Cboe Japan Snapshot Recovery Service Specification

Cboe Japan Trading System

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Version 1.0-04

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1   Introduction

Cboe Japan Trading System ("CTS") is a high performance, low latency trading system. The information processed by CTS is highly valuable to all the market players including participants, data vendors as well as investors. Therefore, a market data feed is one of the key services that is provided by CTS to disseminate such information.

Snapshot Recovery Service (SRS) allows clients to retrieve the latest snapshot of market data feed. Market data clients may use the service provided by SRS Server for large-scale data recovery (e.g. Major outage or late joiners).

Note: For recovery purpose, SRS must be used in combination with Cboe Japan Multicast Market Data Feed (CHIXMMD). As the snapshot contains an End message will indicate the next message that client should be received from CHIXMMD.

This document is meant to share information on these Cboe Japan venues:

- Alpha (Cboe Alpha or Chi-Alpha as the full name)
- Select (Cboe Select or Chi-Select as the full name)

1.1   Relevant documents

ITEM	TITLE	VERSION	DATE
1	JPCX-L3-D-016 Cboe Japan Multicast Market Data Feed Specification.docx	1.1-15	13-Dec-2021

Figure 1: Relevant Document(s)

1.2   Revision History

ITEM	REVISION HIGHLIGHT	DOCUMENT REFERENCE	CHANGE BY
1	Update Connection Parameter (IP Address/Port)	2	Sam (version 1.0-1)
2	Update Connection Parameter for SRS Server 3	2	Sam (version 1.0-2)
3	Add Select market for PROD and SIM Update Network Configuration for Simulation	2	Newton (version 1.0-3)
4	Re-branding – logo and name reference change		Stanley (1.0-4)

Figure 2: Revision History

2 Network Configuration Parameters

The following table summarizes network address & parameter configurations needed for accessing the Snapshot Recovery Service.

Network Address Summary

Production Environment

	Primary Data Centre (Alpha)	**Primary Data Centre (Select)**	**Secondary Data Centre (Alpha)**
SRS Server 1			
IP Address	110.50.74.11	110.50.74.37	-
Port Number	10412	10422	-
SRS Server 2			
IP Address	110.50.74.12	110.50.74.38	-
Port Number	10512	10522	-
SRS Server 3			
IP Address	-		110.50.75.11
Port Number	-		10612

Figure 3: Network Address Summary (Production Environment)

Simulation Environment

	Secondary Data Centre (Alpha)	**Secondary Data Centre (Select)**
SRS Server 1		
IP Address	110.50.75.150	110.50.75.154
Port Number	11702	11722
SRS Server 2		
IP Address	110.50.75.156	110.50.75.158
Port Number	11802	11822
SRS Server 3		
IP Address	110.50.75.38	-
Port Number	11902	-

Figure 4: Network Address Summary (Simulation Environment)

3   Data Type

This section describes the available data types that are used in the SRS.

3.1   Numeric

Numeric fields consist of digits which are ASCII coded. They are presented in right justification and are space-filled from the left.

3.2   Alphanumeric

Alphanumeric text fields consist of alphabetical letters or digits (or both). They are presented in left justification and are padded with spaces to the right.

3.3   Prices

Price data fields are presented in digits and decimal places are allowed.

Standard prices are presented in maximum six digits with four decimal places. Long form prices are presented in maximum 12 digits with 7 decimal places. Spaces are padded from the left in front of the digits and zeros are padded after the last decimal place to the right. Decimal points do not present in the price field. They are recognised by their positions in the price fields.

3.4   Timestamp

Timestamp data fields are presented in digits in milliseconds past midnight.

4 Session

4.1 Session Protocol

1. Snapshot Recovery Service is built on a session layer on top of TCP/IP sockets. Sessions include sequenced and non-sequenced messages in which sequenced messages are the actual data, while the non-sequenced messages are the session level interfaces.
2. Sequenced messages include system event, stock status, add orders, etc.
3. Login, logout and heartbeat messages are the examples of non-sequenced messages.

The following diagram describes a typical snapshot recovery scenario:
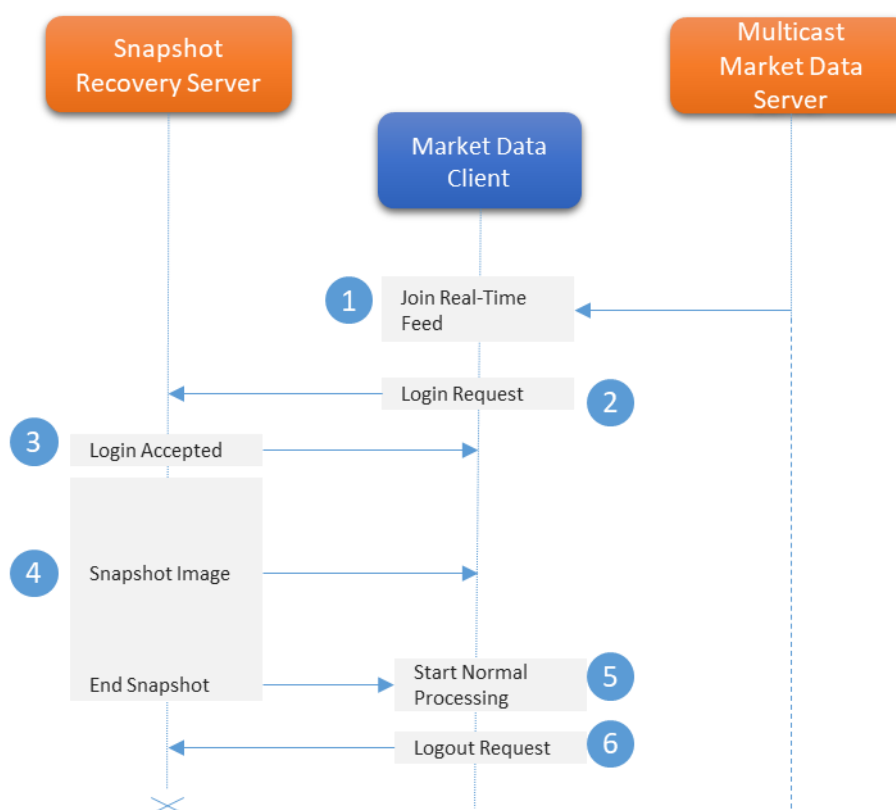
Figure 5: Example Snapshot Recovery Scenario

In the diagram, there are 6 steps involved in the snapshot recovery process.

Step 1: Market Data Client join the Real-Time Multicast Market Data Feed and buffer market data received.

Step 2: Market Data Client then establish a TCP connection with the Snapshot Recovery Server and format a Login Request message to request snapshot, the request mode may be

0: Trade Summary only

1: Order Book only

2: Trade Summary and Order Book

Step 3: After receiving the login request, the Snapshot Recovery Server will validate the user authentication information in the request. A Login Accepted message will be replied to the client to indicate the request is accepted and snapshot transmission will start soon.

Step 4: The Snapshot Recovery Server starts replying the snapshot.

Step 5: When the client receives the End Message, it should:

1. Discard market data with sequence less than the 'Sequence Number' in End Message

2. Process remaining buffered message

3. Start processing message from Real-Time Multicast Market Data Feed

Step 6: Client send a Logout Request to disconnect the recovery session. After the request is sent, the client may close the TCP connection immediately.

Snapshot Recovery Server will only reply the snapshot once for each connection. Only heartbeat message will be sent from the server once the snapshot is transferred. It will terminate the session after received Logout Request or a few seconds after sending out End Message.

5 Session Messages

5.1 Debug Message (Inbound)

- Debug Messages are used for giving useful information to developers assisting them in application development and troubleshooting. They are used during development processes only.

DEBUG MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"+"	Debug Message
Text	1	Variable	Alphanumeric	Free form text
Terminator	Text Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator

5.2 Login Request (Outbound)

- Login Request Message is sent to the server when client tries to establish connection to the server by sending login request packet.

- Since data is sent in ASCII, it must be padded with spaces; for example, the field lengths of Username and Sequence are 6 and 10 alphanumeric characters respectively, if Username is "JOHN", it should be sent as "JOHN_ _", and if the mode is 1, it should be sent as "_ _ _ _ _ _ _ _ _1" ("_" represents a space).

LOGIN REQUEST MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"L"	Login Request Message
Username	1	6	Alphanumeric	Username
Password	7	10	Alphanumeric	Password
Session	17	10	Alphanumeric	Login requested session ID. Leave this field blank for initial login; and provide Session ID for subsequent logins.
Mode	27	10	Numeric	The requested information from snapshot "0" indicates trade summary only. "1" indicates order book only. "2" indicates trade summary and order book.

Terminator	37	1	ASCII 10, Hex 0x0A	Message Terminator

5.3 Login Accepted (Inbound)

- Login Accepted message is used for acknowledging a Login Request message sent by client upon successful login.

LOGIN ACCEPTED MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"A"	Login Accepted Message
Session	1	10	Alphanumeric	The session ID currently logged into.
Mode	11	10	Numeric	The requested mode
Comma	21	1	","	Separator
Messages Total	22	10	Numeric	Always zero
Terminator	32	1	ASCII 10, Hex 0x0A	Message Terminator

5.4 Login Rejected (Inbound)

- Login Rejected message is used for acknowledging the failure of a Login Request message sent by client.

LOGIN REJECTED MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"J"	Login Rejected Message
Reject Reason	1	1	"A" or "S" or "M"	Reason of the login rejection: "A" – Invalid username/password "S" – Invalid session ID "M" – Invalid mode
Terminator	2	1	ASCII 10, Hex 0x0A	Message Terminator

5.5 Logout Request (Outbound)

- Logout Request Message is used for sending session termination request to the server. Session will be closed immediately when receiving logout request packet sent by client.

LOGOUT REQUEST MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"O"	Logout Request Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

5.6 Server Heartbeat Message (Inbound)

- If session is left idle for more than one second, server will send a heartbeat message.

SERVER HEARTBEAT MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"H"	Server Heartbeat Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

5.7 Client Heartbeat Message (Outbound)

- Client Heartbeat Message is used for sending heartbeat messages to server from the client side on a regular interval. Since the server assumes the client is no longer active if it does not receive a heartbeat message from client for more than 15 seconds, the session will be terminated.

CLIENT HEARTBEAT MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"R"	Client Heartbeat Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

5.8 Sequenced Data Message (Inbound)

- Sequenced Data Message is the message sent by the server which contains actual snapshot content.

SEQUENCED DATA MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Message Type	0	1	"S"	Sequenced Data Message
Data	1	Variable	Alphanumeric	Snapshot Recovery Message
Terminator	Data Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator

6 Snapshot Content

The following table describe the content to be included in the snapshot according to the request mode. The composition of the snapshot follows the table's order

	MODE 0	**MODE 1**	**MODE2**
System Event Message	Y	Y	Y
Stock Summary Message	Y		Y
Stock Status Message (Trading Status and Short Sell Price Check)		Y	Y
Add Order Message		Y	Y
End Message	Y	Y	Y

7   Snapshot Recovery Messages

7.1   System Event Message

- System Event Message is used for signalling an event which affects all systems of CTS.

SYSTEM EVENT MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"S"	System Event Message
Event Code	9	1	Alphanumeric	Please see System Event Codes below

7.1.1   System Event Codes

SYSTEM EVENT CODE	DESCRIPTION	REMARKS
O	Start of Messages	This is the first message of the day
S	Start of Trading Session	This message indicates that CTS is open and accepting orders
E	End of System hours	This message indicates that CTS is closed and not accepting orders anymore. It is still possible to receive Broken Trade and Order Cancel messages after this.
C	End of Messages	This is the last message of the day

7.2   Stock Summary Message

This message indicates the summary of a stock. It is sent when clients request snapshot with trade summary from SRS.

STOCK SUMMARY MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"V"	Stock Summary Message
Stock	9	6	Alphanumeric	Stock Symbol
High Price	15	19	Price	Highest execution price
Low Price	34	19	Price	Lowest execution price
Open Price	53	19	Price	First execution price
Close Price	72	19	Price	Final execution price
Total Value	91	12	Numeric	Total executed value
Total Volume	103	12	Numeric	Total executed shares
Total Count	115	12	Numeric	Total number of execution

7.3 Stock Status Message

This message indicates the current trading status of a stock. At the start of day, the feed will send out a stock status message with Trading Status set with 'T' – Trading or 'H' - Halted for each of the symbols trading on CTS. And then, the feed will send out stock status message with Trading Status set with 'A' or 'D' to indicate if Short Sell Price Check is activated or not for each of the symbols.

Subsequently, stock status messages will be sent when a stock is halted or is released for trading. Also, stock status messages will be sent when Short Sell Price check is activated for a stock.

STOCK STATUS MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"H"	Stock Trading Action Message
Stock	9	6	Alphanumeric	Stock Symbol
Trading State	15	1	Alphanumeric	"H" = Halted, "T"= Trading, "A" = "Short Sell Price Check activate", "D" = "Short Sell Price Check deactivate"
Reserved	16	1	Alphanumeric	Reserved for future use

7.4 Add Order Message

- Add Order Message is used for acknowledging the acceptance of a visible order into the book in CTS. The message contains an Order Reference which is a unique key of the day assigned to the order by CTS.

ADD ORDER MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"A"	Add Order Message
Order Reference	9	9	Numeric	Unique order reference number of the day.
Buy/Sell Indicator	18	1	"B" or "S"	"B" = Buy Order "S" = Sell Order
Shares	19	6	Numeric	Total number of shares being added to the book. (The number of shares added to the book may be less than the actual number of shares entered because part of the order may trade before being posted to the book).
Stock	25	6	Alphanumeric	Stock symbol (which is right-padded with spaces).
Price	31	10	Price	The display price of the order.
Display	41	1	"Y"	"Y" = displayed in quote

LONG FORM ADD ORDER MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"a"	Long Form Add Order Message
Order Reference	9	9	Numeric	Unique order reference number of the day.
Buy/Sell Indicator	18	1	"B" or "S"	"B" = Buy Order "S" = Sell Order
Shares	19	10	Numeric	Total number of shares being added to the book. (The number of shares added to the book may be less than the actual number of shares entered because part of the order may trade before being posted to the book).
Stock	29	6	Alphanumeric	Stock symbol (which is right-padded with spaces).
Price	35	19	Price	The display price of the order.
Display	54	1	"Y"	"Y" = displayed in quote

7.5   End Message

This message indicate the snapshot is end. It includes the sequence number of CHIXMMD that should be continued for the snapshot.

END MESSAGE				
NAME	**OFFSET**	**LENGTH**	**VALUE**	**REMARKS**
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"G"	End Message
Sequence Number	9	10	Numeric	Next expected sequence number

8 Sample Data

8.1 CTS is opened and accepting orders

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
CTS is opened	47062943SS

8.2 Snapshot with Stock Summary

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
Stock Summary Message indicate 1 trade on symbol 2531 with price 1000 and quantity 1000	55594803V2531 10000000000 10000000000 10000000000 10000000000 1000000 1000 1

8.3 Short Sell price check activated

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
Stock Status Message indicates symbol 9957 is tradable.	23412935H9957 TN
Stock Status Message indicates short sell price check activated for symbol 9957	27412896H9957 AN

8.4 Short Sell price check deactivated

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
Stock Status Message indicates symbol 9957 is tradable.	23412935H9957 TN
Stock Status Message indicates short sell price check deactivated for symbol 9957	27412896H9957 DN

8.5 An order is placed on CTS

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
Buy of 2531 with 1000 shares entered at 300. Order Reference 1 assigned.	59969658A 1B 10002531 3000000Y

8.6 Snapshot End

ACTION	SNAPSHOT RECOVERY SERVICE MESSAGE
Next sequence number to begin with the snapshot is 7318	55594803G 7318