous day Settlement Value
Discount Factor	65	8	Signed Binary	Discount Factor (signed 64-bit decimal with 16 implied decimal places)
Initial Strike	73	8	Binary Price	Initial strike
Previous ARMVM	81	8	Signed Binary	ARMVM that was used to adjust the previous day settlement price (signed 64-bit decimal value with 6 implied decimal places)
Fed Funds Rate	89	8	Signed Binary	Fed Funds rate of prior day (signed 64-bit number with 6 implied decimal places)
The following fields repeat *Leg Count* times (maximum of 4) for spread instruments.				
Leg Ratio	*Leg Offset* + (10 * Leg Index)	4	Signed Binary	Leg ratio (positive for buy, negative for sell)
Leg Symbol	*Leg Offset* + 4 + (10 * Leg Index)	6	Alphanumeric	Symbol of leg.
Variable Total Length = 45 + 52 if Variance Future) + (*Leg Count* * 10) bytes				

2.10 Futures Instrument Definition Message Fields (Effective 09/23/24)

This section presents the `Futures Instrument Definition` message that will be available to test in the CFE certification environment on 07/29/24 and will become the `Futures Instrument Definition` message in the CFE production environment on 09/23/24. The `Futures Instrument Definition` message contains general futures contract information and is sent for all futures prdoucts, including Variance Futures. Product-specific attributes will be disseminated in product-specific supplementary messages. In the case of Variance Futures, product specific attributes are disseminated in the `Futures Variance Symbol Mapping` message.

The Futures Flag field, which previously differentiated between Variance Futures and Standard Futures, is no longer necessary as the structure of the message for Variance Futures is the same as for all other futures. To enable existing parser implementations to function without change, this field remains present but with a value of zero, which formerly indicated Standard Future.

The `Futures Instrument Definition` message can be sent as a sequenced message or an un-sequenced message. It is sent as a sequenced message when the system starts up at the beginning of a trading session or if an instrument is created or modified during a trading day. A new sequenced

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message may be sent for a *Symbol* that does not visibly change any attribute. One un-sequenced `Futures Instrument Definition` message for each *Symbol* is also sent in a continuous loop, which completes approximately once every minute as part of the Periodic Refresh mechanism.

If the instrument is a spread (*Leg Count* > 0) then the message contains one or more repeating groups of leg definitions beginning at the field indicated by *Leg Offset*. There is a limit of 4 leg definitions.

The *Leg Offset* field is provided to support adding additional fields to this message preceding the Leg definitions.

The *Report Symbol* field will contain either the weekly (e.g. VX01) or the monthly (e.g. VX) symbol for any simple futures contract. The *Report Symbol* will always contain the standard futures root symbol (e.g. VX) for all spread instruments.

Futures Instrument Definition				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBB	`Futures Instrument Definition` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp or *Unit Timestamp* in this message if it is non-zero.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Unit Timestamp	12	4	Binary	Unit timestamp expressed as number of whole seconds since the Epoch (Midnight, January 1, 1970 UTC).
Report Symbol	16	6	Alphanumeric	Symbol for product or underlying security.
Futures Flags	22	1	Bit Field	Value will always be zero.
Expiration Date	23	4	Binary Date	Expiration Date of Instrument.
Contract Size	27	2	Binary	Contract size of Instrument.
Listing State	29	1	Alphanumeric	`A` = Active `I` = Inactive `T` = Test
Price Increment	30	8	Binary Price	Minimum Price Increment.
Leg Count	38	1	Binary	Values greater than 0 indicate this is a spread instrument.
Leg Offset	39	1	Binary	Leg definitions, if any, begin at this offset from the beginning of the message. Possible values are

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				0 (no legs present) or 45 (spread instrument). Cboe reserves the right to change these values without prior notice.
Reserved	40	1	Binary	Reserved. Value will always be zero.
Contract Date	41	4	Binary Date	Populated for single leg instruments only. Zero-filled for spread instruments. The date that should be used in describing the future's third party symbol and the measurement period of the contract. Set to same value as *Expiration Date* for futures that have a *Contract Date* that does not differ from expire date.
The following fields repeat *Leg Count* times (maximum of 4) for spread instruments.				
Leg Ratio	*Leg Offset* + (10 * Leg Index)	4	Signed Binary	Leg ratio (positive for buy, negative for sell).
Leg Symbol	*Leg Offset* + 4 + (10 * Leg Index)	6	Alphanumeric	Symbol of leg.
Variable Total Length = 45 + (*Leg Count* * 10) bytes				

2.11 Futures Variance Symbol Mapping Message Fields (Effective 09/23/24)

The `Futures Variance Symbol Mapping` message is used to disseminate symbol reference data for S&P 500 Variance Futures (VA Futures) symbols. VA Futures symbol reference data are disseminated with both the `Futures Instrument Definiton` and `Futures Variance Symbol Mapping` messages. The purpose of the `Futures Variance Symbol Message` is to disseminate product-specific supplemental information for VA Futures symbols (i.e., Accrued Day Variance, Num Final Returns, and Num Elapsed Returns).

The `Futures Variance Symbol Mapping` message can be sent as a sequenced message or an un-sequenced message. It is sent as a sequenced message when the system starts up at the beginning of a trading session or if an instrument is created or modified during a trading day. A new sequenced message may be sent for a symbol that does not visibly change any attribute. One un-sequenced

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`Futures Variance Symbol Mapping` message for each symbol is also sent in a continuous loop, which completes approximately once every minute as part of the Periodic Refresh mechanism.

`Futures Variance Symbol Mapping` messages are included in a spin response.

Futures Variance Symbol Mapping				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xFA	`Futures Variance Symbol Mapping` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp or *Unit Timestamp* in this message if it is non-zero.
Unit Timestamp	6	4	Binary	Unit timestamp expressed as number of whole seconds since the Epoch (Midnight, January 1, 1970 UTC).
Feed Symbol	10	6	Printable ASCII	Six character, base 62 symbol.
Futures Symbol	16	12	Alphanumeric	Twelve character textual definition of the symbol where the first six characters contain the product symbol, left justified, and padded on the right with spaces, and the right most six characters are the expiration date in YYMMDD format.
Accrued Day Variance	28	8	Signed Binary	Accrued day variance as of the start of the trading day (signed 64-bit decimal with twelve implied decimal places).
Num Final Returns	36	2	Binary	Number of S&P 500 Index returns used in the Final Settlement Value calculation.
Num Elapsed Returns	38	2	Binary	Number of elapsed S&P 500 Index returns including the current day.
Total Length = 40 bytes				

2.12 Price Limits Message Fields

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The `Price Limits` message is sent out at the start of a session for products subject to price limits per the contract specifications. The `Price Limits` message does not signal whether price limits are in effect for that symbol; it simply provides those values for when they are in effect. If multiple `Price Limits` messages are received for the same *Symbol*, the most recent values will override the previous values.

`Price Limits` messages are included in a spin response.

Price Limits				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBE	`Price Limits` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Upper Price Limit	12	8	Binary Price	Upper price limit
Lower Price Limit	20	8	Binary Price	Lower price limit
Total Length = 28 bytes				

2.13 Add Order Message Fields

An `Add Order` message represents a newly accepted visible order on the CFE book. It includes a day-specific *Order Id* assigned by CFE to the order.

Add Order (long)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x21	`Add Order` message (long)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	Day-specific identifier assigned to this order
Side Indicator	14	1	Alphanumeric	B = Buy Order S = Sell Order
Quantity	15	4	Binary	Number of contracts being added to the book (may be less than the number entered).
Symbol	19	6	Printable ASCII	Six character, base 62 symbol.
Price	25	8	Binary Price	The limit order price.
Total Length = 33 bytes				

Add Order (short)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x22	`Add Order` message (short)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.

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Order Id	6	8	Binary	Day-specific identifier assigned to this order.
Side Indicator	14	1	Alphanumeric	B = Buy Order S = Sell Order
Quantity	15	2	Binary	Number of contracts being added to the book (may be less than the number entered).
Symbol	17	6	Printable ASCII	Six character, base 62 symbol.
Price	23	2	Binary Short Price	The limit order price.
Total Length = 25 bytes				

2.14 Order Modification Messages

`Order Modification` messages refer to an *Order Id* previously sent with an `Add Order` message. Multiple `Order Modification` messages may modify a single order and the effects are cumulative. Modify messages may update the size and/or the price of an order on the book. When the remaining size of an order reaches zero, the order is dead and should be removed from the book.

2.14.1 Order Executed Message Fields

`Order Executed` messages are sent when an order on the CFE book is executed in whole or in part. The execution price equals the limit order price found in the original `Add Order` message or the limit order price in the latest `Modify Order` message referencing the *Order Id*.

Order Executed				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x23	`Order Executed` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that was executed.
Executed Quantity	14	4	Binary	Number of contracts executed.
Execution Id	18	8	Binary	CFE generated day-unique execution identifier of this execution. *Execution Id* is also referenced in the `Trade Break` message.
Trade Condition	26	1	Alphanumeric	`(Space)` = Normal trade O = Opening trade[1] S = Spread trade[1] [1]Sent for simple (non-spread) symbols only.
Total Length = 27 bytes				

2.14.2 Reduce Size Message Fields

`Reduce Size` messages are sent when a visible order on the CFE book is partially reduced.

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Reduce Size (long)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x25	`Reduce Size` message (long)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that has been reduced.
Canceled Quantity	14	4	Binary	Number of contracts canceled.
Total Length = 18 bytes				

Reduce **Size (short)**				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x26	`Reduce Size` message (short)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that has been reduced.
Canceled Quantity	14	2	Binary	Number of contracts canceled.
Total Length = 16 bytes				

2.14.3 Modify Order Message Fields

The `Modify Order` message is sent whenever an open order is visibly modified. The *Order Id* refers to the *Order Id* of the original `Add Order` message.

Note that `Modify Order` messages that appear to be “no ops” (i.e. they do not appear to modify any relevant fields) will still lose priority.

Modify (long)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x27	`Modify Order` message (long)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that has been modified.
Quantity	14	4	Binary	Number of contracts associated with this order after this modify (may be less than the number entered).
Price	18	8	Binary Price	The limit order price after this modify.
Total Length = 26 bytes				

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Modify (short)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x28	`Modify Order` message (short)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that has been modified.
Quantity	14	2	Binary	Number of contracts associated with this order after this modify (may be less than the number entered).
Price	16	2	Binary Short Price	The limit order price after this modify.
Total Length = 18 bytes				

2.14.4 Delete Order Message Fields

The `Delete Order` message is sent whenever a booked order is cancelled or leaves the order book. The *Order Id* refers to the *Order Id* of the original `Add Order` message. An order that is deleted from the book may return to the book later under certain circumstances. Therefore, a `Delete Order` message does not indicate that a given *Order Id* will not be sent again on a subsequent `Add Order` message.

Delete				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x29	`Delete Order` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	*Order Id* of a previously sent `Add Order` message that has been removed from order book.
Total Length = 14 bytes				

2.15 Trade Message Fields

The `Trade` message provides information about executions that occur off of the CFE book (such as ECRP/Block trades). `Trade` messages are necessary to calculate CFE execution data. `Trade` messages do not alter the book and can be ignored if messages are being used solely to build a book. The *Order Id* sent in a `Trade` message is obfuscated and will not tie back to any real *Order Id* sent back via a FIX or BOE order entry session.

Trade (long)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x2A	`Trade` message (long)

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Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	Obfuscated *Order ID* or *Order Id* of the executed order.
Side Indicator	14	1	Alphanumeric	Always 'B' = Buy Order regardless of resting side.
Quantity	15	4	Binary	Incremental number of contracts executed.
Symbol	19	6	Printable ASCII	Six character, base 62 symbol.
Price	25	8	Binary Price	The execution price of the order.
Execution Id	33	8	Binary	CFE generated day-unique execution identifier of this trade. *Execution Id* is also referenced in the `Trade Break` message.
Trade Condition	41	1	Alphanumeric	`(Space)` = Normal trade O = Opening trade[1] S = Spread trade[1] B = Block trade E = ECRP trade D = Derived [1]Sent for simple (non-spread) symbols only.
Total Length = 42 bytes				

Trade (short)				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x2B	`Trade` message (short)
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Order Id	6	8	Binary	Obfuscated *Order ID* or *Order Id* of the executed order.
Side Indicator	14	1	Alphanumeric	Always 'B' = Buy Order regardless of resting side.
Quantity	15	2	Binary	Incremental Number of contracts executed.
Symbol	17	6	Printable ASCII	Six character, base 62 symbol.
Price	23	2	Binary Short Price	The execution price of the order.
Execution Id	25	8	Binary	CFE generated day-unique execution identifier of this trade. *Execution Id* is also referenced in the `Trade Break` message.
Trade Condition	33	1	Alphanumeric	`(Space)` = Normal trade O = Opening trade[1] S = Spread trade[1] B = Block trade D = Derived

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				[1]Sent for simple (non-spread) symbols only.
Total Length = 34 bytes				

2.16 Transaction Begin Message Fields

The `Transaction Begin` message indicates any subsequent messages, up to the accompanying `Transaction End` message, are all part of the same transaction block. One example of where this might be used is when a single aggressive order executes against several resting orders. All PITCH messages corresponding to such an event would be included between a `Transaction Begin` and `Transaction End` messages. It is important to note that any PITCH *Message Type* may be included in a transaction block and there is no guarantee that the messages apply to the same price level or even the same *Symbol*. `Transaction Begin` messages do not alter the book and can be ignored if messages are being used solely to build a book.

Feed processors can use a transaction block as a trigger to postpone publishing a quote update until the end of the transaction block. In the prior example of a single aggressive order executing against multiple resting orders, a top of book feed would be able to publish a single trade message and quote update resulting from multiple `Order Executed` messages once it finished processing all of the messages within the transaction block.

Transaction Begin				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBC	`Transaction Begin` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Total Length = 6 bytes				

2.17 Transaction End Message Fields

The `Transaction End` message indicates that a transaction indicated by a previous `Transaction Begin` message has completed. `Transaction End` messages do not alter the book and can be ignored if messages are being used solely to build a book.

Transaction End				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBD	`Transaction End` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Total Length = 6 bytes				

2.18 Trade Break Message Fields

The `Trade Break` message is sent whenever an execution on CFE is broken. Trade breaks are rare and only affect applications that rely upon CFE execution-based data. A `Trade Break` message

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followed immediately be a new `Trade` message with the same *Execution Id* indicates that a trade correction has occurred. Applications that simply build a CFE book can ignore `Trade Break` messages.

Trade Break				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x2C	`Trade Break` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Execution Id	6	8	Binary	CFE execution identifier of the execution that was broken. *Execution Id* refers to previously sent `Order Executed` or `Trade` message.
Total Length = 14 bytes				

2.19 Settlement Message Fields

`Settlement` messages are used to provide information concerning indicative, approved, or corrected daily and final settlement prices for CFE products. An indicative daily settlement price (*Issue* = *I*) is calculated by the system and sent immediately after an instrument closes trading but before the settlement price is approved. An approved settlement price (*Issue* = *S*) is sent once the CFE Trade Desk approves a settlement price for an instrument. If there is an error in the approved settlement price, then it may be re-issued (*Issue* = *R*). For symbols that settle each day using VWAP, the system will begin disseminating an intermediate indicative price update *(Issue = i)* at 2:59:35 p.m. CT (following the first interval of the VWAP calculation) that will be sent every five seconds, leading up to the receipt of the indicative daily settlement price *(Issue = I)*.

Settlement				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xB9	`Settlement` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Trade Date	12	4	Binary Date	Trade Date for the settlement.
Settlement Price	16	8	Binary Price	Settlement Price
Issue	24	1	Alphanumeric	`i` = Periodic Indicative Settlement `I` = Indicative Settlement `S` = Initial Settlement `R` = Re-issued Settlement
Total Length = 25 bytes				

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2.20 Open Interest Message Fields

The `Open Interest` message is sent to communicate a symbol's open interest, usually for the prior trading date. This message will be sent when open interest information is made available to CFE and may be sent multiple times if there are changes to the open interest for a symbol. The open interest is also populated in the `End of Day Summary` message.

Open Interest				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xD3	`Open Interest` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Trade Date	12	4	Binary Date	Trade Date for the *Open Interest* data.
Open Interest	16	4	Binary	Open Interest for this symbol.
Total Length = 20 bytes				

2.21 End of Day Summary Message Fields

The `End of Day Summary` message is sent immediately after trading ends for a symbol. No more Market Update messages will follow an `End of Day Summary` message for a particular symbol. A value of zero in the *Total Volume* field means that no volume traded on that symbol for the day. The *Total Volume* field reflects all contracts traded during the day. Block, ECRP, and Derived trades are included in the *Total Volume* field, but they are also reported separately to provide more detail.

The *Summary Flags* field provides additional information on how to interpret the *High Price* and *Low Price* fields, especially in instruments that had no volume for the day and/or where '0' is a valid price (e.g. Trade At Settlement products). There are flags that indicate whether or not the *High Price* and *Low Price* fields are valid. If they are not valid, then there was no High (and/or Low) Price for the day. There are also flags that indicate whether the *High Price* was set by the highest bid and the *Low Price* was set by the lowest offer rather than a trade.

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All `End of Day Summary` message values will span the full trading day, including all extended hours trading and all trading segments.

End of Day Summary				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0xBA	`End of Day Summary` message
Time Offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Trade Date	12	4	Binary Date	Trade Date for the message.
Open Interest	16	4	Binary	Prior Trade Date Open Interest for this symbol.
High Price	20	8	Binary Price	The higher of highest bid price and highest trade price for the day. Block and ECRP trades (*Trade Condition* = B or E) do not update *High Price*.
Low Price	28	8	Binary Price	The lower of lowest offer price and lowest trade price for the day. Block and ECRP trades (*Trade Condition* = B or E) do not update *Low Price*.
Open Price	36	8	Binary Price	The first trade on the day (in any session) will set the *Open Price* for the day (valid only if *Total Volume* > 0). Block and ECRP trades (*Trade Condition* = B or E) do not update *Open Price*.
Close Price	44	8	Binary Price	The last trade on the day (in any session) will set the *Close Price* for the day (valid only if *Total Volume* > 0). Block and ECRP trades (*Trade Condition* = B or E) do not update *Close Price*.
Total Volume	52	4	Binary	Total number of contracts traded for the day, including block and ECRP trades.
Block Volume	56	4	Binary	Total number of block and derived contracts traded for the day.
ECRP Volume	60	4	Binary	Total number of contracts traded for the day.
Summary Flags	64	1	Bit Field	`Bit 0 =` *High Price* Valid – Set if *High Price* is a valid value. `Bit 1 =` *High Price* is bid– Set if *High Price* was set by the highest bid (rather than a trade). `Bit 2 =` *Low Price* Valid – Set if *Low Price* is a valid value. `Bit 3 =` *Low Price* is offer – Set if *Low Price* was set by the lowest offer (rather than a trade).

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				`Bit 4 =` Open/Close Valid – Set if both *Open Price* and *Close Price* fields contain valid values. `Bit 5-7` = Reserved
Total Length = 65 bytes				

2.22 Trading Status Message Fields

The `Trading Status` message is used to indicate the current trading status of a Futures contract. A `Trading Status` message will be sent whenever a security's trading status changes. If a `Trading Status` message has not been received for a symbol, then the *Trading Status* for the symbol should be assumed to be 'S' = Suspended. The following summarizes the *Trading Status* values in the CFE system:

- S = Suspended. A contract is in a suspended state when the associated product is closed and not accepting orders.
- Q = Accepting orders for queuing. Queing state is used during the Pre-Open for all products. It is also used for spread instruments that may not be tradeable due to Threshold Width.
- T = Trading. Used for both Extended and Regular Hours trading.
- H = Halt state. This state is used for Supervisory Halts initiated by the Trade Desk. Orders are not being accepted in this state.

Trading Status				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	Length of this message including this field.
Message Type	1	1	0x31	`Trading Status` message
Time offset	2	4	Binary	Nanosecond offset from last unit timestamp.
Symbol	6	6	Printable ASCII	Six character, base 62 symbol.
Reserved1	12	2	Alpha	Reserved
Trading Status	14	1	Alpha	S = Suspended Q = Queuing T = Trading H = Halted
Reserved2	15	3	Alphanumeric	Reserved
Total Length = 18 bytes				

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2.23 End of Session Message Fields

The `End of Session` message is sent for each unit when the unit shuts down. No more sequenced messages will be delivered for this unit, but heartbeats from the unit may be received.

End of Session				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x2D	`End of Session` message
Timestamp	2	4	Binary	Nanosecond offset from last unit timestamp.
Total Length = 6 bytes				

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3 Gap Request Proxy Messages

The following messages are used for initializing a TCP/IP connection to the Gap Request Proxy (GRP) and to request message retransmissions. Participants only need to implement the following messages if gap requests will be made. The following messages will not be delivered using multicast.

3.1 Login Message Fields

The `Login` message is the first message sent to the GRP by a user's process after the connection to the GRP is established. Failure to login before sending any other message type will result in the connection being dropped by the GRP.

Login				
Field	**Offset**	**Length**	**Value/Type**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x01	`Login` message
SessionSubId	2	4	Alphanumeric	*SessionSubId* supplied by CFE.
Username	6	4	Alphanumeric	*Username* supplied by CFE.
Filler	10	2	Alphanumeric	(space filled)
Password	12	10	Alphanumeric	*Password* supplied by CFE.
Total Length = 22 bytes				

3.2 Login Response Message Fields

The `Login Response` message is sent by the GRP to a user's process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

Login Response				
Field	**Offset**	**Length**	**Value/Type**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x02	`Login Response` message
Status	2	1	Alphanumeric	Accepted or reason for reject.
Total Length = 3 bytes				

Login Response - Status Codes	
'A'	Login Accepted
'N'	Not authorized (Invalid Username/Password)
'B'	Session in use
'S'	Invalid Session

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3.3 Gap Request Message Fields

The `Gap Request` message is used by a user's process to request retransmission of a sequenced message (or messages) by one of CFE's gap servers.

Gap Request				
Field	**Offset**	**Length**	**Value/Type**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x03	`Gap Request` message
Unit	2	1	Binary	*Unit* that the gap is requested for.
Sequence	3	4	Binary	*Sequence* of first message (lowest sequence in range).
Count	7	2	Binary	*Count* of messages requested.
Total Length = 9 bytes				

3.4 Gap Response Message Fields

The `Gap Response` message is sent by the GRP in response to a `Gap Request` message. The *Unit* and *Sequence* fields will match the values supplied in the `Gap Request` message. A `Gap Response` message, with a Status of 'Accepted' or reason for failure, will be sent for each `Gap Request` message received by the GRP.

Gap Response				
Field	**Offset**	**Length**	**Value/Type**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x04	`Gap Response` message
Unit	2	1	Binary	*Unit* the gap was requested for.
Sequence	3	4	Binary	*Sequence* of first message in request.
Count	7	2	Binary	*Count* of messages requested.
Status	9	1	Alphanumeric	Accepted or reason for reject*.
Total Length = 10 bytes				

Gap Response - Status Codes	
'A'	Accepted
'O'	Out of range (ahead of sequence or too far behind)
'D'	Daily gap request allocation exhausted
'M'	Minute gap request allocation exhausted
'S'	Second gap request allocation exhausted
'C'	Count request limit for one gap request exceeded
'I'	Invalid Unit specified in request
'U'	Unit is currently unavailable

* - All non-'A' status codes should be interpreted as a reject.

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4 Spin Messages

4.1 Login

The `Login` message is the first message sent to the Spin Server by a user's process after the connection to the Spin Server is established. Failure to login before sending any other message type will result in the connection being dropped by the Spin Server.

The format of the `Login` message for the Spin Server is identical to that of the GRP described previously in Section 3.1.

4.2 Login Response

The `Login Response` message is sent by the Spin Server to a user's process in response to a `Login` message. The status field is used to reflect an accepted login or the reason the session was not accepted. If login fails, the connection will be dropped after the `Login Response` message is sent.

The format of the `Login Response` message for the Spin Server is identical to that of the GRP described previously in Section 3.2.

4.3 Spin Image Available Message Fields

The `Spin Image Available` message is sent once per second and indicates through what sequence number a spin is available.

Spin Image Available				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x80	`Spin Image Available` Message
Sequence	2	4	Binary	Spin is available which is current through this sequence number.
Total Length = 6 bytes				

4.4 Spin Request Message Fields

The `Spin Request` message is used by a user's process to request transmission of a spin of the unit's order book. Refer to Section 1.6 for more complete details regarding *Sequence* specification as well as buffering requirements.

Spin Request				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x81	`Spin Request` message

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Sequence	2	4	Binary	Sequence number from a `Spin Image Available` message received by the participant.
Total Length = 6 bytes				

4.5 Spin Response Message Fields

The `Spin Response` message is sent in response to a user's `Spin Request` message indicating whether a spin will be sent.

Spin Response				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x82	`Spin Response` message
Sequence	2	4	Binary	Sequence number from a `Spin Image Available` message received by the participant.
Order Count	6	4	Binary	Number of `Add Order` messages which will be contained in this spin.
Status	10	1	Alphanumeric	Accepted or reason for reject*.
Total Length = 11 bytes				

Spin Response - Status Codes	
'A'	Accepted
'O'	Out of Range (*Sequence* requested is greater than *Sequence* available by the next spin)
'S'	Spin already in progress (only one spin can be running at a time)

* - All non-'A' status codes should be interpreted as a reject.

4.6 Spin Finished Message Fields

The `Spin Finished` message is sent to indicate that all messages for the spin requested have been sent. A `Spin Finished` message is only sent if a `Spin Request` message was not rejected. Upon receipt of a `Spin Finished` message, any buffered multicast messages should be applied to the participant's copy of the book to make it current.

Spin Finished				
Field Name	**Offset**	**Length**	**Type/(Value)**	**Description**
Length	0	1	Binary	*Length* of this message including this field.
Message Type	1	1	0x83	`Spin Finished` message
Sequence	2	4	Binary	Sequence number from the `Spin Request` message.
Total Length = 6 bytes				

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4.7 Spin Server Usage Example

The following diagram (see next page) shows the exchange of messages over time between a participant and CFE's Multicast PITCH feed and Spin Server. Note that while the example alone may seem to imply `Add Order` messages only would be sent on a spin, this is not the case. `Trading Status` message may be sent at the beginning of the spin.

At time 1, the participant has no state of the book and desires to become current. The participant caches the received Multicast PITCH messages (sequences 310172 and 310173) for later use. Since the participant has no book, they cannot yet be applied.

At time 5, the participant has successfully logged into the Spin Server and has cached another message, sequence 310174.

At time 7, the participant receives a `Spin Image Available` message which indicates that the spin server is capable of giving them a spin of all open orders as of sequence 310169. The participant does not have all messages cached after 310169 (they are missing 310170 and 310171), so this spin is not useful to the participant.

At time 10, the participant receives a `Spin Image Available` message which is useful since it would be a spin of all orders up to and including sequence 310175 and the participant has all messages after 310175 cached.

At time 11, the participant sends a `Spin Request` for all messages up to and including 310175 and continues to cache Multicast PITCH messages received.

At time 14, the spin server acknowledges the spin request and indicates that three open orders will be sent.

At time 24, the spin server indicates that it has finished sending all open orders. The participant must then apply the cached messages from sequence number 310176 through current.

Notes:

- Spin Servers are available for each unit. Participants may need to employ multiple Spin Servers depending upon their architecture.

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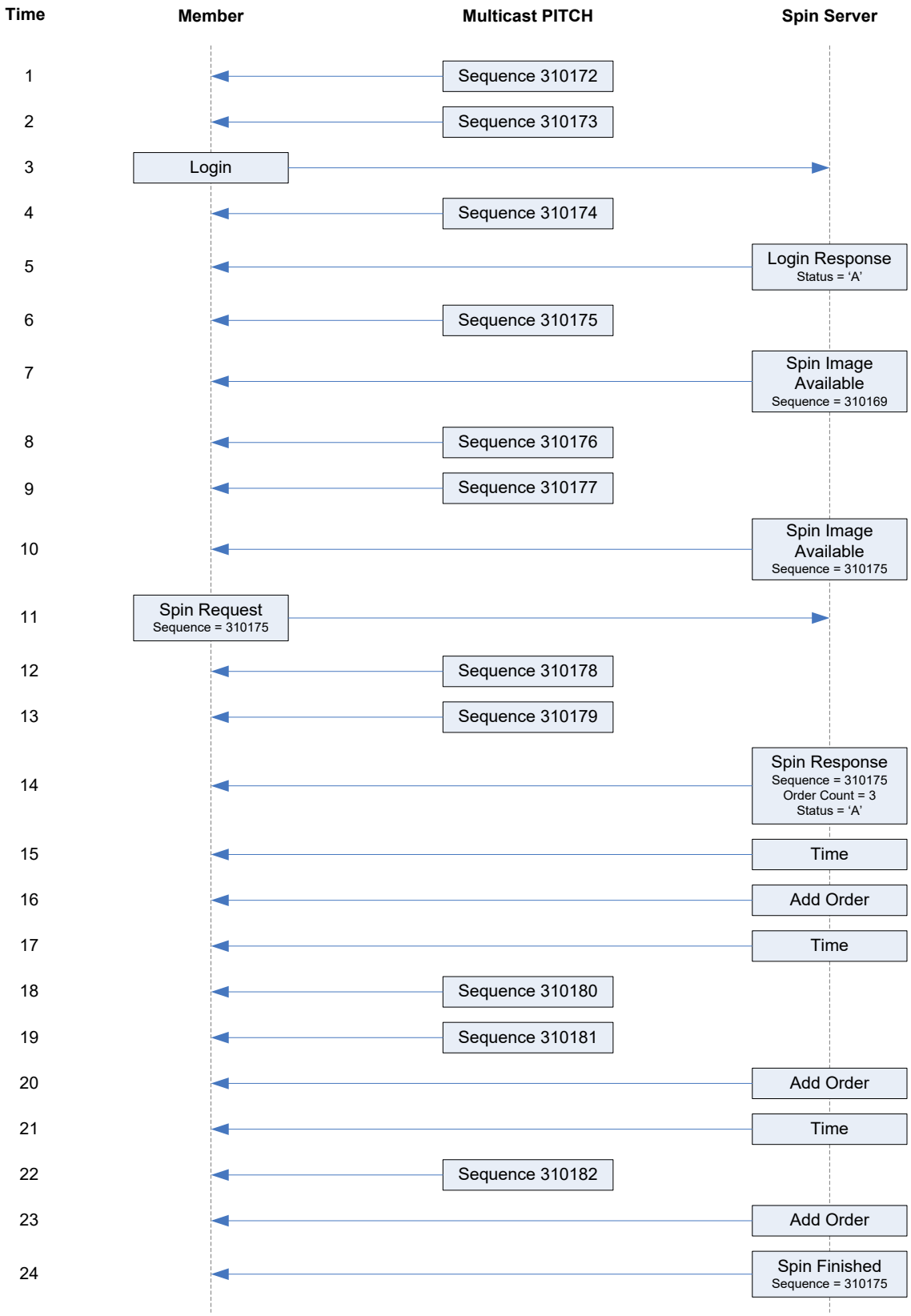

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5 Message Types

5.1 Gap Request Proxy Messages

0x01	Login
0x02	Login Response
0x03	Gap Request
0x04	Gap Response

5.2 Spin Server Messages

0x01	Login
0x02	Login Response
0x80	Spin Image Available
0x81	Spin Request
0x82	Spin Response
0x83	Spin Finished

5.3 PITCH Messages

0x20	Time
0x21	Add Order - Long
0x22	Add Order – Short
0x23	Order Executed
0x25	Reduce Size – Long
0x26	Reduce Size – Short
0x27	Modify Order – Long
0x28	Modify Order – Short
0x29	Delete Order
0x2A	Trade – Long
0x2B	Trade – Short
0x2C	Trade Break
0x2D	End of Session
0x31	Trading Status
0x97	Unit Clear
0xB1	Time Reference
0xB9	Settlement
0xBA	End of Day Summary
0xBB	Futures Instrument Definition
0xBC	Transaction Begin
0xBD	Transaction End
0xBE	Price Limits
0xD3	Open Interest

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0xFA	Futures Variance Symbol Mapping **(effective 09/23/24)**

6 Example Messages

Each of the following message types must be wrapped by a sequenced or unsequenced unit header as described in Section 2.4. Note that in the following examples, each byte is represented by two hexadecimal digits.

6.1 Login Message Example

```
Length       16                              22 bytes
Type         01                              Login
SessionSubId 30 30 30 31                     "0001"
Username     46 49 52 4D                     "FIRM"
Filler       20 20                           "  "
Password     41 42 43 44 30 30 20 20 20 20   "ABCD00    "
```

6.2 Login Response Message Example

```
Length     03                                3 bytes
Type       02                                Login Response
Status     41                                Login accepted
```

6.3 Gap Request Message Example

```
Length     09                                9 bytes
Type       03                                Gap Request
Unit       01                                Unit 1
Sequence   3B 10 00 00                       First message: 4155
Count      32 00                             50 messages
```

6.4 Gap Response Message Example

```
Length     08                                8 bytes
Type       04                                Gap Response
Unit       01                                Unit 1
Sequence   3B 10 00 00                       First message: 4155
Status     41                                Accepted
```

6.5 Spin Image Available Message Example

```
Length     06                                6 bytes
Type       80                                Spin Image Available
Sequence   3B 10 00 00                       Sequence: 4155
```

6.6 Spin Request Message Example

```
Length     06                                6 bytes
```

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Type	81	Spin Request
Sequence	3B 10 00 00	Sequence: 4155

6.7 Spin Response Message Example

Length	0B	11 bytes
Type	82	Spin Request
Sequence	3B 10 00 00	Sequence: 4155
Order Count	42 00 00 00	66 orders
Status	41	Accepted

6.8 Spin Finished Message Example

Length	06	6 bytes
Type	83	Spin Finished
Sequence	3B 10 00 00	Sequence: 4155

6.9 Time Message Example

Length	0A	10 bytes
Type	20	Time
Time	98 85 00 00	34,200 seconds = 09:30 AM Eastern
Epoch Time	F8 27 94 5A	1519659000 = February 26, 2018 9:30:00 AM Central

6.10 Unit Clear Message Example

Length	06	6 bytes
Type	97	Unit Clear
Time offset	18 D2 06 00	447,000 ns since last Time Message

6.11 Time Reference Message Example

Length	12	18 bytes
Type	B1	Time Reference
Midnight Reference	E0 50 92 5A	2018-02-25 00:00:00 Central (1519538400 seconds since the Epoch)
Time	00 E1 00 00	16:00:00
Time Offset	00 00 00 00	Exactly 16:00:00
Trade Date	02 ED 33 01	20180226 February 26, 2018

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6.12 Add Order – Long Message Example

Length	21	33 bytes
Type	21	Add Order - Long
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order ID	96 95 94 93 92 91 00 00	
Side Indicator	42	Buy
Quantity	20 4E 00 00	20,000 contracts
Symbol	33 34 35 33 32 31	345321
Price	00 00 32 00 00 00 00 00	$327.68

6.13 Add Order – Short Message Example

Length	19	25 bytes
Type	22	Add Order - Short
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order ID	98 97 96 D3 22 5A 0E 0E	
Side Indicator	42	Buy
Quantity	20 4E	20,000 contracts
Symbol	33 34 35 33 32 31	345321
Price	FF 7F	$327.67

6.14 Order Executed Message Example

Length	1B	27 bytes
Type	23	Order Executed
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	96 95 94 93 92 91 00 00	
Executed Quantity	2C 01 00 00	300 contracts
Execution ID	56 55 54 53 52 51 00 00	
Trade Condition	53	S – Spread Trade

6.15 Reduce Size – Long Message Example

Length	12	18 bytes
Type	25	Reduce Size - Long
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Canceled Quantity	00 00 01 00	65,536 contracts

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6.16 Reduce Size – Short Message Example

Length	10	16 bytes
Type	26	Reduce Size - Short
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Canceled Quantity	64 00	100 contracts

6.17 Modify Order – Long Message Example

Length	1A	26 bytes
Type	27	Modify Order – Long
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Quantity	FF FF 00 00	65,535 contracts
Price	2C 33 32 00 00 00 00 00	$328.99

6.18 Modify Order – Short Message Example

Length	12	18 bytes
Type	28	Modify Order – Short
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Quantity	FF FF	65,535 contracts
Price	0A 28	$102.50

6.19 Delete Order Message Example

Length	0E	14 bytes
Type	29	Delete Order
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	

6.20 Trade – Long Message Example

Length	2A	42 bytes
Type	2A	Trade - Long
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Side	42	Buy
Quantity	F8 24 01 00	75,000 contracts

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Symbol	33 34 35 33 32 31	345321
Price	E8 A3 0F 00 00 00 00 00	$102.50
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Trade Condition	20	(space) Normal

6.21 Trade – Short Message Example

Length	22	34 bytes
Type	2B	Trade - Long
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	05 40 5B 77 8F 56 1D 0B	
Side	42	Buy
Quantity	64 00	100 contracts
Symbol	33 34 35 33 32 31	345321
Price	0A 28	$102.50
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC
Trade Condition	53	S – Spread Trade

6.22 Trade Break Message Example

Length	0E	14 bytes
Type	2C	Trade Break
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Execution Id	34 2B 46 E0 BB 00 00 00	0AAP09VEC

6.23 End of Session Message Example

Length	06	6 bytes
Type	2D	End of Session
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message

6.24 Transaction Begin Message Example

Length	06	6 bytes
Type	BC	Transaction Begin
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message

6.25 Transaction End Message Example

Length	06	6 bytes
Type	BD	Transaction End
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message

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6.26 Futures Instrument Definition Message Example (*Contract Date Different from Expiration Date*)

Length	2D	45 bytes
Type	BB	Futures Instrument Definition Message
Time Offset	E8 61 BF 23	599,745,000 ns since Last Time Message
Symbol	30 30 30 33 6C 4E	0003lN
Unit Timestamp	75 2D 40 5E	2020-02-09 10:04:05 Central Time (1581264245 seconds since Epoch)
Report Symbol	41 4D 42 33 20 20	AMB3
Futures Flags	00	0
Expiration Date	D4 3D 34 01	20200916 – September 16, 2020
Contract Size	19 00	25
Listing State	41	A - Active
Price Increment	C4 09 00 00 00 00 00 00	$0.25
Leg Count	00	0 legs
Leg Offset	00	0 – No Legs
Reserved	00	0 – Reserved*
Contract Date	A9 3C 34 01	20200617 – June 17, 2020

***Effective 09/23/24**

6.27 Futures Instrument Definition Message Example (*Contract Date Same as Expiration Date*)

Length	2D	45 bytes
Type	BB	Futures Instrument Definition Message
Time Offset	80 A3 14 27	655,664,000 ns since Last Time Message
Symbol	30 30 30 33 69 34	0003i4
Unit Timestamp	75 2D 40 5E	2020-02-09 10:04:05 Central Time (1581264245 seconds since Epoch)
Report Symbol	56 58 20 20 20 20	VX
Futures Flags	00	0
Expiration Date	A9 3C 34 01	20200617 – June 17, 2020
Contract Size	E8 03	1000

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Listing State	41	A - Active
Price Increment	F4 01 00 00 00 00 00 00	$0.05
Leg Count	00	0 legs
Leg Offset	00	0 – No Legs
Reserved	00	0 – Reserved*
Contract Date	A9 3C 34 01	20200617 – June 17, 2020

*Effective 09/23/24

6.28 Futures Instrument Definition w/ 2 Legs Message Example (*Contract Date Populated with Zero value*)

Length	41	65 bytes
Type	BB	Futures Instrument Definition Message
Time Offset	E8 61 BF 23	599,745,000 ns since Last Time Message
Symbol	30 30 30 33 6C 52	00031R
Unit Timestamp	75 2D 40 5E	2020-02-09 10:04:05 Central Time (1581264245 seconds since Epoch)
Report Symbol	41 4D 42 33 20 20	AMB3
Futures Flags	00	0
Expiration Date	A9 3C 34 01	20200617 – June 17, 2020
Contract Size	19 00	25
Listing State	41	A - Active
Price Increment	C4 09 00 00 00 00 00 00	$0.25
Leg Count	02	2 legs
Leg Offset	2D	Legs begin at byte 45
Reserved	00	0 – Reserved*
Contract Date	00 00 00 00	Offset 0
Leg #1 Ratio	FF FF FF FF	-1 (1 Sell)
Leg #1 Symbol	30 30 30 33 67 75	0003gu
Leg #2 Ratio	01 00 00 00	1 (1 Buy)
Leg #2 Symbol	30 30 30 33 6C 4E	00031N

*Effective 09/23/24

6.29 Futures Variance Symbol Mapping Message Example (Effective 09/23/24)

Length	28	40 bytes
Type	FA	Futures Variance Symbol Mapping Message

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Time Offset	E8 61 BF 23	599,745,000 ns since Last Time Message
Unit Timestamp	E5 CE 44 66	2024-05-14 10:04:05 CT
Feed Symbol	30 30 30 33 6C 52	0003lR
Futures Symbol	56 41 20 20 20 20 32 34 30 35 31 37	VA 240517
Accrued Day Variance	E0 3E 3F 56 32 87 00 00	148.650265100000
Num Final Returns	0F 01	271
Num Elapsed Returns	0D 01	269

6.30 Trading Status Message Example

Length	12	18 bytes
Type	31	Trading Status
Time offset	18 D2 06 00	447,000 ns since last Time Message
Symbol	5A 56 5A 5A 54 20 20 20	ZVZZT
Trading Status	54	T = Trading
Reserved	30 20 20	

6.31 Price Limits Message Example

Length	1C	28 bytes
Type	BE	Price Limits
Time Offset	18 D2 06 00	447,000 ns since last Time Message
Symbol	31 32 33 34 35 20	12345
Upper Price Limit	08 E2 01 00 00 00 00 00	$12.34
Lower Price Limit	8C 81 01 00 00 00 00 00	$9.87

6.32 End of Day Summary Message Example

Length	41	65 bytes
Type	BA	End of Day Summary
Time Offset	18 D2 06 00	447,000 ns since last Time Message
Symbol	39 38 37 36 35 34	987654
Open Interest	B1 68 DE 3A	987,654,321 contracts
High Price	DC FB 09 00 00 00 00 00	$65.43
Low Price	08 E2 01 00 00 00 00 00	$12.34
Open Price	E0 49 08 00 00 00 00 00	$54.32
Close Price	F8 A9 08 00 00 00 00 00	$56.78

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Total Volume	15 CD 5B 07	123,456,789 contracts
Block Volume	88 13 00 00	5,000 block contracts
ECRP Volume	E8 03 00 00	1,000 ECRP contracts
Summary Flags	15	High Price Valid 0x01 Low Price Valid 0x04 Has Open/Close 0x10

6.33 Settlement Message Example

Length	19	25 bytes
Type	B9	Settlement
Time Offset	60 84 8E 00	9,340,000 ns since last Time Message
Symbol	36 35 34 33 32 31	654321
Trade Date	03 ED 33 01	20180227 February 27, 2018
Settlement Price	4C F8 06 00 00 00 00 00	$45.67
Issue	53	S - Initial Settlement

6.34 Open Interest Message Example

Length	19	20 bytes
Type	D3	Open Interest
Time Offset	60 84 8E 00	9,340,000 ns since last Time Message
Symbol	36 35 34 33 32 31	654321
Trade Date	A9 3C 34 01	20200617 - June 17, 2020
Open Interest	B1 68 DE 3A	987,654,321 contracts

6.35 Sequenced Unit Header with 2 Messages

Sequenced Unit Header Message Example

Hdr Length	31 00	49 bytes, including header
Hdr Count	02	2 messages to follow
Hdr Unit	01	Unit 1
Hdr Sequence	01 00 00 00	First message has sequence number 1

Message 1: Add Order (Short) Message Example

Length	19	25 bytes
Type	22	Add Order - Short
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message

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Order ID	98 97 96 D3 22 5A 0E 0E	
Side Indicator	42	Buy
Quantity	20 4E	20,000 contracts
Symbol	33 34 35 33 32 31	345321
Price	FF 7F	$327.67

Message 2: Reduce Size (Short) Message Example

Length	10	16 bytes
Type	26	Reduce Size - Short
Time Offset	08 5C 44 25	625,237,000 ns since Last Time Message
Order Id	98 97 96 D3 22 5A 0E 0E	
Canceled Quantity	64 00	100 contracts

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7 Multicast Configuration

7.1 Production Environment Configuration

7.1.1 Limitations/Configurations

The following table defines the configuration for network and gap request limitations. These limitations are session based. CFE reserves the right to adjust the gap request limitations to improve the effectiveness of the gap request infrastructure.

Period/Type	Limit/Setting	Notes
MTU	1500	CFE will send UDP messages up to 1500 bytes. Participants should ensure that their infrastructure is configured accordingly.
WAN-Shaped Throttle	100 Mb/s	The real-time and gap multicast head ends are configured to shape their output to this level to minimize packet loss.
Gap Response Delay	2 ms	The Gap Server will delay resending sequenced messages via multicast for the specified limit in order to satisfy multiple GRP gap requests with one multicast response.
Count	100	Any single gap request may not be for more than this number of dropped messages.
1 Second	320 Requests	This is the maximum number of retransmission requests allowed per second for each session. This is renewed every clock second.
1 Minute	1,500 Requests	This is the maximum number of retransmission requests allowed per minute for each session. This is renewed every clock minute.
Day	100,000 Requests	This is the maximum number of retransmission requests allowed per day for each session.
Within Range	1,000,000 Messages	Users' retransmission requests must be within this many messages of the most recent sequence sent by the real-time feed per session.

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7.1.2 Unit/Product Distribution

The following table describes the CFE symbol distribution across units.

Symbol Range Start	Unit
VX,VXT,VXM,VXMT	1
All Other Products	2

Note - CFE reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

7.1.3 Multicast Routing Parameters

Data Center	Rendezvous Point
Primary Data Center C feed	74.115.128.164
Primary Data Center D feed	74.115.128.165
Secondary Data Center E feed	170.137.16.128

7.1.4 Address/Unit Distribution

The following tables describe the unit distribution across the CFE Multicast PITCH feeds.

Primary Datacenter		WAN-Shaped [FC] 74.115.133.96/29		WAN-Shaped [FD] 74.115.133.104/29	
Unit	IP Port	Real-time MC	Gap Resp. MC	Real-time MC	Gap Resp. MC
1	30001	224.0.131.132	224.0.131.133	233.130.124.132	233.130.124.133
2	30002				

Note - CFE reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

Secondary Datacenter		WAN-Shaped [FE] 170.137.16.80/29	
Unit	IP Port	Real-time MC	Gap Resp. MC
1	31001	233.182.199.0	233.182.199.1
2	31002		

Note - CFE reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

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7.2 US Futures Certification Environment Configuration

7.2.1 Unit/Product Distribution

The following table describes the CFE symbol distribution across units.

Symbol Range Start	Unit
VX,VXT,VXM,VXMT	1
All Other Products	2

Note - CFE reserves the right to add units and/or change symbol distribution with 48 hours of notice and no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

7.2.2 Certification Multicast Routing Parameters

Data Center	Rendezvous Point
Primary Data Center	74.115.128.130

7.2.3 Address/Unit Distribution

The following tables describe the unit distribution across the certification CFE Multicast PITCH feeds.

Primary Datacenter		WAN-Shaped [Cert] 174.136.160.16/28	
Unit	IP Port	Real-time MC	Gap Resp. MC
1	32001	224.0.74.196	224.0.74.197
2	32002		

Note - CFE reserves the right to add multicast addresses with prior notice, but no migration period. Notice will be given that the distribution will change on a certain date. Care should be taken to support mappings in these tables via software configuration.

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8 Connectivity

8.1 Supported Extranet Carriers

The WAN-Shaped feed will be made available to participants through extranet carriers that have completed their multicast implementation and registered with CFE for receipt of market data. CFE has certified a number of carriers defined in the CFE Connectivity Manual with respect to edistribution of CFE multicast data feeds. For more information on receiving Multicast PITCH through any of these providers, reach out to the vendor contact noted in the Extranet Providers section of the CFE Connectivity Manual.

8.2 Bandwidth Recommendation

The WAN-shaped feeds require 100Mbps of bandwidth. CFE will use 90% of these respective bandwidths for Multicast PITCH to allow participants to use the same physical connection for order entry if desired.

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9 Support

Please direct questions or comments regarding this specification to cfetradedesk@cboe.com.

9.1 Canned Test Data

Customers are strongly encouraged to capture their own test data from the Certification environment to ensure that their systems can correctly decode the PITCH feed and all available message types. To assist firms with their own testing a PITCH sample (taken from the Certification environment) is made available at the link below. Cboe does not guarantee that all message types will appear in test data and cautions that canned test data will be updated infrequently and may not fully reflect the current specification.

CFE PITCH Test Data (last updated 04/02/2020)

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Revision History

Document Version	Date	Description
1.0.0	05/01/17	Initial version.
1.0.1	06/28/17	Updated description for *Report Symbol*, *Leg Offset* and *Variance Block Offset* fields in `Futures Instrument Definition` message. Updated descriptions of Variance Futures fields in `Futures Instrument Definition` message. Updated list of messages included in spin responses. Added `Price Limits` message. Corrected inconsistencies of field and messages lengths for `Trade Long` and `Trade Short` messages.
1.0.2	07/11/17	Added Rendevous Points, Source IP addresses, and Multicast IP addresses.
1.0.3	08/08/17	Replaced Binary Long Price with Binary Price. Updated Data Types to include definition of Binary Price.
1.0.4	09/21/17	Renamed `Trade Date` message to `Time Reference`. Added *Epoch Time* field to `Time` message. Fixed discrepancies between Spec and Example Messages.
1.0.5	09/26/17	Fixed discrepancies between available PITCH message types and those listed in section 5.3. Corrected feed label references in section 7.
1.0.6	10/17/17	Added clarification on `Trading Status` messages for Complex Instruments going in and out of Queuing because of Threshold Width Cboe branding/logo changes.
1.0.7	10/18/17	Fixed discrepancy with the Secondary Data Center listed as CH4 instead of 400 S La Salle.
1.0.8	11/24/17	Removed *LegOffset* = 93 value as this value is not possible to be sent. Added missing *Price* fields in example messages Added clarification to handling of `Order Executed at Price/Size` message `Futures Instrument Definition` messages are sent for all live symbols on a spin.
1.0.9	12/08/17	Price limits may apply during any trading hours subject to contract specifications.

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1.0.10	12/29/17	`Trading Status` messages for Complex instruments transitioning in and out of Queuing on account of Threshold Width no longer surpressed. Removed associated commentary from `Trading Status` message section. Added "I=Inactive" as possible *Listing State*. Updated *Realized Variance, Discount Factor, Previous ARMVM,* and *Fed Funds Rate* to Signed Binary data type. Corrected the offsets for *Leg Ratio* and *Leg Symbol*. Added Canned Test Data section.
1.0.11	01/17/18	Block and ECRP trades (*Trade Condition* = B or E) do not update *High Price* or *Low Price*. Corrected length of `Transaction End` from 48 to 6 bytes.
1.0.12	01/25/18	Updated field description of *Symbol* to remove "padding" language. The *Symbol* field is always six characters, base 62. `Price Limits` are included in a spin. Added Feed Hours and System Restart section. Clarified cases where the `Unit Clear` message would be sent. More specifics added to how `End of Day Summary` values are determined. If no `Trading Status` has been received for a *Symbol*, then the *Trading Status* is "S= Suspended".
1.0.13	02/01/18	Added links to certification and production symbol mapping files.
1.0.14	02/21/18	Fixed remaining discrepancy with the Secondary Data Center listed as CH4 instead of 400 S La Salle. Updated *Trade Condition* field values to demonstrate that some values are only sent for simple instruments. Described how trade corrections are modeled in the feed. Additional clarifications added around daily restart based on customer feedback.
1.0.15	02/27/18	Fixed formatting of the `Settlement` message example.
1.1.0	03/01/18	Removed `Executed at Price/Size` message. This message is not used for CFE. Updated description of *High Price* and *Low Price* in `End of Day Summary` message.
1.1.1	03/22/18	The `End of Day Summary` message will be enhanced and expanded to 65 bytes . • *Total Volume* will be updated to include Block and ECRP volume. • *Block Volume* field will be added. • *ECRP Volume* field will be added. • *Bit Fields* field will be added. `End of Day Summary` example was updated.

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1.1.2	03/23/18	Updated effective date of `End of Day Summary` message change from 1.1.1 to be effective 06/03/18.
1.1.3	05/10/18	Clarified the cases when sequenced `Futures Instrument Definition` messages are sent.
1.1.4	07/16/18	Removed *ModifyBitField1* from `Modify Order - Short` example in section 6.18; not applicable to futures.
1.1.5	11/08/18	Updated Overview and and Multicast Routing Parameter sections with new Multicast Feed IDs (A to FC, B to FD, E to FE). Added note clarifying simple leg FID messages come before complex leg FID messages sent in Spin responses. Updated multicast feed ids in section 1.3 to follow standard naming convention.
1.1.6	04/08/19	Updated Multicast Routing Parameter Data Center feed names to align with references in unit distribution table.
1.1.7	01/16/20	Clarified definition of `Time` message. `Time` messages are only sent when there is a new PITCH message in a given second.
1.1.8	02/14/20	Added *Contract Date* field to `Futures Instrument Definition` message. Effective trade date 04/27/20.
1.1.9	02/24/20	*Variance Offset* and *Leg Offset* values will be set at 45 as a result of the change to add *Contract Date*. Refer to `Futures Instrument Definition` message for more details.
1.1.10	04/07/20	New Canned Data sample provided dated 04/02/20. Corrected feed symbols from 'FA and FB' to 'FC and FD' in Feed Connectivity Requirements section.
1.1.11	07/27/20	Updated symbols listed in Unit/Product Distribution tables to include VXT, VXM, and VXMT.
1.1.12	01/21/21	Added new value of "`I = Indicative Settlement`" to the *Issue* field on the `Settlement` message (effective 03/22/21).
1.2.0	08/17/21	Added new value of "`i = Periodic Indicative Settlement`" to the *Issue* field on the `Settlement` message (effective 10/17/21). Added new `Open Interest` message (effective 10/17/21).
1.2.1	10/26/21	Added note indicating CFE will eliminate the 15 minute trading pause for VX, VXM, and AMERIBOR futures products (effective 12/06/21).
1.2.2	11/01/21	Corrected hyperlinks to Production symbol files and Certification symbol files.
1.2.3	01/03/22	Updated `Delete Order` message description.

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1.2.4	10/09/23	Added new value of 'D=Derived' to *Trade Condition* field in the Trade message and updated section 2.19 to indicate derived trades will be included in the *Total Volume* field (effective 12/11/23). Removed values 'B=Block trade' and 'E=ECRP trade' from *Trade Condition* field in the `Order Executed` message. Removed 'E=ECRP trade' value from *Trade Condition* field in the `Trade (short)` message.
1.2.5	11/28/23	Updated hyperlinks to symbol mappings in production and certification environments.
1.2.6	06/28/24	Updated section 1.7 to include `Future Variance Symbol Mapping`, added message type `Future Variance Symbol Mapping`, added new message structure for `Futures Instrument Definition` (replacing the current message structure), updated `Variance Block` to `Reserved` in example messages in section 6.26, 6.27 and 6.28, and added `Future Variance Symbol Mapping` example message **(effective 09/23/24)**.
1.2.7	07/15/24	Noted the `Futures Instrument Definition` message contains general futures contract information and is sent for all futures products, including Variance Futures **(effective 09/23/24)**.
1.2.8	08/09/24	The `Futures Variance Symbol Mapping` message may be sent as a sequenced message intraday if a symbol is modified intraday. Clarified the reason for setting the *Futures Flags* field of the `Futures Instrument Definition` message to zero.

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