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Universal Trading Platform Market Data

Equities Feed Specifications

OrderBook Appendix

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Overview

This document details the Specifications of the Equities OrderBook Feed.

History

V 1.4, 6 March 2009:

- Modification of the description of Instrument identifiers (Chapter 1.8)
- Modification of description of the field 'PacketType' (Chapter 2.1);
- Correction of offset content in the 231 message (chapter 2.2);
- Modification of Heartbeat frequency (Chapter 3.3)
- Add of new 'RejectReason' for the retransmission responses (chapter 3.6).
-

V 1.3, 6 October 2008:

- Modification of the 'Introduction' description (Chapter 1.1)
- Modification of the 'Date and times conventions' description (Chapter 1.4)
- Modification of the 'Data types' description (Chapter 1.7)
- Add of the 231 message 'Orderbook retransmission delimiter' (Chapter 2.2)

V 1.2, 25 September 2008:

- Addition of new chapter General Notes (chapter 1);
- Renumbering chapters because of insertion of new chapter 1
- Modification of the possible values of field 'OrderType' (chapter 2.2);
- Modification of description of the field 'DeliveryFlag' (chapter 2.1, 3.1);
- Modification of the description of the field 'ActionType' (chapter 2.2);
- Deletion of type "5" from description of Technical Packet Header (chapter 3.1);
- Message in chapter 3.2 is Packet Sequence Number reset, text corrected for this
- Modification of the description of the field 'BeginSeqNum' (chapter 3.5);
- Modification of the description of the field 'EndSeqNum' (chapter 3.5);
- Modification of the description of the field 'SourceID' (chapter 3.5);
- Deletion of all Refresh related messages

V 1.1, 18 July 2008:

- Modification of the description of field 'DeliveryFlag' (chapter 1.1, 2.1)
- Modification of the description of field 'PacketSeqNum' (chapter 1.1, 2.1)

V1.0, 16 May 2008: Initial version.

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Chapter 1 – General Notes

1.1 Introduction

The Universal Trading Platform Market Data Equities Feed is a real-time data feed that disseminates market data for Cash markets and Indices instruments.

This specification is aimed at developers that wish to write applications that interface with the Equities Market data feed.

1.2 Multicast Streams

Dual multicast streams are made available for the distribution of real-time and refresh data.

Equities Trade data is provided across multiple multicast streams. Users should refer to supporting documentation for information on what data is carried in each multicast group.

Subscribers should connect to multicast stream(s) for which they require data.

1.3 TCP/IP Channels

TCP/IP channels are made available for retransmission requests and responses.

The user can choose to disconnect/reconnect in between requests. However if choosing to remain connected, the user will need to respond to heartbeat requests from the exchange.

1.4 Date and Time Conventions

Dates and Times use UTC (Universal Time, Coordinated).

The base for timestamps in Packet headers is the number of milliseconds since the previous Sunday 00:00:00.000 UTC (so in the night from Saturday to Sunday).

The base for timestamps in Message bodies is the number of milliseconds since previous midnight 00:00:00.000 UTC.

For example Wednesday 15:30:00.000 UTC is indicated as 315000000 in a Packet Header or 55800000 in a message body.

1.5 Sequence Numbers

The feed contains two sequence numbers:

- The packet sequence number is part of the packet header, and should be used for retransmission requests. It is unique per service, and common across a pair of dual multicast streams.
 - The source sequence number is assigned by the source system to this message. Whilst this sequence number increases serially, it does not increase monotonically.
-

1.6 Price Formats

Prices in this feed are represented by two fields, an integer value and a scale code. All prices in the feed share a common scale code, which is represented in the PriceScaleCode.

The value should be calculated using the following formula:

$$Value = \frac{Integer}{10^{ScaleCode}}$$

For example, a price of 27.56 is represented by an Integer of 2756 and a PriceScaleCode of 2.

1.7 Data Types

All "Binary" formatted fields are numeric unsigned binary. All "Binary (signed)" formatted fields are signed binary. Binary data is in network byte order (Big Endian).

All "ASCII Str." And "ASCII Ch." Fields are alphanumeric, left justified and null padded.

1.8 Instrument Identifiers

An instrument is identified by its SymbolIndex, across all feeds that relate to that instrument. The SymbolIndex is arbitrarily assigned by the feed, and will not change for the lifetime of the instrument.

The SymbolIndex can take a different value for the same instrument depending on the environment (Production or Test).

Standard security identifiers (for example ISIN, Euronext Trading Code) can be found in the 553 Reference Data message (as detailed in the Market Information Appendix).

Chapter 2 – Message Specifications: Equities OrderBook.

Overview

The Equities OrderBook service uses the push-based publishing model. This means that data will be published based on its availability. Once information is available, it will be published to subscribers.

List of the messages in the Equities OrderBook:

- Order update
- Orderbook retransmission delimiter

2.1 Packet Header Format

All messages are preceded by a common header format. The table describes the header fields of an OrderBook message.

Field	Offset	Size (Bytes)	Format	Description
PacketLength	0	2	Binary	Length of the packet including the 16-bytes packet header.
PacketType	2	2	Binary	Identifier for the type of data contained in the packet. 230 - Order Update message - 80 Bytes. 231 - Orderbook retransmission delimiter message - 32 Bytes.
PacketSeqNum	4	4	Binary	This field contains the packet sequence number. It is unique for each broadcast stream (multicast group) and is used for gap detection. It increases serially and monotonically and is reset to 1 at the beginning of each trading day.
SendTime	8	4	Binary	Timestamp in millisecond indicating the packet broadcast time. The number represents the number of milliseconds since midnight of the last Sunday 00:00 UTC.
ServiceID	12	2	Binary	Numeric value identifying the broadcast stream. Possible values are described in Feed Configuration descriptions
DeliveryFlag	14	1	Binary Bit Map	Indicates delivery method. 0 - Real Time message (Uncompressed) 2 - Retransmission message (Uncompressed) 8 - Real Time message (Compressed using FAST) 10 - Retransmission message (Compressed using FAST)
NumberMsgEntries	15	1	Binary	The number of messages that are contained within the packet.

2.2 Order Update

The table below describes the body fields of an Equities OrderBook message, **MsgType = '230' Order Update.**

Field Name	Offset	Size (Bytes)	Format	Description
MsgSize	16	2	Binary	Length of the message body, excluding the 2 bytes MsgSize field.
MsgType	18	2	Binary	230 - Order Update Message
SymbolIndex	20	4	Binary	Index of the Symbol- Stock representation
SourceTime	24	4	Binary	This field specifies the time when the Order Update is generated. Note, when an order is added, the SourceTime represents the order entry time. The number in this field represents the number of milliseconds since midnight of the same day. Ex: If SourceTime = 13:12:56 secs, 170ms and 30 microsecs, this field

				will contain 47576170
SourceSeqNum	28	4	Binary	This field specifies the sequence number assigned by the source system to this message. Please note that while the sequence number increases serially, it does not increase monotonically.
Price	32	4	Binary	Price point (according to PriceScaleCode)
AggregatedVolume	36	4	Binary	Total interest quantity at a price point
Volume	40	4	Binary	Difference between the previous and current size at the price point
LinkID	44	4	Binary	The LinkID identifies a unique transaction in the matching and allows you to correlate execution reports and quotes to the last sale. This field is populated only when an execution occurs. (optional).
OrderID	48	4	Binary	Identifies the uniqueness of the order, when combined with OrderDate.
SystemID	52	4	Binary	The ID of the originating Exchange/System of the message.
SourceTimeMicroSecs	56	2	Binary	Number of micro seconds. To be combined with SourceTime.
NumberOrders	58	2	Binary	Number of order at the current price point
Side	60	1	ASCII Ch.	Side: 'B' Buy, 'S' Sell.
OrderType	61	1	ASCII Ch.	Type of Order. Valid values: <u>For instruments traded on NSC:</u> 'O' Opening Price Order 'L' Limit Order, 'X' Market Order. <u>For instruments traded on UTP:</u> '1' Market order '2' Limit order 'K' Market to limit order 'P' Peg order
ActionType	62	1	ASCII Ch.	This field identifies why the volume (size) at the price point was modified. Values reserved for future use (US markets): 'O', 'C', 'E', 'X', 'Z' Valid values: 'A' - New order 'M' - Modification of existing order 'D' - Deletion of order identified by OrderID 'P' - Deletion of order identified by OrderID and all preceding orders 'F' - Deletion of all orders for the given instrument 'Y' - Retransmission of all orders for the given instrument
PriceScaleCode	63	1	Binary	Applicable to all prices in the message
<i>The following fields will be removed in the future</i>				
OrderDate	64	4	Binary	Date of order (YYYYMMDD). To be combined with OrderId.
OrderPriorityDate	68	4	Binary	Date giving the priority of the order (YYYYMMDD)
OrderPriorityTime	72	4	Binary	Time giving the priority of the order (HHMMSSsss)
OrderPriorityMicroSecs	76	2	Binary	Number of micro seconds in the current millisecond
Filler	78	2	Binary	

2.2 Orderbook retransmission delimiter

The table below describes the body fields of an Equities OrderBook message, **MsgType = '231' Orderbook retransmission delimiter.**

Field Name	Offset	Size (Bytes)	Format	Description
MsgSize	16	2	Binary	Length of the message body, excluding the 2 bytes MsgSize field.
MsgType	18	2	Binary	'231' - Orderbook retransmission delimiter Message
SourceTime	20	4	Binary	This field specifies the time when the Order Update is generated. Note, when an order is added, the SourceTime represents the order entry time. The number in this field represents the number of milliseconds since midnight of the same day.

				Ex: If SourceTime = 13:12:56 secs, 170ms and 30 microseconds, this field will contain 47576170
SourceSeqNum	24	4	Binary	This field specifies the sequence number assigned by the source system to this message. Please note that while the sequence number increases serially, it does not increase monotonically.
TradingEngineID	28	2	ASCII Str.	Code identifying the trading engine. Valid values: VE: NSC-VE C1: UTP Equities
InstanceID	30	1	Binary	Indicates the number of instances for a given trading engine rebroadcasting orderbooks.
RetransmissionIndicator	31	1	ASCII Ch.	Indicates the status of the retransmission for the instance of the trading engine: 'B' Beginning of the retransmission 'E' End of the retransmission

Chapter 3 – Equities OrderBook technical message specifications

Overview

There are two types of messages transmitted as part of this protocol: control and data. Control messages do not contain data, they allow conversing parties to exchange session-specific information (e.g., 'reset sequence number'). Data messages are product specific and, although they will adhere to the specification referred in chapter one.

3.1 Packet Header Format

All technical messages will contain a common packet header. The table below describes the header fields of a technical Equities OrderBook messages.

The design is intended to minimize the development burden on behalf for subscribers.

Meaning that, all subscribers may implement line-level protocol processing once, and then only need develop parsing algorithms for their choice of message.

Field	Offset	Size (Bytes)	Format	Description
PacketLength	0	2	Binary	Length of the packet including the 16-byte packet header.
PacketType	2	2	Binary	Identifier for the type of data contained in the packet. 1 - Sequence Number Reset 2 - Heartbeat Message 10 - Retransmission Response message 20 - Retransmission Request Message 22 - Refresh Request message 23 - Refresh response message 24 - Heartbeat Response Message
PacketSeqNum	4	4	Binary	This field contains the packet sequence number. It is unique for each broadcast stream (multicast group) and is used for gap detection. It increases serially and monotonically and is reset to 1 at the beginning of each trading day.
SendTime	8	4	Binary	Timestamp in millisecond indicating the packet broadcast time. The number represents the number of milliseconds since midnight of the last Sunday 00:00 UTC.
ServiceID	12	2	Binary	Numeric value identifying the broadcast stream. Possible values are described in Feed Configuration descriptions
DeliveryFlag	14	1	Binary Bit Map	Indicates delivery method. 0 - Real Time message (Uncompressed) 2 - Retransmission message (Uncompressed) 8 - Real Time message (Compressed using FAST) 10 - Retransmission message (Compressed using FAST)
NumberMsgEntries	15	1	Binary	The number of messages that are contained within the packet.

3.2 Packet Sequence Number reset

This message is sent to 'reset' the Packet Sequence Number at start of day, in response to failures, etc. Note that this message will contain a valid sequence number. The message format is shown below.

Packet Sequence Number Processing Notes.

Packet Sequence numbers normally begin at one (1) and increase monotonically with each subsequent packet. There are two scenarios where the packet sequence number is reset (besides the start of day). Firstly, if the value should exceed the maximum value that the SeqNum field may contain, it will be reset to one (1). Secondly, if the system fails and it recovers, it sends a Packet Sequence Number reset message. The PacketSeqNum field of that packet will be set to one (1) and the NextSeqNumber field will be set to two (2).

Field	Offset	Size (Bytes)	Format	Description
Defined below are the 'body' fields of the Sequence Number Reset				
NextSeqNumber	16	4	Binary	Contains the packet sequence number value that the customer should expect in the immediately succeeding data packet. Note that this packet will contain its own valid packet sequence number in the header portion of the message.

3.3 Heartbeat

Heartbeat messages are sent in the multicast streams as well as in the active TCP/IP retransmission sessions.

General heartbeat Processing notes.

- ✓ Heartbeat messages will only contain the packet header (with PacketType = '2'). The packet will not contain a message body.
- ✓ Heartbeat frequency is 2 seconds.

Retransmission heartbeat Processing notes.

- ✓ Subscribers may receive a heartbeat message if they have an active TCP/IP session with the retransmission server
- ✓ Subscribers that choose to establish and remain connected to the retransmission server intraday must respond to a heartbeat message with a heartbeat response message.
- ✓ The time out for this heartbeat response message is set at 5 seconds. If no response is received by the server within this timeframe, the TCP/IP session will be disconnected.

3.4 Heartbeat Response

Subscribers that choose to establish and remain connected to the retransmission server intraday, must respond to a heartbeat message with a heartbeat response message.

Note that the fields in the packet header should be filled as follows:

PacketLength = 36
 PacketType = 24
 PacketSeqNum = optional
 SendTime = optional
 ServiceID = optional
 DeliveryFlag = 0
 NumberMsgEntries = 1 (only 1 heartbeat response message should be sent per packet)

Field	Offset	Size (Bytes)	Format	Description
Defined below are the 'body' fields of the Heartbeat response				
SourceID	16	20	ASCII Str.	This field represents the Identifier of the source (client) requesting

				retransmission. Field is null padded, left aligned.
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3.5 Retransmission on Request

This message is sent by subscribers requesting missing messages. The system will retransmit the appropriate message(s).

Note that the fields in the packet header should be filled as follows:

PacketLength = 44
 PacketType = 20
 PacketSeqNum = optional
 SendTime = optional
 ServiceID = Service ID of the broadcast stream corresponding to the request, in other words the stream for which messages need to be recovered by the client.
 DeliveryFlag = 0
 NumberMsgEntries = 1 (only 1 retransmission request should be sent per packet)

Field	Offset	Size (Bytes)	Format	Description
Defined below are the 'body' fields of the Retransmission Request				
BeginSeqNum	16	4	Binary	Begin Sequence Number of the requested range of messages to be retransmitted. Note the Sequence Number refers to the PacketSeqNum in the header. Remark: The broadcast stream from which a retransmission is requested has to be stated in the field ServiceID in the Packet header of the RetransmissionRequest message.
EndSeqNum	20	4	Binary	End Sequence Number of the requested range of messages to be retransmitted. Note the Sequence Number refers to the PacketSeqNum in the header. Remark: The broadcast stream from which a retransmission is requested has to be stated in the field ServiceID in the Packet header of the RetransmissionRequest message.
SourceID	24	20	ASCII Str.	This field represents the Identifier of the source (client) requesting a retransmission. Source-ID is pre-set by the Exchange and is subject to validation. Field is null padded, left aligned.

3.6 Retransmission on Response

This message will be sent immediately via TCP/IP in response to the subscriber's request for retransmission messages.

Field	Offset	Size (Bytes)	Format	Description
Defined below the 'body' fields of the Retransmission Response				
SourceSeqNum	16	4	Binary	This field contains the request message sequence number assigned by the client. It is used by the client to couple the request with the response message.
SourceID	20	20	ASCII Str.	This field represents the Identifier of the source (client) requesting retransmission. Field is null padded, left aligned.
Status	40	1	ASCII Str.	Indicates whether the retransmission request was accepted or rejected. Valid values: 'A' - Accepted 'R' - Rejected.

RejectReason	41	1	Binary	Indicates the reason for the rejection. Valid values: 0 Message was accepted 1 Rejected due to permissions (the ServiceID is not granted for the SourceID or a connection is already open for this SourceID) 2 Rejected due to invalid sequence range 3 Rejected due to max sequence range reached (> thresholds) 4 Rejected due to max request reached in a day (> thresholds) 5 - Rejected - Requested packets are no longer available 6 - Rejected - Retransmission request incorrectly formatted
Filler	42	2	ASCII Str.	For future use

3.7 Retransmission Message

Upon receipt of a valid retransmission request message, the requested message(s) will be sent. This message(s) has the same message format and content as the original sent by the system.