DOCUMENT TITLE

Universal Trading Platform Market Data

Equities Feed Specifications

Quotes & BBO10 Appendix

STATUS

Version 1.4

6 March 2009

Introduction

Copyright Trademark Statements

Overview

This document details the Specifications of the Equities Quotes Feed.

History

V 1.4, 6 March 2009:
- Modification of the size (bytes) of field 'TypeOfAskPrice' (chapter 2.2);
- Add of new 'RejectReason' for the retransmission responses (chapter 3.6).
- Modification of the description of Instrument identifiers (Chapter 1.8)
- Modification of Heartbeat frequency (Chapter 3.3)

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)
- Modifications of the description of some fields in the 140 message.

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 description of field 'PacketType' (chapter 2.1);
- Modification of description of field 'DeliveryFlag' (chapter 2.1, 3.1);
- Modification of description of field 'QuoteNumber' (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 description of field 'BeginSeqNum' (chapter 3.5);
- Modification of description of field 'EndSeqNum' (chapter 3.5);
- Modification of description of field 'SourceID' (chapter 3.5, 3.6, 3.7);

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)
- Add of 2 fields in the '140 - Quotes' message: 'TypeOfBidPrice' and 'TypeOfAskPrice' (Chapter 1.2)
- Modification of the lenght of field 'SystemID' in the '141 - Weighted average spread' message (Chapter 1.3)
- Modification of the description of field 'QuoteNumber' in the '140 - Quote' message (Chapter 1.2).

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 – Equities Quotes message specifications

Overview

The Equities Quotes service uses the push-based publishing model. This means that data will be published based on its availability. Once a Quote is available, it will be published to subscribers.
The Equities Quote message reflects a configurable number of highest bids and lowest offers (e.g. BBO1, BBO10, ...) in each NYSE Euronext traded security.
List of the message types in the Equities Quotes Feed:

Quotes
WAS

2.1 Packet Header Format

All messages are preceded by a standard header format. The table on the next page describes the header fields of a Quotes 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. If all messages within a packet are of the same message type, the packet type will be equal to that message type. If not, the packet type will be set at 994. Possible values: 994 - Generic Quotes Message. 140 - Quotes Message - 68 Bytes 141 - WAS message - 52 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 Quotes

The table below describes the body fields of an Equities Quotes message, **MsgType = '140' Quotes.**

Field Name	Offset	Size (Bytes)	Format	Description
MsgSize	16	2	Binary	Length of the message body, excluding the 2 byte MsgSize field.
MsgType	18	2	Binary.	140 - Quote Message – Quotes
SymbolIndex	20	4	Binary	Index of the Symbol- Stock representation
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
SourceTime	28	4	Binary	This field specifies the Quote generation 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.
QuoteLinkID	32	4	Binary	Identifies a unique quote that the Trade executed against. Not provided for European Market
AskPrice	36	4	Binary	Ask Price for Quote (according to ScaleCode) Specific values: FF FF FF FE: Market Order or Market To Limit Order FF FF FF FD At Opening Order
AskSize	40	4	Binary	Size of the Quote on Ask side in securities
BidPrice	44	4	Binary	Bid Price for Quote (according to ScaleCode) Specific values: FF FF FF FE: Market Order or Market To Limit Order FF FF FF FD At Opening Order
BidSize	48	4	Binary	Size of the Quote on Bid side in securities
SystemID	52	4	Binary	The ID of the originating Exchange/System of the message.
NumberAskOrders	56	2	Binary	Number of sell orders for a best offer
NumberBidOrders	58	2	Binary	Number of buy orders for a best bid
SourceTimeMicroSecs	60	2	Binary	Number of micro seconds. To be combined with SourceTime.
TypeOfAskPrice	62	**1**	Binary	Valid values: 0 - Limit order 1 - Market order 2 - Opening order
TypeOfBidPrice	63	1	Binary	Valid values: 0 - Limit order 1 - Market order 2 - Opening order
QuoteCondition	64	1	ASCII Ch.	Valid values: **European markets** '0' - No Liquidity provider (LP) '1' - LP only on Ask side '2' - LP only on Bid side '3' - LP on Ask and Bid sides Null Not provided/Not applicable
QuoteNumber	65	1	Binary	Indicates the level in the order book for the given aggregate quote, derived from it's price value. Level '0' is dedicated to the market summary (The market summary for an instrument is the summary of the orders that would be executed if the opening of an instrument took place at the moment that this message is sent.
ScaleCode	66	1	Binary	Applicable to all prices in the message
Filler	*67*	*1*	*Ascii Str*	*For future use.*

2.3 WAS

The table below describes the body fields of an Equities Quotes WAS message, **MsgType = '141' Weighted average spread.**

Note: European Specificities. Not applicable to US Market.

Field Name	Offset	Size (Bytes)	Format	Description
MsgSize	16	2	Binary	Length of the message body, excluding the 2 byte MsgSize field.
MsgType	18	2	Binary	141 - Quote Message – Weighted Average Spread
SymbolIndex	20	4	Binary	Index of the Symbol- Stock representation
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

SourceTime	28	4	Binary	This field specifies the message generation time. The number in this field represents the number of milliseconds since midnight of the same day. Example: If SourceTime = 13:12:56 secs, 170ms and 30 microsecs, this field will contain 47576170.
BuyingPrice	32	4	Binary	Buying price of the Weighted Average Spread (according to ScaleCode).
SellingPrice	36	4	Binary	Selling price of the Weighted Average Spread (according to ScaleCode).
MoneyAmount	40	4	Binary	Money amount for calculation of the WAS (according to MoneyScaleCode)
SystemID	44	4	Binary	The ID of the originating Exchange/System of the message
SourceTimeMicroSecs	48	2	Binary	Number of micro seconds. To be combined with SourceTime.
ScaleCode	50	1	Binary	Applicable to all prices in the message
MoneyScaleCode	51	1	Binary	To be combined with MoneyAmount.

Chapter 3 – Equities Quotes 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 on the next page describes the header fields of a technical Equities Market Information 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 beloware 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.

3.5 Retransmission 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 retransmission. Source-ID ispre-set by the Exchange and subject to validation. Field is null padded, left aligned.

3.6 Retransmission 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 are 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 a reception 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.