FIX/FAST Direct System Overview User Guide

February 18, 2011 | Version 2011-02

Table of Contents

Overview

Document Scope

This document serves as an introduction to the FIX/FAST Direct System.

It outlines the system structure as well as the counterpart FIX/FAST client Systems—designed by the customers to process the data feeds.

The document consists of sections dedicated to:

- FIX/FAST Direct system components
- External Protocols
- System Use Cases
- Environments

Publication History

Version	Date	Comments
2010-01	September 8th , 2010	Initial publication
2010-02	September 24th, 2010	Minor update
2010-03	October 13th, 2010	Minor update
2010-05	November 30th, 2010	Security Definition Server IP
2011-01	January 25th, 2011	Testing Environment Settings update
2011-02	February 18th, 2011	Testing channel ID added

Background Information

CQG provides financial data consumers with several market data feed choices, including:

- FIX/FAST Direct
- CQG Integrated Client
- CQG API

To request a testing environment or for more information, please contact Sales@CQG.com.

FIX/FAST Direct

FIX/FAST Direct provides fast and reliable market data feeds using the industry-standard FIX/FAST formats.

Customers who already have a solution for FIX/FAST data feed processing (especially CME FIX/FAST) will benefit from the straightforward implementation process of FIX/FAST Direct.

CQG Integrated Client

From the market data feed point of view, the CQG Integrated Client (CQG IC) is a one stop solution, optimized to serve individual traders and decision makers. Without the CQG API described below, it has limited data export capabilities.

CQG API

CQG API was created to make CQG IC data and functionality available to customer applications.
Our API can be used to retrieve real-time market data, account and position data; perform order management; and retrieve historical data. The API enables customers to create their own customized and automated systems using data that is available via CQG IC.
CQG API is an automation server component and is convenient to use from any application written in VB, C#, C++, or any other language that supports automation technologies. If you are familiar with Excel Object Model, working with the CQG API should be rather an easy transition for you.
CQG API can be used to retrieve real-time market data, account and position data, perform order management, and retrieve historical data.
It has an intuitive programming interface. Users who had worked with Excel and are familiar with Excel Object Model will quickly get used to this component.

Note:

CQGIC should be started on the same computer running the API application.

FIX/FAST Direct

The Road from Exchanges to Traders

When CQG receives raw market data from the exchanges, the FIX/FAST Direct system interprets and translates this data into standard compliant FIX/FAST messages and broadcasts it over Incremental and Snapshot UDP multicast group feed channels.

Customers design their FIX/FAST client systems to interpret the data according to their preferences and needs.

FIX/FAST Direct Brief Operational Guide

Note:

Obtain your username/password and FeedIDs from Sales@CQG.com.

1. Get the FIX/FAST Direct templates from the Templates Dissemination FTP site.
2. Logon to the Security Definition Server (SDS).
3. Retrieve the security definitions for the enabled contracts.
4. Listen to the Incremental/Snapshot feed(s) as needed, to resolve the FAST messages.
5. Decode the FAST message using the corresponding template.
6. Treat the decoded FAST message as a FIX message.
7. For each FIX message check the SecurityID to find whether they match to any of the ones received from SDS. Drop if no such definition exists in your definitions book.
8. Process the FIX message according to its content.

FIX/FAST Direct Components

Template Dissemination Service

FIX/FAST is a template-based protocol. As a result, messages can be interpreted only using a template. Each message contains a unique Template ID that references the template to be used to interpret the message.
The Template Dissemination Service features an FTP site to provide the FIX/FAST client systems with the active FIX/FAST Direct templates.
Find the templates at:
ftp://develop.cqg.com

Security Definition Server (SDS)

SDS serves as the main entrance to the FIX/FAST Direct system. It:

- allows the client systems to logon;
- upon client’s request, it provides the security definitions for enabled contracts;
- provides connection configurations for the Incremental and Snapshot UDP multicast groups, as well as the Replay TCP channels; and
- continues providing new security definitions as they emerge in real-time.

Note:

While the connection with SDS is idle, it may drop the connection anytime.

Incremental Feed

The Incremental Feed is a UDP multicast group that is used to disseminate incremental market data using FAST encoded FIX messages. This includes book updates, quotes, trades, statistics, and market status.

Snapshot Feed

The Snapshot Feed is a UDP multicast group that is used to disseminate market data snapshots for all books with any activity since the beginning of the week. A single FIX/FAST message includes information about the market state for a given instrument. Snapshots are replayed at a constant frequency.

Replay Server

The Replay Server provides a way to recover incremental or snapshot data that was corrupted or lost due to network problems.
When the FIX/FAST client detects discrepancies in the data received via the UDP Incremental Feed, it establishes a TCP connection with the Replay Server and requests the lost/corrupt data. Once the requested data is sent, the Replay Server terminates the TCP connection.

Note:

Only 2000 messages can be requested per session.

FIX/FAST Direct vs. CME FIX/FAST

FIX/FAST Direct is designed to be as close to CME FIX/FAST 2.0 as possible. However, some technical characteristics of the system were changed in order to provide maximum productivity.

Divergences from the CME FIX/FAST

- CQG provides one incremental channel and one snapshot channel with no hot swap possibility instead of the identical A and B incremental and snapshot UDP multicast groups. A TCP Replay service is used to recover lost/corrupt data when needed.
- CQG provides a TCP Instrument Definition channel instead of public access to the Instrument Definition Feed.
- CQG does not provide the total traded volume with each trade.
- As CQG does not limit the DOM depth, the DOM book can grow indefinitely.
- CQG provides implied and combined (i.e., implied + explicit) book updates.
- For options, CQG sends combined BBA and only 1-level DOM book updates.

Refer to the **FIX/FAST Direct Message Specification** for a more technical and complete presentation of the existing divergences.

A FIX/FAST Client Model

A general-purpose FIX/FAST client model may have the following functional components:

- A Communication Manager to conduct and monitor the logon and security definition update processes.
- A FIX/FAST parser armed with the active FIX/FAST Direct templates to interpret the Incremental and Snapshot feeds.
- Failover management to request data replay when data is not received correctly.

External Interfaces & Protocols

FIX

The **Financial Information eXchange (FIX) Protocol** is a messaging standard developed specifically for the real-time electronic exchange of securities transactions and markets.

Note:

FIX/FAST Direct supports FIX messages of version 5.0 SP1 or higher.

A FIX message represents a sequence of fields, the values of which are associated with predefined unique numbers, called “tags.”
The fields of the message are delimited by the ASCII character 01: SOH (start of heading).

A FIX message example (Logon):

```
8=FIX.5.0.SP2|9=71|35=A|34=1|49=CQG|52=20100707-20:00:00|108=60|553=username|554=password|10=003|
```

A FIX message consists of three parts:

1. Header,
2. Body, and
3. Trailer

1. The header must have has the following fields:
   - **8:** BeginString
   - **9:** BodyLength
   - **34**: MsgSeqNum
   - **35:** MsgType
   - **49**: SenderCompID
   - **52**: SendingTime
2. The body of the message depends on the MsgType (tag 35, specified in the header).
3. The trailer (tag 10) provides the checksum of the message, which can be used to determine whether the message was properly received or not.

Note:

All messages from FIX/FAST clients to FIX/FAST Direct are expected to be in plain FIX format without FAST encoding.

FAST

The FIX Adapted for Streaming (FAST) Protocol is a group of encoding and decoding rules meant to provide a concrete, standards-based mechanism for delivering a FIX data stream in a highly efficient manner.
FAST has been shown to reduce message size by as much as 90% with relatively low processing overhead.
FIX/FAST Direct fully supports the standard **FAST v1.1**, which is documented at www.fixprotocol.org.

Note:

All FIX messages sent from the FIX/FAST Direct system are FAST-encoded and are standard compliant.

The working FAST templates must be obtained from the Template Dissemination Service.

Data Channels

Connections to the Security Definition Server and Replay Server are conducted over TCP.

FIX/FAST Direct uses separate UDP multicast groups: one for each feed type (incremental or snapshot) of every feed ID.

Each security definition includes information about the corresponding incremental, snapshot, and replay channels.

The FIX/FAST templates are available at:

ftp://develop.cqg.com

System Use Cases

Main Usage

Note:

The use cases provided here should be considered as basic pointers. To find more technical and in-depth information refer to the “FIX/FAST Direct - Core Functionality” document.

Logon / Definitions Requesting & Receiving

1. The FIX/FAST client sends a logon request to SDS using standard FIX logon message (tag 35=A).
2. If SDS accepts the Logon attempt, it responds with FAST encoded FIX logon message (tag 35=A).
3. The FIX/FAST client requests the security definitions for a given feed ID using standard FIX *SecurityDefinitionRequest* message (35=c), in which the FIX/FAST client specifies the contracts it wants to process using the feed ID.
4. The server sends the Security Definition messages, for which the account has enablements. The response is FAST-encoded.
   Each security definition contains information about the feed configurations (IP, Port) for the corresponding incremental, snapshot, and replay connections.
5. The connection with SDS can be maintained to facilitate the transfer of new Security Definitions as they are added. However, SDS may drop an idle connection anytime.

Note:

The Security Definitions are changed at least once every week.

Receiving Real-time Incremental Updates

1. The FIX/FAST client joins an incremental multicast group.

Note:

Each multicast group provides updates for contracts from only one FeedID.
SDS sends the data feed connection details in every security definition message.

2. FIX/FAST Direct system broadcasts all available contract updates. Each update has a SecurityID reference field.
3. If the SecurityID matches a Security Definition— received from SDS, the client system resolves the message.

4. Messages with SecurityIDs not explicitly received from SDS should be dropped.

Receiving Snapshot Updates

1. The FIX/FAST client joins a special multicast group to receive the current market state.
2. The FIX/FAST Sender disseminates the snapshots, each of which has its own sequence number and the total number of contracts.
3. The FIX/FAST client listens to the snapshots until all of them arrive (confirmed when the snapshot ID and the total number of contracts received match the total number of contracts declared in the feed) and closes the socket.
4. Then it resolves the snapshots using the security IDs received from SDS.

Error Handling

Data Gaps Processing (Client-Side)

Whenever discrepancies in the data feeds are detected, the client system requests the lost/corrupt data from the Replay Server.

1. The client system logs on to the TCP Replay Server and requests a replay of the missed messages specifying the FeedID and the range of sequence numbers to replay.

Note:

Only 2000 messages can be requested from the Replay Server per session.

2. The Replay Server responds with the requested data and terminates the connection.

Failover Use Cases

1) When the Primary FIX/FAST feed may switch to the backup FIX/FAST feed, a 'Sequence Number Reset' message is sent and all sequence numbers restart from '1'. When this occurs, the FIX client should open the snapshot channel to refresh the instruments state.

Note:

All messages before the 'Sequence Number Reset' message are no longer available for retransmission by the Replay Server.

2) When the primary SDS is not responding, the FIX client should try to connect to the successive SDS provided by CQG. All SD Servers provide identical data and are interchangeable.
FIX clients use heartbeat messages to monitor the connection state.

Note:

The user sets the Heartbeat timeout through the 'HeartbeatTimeout' field in the Logon message.

Environments

The Production Environment

The production environment is the main real-time data feed and service management environment.

Note:

To access the production environment, a FIX/FAST client system must be certified.

The Testing Environment

The testing environment grants developers early access to a production-like environment of upcoming FIX/FAST Direct releases.
Compared to production, the testing environment has the following restrictions:

- Only one Feed ID is available
- All data is delayed one hour

Please revise your FIX/FAST client configuration to use the following testing components:

- **Template Dissemination server**:
  ftp://develop.cqg.com/Testing/
  Request the login/password information from Sales@CQG.com.
- **Security Definition Server**:
  Channel ID: 13 (tag 1180-ApplID)
  Host: 10.1.0.71
  Port: 2222
  Username: test
  Password: test
- **Incremental refresh mcast group**:
  239.246.1.13:11013
- **Snapshots mcast group**:
  239.246.2.13:12013

The Certification Environment

The certification environment provides a web UI and an explicitly-created FIX/FAST Direct setup, which help customers to assess their newly-developed FIX/FAST client systems and check their conformance with FIX/FAST Direct.
The certification web UI is available at:
https://develop.cqg.com/fixfast/.

The Certification Process

The certification process consists of several cases that should be performed one-by-one. One certification case is devoted to the use of one or several FIX/FAST Direct data types (DOM, trades, settlements, etc).

Each certification case contains several questions; the applicant must answer to become certified and obtain access to the production environment. The FIX/FAST client is given an unlimited amount of attempts.

In order to simulate real market situations, certification cases use special multicast groups to send sample data (incremental refresh) prepared for the certification environment.

Note:

Each certification case is passed independently. Therefore, before starting each case, the FIX/FAST client is reset. Raw data received for previous cases does not affect the subsequent cases.

From a technical point of view, the certification environment works like the production environment, with the following restrictions:

- Only one pair of multicast groups (one incremental and one snapshot) is used.
- Provided security definitions do not match production values.
- Snapshots are not passed in cycle.
- To access the certification environment, the FIX/FAST client uses the login/password that was obtained from CQG solely for this purpose. The same credentials are used for accessing the Security Definition Server.