CBOE CMTA FIX Protocol Support

Version 1.0

FIX Volume 8: CBOE FIX 4.4 Session Layer

Programmer's guide to the CBOE FIX 4.4 Service session layer

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CBOE Proprietary Information

07 March 2008

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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
07 Mar 2008	V1.0	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 FIX 4.4 service to access the CBOE CTMi application, which includes the ability to query and allocate orders to the CBOE Trade Match System, for the purpose of accounting.

Intended Audience

Management requiring a deeper technical understanding of CBOE's support for FIX 4.4 in making decisions on how best to participate in CBOE markets and developers of applications that will use the FIX 4.4 service to communicate with CBOE systems.

Related Documents

Document Number	Document Description
FIX-01	CBOE FIX Volume 1: Overview & Concepts
FIX-03A	CBOE FIX Volume 3A: FIX 4.4 Programmer's Guide: FIX Session Layer
FIX-03B	CBOE FIX Volume 3B: FIX 4.4 Programmer' Guide: Application Layer: Fundamentals and Field (Tag) Dictionary
	Financial Information Exchange Protocol (FIX) Version 4.4 (http://www.fixprotocol.org)

Usage and Conventions

The FIX 4.4 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]

Introduction to the CBOE FIX 4.4 Session Layer

The CBOE FIX 4.4 Service supports the standard FIX 4.4 session protocol. You should refer to the FIX 4.4 documentation for a detailed description of the FIX Session level protocol.[1]

Firms using a commercially available product or developing their own engines per the FIX 4.4 specification should have minimal problems connecting to CBOE using FIX.

Firm System Failure Considerations

CBOE restricts a single FIX connection to one IP address.

In a minimal configuration, a firm is encouraged to maintain two FIX connections to CBOE. In case of failure of one connection, the firm should design their application to route orders and receive Execution Reports over the alternative line.

Security within the FIX engine is done by validating the IP address of the firm against their connection id (*SenderCompID[49]*). If a mismatch occurs, the session is terminated. CBOE does not provide a mechanism to define backup IP addresses for a connection.

The inability to be able to define multiple IP addresses per connection is why CBOE encourages firms to use network address translation (NAT) on their site. NAT will enable a backup host to be presented to CBOE as the same external IP address. This permits the firm to switch to a backup FIX engine quickly in case of failure of their primary fix engine.

[1] The FIX 4.4 Specification is available on the FIX Protocol Organization Web Site (http://www.fixprotocol.org).

Standard FIX Message header and trailer support

All FIX messages have a standard header and trailer field. CBOE is fully compliant in its usage of the standard header and trailer. Refer to the FIX 4.4 Specification available from the FIX Protocol Ltd. website (http://www.fixprotocol.org) for additional information on the standard FIX header.

CBOE assigns the connection identifiers (CompIDs) used as the *SenderCompID[49]* and *TargetCompID[56]* that represent the CBOE side and the firm side of the connection.

Firm CompIDs

CBOE uses an abbreviation of the firm name combined with a connection number to identify the firm in the *SenderCompID[49]* field (for messages sent to CBOE from the firm) and the *TargetCompID[56]* (for messages sent to the firm from CBOE).

For example: Firm Smith and Jones, Inc. is connecting to CBOE. CBOE may choose to assign a compid such as "*SMJN01*"for the first connection, "*SMJN02*" as the second connection, and so on.

The maximum length of a firm CompID is 8 characters.

CBOE CompIDs

The format of CBOE CompIDs is "**X**FIX**NN"**

where

X is the type of environment:

D for Developer unattended testing

T for Assurance Testing (attended)

P for Production

NN is the engine number in the range of [01-99]

For example: A firm may be assigned to CBOE's FIX engine number one for developer testing that has a CompID of "*DFIX02*".

Table 1 Standard Header Field Usage

Tag	Field Name	FIX Req'd	CBOE Req'd	Comments
8	BeginString	Y	Y	Per standard "FIX.4.4"
9	BodyLength	Y	Y	Per standard
35	MsgType	Y	Y	Per standard
49	SenderCompID	Y	Y	Firm CompID on messages inbound to CBOE CBOE CompID on messages outbound from CBOE
56	TargetCompID	Y	Y	CBOE CompID on messages inbound to CBOE Firm CompID on messages outbound from CBOE
115	OnBehalfOfCompID	N	N	Used if Firm sends this field as populated value, than CBOE will return this same value to Firms in CBOE outbound messages.

Tag	Field Name	FIX Req'd	CBOE Req'd	Comments
34	MsgSeqID	Y	Y	Per FIX standard
52	SendingTime	Y	Y	Usage per standard Time upon input is expected to be in Universal Time Coordinated (UTC) – see FIX specification.

Logon Message (*MsgType=A*)

You will initiate a FIX session by sending a Logon message to CBOE. You must acquire a CBOE user name and password before you can use FIX 4.4. This is provided as part of the certification process. The connection must be configured on the CBOE FIX 4.4 Server prior to attempting a connection to CBOE. A connection consists of the following information: IP Address, TCP/IP Port Number, and a ConnectionID (CompID) assigned by CBOE (see discussion of CompIDs above). After the firm sends a Logon message to CBOE, the firm must not send any other messages to CBOE until after the firm receives a Logon acknowledgement from the CBOE. This can take anywhere from 1-3 minutes.

Table 2 Logon Message

Tag	Field Name	FIX Req'd	CBOE Req'd	Comments
	Standard Header	Y	Y	*MsgType[35]* = A *Refer to standard Header fields in Table 1.*
108	HeartBtInt	Y	Y	This tag is the heartbeat interval in seconds. It is determined by the user at login time. The firm's heartbeat interval should be greater than 5 seconds. If the user fails to respond to 3 test requests following missed "heartbeats", CBOE will log out the user.
553	*Username*	*Y*	*Y*	*Username assigned by CBOE*
554	*Password*	*Y*	*T*	*Password assigned by Firm admin.*
	Standard Trailer	*Y*	*Y*	*Per standard.*

Any additional, optional FIX fields supplied by any firm request messages will be ignored by the CBOE FIX 4.4 service. These unsupported fields will not be carried through the system. This means that the unsupported fields will not be sent into CBOE CMTA system, nor will any unsupported fields be reported back to the firm on any Trade Capture Reports or Allocation Instruction Ack's.

Logon Message Examples

For the following example, assume that the firm name is “Smith and Jones Trading” and the CBOE has assigned a connection identifier of “SMJN01”. The CBOE connection identifier assigned for purposes of this example is “PFIX01”.

For this example assumes that the userid assigned by CBOE is “`smg`” and the password is “`son123`”.

Example 1 Normal logon using defaults

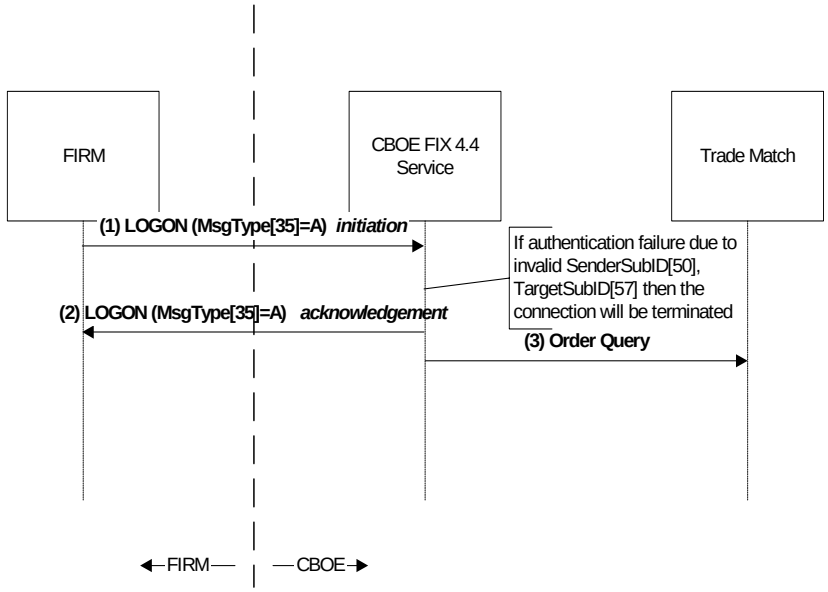
Example of an inbound logon request message from the firm to CBOE:

```
8=FIX.4.4^35=A^49=SMJN01^56=PFIX01^108=300^553=UserName
^554=Password
```

The outbound logon acknowledgement message from CBOE to the firm for the above logon would be::

```
8=FIX.4.4^35=A^49=PFIX01^56=SMJN01^108=300
```

Figure 1 Logon Message Sequence



Invalid Logon

Invalid logon attempts will result in the connection being terminated by CBOE in compliance with the FIX 4.4 specification. Invalid logon attempts are logged at CBOE. There will be a reject message (refer to reject message on page 9) acknowledging the invalid logon attempt and connection is terminated.

Logout Message (*MsgType=5*)

Logout from a session can be initiated either by the firm or by CBOE. If CBOE initiates the logout, the *Text[58]* field will contain the reason for the logout. As per the FIX 4.4 specification, the firm should respond with a Logout acknowledgement message. Also a reasonable time period should be permitted prior to breaking the connection to permit the side receiving the logout request to process any gap fills.

Table 3 List of messages and reasons for CBOE initiated logout

***Text[58]* content when the CBOE FIX 4.4 Service initiates a logout**	**Explanation**
Forced logout due to lost of connection	
Forced logout due to closing session	
Critical components unreachable due to process failure	Failure of a CBOE component caused FIX session to be terminated
Admin request to force leave session	The help desk or operations staff has forced a logoff of the session.
Forced session close since Session Management Service process has been lost	A connection to the CBOEdirect service for system management has been lost

Table 4 Logout Message

Tag	Field Name	FIX Req'd	CBOE Req'd	Comments
	Standard Header	Y	Y	*MsgType[35]* = 5
58	Text	N	N	Will be ignored when the firm initiates the logout. CBOE will always provide a reason for logout initiation.
	Standard Trailer	Y	Y	Per standard.

Logout Message Examples

For the following example assume that the firm is Smith and Jones Trading and the CBOE has assigned a connection identifier of "SMJN01". The CBOE connection identifier assigned for purposes of this example is "PFIX01".

Firm Initiated Logout

Example firm initiates logging off by sending a Logout Message to CBOE:

```
8=FIX.4.4^35=5^49=SMJN01^56=PFIX01
```

The firm should wait for a reasonable length of time for CBOE to reply and perform any potential gap fills and then send a confirmation logout. If there is no reply after this unspecified reasonable period then per the FIX specification you should close the sockets connection. After confirming the logout, the firm should wait a minimum of 30 seconds before attempting to send a logon request message to CBOE.

In exceptional circumstances, CBOE may perform gap fills.

Normally CBOE will immediately reply with a confirming logout.

```
8=FIX.4.4^35=5^49=PFIX01^56=SMJN01
```

CBOE Initiated Logout

In this example due to an error condition or scheduled down time, CBOE initiates a logout by sending a Logout Message to the Firm.

```
8=FIX.4.4^35=5^49=PFIX01^56=SMJN01^58=ReasonForLogout^10=checksum
```

At this point, the CBOE FIX 4.4 Service will wait a reasonable period of time, about 30 seconds, for the firm to perform gap fills – if required.

The firm, per FIX specification, should reply with a confirming Logout Message:

```
8=FIX.4.4^35=5^49=PFIX01^56=SMJN01
```

After confirming the logout, the firm should wait a minimum of 30 seconds before attempting to send a logon request message to CBOE.

Refer to the error handling discussions regarding the contents of the *Text[58]* field upon CBOE initiated logout.

Reject Message (*MsgType=3*)

The Reject Message will only be used for session level rejects in FIX 4.4. Firm applications should provide a mechanism for reporting or logging the value in the Text[58] field of the reject message which will contain the reason for the reject. Refer to the Reject Reason table below.

The CBOE FIX 4.4 Service has reduced the role of the Reject Message to session level errors only, in keeping with the FIX 4.4 Specification.

- Malformed or garbled message or check sum error received

  The Reject Message will be used to reject malformed or invalid FIX messages. This type of reject is normally encountered due to a communications error and will most likely not be encountered. This type of error will often result in a checksum error being encountered by the receiver of the message. Refer to the FIX specification for more details on recovery from this type of error.

- CBOE FIX Engine is unable to communicate with CBOE CMTA application.

  If the CBOE FIX Engine is unable to communicate with CBOE CMTA application – the FIX Engine will place all connections in a "Hold status". When connections are placed in a hold status – all incoming messages are rejected with a Reject Message with the *Text[58]* field set to "`CBOE CMTA application is currently unavailable or unreachable`".

  NOTE: Invalid Data in otherwise valid FIX Messages is now rejected using the *Business Reject Message Reject* (*MsgType=*"j").

Table 5 Reject Message

Tag	Field Name	Req'd	Comments
	Standard Header	Y	*MsgType[35]* = 3
45	RefSeqNum	Y	MsgSeqNum of rejected message
58	Text	N	Message that explains reason for rejection.
	Standard Trailer	Y	

The first column of this table contains the literal text that will be transmitted as part of the *Text[58]* field in the *Reject Message*. This is provided to permit firms to parse or trap specific errors to improve detection and automation of error recovery.

Table 6 Reject Message Possible values for tag *Text[58]*

Reject Message Text	Further Description and Recommended Firm Response
`Unsupported FIX Message –` *Message-name*`(`*MsgType*`) [ SenderCompID=`*header.SenderCompID* `SequenceNumber=`*header.MsgSeqNum* `]`	A FIX 4.4 message that is not supported by the FIX 4.4 Service was received. The message is logged to a reject file at CBOE. A notice is sent to CBOE personnel to investigate the error. After an application is certified, this error should never occur. If it does, this should be considered very serious and will most likely require software maintenance at the firm to correct the problem.

CBOE does not accept inbound Reject Messages

CBOE will verify through firm testing that your application will not generate any session level reject messages.

If inbound Reject Messages (*MsgType*=3) are received by CBOE, CBOE will suspend the firm connection and require the firm to repeat the certification process.

Other Session Messages

The commercial FIX Engine used by CBOE provides the full session management capability specified in the FIX 4.4 specification. *Heartbeat*, *Test Requests*, *Resend Request* messages operate according to the FIX 4.4 specification.

Questions regarding the FIX Session Layer

How is a connection to the CBOE FIX service obtained?

You obtain a FIX connection by contacting the API Relations Group at 312.786.7300 or by sending an email to api@cboe.com. The API Relations Group will establish a contact point within CBOE for your firm depending on your planned usage of the FIX interface.

If you have problems in obtaining service, have any other questions, or concerns you can contact Doug Hoffman, Director of API Relations, at 312.786.7699 or via email at dhh@cboe.com.

How is a userid and password used to initiate a FIX logon session obtained?

The CBOE API Liaison group or the CBOE System liaison group, working in conjunction with the membership and help desk areas, will assign a userid and password for your FIX connection. For market maker firms, the userid will be a badge acronym. For order routing firms, the userid will be assigned based upon a badge or a value made up of the firm acronym.The userid and password are assigned as part of the initial setup for testing.

Is there a test environment available?

Refer to the NET-01 (CBOE Network Connectivity) and FIX-06 (Volume 6: FIX 4.4 Certification and Testing Guide) documents for an overview of connectivity and testing. A test environment is available for unattended firm testing and for attended firm testing.