CBOE

®

CBOE FIX Protocol Support

Version 9.0.2

Volume 6: FIX 4.2 Certification and Testing Guide

Guide to testing and certifying a FIX application with the CBOE FIX 4.2 Service

CBOE Proprietary Information

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15 July 2011

Document #[FIX-06]

Production Release

Disclaimer and Preface

Disclaimer

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Preface

CBOE is providing the FIX protocol to support order routing to all CBOE markets. This will include the current open outcry markets, as well as the planned electronic trading system. CBOE has provided a leadership role in expanding the FIX protocol standard for use in accessing exchange based derivatives markets.

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Change Notices

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

Date	Version	Description of Change
29 Apr 2011	9.0.1	No updates
14 Jan 2011	9.0	No updates
08 Jan 2010	7.0	No updates
14 Aug 2009	6.1	No updates
22 May 2009	6.0	No updates
25 Nov 2008	5.3	No updates
03 Oct 2008	5.2	No updates
18 Jul 2008	5.1	No updates
29 Feb 2008	5.0	No updates
18 Jan 2008	4.2.4	No updates
02 Nov 2007	4.2.3	No updates
01 June 2007	4.2.2	No updates
23 Feb 2007	4.2.1	No updates
15 Dec 2006	4.2	No updates
20 Sept 2006	4.1	No updates
25 May 2006	4.0	No updates
06 Jan 2006	3.2b	No updates
12 Aug 2005	3.2	No updates
29 Jul 2005	V3.2	Added a Testing Environment section to describe "Cert"
08 Apr 2005	3.1a	No changes
30 Nov 2004	3.1	No changes
20 July 2004	3.0a	Documentation Update
18 June 2004	3.0	API Enhancements
28 April 2004	2.52	Version Updates
06 February 2004	2.63	Support added for the CBOE Futures Exchange (CFE) and Stock Trading On CBOEdirect (STOC)
08 July 2003	2.51	Documentation Update
23 April 2003	2.5	Hybrid Trading

Date	**Version**	**Description of Change**
22 Apr 2002	2.0	Production Release
01 Feb 2002	2.0	Beta 1 release
28 Dec 2001	2.0	Documentation Release Only
08 Aug 2001	1.0a	Revised for production release
13 March 2001	0.4	New Document

About This Document

Purpose

This document is intended to provide information and guidance on how to connect to the FIX 4.2 service to interface with the CBOE Order Routing System (ORS) and the CBOEdirect Trading System.

Intended Audience

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
FIX-07	CBOE FIX Volume 7: FIX 4.2 CBOE Market Data FIX Engine (CFIX)
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)

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. General Questions about Hybrid can be directed to hybrid@cboe.com. The latest version of this document can be found at the CBOE web site http://systems.cboe.com/webAPI/

Terms used in this document

You should understand the following terms before reading the remainder of this document.

Table 1 Terms Used in this Document

Term	Definition
Connection Test Environment	The CBOE FIX 4.2 Connection Test Environment is a FIX Engine connected to a connection test driver that will exercise the session level of a firm FIX engine to test for compliance with the CBOE FIX engine.
Application Test Environment	The CBOE FIX 4.2 Application Test Environment is a version FIX 4.2 that is configured for testing.
Production Test Environment	The CBOE FIX 4.2 Production Test Environment is a version FIX 4.2 that is connected to the production environment.
Test Plan	A set of test cases that must be passed as part of the certification process.
Session Level Test Plan	Test cases that are used to certify the FIX session level of a firm FIX engine.
Application Level Test Plan	Application level test cases that certify that a firm is generating proper requests (for orders, cancel, cancel/replace) and is properly receiving responses (execution reports, rejects, cancel rejects).
Test Connection Request	Form provided in NET-01 that is used to request a FIX connection to CBOE FIX test environments.

Implementing an application using FIX 4.2

Testing Environment

CBOE has a new environment available for firms to use for FIX development and testing. The new environment is called the "Certification" or "Cert" environment. This environment will be the exact same FIX version as production, which will make it easy for your firm to test production issues if they arise. In addition, if your firm is coding to CBOE's APIs to go live in production, your firm may wish to use this new Cert environment to ensure API version compatibility when going live. This environment has all sessions (W_MAIN, CFE_MAIN, ONE_MAIN, UNDERLYING, etc.), similar to the current test environment.

Testing and Certification

The testing and certification of your application is done in phases. Each testing phase must be performed in sequential order. Each phase is described below. Some software vendors supply an API to their end-user for certain functionality to be performed. The end-user would have to test the software vendor's API using this functionality in the CBOEdirect test environment before proceeding to the production environment (phase 4) despite the fact that the software vendor has already passed the functionality tests in the test environment.

Phase 1. Stand Alone Testing

Modify (create) your FIX interface to comply with the FIX 4.2 interface in production at the CBOE.

Phase 2. Connectivity Testing with CBOE

Verify that your application can talk to the FIX 4.2 Test Server.

 2   FIX 4.2 Phase 2 Test Plan

Phase 3. Application Test

Verify that your application behaves properly with a CAS running at the CBOE via a dial-up connection. All test plans must be repeated exception free.

3a   Security Definition Test Plan
3b   Market Data Test Plan
3c   Quote Test Plan - Hybrid-ONE-CFE
3d   W_MAIN Order Test Plan
3e   W_MAIN-ONE-CFE Order Test Plan
3f   Clearing Firm, Duplicate Message Test Plan
3g   Strategy Quote Test Plan - ONE-CFE
3h   W_MAIN Strategy Order Test Plan
3i   W_MAIN-ONE-CFE Strategy Order Test Plan
3j   Hybrid Quote Testing (Contained within 3c Quote Test Plan)
3k   CBOE Futures Exchange (CFE) Supplemental Tests
      (Contained within document 3e: Order Test Plan)
3L   CBOE Futures Exchange (CFE) Supplemental Tests
      (Contained within document 3c: Quote Test Plan)
3m   Stock Trading On CBOEdirect (STOC) Order Test Plan
3n   Stock Trading On CBOEdirect (STOC) Quote Test Plan

3o   Stock Trading On CBOEdirect (STOC) DPM Administrative Test Plan
3x   Functionality Acceptance Test

Phase 4. Assurance Test

Hybrid Options

Log on using your production CAS to the CBOEdirect production environment after trading hours. No application testing and no test plans are required.

OneChicago (ONE) and CBOE Futures Exchange (CFE)

Test your application with the CAS installed at your site connecting to the CBOEdirect production environment outside of trading hours.

   4 Phase 4 Test Plan

Stock Trading on CBOEdirect (STOC) Products

Test your application with the CAS installed at your site connecting to the CBOEdirect production environment outside of trading hours.

   4 Phase 4 Test Plan

Phase 5. Production Test

Hybrid Options

Test your application in production from the CBOE Trading Floor during trading hours using your production hardware, software, and networking. CBOE Trading Operations department will run this test. No test plans are required. The following fake test classes will be used. These are not real stocks and are used for testing purposes only.

HYR (underlying market data is mapped to DJX production underlying market data - *HYR must only be used between 3:02 and 3:30 p.m.*)
HBB (underlying market data is mapped to EBAY production underlying market data)
HTS (underlying market data is mapped to IBM production underlying market data)
HBR (underlying market data is mapped to MRK production underlying market data)

CBOE Futures Exchange (CFE)

Test your application in the production environment with the CBOE Production Help Desk prior to going live. No test plans are needed.
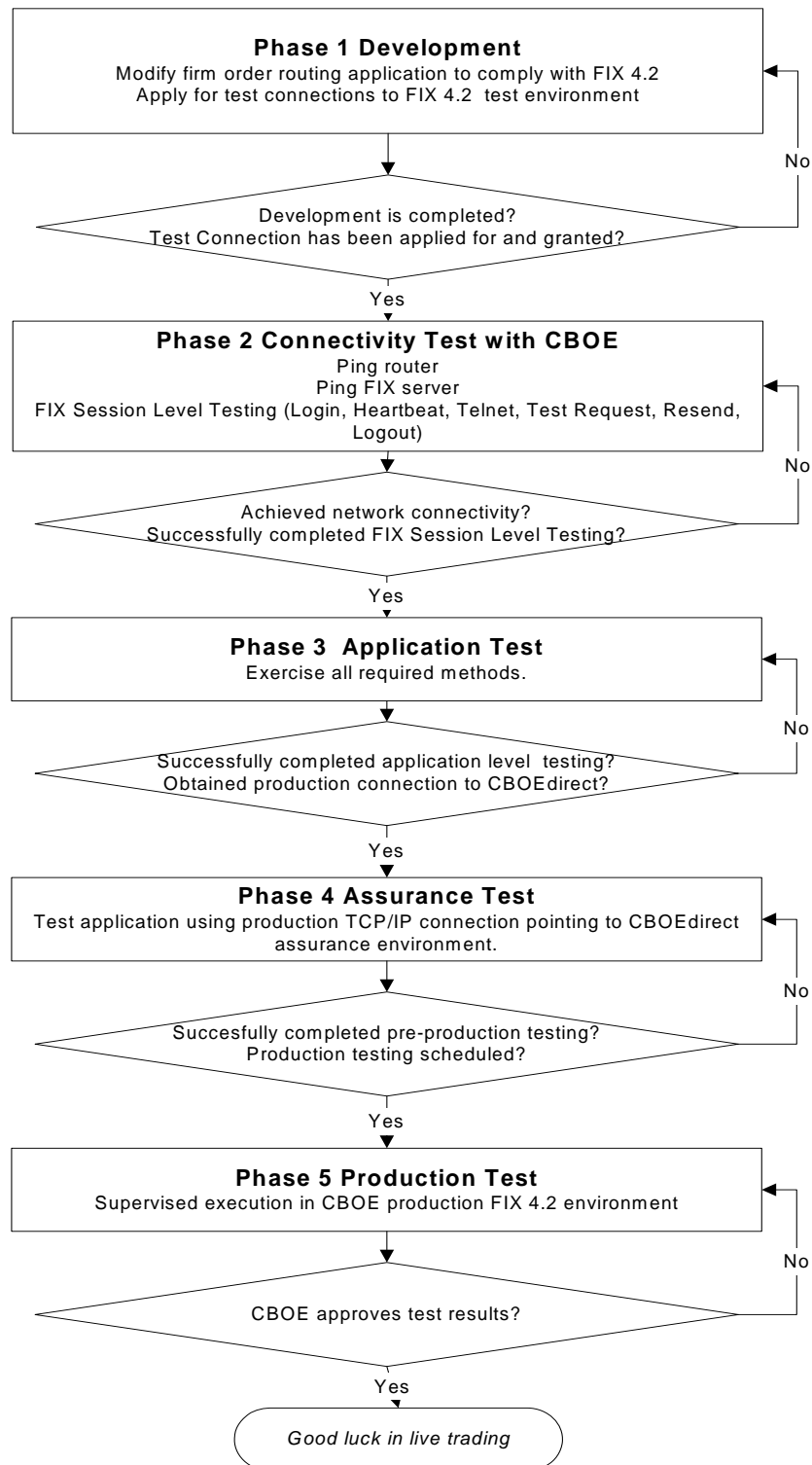   CH
       BT

OneChicago

Test your application in the production environment with the CBOE Production Help Desk prior to going live. No test plans are needed.
       AK
       HOB

Stock Trading on CBOEdirect (STOC) Products

Ask your Systems Client Services (SCS) Representative (formerly API Client Relations and Systems Liaison Group).

Figure 1 FIX 4.2 Certification Process Flowchart

Phase 1 Development
Modify firm order routing application to comply with FIX 4.2
Apply for test connections to FIX 4.2 test environment

No

Development is completed?
Test Connection has been applied for and granted?

Yes

Phase 2 Connectivity Test with CBOE
Ping router
Ping FIX server
FIX Session Level Testing (Login, Heartbeat, Telnet, Test Request, Resend, Logout)

No

Achieved network connectivity?
Successfully completed FIX Session Level Testing?

Yes

Phase 3 Application Test
Exercise all required methods.

No

Successfully completed application level testing?
Obtained production connection to CBOEdirect?

Yes

Phase 4 Assurance Test
Test application using production TCP/IP connection pointing to CBOEdirect assurance environment.

No

Succesfully completed pre-production testing?
Production testing scheduled?

Yes

Phase 5 Production Test
Supervised execution in CBOE production FIX 4.2 environment

No

CBOE approves test results?

Yes

Good luck in live trading

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Certification Testing Phases

Each testing phase is outlined below. If you have any questions regarding the test plan or the FIX 4.2 service in general, direct e-mail to api@cboe.com. Please email hybrid@cboe.com for questions regarding phase 5 testing and general Hybrid business questions.

Phase 1 Development

During this phase you will modify your existing applications to generate FIX 4.2 compliant requests and process FIX 4.2 responses, using the documents listed in the *Inputs* section below as a reference. At some point in the development process you should apply for a test connection to test your application with CBOE, as described in *NET-01: Network Connectivity* and *FIX-04: Connecting to CBOE FIX Services*.

Entry Criteria

Have a FIX 4.2 compliant FIX engine that can also support the custom fields defined for the CBOE FIX 4.2 Service.

If you are planning on using the CBOE proprietary extensions for quote risk monitoring, your FIX engine will need to support the ability to encapsulate XML within the FIX standard header as described in the FIX 4.2 Protocol Specification.

Your firm is (or is associated with) a CBOE member firm.

Inputs

FIX-03A: FIX 4.2 Session Layer

FIX-03B: FIX 4.2 Application Layer: Fundamentals and Field (Tag) Dictionary

FIX-03C: FIX 4.2 Application Layer: Order Routing

FIX-03D: FIX 4.2 Application Layer: Market Making

NET-01: Network Connectivity

FIX-06: Connecting to CBOE FIX Services

Process

1. Create or modify application(s) to support the CBOE FIX 4.2 Service.

2. Apply for a FIX Test Connection following the procedures described in *FIX-04* and *NET-01.*

Outputs

FIX 4.2 application ready to test with FIX 4.2 test environment.

A completed CBOE FIX *Test Connection Request* Form received by CBOE.

Exit Criteria

CBOE reply to FIX Test Connection Request.

Phase 2 Connectivity Test with CBOE

During Phase 2, connectivity testing is performed to verify that the test network connection is operable, the firm has a valid FIX connection, and the firm's FIX session layer is compatible with the CBOE's FIX 4.2 service. This is done using an analog or ISDN dial-up TCP/IP connection. In lieu of using dial-up, firms may use the CBOE Managed WAN to connect to the CBOEdirect test environment.

Entry Criteria

CBOE has provided you with a test connection for your firm.

You determine your application is ready for testing after reviewing *FIX-06, and NET-01*.

Inputs

FIX-06: FIX 4.2 Certification and Testing Guide (this document)

Dial up network hardware (Dial up router, modem, etc.)

NET-01: Network Connectivity

Process

1. Schedule the connectivity test with CBOE personnel by contacting fixconnect@cboe.com.

2. Configure your test network to dial up and connect to the CBOE FIX 4.2 Test Environment.

3. Establish dial up connection to CBOE.

4. Perform the FIX 4.2 Phase 2 Test Plan (available for download at the CBOE API website at http://systems.cboe.com/webapi/):

Outputs

FIX Session Level test results.

Exit Criteria

CBOE verified results of connectivity tests.

CBOE approves advancing to Phase 3 Application Testing.

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Phase 3 Application Test

During this phase of testing firms may test their application against the CBOE FIX 4.2 Test Environment.   This will verify that your FIX engine can generate FIX 4.2 compatible requests and receive FIX 4.2 execution reports..

Entry Criteria

Successful completion of Phase 2 testing.

Inputs

FIX-06: FIX 4.2 Certification and Testing Guide (this document)

Phase 3 Application Level Test Plans

A FIX 4.2 application that can generate the FIX request messages outlined in the Phase 3 Application Level Test Plans.

Process

The Application Test Environment will normally be available 24 hours a day, seven days a week. The environment will be unavailable for a few hours a week in order to perform scheduled maintenance. Please contact your API representative to inquire about scheduled down time. The CBOE will only support this environment during regular business hours. Testing may be performed unattended or attended by CBOE staff. Unattended testing is done at the risk of the testing firm.

Requests for <u>attended</u> testing should be made directly to your primary API contact at CBOE at least 24 hours in advance.

Some software vendors supply an API to the end-user for certain functionality. The end-user would have to test this functionality in the dial-up test environment before proceeding to Phase 4 of testing in the production environment, despite the fact that the software vendor has already passed the functionality tests in Phase 3 of testing in the test environment.

CBOE has the following *Phase 3 Application Level Tests*. The range of application tests required is determined by how the system is to be used. These tests can be found at the CBOE API website at http://systems.cboe.com/webapi/.

Test Plan	Broker-Dealer (Broker)	Market - Maker and DPM	Class Display	(Clearing) Firm	Firm Display
3a, Security Definition Test Plan	Required	Required	Required	Required	Required
3b, Market Data Test Plan	Suggested	**Hybrid DPMs**: Required **Others**: Suggested	Required	N/A	N/A
3c, Quote Test Plan (W_MAIN / ONE)	N/A	Required	N/A	N/A	N/A
3d, W_MAIN Order Test Plan	Required	Suggested	N/A	Required	N/A

CBOE Proprietary Information

Test Plan	Broker-Dealer (Broker)	Market - Maker and DPM	Class Display	(Clearing) Firm	Firm Display
3e, W_MAIN / ONE Order Test Plan	Required	Suggested	N/A	Required	N/A
3f, Clearing Firm, Duplicate Message Test Plan	Required	Required	N/A	Required	Required
3g, Strategy Quote Test Plan (ONE)	N/A	Optional	N/A	N/A	N/A
3h, W_MAIN Strategy Order Test Plan	Optional	Optional	N/A	Optional	N/A
3i, W_MAIN / ONE Strategy Order Test Plan	Optional	Optional	N/A	Optional	N/A
3j Quote Hybrid Testing (Contained within 3c Quote Test Plan)	N/A	Required for Hybrid	N/A	N/A	N/A
3k CBOE Futures Exchange Supplemental Tests (Orders)	Optional	Optional	N/A	Optional	N/A
3L CBOE Futures Exchange Supplemental Tests (Quotes)	N/A	Optional	N/A	N/A	N/A
3m, Stock Trading On CBOEdirect (STOC) Order Test Plan	Required for STOC	Optional for MM, Required for DPMs	N/A	Optional	N/A
3n, Stock Trading On CBOEdirect (STOC) Quote Test Plan	N/A	Required for STOC	N/A	N/A	N/A
3o, Stock Trading On CBOEdirect (STOC) DPM Administrative Test Plan	N/A	DPM only	N/A	N/A	N/A

Tests
- Execute the appropriate Phase 3 Application Test Plans that are available for download at the CBOE API web site at http://systems.cboe.com/webapi/. All test plans must be completed exception free. After all of the appropriate test plans have been completed, the firm must repeat all test plans in a logged functionality acceptance test (phase 3x).

Outputs

Test results and logs from the Phase 3 Application Test.

Exit Criteria

Successful completion of all test plans, as indicated by the test logs.
The tests must be completed in succession.
In the event of a significant exception during functionality acceptance (phase 3x) test, all tests must then be repeated exception free.
CBOE approves advancing to the Phase 4 CBOE Acceptance Test.

Phase 4 Assurance Test

During this phase, you will use the production TCP/IP connection as described in document NET-01. Your application will be tested in the CBOE production environment.

Entry Criteria

You have successfully completed Phase 3 testing.

A production connection established with the CBOEdirect production environment.

Inputs

FIX-06 FIX 4.2 Certification and Testing Guide (this document)

NET-01Connecting to the CBOE Network – Production Connection Request

Process

Acquire a production connection to the CBOE as defined in *NET-01*. Schedule a test time with CBOE for the testing with the CBOE production environment. Independent Software Vendors (ISV), this phase must be repeated at each client site. Clients using vendor supplied APIs must test this software in the test environment before proceeding to test in the production environment. All testing in Phase 4 must be attended. Requests for Phase 4 testing should be made directly to your primary API contact at CBOE at least 24 hours in advance and must include an email to fixconnect@cboe.com. All logs generated from phase 4 testing should be saved for future reference.

Hybrid Options Process

- Log on using your production hardware, software, and networking to the CBOEdirect production environment after trading hours. No application testing and no test plans are required.

OneChicago and CBOE Futures Exchange Process

- Test your application with the CAS installed at your site connecting to the CBOEdirect production environment outside of trading hours. Perform this test using the Phase 4 Test Plan.

Stock Trading On CBOEdirect Process

- Ask your Systems Client Services representative.

Outputs

CBOE test logs for each test plan.

Exit Criteria

Successful completion of all test plans, as indicated by the test logs.

CBOE approves advancing to the Phase 5 Production Test.

Phase 5 Production Test

The final step in testing is in the production environment.   If the user plans to use the CBOE Trader Workstation, then this phase must be performed.

Entry Criteria

You have successfully completed Phase 4 testing.

Inputs

FIX 4.2 application configured for production.

Process

- Configure your production environment for connections to the CBOEdirect production environment.

- For Independent Software Vendors (ISV), this phase must be performed at each client site.

Hybrid Options

- Test your application in production from the CBOE Trading Floor during trading hours using your production hardware, software, and networking. CBOE Trading Operations department will run this test. No test plans are required. The following fake test classes will be used. These are not real stocks and are used for testing purposes only.

  HYR (underlying market data is mapped to DJX production underlying market data - *HYR must only be used between 3:02 and 3:30 p.m.*)
  HBB (underlying market data is mapped to EBAY production underlying market data)
  HTS (underlying market data is mapped to IBM production underlying market data)
  HBR (underlying market data is mapped to MRK production underlying market data)

CBOE Futures Exchange

- Test your application in the production environment with the CBOE Production Help Desk prior to going live. No test plans are needed. The following fake test classes will be used. These are not real stocks and are used for testing purposes only.

  CH
  BT

OneChicago Exchange

- Test your application in the production environment with the CBOE Production Help Desk prior to going live. No test plans are needed. The following fake test classes will be used. These are not real stocks and are used for testing purposes only.

  AK
  HOB

Stock Trading On CBOEdirect Process

- Ask your Systems Client Services representative.

Outputs

- CBOE verifies results of testing as described above.

Exit Criteria

- Successful operation of FIX connection and application in production environment, as indicated in the CBOE production log files.

- CBOE approves firm for live production trading.