

CHI-X EUROPE

Title: CHIXMD Feed Specification

Synopsis: This document describes the protocol of the Chi-X CHIXMD Feed. This feed provides a recoverable stream of orders and trades to Chi-X customers and vendors through a TCP session.

Doc Revision: 1.6

Revision Date: June 7th 2010

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System response times may vary for a number of reasons including market conditions, trading volumes and system performance.

Chi-X CHIXMD Feed

1. Overview

The Chi-X CHIXMD Feed is the vendor level data feed of Chi-X Europe Limited, the first order driven Pan European MTF. It disseminates information about orders and executions on Chi-X in real time. The feed is a series of sequenced and unsequenced variable length messages. The messages themselves are encoded in printable ASCII bytes.

The Chi-X CHIXMD Feed shares many similarities to the protocols implemented by other MTFs.

2. Revision History

Name	Description	Date
Version 1.0	New Document Issued	2007-05-16
Version 1.1	Added Long Form Messages	2007-10-04
Version 1.2	Revised Long Form use case	2008-03-04
Version 1.3	Updated header and footer information only	2010-02-03
Version 1.4	Updated Trade Message	2010-05-19
Version 1.5	Typographical update to Section 4.3 and added footnote to p9.	2010-05-27
Version 1.6	Update to description of Order Reference and Buy/Sell indicator in Section 4.6 and updated the relevant use cases accordingly.	2010-06-07

3. Session Protocol

The Chi-X CHIXMD market data feed is built on a simple session layer on top of TCP/IP sockets. The session consists of a series of unsequenced and sequenced messages. The unsequenced messages provide the session level interface that is not part of the market data feed such as login, logout, and heartbeats. The sequenced messages contain the actual market data and are reliable, recoverable, and replayable.

3.1 Data Types

All numeric fields are composed of a string of ASCII coded digits, right justified and space filled on the left.

All alphanumeric text fields are left justified and padded on the right with spaces, and can include letters or digits.

Standard prices are given in decimal format with 6 whole number places followed by 4 decimal digits. Long form prices are given in decimal format with 12 whole number places followed by 7 decimal digits. The whole number portion is padded on the left with spaces; the decimal portion is padded on the right with zeros. The decimal point is implied by position; it does not appear inside the price field.

Timestamp fields are given in milliseconds past midnight UK Local Time.

3.2 Session Initialization

A session begins with the client establishing a TCP session and sending a login packet. If a login packet is not received within 30 seconds the server will terminate the session. Once a login packet is received, the server will respond with a login accepted packet and begin sending sequenced data, or reject the login and terminate the connection.

The session does not actually send explicit sequence numbers with each message, but instead relies upon the concept of implied sequence numbers. The first sequenced message of the day should be considered '1', and each subsequent sequenced message increments this. When recovering a session, you simply count the number of sequenced messages you have received to determine what sequence number you want to recover from. For example, if you login and receive 50 sequenced messages and then are disconnected, when you reconnect you would login and provide your next expected sequence, in this case 51, and the session will continue from that point.

3.3 Session Messages

3.3.1 Debug Message (Inbound)

Debug messages are used to provide additional information to aid developers during development and troubleshooting. They should be discarded.

Debug Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"+"	Debug Message
Text	1	Variable	Text	Free form text.

Terminator	Text Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator
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3.3.2 Login Request (Outbound)

The login request packet is sent by the client to establish the connection immediately after connecting to the server. It is also how session recovery is controlled via the 'sequence' field. All data sent is in ASCII and needs to be space filled. If the Username is "RICK" it should be "RICK ". If the Sequence is 1, it should be " 1".

Login Request Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"L"	Login Request
Username	1	6	Alphanumeric	Username
Password	7	10	Alphanumeric	Password
Session	17	10	Alphanumeric	Requested session ID. For initial login leaving this field blank is recommended. For subsequent logins inclusion of the session ID is recommended.
Sequence	27	10	Numeric	Sequence you wish feed to start from (next expected). 1 indicates the beginning of the day. 0 indicates the last message generated by the system bypassing recovery.
Terminator	37	1	ASCII 10, Hex 0x0A	Message Terminator

3.3.3 Login Accepted (Inbound)

The login accepted packet is sent by the server immediately after, and in response to, a login request packet indicating successful login.

Login Accepted Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"A"	Login Accepted
Session	1	10	Alphanumeric	The session currently logged into.
Sequence	11	10	Numeric	The next sequence number you can expect to receive.
Terminator	21	1	ASCII 10, Hex 0x0A	Message Terminator

3.3.4 Login Rejected (Inbound)

The login rejected packet is sent by the server immediately after, and in response to, a login request packet indicating an unsuccessful login.

Login Rejected Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"J"	Login Rejected
Reject Reason	1	1	Alphanumeric	Reason the login was rejected: A – Invalid username/password. S – Invalid session.

Terminator	2	1	ASCII 10, Hex 0x0A	Message Terminator
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3.3.5 Logout Request (Outbound)

The logout request packet is sent by the client to terminate a session. Upon receipt, the server will immediately close the session.

Logout Request Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"O"	Logout Request
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

3.3.6 Server Heartbeat Message (Inbound)

The server will send a heartbeat message if the link has been idle for more than 1 second.

Server Heartbeat Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"H"	Server Heartbeat Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

3.3.7 Client Heartbeat Message (Outbound)

The client should send heartbeat messages to the server periodically. If the server has not received a heartbeat message from the client for 15 seconds, it will assume the client is no longer listening and will disconnect the client.

Client Heartbeat Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"R"	Client heartbeat message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

3.3.8 Sequenced Data Message (Inbound)

Sequenced data messages will be sent by the server and will contain the actual market data itself. They are also the only messages in the protocol that are or need to be reliable and recoverable. The sequence number itself is implied. The first sequenced data message of the current session should be considered sequence number 1, with each subsequent sequenced message incrementing this by 1.

Sequenced Data Message				
Name	Offset	Length	Value	Notes
Message Type	0	1	"S"	Sequenced data message
Data	1	Variable	Alphanumeric	Sequenced data. This is where all messages relating to the actual market data feed will be found. A message with zero length indicates the end of the session and no more messages are available.

Terminator	Data Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator
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4. Market Data

The Chi-X CHIXMD Feed service is composed of a series of messages that describe orders added to, removed from, and executed on Chi-X. All of these messages will be contained in a 'Sequenced Data Message' and are inbound messages to the client.

4.1 System Event Message

System Event Messages signal events that affect the entire Chi-X system.

System Event Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"S"	System Event Message
Event Code	9	1	Alphanumeric	"S" = Start of Day. This is always the first message sent in any trading day. "E" = End of Day. This is always the last message sent in any trading day.

4.2 Add Order Message

An Add Order Message indicates that Chi-X has accepted a visible order into the book. It includes a day-unique Order Reference key assigned by Chi-X to the order. (Note: the issuing of an Add Order Message is not necessarily always for a new order. See section "Modification of Existing Orders".)

Add Order Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"A"	Add Order Message
Order Reference	9	9	Numeric	Day unique order reference number
Buy/Sell Indicator	18	1	Alphanumeric	"B" = Buy Order "S" = Sell Order
Shares	19	6	Numeric	Total number of shares being added to the book (may be less than the number of shares entered because part of the order may trade before being posted to the book).
Stock	25	6	Alphanumeric	Stock symbol right padded with spaces.
Price	31	10	Price	The display price of the order.
Display	41	1	Alphanumeric	"Y" = displayed in quote You will only receive "Y" currently.

Long Form Add Order Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"a"	Add Order Message
Order Reference	9	9	Numeric	Unique reference number,
Buy/Sell Indicator	18	1	Alpha	"B" = Buy Order "S" = Sell Order
Shares	19	10	Numeric	Total number of shares being added to the book (may be less than the number of shares entered because part of the order may trade before being posted to the book).
Stock	29	6	Alpha	Stock symbol right padded with spaces.
Price	35	19	Price	The limit price of the order.
Display	54	1	Alpha	"Y" = displayed in quote

4.3 Order Execution Message

This message is sent whenever a visible order on the book is executed in whole or in part.

Order Execution Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"E"	Order Execution Message
Order Reference	9	9	Numeric	The reference key of the order that was executed. References a previously sent Add Order Message.
Executed Shares	18	6	Numeric	The number of shares executed on this trade
Trade Reference	24	9	Numeric	Day unique trade reference number

Long Form Order Execution Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"e"	Order Execution Message
Order Reference	9	9	Numeric	The reference key of the order that was executed, if applicable. References a previously sent Add Order Message.
Executed Shares	18	10	Numeric	The number of shares executed this trade
Trade Reference	28	9	Numeric	Day unique trade reference number

4.4 Order Cancel Message

This message is sent whenever an order on the book is fully canceled, its quantity revised down or when a pegged order is re-priced.

Order Cancel Message				
Name	Offset	Length	Value	Notes

Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"X"	Order Cancel Message
Order Reference	9	9	Numeric	The reference number of the order being canceled. References a previously sent Add Order Message.
Canceled Shares	18	6	Numeric	Number of shares cancelled

Long Form Order Cancel Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"x"	Order Cancel Message
Order Reference	9	9	Numeric	The reference number of the order being canceled. References a previously sent Add Order Message.
Canceled Shares	18	10	Numeric	Number of shares cancelled

4.5 Modification of Existing Orders

A price modification of an existing order is represented in CHIXMD by the issuing of a Cancel Message (for full open quantity) on the existing order followed by an Add Order Message that uses the same Order reference.

Reduction of quantity order is represented in CHIXMD by the issuing of a Cancel Message on the existing order. The cancel message can reduce the number of shares currently pending in the referenced open order by the number of shares indicated. When the number of currently pending shares for an order reaches zero, the order is dead and should be removed from the book.

4.6 Trade Message

This message is sent when a trade occurs against order quantity not visible on the book (i.e. a fully or partially hidden order). They do not affect the book and can be ignored if you are building a book.

Trade Messages are required to provide time-and-sales and other execution based data; they fill in the gaps left when an order that is not otherwise visible on the data feed is executed.

By combining the executions received separately via both Order Execution Messages and Trade Messages, it is possible to build a complete view of all executions that happen on Chi-X.

Trade Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"P"	Trade Message
Order Reference	9	9	Numeric	The Order Reference will always be set to 0 (zero).
Buy/Sell Indicator	18	1	Alphanumeric	The Buy/Sell indicator will always be set to "B".
Shares	19	6	Numeric	Number of shares executed
Stock	25	6	Alphanumeric	Symbol, right padded with spaces

Price	31	10	Price	Match price of the order
Trade Reference	41	9	Numeric	Trade reference number generated for this trade. ¹

Long Form Trade Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"p"	Trade Message
Order Reference	9	9	Numeric	The Order Reference will always be set to 0 (zero)
Buy/Sell Indicator	18	1	Alpha	The Buy/Sell indicator will always be set to "B".
Shares	19	10	Numeric	Number of shares executed
Stock	29	6	Alpha	Symbol, right padded with spaces
Price	35	19	Price	Match price of the order
Trade Reference	54	9	Numeric	Trade reference number generated for this trade.

4.7 Broken Trade Message

The Broken Trade message is sent whenever an execution on Chi-X is broken. A Broken Trade is final; once a trade is broken it cannot be reinstated.

Broken Trades happen only rarely and will only affect applications that build a time-and-sales database or maintain cumulative volumes or high/low calculations. If you are only building a book, you can ignore these messages; they have no effect on the book.

Broken Trade Message				
Name	Offset	Length	Value	Notes
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"B"	Broken Trade Message
Trade Reference	9	9	Numeric	The trade reference number of the execution that was broken. This refers to a trade reference number from a previously transmitted Order Execution or Trade Message.

5.0 Example Output

5.1 Order added then fully trades

Action	CHIXMD Message
Sell of 100 BTI shares entered at 311.75p. Order Ref of 638 assigned.	38743037A 638S 100BTI 3117500Y
Matching buy order entered and trade results with Trade Ref 355.	38754246E 638 100 355

¹ When the Trade Message relates to a match on Chi-Delta then the Trade Reference will always end in zero. This applies to the Long Form version as well.

Note there is no Add Order message for the buy order. It is not displayed on the book so no alert goes out.

The Execution message has no price. The consumer must infer the execution price based on the limit of the original order.

5.2 Order added, fully trades and residual amount of matching order is placed on the book.

Action	CHIXMD Message
Buy of 111 TRILI shares entered at 436.25p. Order Ref of 2 assigned.	46143332A 2B 111TRILI 4362500Y
Matching sell order entered for 112 shares of TRILI. Execution message sent with Order Ref 2, Trade Ref 1.	46300560E 2 111 1
Addition of residual 1 share of sell order onto the book.	46300713A 4S 1TRILI 4362500Y

5.3 Pegged/Market Order added to book.

Action	CHIXMD Message
Sell of 100 RDSAa shares entered with a pegged order attribute. Order Ref 663 assigned. The display price is 26.57.	9323626A 663S 100RDSAa 265700Y
Each time the price moves and this order is re-priced a Cancel is sent.	39329400X 663 100
Then an Add message is sent but note that the Order Ref is the same. The display price is now 26.56.	39329400A 663S 100RDSAa 265600Y

Note: Chi-X market orders will behave in the same way as above.

5.4 Price Revision.

Action	CHIXMD Message
Sell of 1000 RDSAa shares entered. Order Ref 670 assigned. The display price is 26.58.	39465381A 670S 1000RDSAa 265800Y
Price is revised to 26.59. Cancel is sent.	39476527X 670 1000
Then an Add message is sent but note that the Order Ref is the same. The display price is now 26.59.	39476527A 670S 1000RDSAa 265900Y

5.5 Revision of Order Quantity Down.

Action	CHIXMD Message
Sell of 1000 RDSAa shares entered. Order Ref 671 assigned. The display price is 26.59.	39476527A 671S 1000RDSAa 265900Y
The order is then revised in quantity down by 100 shares, a Cancel message informs the consumer of this.	39483706X 671 100

Note: The consumer is expected to calculate the residual amount of the original order still open. Chi-X does not currently support upward revision of total order quantity.

5.6 Order Revision Results in Execution.

Action	CHIXMD Message
A visible sell order for 1666 BTI shares is placed on the book with a display price of 311.75p	38821658A 642S 1666BTI 3117500Y
A visible buy order of 1066 shares is placed on the book with a display price of 311p	38841745A 644B 1066BTI 3110000Y
The buy order is revised to a display price of 311.75. This results in a Cancel message.	38852664X 644 1066
Then the sell order trades and an Execution message is sent.	38852664E 642 1066 356

5.7 Execution of a Fully Hidden Order

Action	CHIXMD Message
A hidden sell order of 666 BTI shares is put onto the Chi-Delta book with a limit price of 311.75p ²	[No message for hidden order]
A buy order of 666 shares is entered. This results in a Trade message against the hidden order quantity.	39067957P 0B 666BTI 3117500 350

5.8 Trades against a Partially Hidden Order (Iceberg)

Action	CHIXMD Message
A sell order of 10000 RDSAa shares is put on the book with a visible quantity of 1000 shares. The display price is 26.55. This results an A message for the visible amount.	40792757A 2454S 1000RDSAa 265500Y
A Buy order for 500 shares is entered and crosses. 500 shares remains on the book.	40812453E 2454 500 1953
Then a Buy order for 4000 shares is entered and crosses against the iceberg. We first get a visible trade of 500 shares.	40825082E 2454 500 1954
Then a Trade is sent against the not visible quantity of 3500 shares.	40825082P 0B 3500RDSAa 265500 1954
Finally the peak is refreshed onto the book. An Add message is sent for 1000 shares.	40825082A 2454S 1000RDSAa 265500Y

5.10 Trade Cancellation (Bust)

Action	CHIXMD Message
A sell order of 111 RDSAa shares is put on the book. The display price is 26.52. This results an A message for the visible amount.	42119703A 4716S 111RDSAa 265200Y

² This example can be used also a guide for Large in Scale hidden orders in the Lit order book.

An Execution message is generated by a matching order. The Trade Ref is 4152.	42124752E 4716 111 4152
Then the trade is cancelled by Chi-X. A Broken Trade message goes out for each side of the trade.	42204572B 4152 42204574B 4152

5.11 Long Form Messages (Execution of visible order)

Action	CHIXMD Message
Buy of 1,000,000 RBSI shares entered at 80,000,000p. Order Ref of 109 is assigned.	36417412a 109B 1000000RBSI 8000000000Y
An Execution message is generated by a matching order. The Trade Ref is 28.	36447020e 109 1000000 28

5.12 Long Form Messages (Execution against hidden order)

Action	CHIXMD Message
Trade messages generated by an execution against hidden quantity.	36447020p 0B 200000RBSI 8000000000 29

5.13 Long Form Messages (Cancellation of Visible Order)

Action	CHIXMD Message
Buy of 1,000,000 RBSI shares entered at 80,000,000p. Order Ref of 111 is assigned.	36417412a 111B 1000000RBSI 8000000000Y
Then the order is cancelled by Chi-X.	36453536x 111 1000000