CBOE FIX 4.2 Protocol Support

Version 9.0.2

Volume 7: CBOE Market Data FIX Engine (CFIX)

Provides examples of typical FIX 4.2 Market Data flows for Hybrid

CBOE PROPRIETARY INFORMATION

15 July 2011

Document #[FIX-07]

Front Matter

Disclaimer

Change Notices

The following change notices are provided to assist users of the CBOE FIX Services in determining the impact of changes to their applications.

Date	Version	Description of Change
15 Jul 2011	9.0.2	No changes
29 Apr 2011	9.0.1	No changes
14 Jan 2011	9.0	No changes
08 Jan 2010	7.0	No changes
14 Aug 2009	6.1	No changes
22 May 2009	6.0	No changes
25 Nov 2008	5.3	No changes
03 Oct 2008	5.2	No changes
18 Jul 2008	5.1	No changes
29 Feb 2008	5.0	No changes
18 Jan 2008	4.2.4	No changes
02 Nov 2007	4.2.3	No changes
01 June 2007	4.2.2	No changes
23 Feb 2007	4.2.1	No changes
15 Dec 2006	4.2	No changes.
20 Sept 2006	4.1	No changes
25 May 2006	4.0	No changes
06 Jan 2006	3.2b	No changes
12 Aug 2005	3.2	No changes

29 July 2005	3.2	No changes
08 Apr 2005	3.1a	Documentation errata
30 Nov 2004	3.1	No changes
04 Oct 2004	3.0b	Version Changes
20 July 2004	3.0a	Documentation Update
18 June 2004	3.0	API Enhancements
28 Apr 2004	2.52	Version Update
06 Feb 2004	2.63	Version Update
01 May 2003	2.5	New document

Support and Questions Regarding This Document

Questions regarding this document can be directed to The Chicago Board Options Exchange at 312.786.7300 or via e-mail: api@cboe.com.

The latest version of this document can be found at the CBOE web site http://systems.cboe.com.

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About This Document

Purpose

This document is intended to provide information and guidance on how to connect to the CBOE FIX 4.2 Hybrid Market Data service.

Intended Audience

Management requiring a deeper technical understanding of CBOE's support for FIX 4.2 in making decisions on how best to participate in CBOE markets and developers of applications that will use the FIX 4.2 service to communicate with CBOE markets.

Related Documents

Document Number	Document Description
FIX-RELNOTES	CBOE FIX Release Notes
FIX-ROADMAP	CBOE FIX Document Road Map
FIX-01	CBOE FIX Volume 1: Overview & Concepts
FIX-03A	CBOE FIX Volume 3A: FIX 4.2 Programmer's Guide: FIX Session Layer
FIX-03B	CBOE FIX Volume 3B: FIX 4.2 Programmer' Guide: Application Layer: Fundamentals and Field (Tag) Dictionary
FIX-03C	CBOE FIX Volume 3C: FIX 4.2 Programmer' Guide: Order Routing
FIX-03D	CBOE FIX Volume 3D: FIX 4.2 Programmer' Guide: Market making
FIX-06	CBOE FIX Volume 6: FIX 4.2 Certification Guide
NET-01	CBOE Network Connectivity Guide
	Financial Information Exchange Protocol (FIX) Version 4.2 (http://www.fixprotocol.org)
	Financial Information Exchange Protocol (FIX) Version 4.3 (http://www.fixprotocol.org)

Usage and Conventions

The FIX 4.2 Specification contains definitions for all standard FIX messages and tags. With the exception of the Tag Dictionary, the standard definitions for FIX messages have been omitted from this document. This was done for brevity and to not obscure the text describing CBOE's particular implementation of a message or a tag. In the Tag Dictionary, the standard definition is provided next to CBOE's usage.

Fields that follow the FIX standard and are not subject to any CBOE specific constraints are denoted with the phrase "**Per standard.**"

Fragments of FIX messages are shown in the courier new font. The ^ is used to represent the FIX field separator (ASCII 01).

```
55=IBM^48=1237^167=OPT^200=200010^201=0^202=105.00^207=W^
```

FIX Tags are shown are presented by name in italics followed by the tag number in brackets [].

SecurityType[167]

Symbol[55]

Firms should put the repeating group tags in exactly the same order as they appear in the FIX Specification. This will become a requirement for FIX 4.3.

Overview

To enhance the throughput of FIX Market Data, CBOE is splitting up the CBOE Market Data FIX Engine (called CFIX) from the existing Orders/Quotes/SecurityDefinition FIX Engine. This information applies to the test and production environments. This document currently only applies to Hybrid market data.

New FIX Market Data Subscription Model

CBOE recommends using the tag LastMsgSeqNumProcessed[369] when logging on to the CFIX engines. LastMsgSeqNumProcessed is located in the FIX 4.2 message header and as such can be included on any FIX message without causing rejects (including application messages other than Logon request). This value signifies the last message that the firm received from CBOE on that day. If a user sets tag 369, CFIX will take that number and then add one (1) to get the next sequence number that it sends to the firm. If the firm is logging on for the first time that day, the firm should set 369 = 0. 369 is useful for detecting a backlog between the CBOE and the firm. This tag is a CFIX only functionality. If the firm uses this tag when logging on to the trading engines, CBOE will ignore it and not reset any sequence numbers.

The new model of subscribing for FIX Market Data is as follows:

1. Firm connects to the new CFIX Engine using the Class Display (CD) role UserID+Password (CD001, CD002, etc.). Note: CBOE previously allowed CD roles that planned to use CFIX market data to connect to the trading engines and then get redirected to a CFIX engine. CBOE now requires that CFIX market data CD roles logon directly to CFIX engines.
2. Firm subscribes for Market Data
3. CBOE Engine rejects the subscription with a new MarketDataRejectReason (Tag 281= “D”), and the new TargetCompID in the OnBehalfOfCompID field (Tag 115).
4. Firm looks up the TargetCompID in the CSV file provided by CBOE, and finds the new IPAddress+Port for the MarketData-only connection.
5. Firm determines if it already has a connection to that IPAddress+Port
6. If not, Firm establishes a new FIX connection to that IPAddress+Port.
7. Firm logs in using the new CFIX TargetCompID from #4, and the **CFIX** UserID+Password given to the firm by CBOE. This CFIX UserID + Password will be the SenderSubId and must be of the format CDxxx (for example CD01, CD123, etc.).
8. Firm resubmits the subscription on the new CFIX connection from #5
9. Firm receives market data on the new CFIX connection

CBOE will be load-balancing classes between different CFIX Market Data Engines – meaning that the Firm may be receiving market data for two different classes from two different CFIX engines.

The Firm cannot assume which CFIX engine is handling which classes or products – the only assumption the Firm can make is that its subscription requests will be rejected with a reference to an alternate CFIX engine.

Additionally, the new model of subscribing for FIX Market Data also allows CBOE to automatically unsubscribe Firm's subscriptions for one of the following reasons:

1. If the firm subscribes by a product, and subsequently subscribes by that product's class, the product subscription will be automatically unsubscribed, and a MarketDataReject with Reason = 'F' will be sent for the MDReqID of the original Product subscription.
2. If during the day the CFIX engine handling Firm's subscriptions starts experiencing problems with a specific subscription request, that subscription will be automatically unsubscribed, and a MarketDataReject with Reason = 'G' will be sent for the MDReqID of the original subscription.
3. If during the day the CFIX engine needs to terminate, it will automatically unsubscribe all of Firm's subscriptions, and a MarketDataReject with Reason = 'D' will be sent for the MDReqID of the original subscription, and the OnBehalfOfCompID (Tag 115) will contain the new TargetCompID of the new CFIX engine that can take over the subscriptions. Firm will need to handle step #4 from the above list.

Class Display User Architecture

CBOE recommends Firm's register for an individual class with one and only one CD user and distribute the data to as many users as needed on the Firm side. Firms can use as many CD users (or processes) as needed to load balance on their side and maintain peak performance as long as subscriptions for individual classes are not duplicated.

New MDReqRejReason (Tag 281) Codes

CBOE is adding four new enumerations to the MDReqRejReason (Tag 281) field this is provided in the **Market Data Request Reject** message.

“D” - Reroute to alternate Market Data Provider

Used to "reroute" a specific MarketData request to another engine (specified in OnBehalfOfCompID, Tag#115) that can handle it.

It can be in direct response to a MarketDataRequest -- no subscription takes place

Can be sent in a subsequent "loss-of-data-feed" scenario -- with the engine automatically unsubscribing the affected MDReqID.

Example: 262=MOT_CM_C^281=D^58=Reroute to alternate Market Data Provider^10=000^

“E” -Already Subscribed

Prevents duplicate subscriptions for the same product

Prevents duplicate subscriptions for a product already subscribed for as a part of a larger subscription (option class, etc) containing that product.

Example: 262=MOT_CM_C^281=E^58=Already Subscribed By This Class^10=000^

Example: 262=MOT_CM_P^281=E^58=Already Subscribed By This Product's Class^10=000^

Example: 262=MOT_CM_P^281=E^58=Already Subscribed By This Product^10=000^

“F” -Subscription Replaced

Removes duplicate subscriptions for a product upon a larger subscription (option class, etc) containing that product

Example: 262=MOT_CM_P^281=F^58=Unsubscribed By Product Because Now Subscribed By Class^10=000^

“G” -Forced Unsubscribe

Allows the engine to remove subscriptions, for throughput, bandwidth, or other reasons, but not for “re-routing” ("Reroute to alternate Market Data Provider") reasons. It is up to the Firm to determine whether to re-subscribe again.

Example: 262=MOT_CM_C^281=G^58=Unsubscribed By System^10=000^

Common CFIX Market Data Request Reject (MsgType='Y') Messages

262=MOT_CM_C^281=0^Can't build a product or class from supplied information^10=000^

Reasons: *Could not extract enough information from the Market Data Request to subscribe*, or

System experiencing problems, and can't process message right now

262=MOT_CM_C^281=2^getBookDepth rejected. Call limit exceeded^10=000^

Reason: *Only happens on BookDepth snapshot requests that exceed the call/second limits*

262=MOT_CM_C^281=3^58=Insufficient Permissions^10=000^

Reasons: *User is misconfigured, or System is experiencing problems and can't process request at this moment*

262=MOT_CM_C^281=1^58=Already Subscribed By This MDReqID^10=000^

Reason: *Firm is erroneously reusing MDReqIDs*

Example FIX flow of the new subscription model

Following is an example session with the FIX messages as they will be sent and received by the Firm's engine and two CBOE engines (CBOE_LOOKUP and CF1M01).

1. Firm's engine establishes a connection to CBOE's FIX server at IP=xxx.xxx.xxx.xxx PORT=nnnnn, SenderCompID=FIRM TargetCompID= CBOE_LOOKUP (SOH == ^) [Same DFIX201/DFIX202 Fix Engines Firm connects to currently]
2. Firm logs in to CBOE FIX Engine CBOE_LOOKUP

   8=FIX.4.2^9=0000^35=A^49=FIRM^**56=CBOE_LOOKUP**^34=1^52=20030415-10:10:10^**50=UserID_1:Password_1**^57=PROD^98=0^108=0^10=000^
3. CBOE FIX Engine CBOE_LOOKUP acknowledges the firm logon

   8=FIX.4.2^9=0000^35=A^52=20030415-10:10:10^34=1^**49=CBOE_LOOKUP**^56=FIRM^98=0^108=0^10=000^
4. Firm subscribes for the Current Market of entire class of MOT OPTions for trading session W_MAIN, using MOT_CM_C as the MDReqID

   8=FIX.4.2^9=0000^35=V^49=FIRM^**56=CBOE_LOOKUP**^34=2^52=20030415-10:10:10^**262=MOT_CM_C**^263=1^264=1^265=0^267=2^269=0^269=1^146=1^55=MOT^167=OPT^336=W_MAIN^9315=1^10=000^
5. CBOE FIX Engine CBOE_LOOKUP engine rejects this subscription with MDReqRejReason='D' and OnBehalfOfCompID="CF1M01"

   8=FIX.4.2^9=0000^35=Y^52=20030415-10:10:10^34=2^**49=CBOE_LOOKUP**^56=FIRM^**262=MOT_CM_C^281=D^58=Reroute to alternate Market Data Provider^115=CF1M01**^10=000^
6. Firm looks up "CF1M01" in the provided CSV flat file to find the IPAddress and Port to use (fake ip addresses, but the CSV file format is TargetCompID,IP,Port)

   CF1M01,170.137.230.00X,21536

   CF1M02,170.137.230.00Y,21536

   (**** If connection to CF1M01 has already been established for prior requests, steps 7, 8, and 9 have to be skipped – duplicate connections to CFIX will be rejected)
7. Firm's engine establishes a connection to CBOE's FIX Engine at IP=170.137.230.XXX PORT=21536, SenderCompID=FIRM TargetCompID= CF1M01
8. Firm logs in to CBOE FIX Engine CF1M01 using a CFIX-specific UserID/Password (newly assigned by CBOE, can be reused on all of Firm's CFIX connections concurrently)

   8=FIX.4.2^9=0000^35=A^49=FIRM^**56=CF1M01**^34=1^52=20030415-10:10:10^**50=CFIX_UserID:CFIX_Password**^57=PROD^98=0^108=0^10=000^
9. CBOE FIX Engine CF1M01 acknowledges the firm logon

   8=FIX.4.2^9=0000^35=A^52=20030415-10:10:10^34=1^**49=CF1M01**^56=FIRM^98=0^108=0^10=000^
10. Firm subscribes for the Current Market of entire class of MOT OPTions for trading session ONE_MAIN, using MOT_CM as the MDReqID

8=FIX.4.2^9=0000^35=V^49=FIRM^**56=CF1M01**^34=2^52=20030415-10:10:10^**262=MOT_CM_C**^263=1^264=1^265=0^267=2^269=0^269=1^146=1^55=MOT^167=OPT^336=W_MAIN^9315=1^10=000^

11. CBOE FIX Engine CF1M01 sends market data of MOT OPT using MDReqID=MOT_CM_C

    8=FIX.4.2^9=0000^35=W^52=20030415-10:10:10^34=2^**49=CF1M01**^56=FIRM^**262=MOT_CM_C**^55=MOT^48=97917867^22=8^167=OPT^200=200306^205=21^201=0^202=20^207=W^268=2^269=0^270=0^271=0^273=12:17:45^336=W_MAIN^276=D^346=1^269=1^270=0^271=0^276=D^346=1^6699=0^10=000^

12. IF CBOE FIX Engine CF1M01 sends another reject of MDReqID=MOT_CM_C with MDReqRejReason='D' and OnBehalfOfCompID="CF1M02", that means that for some reason that CFIX engine can no longer provide market data, and has automatically unsubscribed the MDReqID. The firm should attempt to perform steps 6-11 for "CF1M0**2**".

    8=FIX.4.2^9=0000^35=Y^52=20030415-10:10:10^34=2^**49=CF1M01**^56=FIRM^**262=MOT_CM_C**^**281=D**^**58=Reroute to alternate Market Data Provider**^**115=CF1M02**^10=000^