CONFIDENTIAL

CBOE Application Programming Interface

Version 9.0.2

CBOE API Volume 6: Connecting to the CBOE Network

A Guide to obtaining connections to CBOEdirect™ using CMi services

CBOE Proprietary Information

15 July 2011

Document #[API-06]

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Disclaimer

Change Notices

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

Date	Version	Description of Change
15 Jul 2011	V9.0.2	No changes
29 Apr 2011	V9.0.1	No changes
14 Jan 2011	V9.0	No changes
08 Jan 2010	V7.0	Updated the Connection Method sections for the Testing and Production environments. Updated the ORB CAS port number to 8102. Removed Glossary terms that no longer apply.
12 Aug 2009	V6.1	No changes
22 May 2009	V6.0	No changes
25 Nov 2008	V5.3	No changes
24 Sept 2008	V5.2	No changes
23 Jul 2008	V5.1	No changes
29 Feb 2008	V5.0	No changes
18 Jan 2008	V4.2.4	No changes
02 Nov 2007	V4.2.3	No changes
01 June 2007	V4.2.2	No changes
23 Feb 2007	V4.2.1	No changes
15 Dec 2006	V4.2	No changes
20 Sept 2006	V4.0	No changes
25 May 2006	V4.0	Referenced the new Market Data Express (MDX) document, API-08
06 Jan 2006	V3.2	No updates
12 Aug 2005	V3.2	No updates
29 Jul 2005	V3.2	No changes
08 Apr 2005	V3.1a	Documentation Errata Release
17 Dec 2004	V3.1	No change
18 Jun 2004	V3.0	No change.

Date	Version	Description of Change
28 Apr 2004	V2.52	No change.
06 Feb 2004	V2.63	No change.
10 Oct 2003	V2.62	No change.
29 Aug 2003	V2.61	No change.
31 Jul 2003	V2.6	Support for market linkage and stock
08 Jul 2003	V2.51	Revisions since the last release.
14 Mar 2003	V2.5	Support for Hybrid
24 Jan 2003	V2.1	Support for Linkage P orders.
14 Aug 2002	V2.0.1	Port addition (18035/TCP) and static NAT description changes.
21 June 2002	V2.0.1	Port updates.
20 May 2002	V2.0.1	No change.
22 April 2002	2.0	Production Release
27 February 2002	2.0b	Software Development Kit Beta 2
23 January 2002	2.0a	Software Development Kit Beta 1
14 December 2001	2.0	Documentation Update
3 October 2001	1.1	ORB Port Change
18 May 2001	1.0b	Added Market Data role information.
19 March 2001	1.0a	Production Update
24 October 2000	0.9	New Document

About This Document

Purpose

This document is intended to provide application specific networking information and guidance on how to connect to CBOEdirect using the CBOE Market Interface (CMi).

Intended Audience

Firm representatives responsible for establishing and maintaining network connections to CBOEdirect.

Related Documents

Document Number	Document Description
Roadmap.doc	CBOE API and CAS Document Road Map
API-01	CBOE API Volume 1: Overview and Concepts
API-02	CBOE API Volume 2: CMi Programmer's Guide to Interfaces and Operations
API-03	CBOE API Volume 3: CMi Programmer's Guide to Messages and Data Types
API-04	CBOE API Volume 4: CMi Dictionary of Attributes and Operations
API-05	CBOE API Volume 5: Using CMi with Specific Object Request Brokers
API-07	CBOE API Volume 7: CBOEdirect Certification and Testing Procedures
API-08	CBOE API Volume 8: CMi Programmer's Guide to the Market Data Express (MDX) Data Feed
CAS-01	CBOE Application Server Volume 1: Overview and Concepts
CAS-02	CBOE Application Server Volume 2: CBOE Application Server Simulator for Stand Alone Testing

Support and Questions Regarding This Document

Specific questions regarding setting up a test connection to CBOEdirect via CMi can be directed to cmiconnect@cboe.com. General questions regarding CBOEdirect APIs can be directed to 312.786.7300 or api@cboe.com. The latest version of this document can be found at the CBOE API web site http://systems.cboe.com/webAPI/.

Introduction

This document describes test and production CMi application related networking information and considerations that must be addressed by all CMi users. The procedure for connecting to the CBOE Network in order to access the CBOEdirect electronic trading system via the CBOE Market Interface (CMi) for obtaining network connections is described in document NET-01 which is currently available for download on the CBOE API web site at http://systems.cboe.com/webAPI. In order to use CMi to access CBOEdirect, your firm must pass all phases of testing. The phases of testing are defined in document API-07. API-07 is a living document and is subject to change in the future.

IOR, SSH, and ORB Port Considerations

IOR

The client machine hostname and IP will be given to the CBOE. The hostname must be included in the IOR.

Please refer to your ORB documentation for instructions on how to configure the ORB to identify the hostname your client workstation will be using.

SSH

The CBOE is currently utilizing SSH Secure Shell to access the client CAS from the CBOE.

In addition, if a firm is using the CBOE GUI, SSH allows the CBOE access from the CAS to the client workstation.

ORB Ports

The CBOE is currently using ORB port 8200 for connectivity from the CBOE to the CAS.

If a firm is using CBOEconnect it will not be necessary to make any port changes.

Please refer to the CBOEdirect ports table 2 for a complete list of ports used by the CBOE for CBOEdirect.

CBOEdirect Testing Environment

Connection Method

Access to the CBOEdirect testing environment is accomplished via VPN as described in document NET-01 which is available for download at the CBOE API web site at http://systems.cboe.com/webAPI. Please refer to the Dial-Up Test Network diagram in NET-01 for reference.

CBOE has an access server that connects to a test CAS that resides at the CBOE. To simulate the production environment, the CAS will connect to the CBOEdirect test environment through a firewall. The test CAS is identical to the one that will be used in the production environment.

Firm Firewall Considerations

Your firm can use a firewall between its LAN and the CBOE test environment if desired, however, special considerations must be made as described below. Please describe your firm's security plans in the comment field of Worksheet [A] which is available for download at the CBOE API web site http://systems.cboe.com/webAPI. (or attach a separate sheet if necessary)

Network Address Translation (NAT)

CBOE ***strongly*** recommends that CMi firms do not use Network Address Translation (NAT). If your firm insists on using NAT, then it must verify that it's ORB is configured to handle messages using the client workstation's hostname, as opposed to its IP address. CMi imbeds hostname in the data portion of the message where it cannot be modified by NAT. Most ORBs default to this setting. If your ORB does not default to this setting, then your firm should be able to recompile and reconfigure your ORB to do so. In addition, firms must use static one to one NATing and not dynamic NATing.

TCP Port Settings

CBOE recommends that port restrictions may be used on your firm's firewall for both incoming and outgoing message traffic. If your firm uses a firewall or router filters, the following ports must be kept open:

Outgoing Message Traffic From Client To CAS

Port Type	Description	Port Number
HTTP CAS (CAS GUI)	This is the port that the client application uses to make initial contact to the CAS	8003
ORB CAS	This is the port that the client application uses to make all subsequent contact to the CAS. The client ORB does not make any configuration changes for this port. This port number is communicated to the client ORB in the IOR when the client connects to the CAS.	8102

Incoming Message Traffic From CAS To Client

By default, the client ORB randomly assigns a port to receive incoming message traffic from the CAS. If your firm plans to use a firewall or router filters, then a static port number must be used for the CAS to communicate to the client workstation. This can be done if your firm starts its ORB with a parameter to set the callback port on its connection to its ORB. CBOE requests that your firm uses static port number 8101.

Port Type	Description	Port Number
ORB GUI	This is the port that the CAS uses to make all contact to the client application after the initial contact has been made.	8101

Obtaining a connection to the CMi Testing Environment

Please visit http://systems.cboe.com/webAPI/NetworkConn.htm to download Worksheet [A] that is required to be submitted to the CBOE. As part of the worksheet, the CBOE requires that your firm supply the CBOE with your firm's proposed test and production network diagrams. Visio file formats are preferred but not required. After your firm passes Phase 1 of testing as defined in document API-07 and your firm's proposed test and production network diagrams have been submitted, the CBOE will supply your firm with CBOE test application configuration information necessary to perform testing.

CBOEdirect Production Environment

Connection Methods

CBOE plans to use two different methods that your firm can use to connect to the CBOE Network for trading on CBOEdirect.

1. If your firm already has existing TCP/IP connectivity to the CBOE for other APIs such as Market-Maker Hand Held or Common Wireless Network, it may use that connection for message transmission in the CBOEdirect production environment.
2. CBOE approved Extranets.

Firewall considerations

Network Address Translation (NAT)

CBOE ***strongly*** recommends that CMi firms do not use Network Address Translation (NAT). If your firm insists on using NAT, then it must verify that it's ORB is configured to handle messages using the client workstation's hostname, as opposed to its IP address. CMi imbeds hostname in the data portion of the message where it cannot be modified by NAT. Most ORBs default to this setting. If your ORB does not default to this setting, then your firm should be able to recompile and reconfigure your ORB to do so. In addition, firms must use static one to one NATing and not dynamic NATing.

TCP Port Settings

CBOE recommends that port restrictions may be used on your firm's firewall for both incoming and outgoing message traffic. The same callback port cannot be reused from the same PC for multiple logons of the same user ID.

If your firm uses a firewall or router filters, the following ports must be kept open:

Outgoing Message Traffic From Client To CAS

Port Type	Description	Port Number
HTTP CAS (CAS GUI)	This is the port that the client application uses to make initial contact to the CAS	8003
ORB CAS	This is the port that the client application uses to make all subsequent contact to the CAS. The client ORB does not make any configuration changes for this port. This port number is communicated to the client ORB in the IOR when the client connects to the CAS.	8102

Incoming Message Traffic From CAS To Client

By default, the client ORB randomly assigns a port to receive incoming message traffic from the CAS. If your firm plans to use a firewall or router filters, then a static port number must be used for the CAS to communicate to the client workstation. This can be done if your firm starts its ORB with a parameter to set the callback port on its connection to its ORB. CBOE requests that your firm uses static port number 8101.

Port Type	Description	Port Number
ORB GUI	This is the port that the CAS uses to make all contact to the client application after the initial contact has been made.	8101

Glossary

Table 1 Glossary

Term	Abbreviation	Definition
Application Programming Interface	API	A set of routines, protocols, and tools for building software applications.
CBOE Application Server	CAS	Computing tier that provides caching, session management, system access to applications requiring access to Exchange Services. Clients access the CBOE Application Server via the CBOE Market Interface.
CBOEdirect		The CBOE electronic trading system
CBOE Market Interface	CMi	The CORBA based interface from the CBOE that provides access to CBOEdirect and to CBOE open outcry markets.
CMi Client		Any trading terminal that communicates to CBOE by means of the CMi API.
Firewall		An electronic boundary that prevents unauthorized access to a network.
Graphical User Interface	GUI	This is an application that allows the user to interact with the CAS or other portions of the client application
Internet Protocol	IP	Protocol that is designed to be independent of underlying physical network structure. Uses an independent numbering scheme (IP Addressing) to provide network messaging that can be independent and easily routed between heterogeneous networks. Part of the TCP/IP Protocol Suite.
Local Area Network	LAN	A computer network covering a small geographical area typically confined to a single building.
Network Address Translation	NAT	Network Address Translation – The conversion of the source and/or destination IP address on a packet when traversing a gateway, typically a firewall.
Object Request Broker	ORB	Software that is responsible for managing distributed objects in a computing environment. The ORB is responsible for resolving locations of objects and establishing communication between clients and object services.

Term	Abbreviation	Definition
Transmission Control Protocol	TCP	A session oriented streaming protocol that provides for reliable communication between nodes on a network. Part of the TCP/IP Protocol Suite.
Transmission Control Protocol/Internet Protocol Suite	TCP/IP	Acronym used to designate a collection of multiple protocols originally developed by the US Department of Defense for computation between heterogeneous networks and computers. The standards are now guided by a collection of standards organizations, including the Internet Engineering Task Force (IETF) and the Internet Architecture Board (IAB).
Wide Area Network	WAN	A computer network that spans a relatively large geographical area and makes use of circuits and / or data transport services purchased from a carrier.

CBOE direct™

Connectivity Update for Version 2.0

6/26/02

A. Routing

- **Firms using CBOE*connect* only need to route traffic between their GUIs and the CAS network.**
- **Firms that are using a Direct Network Connection must also route traffic between the CAS network and the following CBOE networks.**

CBOE routes for CBOE*direct*

170.137.4.0/24
170.137.5.0/24
170.137.7.0/24
170.137.93.0/24

B. Changes to required Ports

- The same callback port cannot be reused from the same PC for multiple logons of the same user ID.
- When using CBOE*connect* and for Test connections, the following ports must be open if the Firm places a firewall between their client workstations (GUIs) and the CAS server.

CAS to GUIs

22/TCP SSH (for CBOE Trader Workstation GUIs only)
8101/TCP GUI ORB (port or ports determined by GUI ORB configuration)

GUIs to CAS

8003/TCP HTTP primary
8004/TCP HTTP secondary (optional)
8102/TCP CAS ORB primary
8103/TCP CAS ORB secondary (optional)

- If the Firm is using CBOE*connect*, the CAS will be located outside the Firm network and no Firm firewalls will be between it and CBOE.
- When using a Direct Network Connection instead of CBOE*connect*, if the firm places a firewall between the CAS network and CBOE the following ports must be open.

CBOE to CAS network

ICMP	Ping
22/TCP	SSH
23/TCP	Telnet
161/UDP	SNMP
3181/TCP	Patrol
8200/TCP	HTTP
8203/TCP	CAS ORB
18039/TCP	sysman agent primary
18099/TCP	sysman agent backup
18136/TCP	process watcher

CAS network to CBOE

ICMP	Ping
49/TCP	TACACS+
123/UDP	NTP
161/UDP	SNMP
162/UDP	SNMP Trap
514/UDP	SYSLOG
5101/TCP	RT server
18005/TCP	FE ORB
18023/TCP	FE ORB v2.0
18035/TCP	IFR new proxy
18039/TCP	sysman agent primary
18050/TCP	trader proxy
18076/TCP	security service
18078/TCP	channel admin proxy
18079/TCP	IFR proxy
18080/TCP	central repository
18081/TCP	SMS proxy
18082/TCP	central logging proxy
18083/TCP	tran timing registration proxy
18099/TCP	sysman agent backup
18136/TCP	process watcher

C. Logon to the CAS

When a new CMi workstation plans to logon to the CAS to send orders or quotes, the firm must add the CAS IP and hostname to their workstation's host file. In addition, CBOE has to add the firm's workstation IP and hostname to the CAS host file. When a new CMi workstation subscribes to CMi options market data, CBOE has to add the firm's workstation IP and hostname to CBOE's MDCAS host file. In this case, the firm does not have to add the MDCAS IP and hostname to its workstation's host file.