



DOCUMENT TITLE

Universal Trading Platform Market Data

CASH

Compressed Feed Specifications for low bandwidth offer

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Overview and Background

To help Cash Members depending on connectivity to our “lower capacity” PoPs in Brussels and Lisbon, NYSE Euronext has designed a new version of the UTP-MD Cash Market data feed which includes the stripping of some functionality and the addition of Zlib compression. This new feed can be delivered via 10Mbps lines, which is the maximum bandwidth available in these PoPs. This version of the UTP-MD Cash market data feed is called UTP-MD Cash Compressed.

This document details the specifications of the UTP-MD Cash Compressed feed.

History

V1.0, May 2009: Initial version.

Glossary

Acronym	Term/Meaning
CF	Compressed Feed.
LB	Low Bandwidth solution.
Product	Smallest set of data a customer can subscribe to.
Service	Smallest set of data a customer can receive. Set of coherent messages. Products comprise one or more services.
UDP	User Datagram Protocol.

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Chapter 1 – Cash CF Processing Notes

1.1 Overview

The Cash Compressed Feed (CF) is a compressed real-time market data feed built on multicast protocol. Customers can choose to receive the Equities and/or Warrants real-time feeds in a ZLiB compression format. This is a method for compacting data resulting in reduced bandwidth.

The complete ZLiB specifications are available at :
http://www.zlib.net/zlib_docs.html

A retransmission facility - compressed - is available for recovery purposes.

In order not to exceed the bandwidth limit set, the information broadcast related to the NYSE Euronext Equities Order Book messages may, technically, be disabled during the trading session at the discretion of Cash Market Surveillance. This technical action is fully independent of the functional behaviour of the trading engine.

1.2 Multicast Streams

The following part will provide you with all necessary connectivity information in order to subscribe to one of the compressed feeds.

The Cash CF will be split into three products: two for Equities and one for Structured Products, which is also called Warrants.

The compressed feed is published using two sets of unique IP Multicast Group IDs ("Primary Feed A" and "Secondary Feed B"). The two will originate from the same distribution site. The feeds are redundant to each other, e.g. they are synchronized with each other.

Subscribers should connect to (i.e. join) the multicast stream(s) for which they require data.

The tables below show the UDP/IP configuration for both the primary and the secondary feeds, illustrated for both the Production platform and the External User Acceptance platform.

In this table the following indicators are used:

S = Source IP

G = Group

P = UDP Port

Production Platform			
Products	Service ID	Primary Feed (A)	Secondary Feed (B)
EQUITIES (compressed)	201 NYSE Euronext Equities ORDERS	S: 156.48.126.120/29 G: 224.0.52.23 P: 21066	S: 156.48.126.112/29 G: 224.0.53.23 P: 21067
	202 NYSE Euronext Equities OTHERS	S: 156.48.126.107 G: 224.0.52.24 P: 21068	S: 156.48.126.112/29 G: 224.0.53.24 P: 21069
WARRANTS (compressed)	203 NYSE Euronext Warrants (all)	S: 156.48.126.120/29 G: 224.0.52.25 P: 21070	S: 156.48.126.112/29 G: 224.0.53.25 P: 21071

Please note that the sum of whole compressed multicast feeds delivered will be contained within 5 Mbps per SFTI 10Mbps line. The remaining bandwidth is shared between Order Entry and dedicated TCP IP Retransmission channels.

External User Acceptance Platform			
NB: Only Equities Products are available.			
Products	Service ID	Primary Feed (A)	Secondary Feed (B)
EQUITIES (compressed)	11 NYSE Euronext Equities ORDERS	S: 156.48.126.120/29 G: 224.0.52.22 P: 21064	S: 156.48.126.99 G: 224.0.53.22 P: 21065
	12 NYSE Euronext Equities OTHERS	S: 156.48.126.107 G: 224.0.52.27 P: 21074	S: 156.48.126.99 G: 224.0.53.27 P: 21075

Rendez Vous Point	RP1 Primary Feed (A)	RP2 Secondary Feed (B)
	S: 156.48.121.2 Associated to G: 224.0.52.x	S: 156.48.121.55 Associated to G: 224.0.53.x

1.3 Feeds

The tables describe the contents of each compressed service for the Production and the EUA platforms.

Production Platform		
Products	Service ID	Contents
EQUITIES (compressed)	201 NYSE Euronext Equities ORDERS	All information related to the following packet types: <ul style="list-style-type: none"> NYSE Euronext Cash markets - Order Book - 230, 231.
	202 NYSE Euronext Equities OTHERS	All information related to the following packet types: <ul style="list-style-type: none"> NYSE Euronext Cash markets - Referential Data - 995, 550, 551,553. NYSE Euronext Equities Trades & Market Information, 995, 505, 513, 516, 523, 530, 531, 534, 535, 537, 539, 540, 541. 998, 220, 221, 240, 241, 242, 243, 244, 245. NYSE Euronext Equities Quotes, 994, 140, 141. NYSE Euronext Indices, 996, 542, 543, 544
WARRANTS (compressed)	203 NYSE Euronext Warrants (All)	All information related to the following packet types: <ul style="list-style-type: none"> NYSE Euronext Cash markets - Referential Data - 995, 550, 551,553. NYSE Euronext - Warrants Trades & Market information - 995, 505, 513, 516, 523, 530, 531, 534, 535, 537, 539, 540, 541. NYSE Euronext - Warrants Quotes - 994, 140, 141.

External User Acceptance Platform		
NB: Only Equities Product is available		
Products	Service ID	Contents
EQUITIES (compressed)	11 NYSE Euronext Equities ORDERS	All information related to the following packet types: <ul style="list-style-type: none"> NYSE Euronext Cash markets - Order Book - 230, 231.
	12 NYSE Euronext Equities OTHERS	All information related to the following packet types: <ul style="list-style-type: none"> NYSE Euronext Cash markets - Referential Data - 995, 550, 551,553. NYSE Euronext Equities Trades & Market Information, 995, 505, 513, 516, 523, 530, 531, 534, 535, 537, 539, 540, 541. 998, 220, 221, 240, 241, 242, 243, 244, 245. NYSE Euronext Equities Quotes, 994, 140, 141. NYSE Euronext Indices, 996, 542, 543, 544

1.4 TCP/IP Channels

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

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

Platform	Primary Source	Secondary Source
Production	156.48.126.43 / 23150	N/A
External User Acceptance	156.48.126.92 / 21510	N/A

NB: a Source ID is needed to allow customers to submit retransmission requests. NYSE Euronext Customer Technical Support (CTS) will provide one upon request.

Clients should clearly state for which environment (EUA or Production) a Source ID is requested. Each Source ID may only be logged onto a server once at a given time.

1.5 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 (i.e. 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.

1.6 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. This sequence number increases serially.
-

1.7 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.

1.8 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.

1.9 Instrument Identifiers

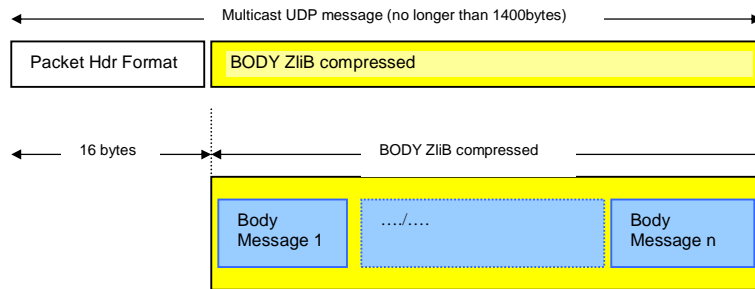
An instrument is identified by its SymbolIndex, across all feeds that relate to that instrument. The SymbolIndex is arbitrarily assigned by the feed, and will not change for the lifetime of the instrument. Standard security identifiers (for example ISIN, Euronext Trading Code) can be found in the 553 Reference Data message (as detailed in the Market Information Appendix).

Chapter 2 – Cash CF message structure

Overview

The application builds UDP packets which consist of a 16-byte header and a variable length body message containing one or more messages.

Basic UDP Multicast Packet Structure:



Key principle

The ZLib compression is only applied to the whole buffer gathering individual uncompressed body messages, giving one global Zlib compressed body.

This implementation is intended to facilitate decompression on clients' software, meaning that, upon receipt of a UDP multicast packet, customers will only apply the de-compression mechanism once, on the body.

2.1 Packet Header Format

All UDP multicast packets will contain one packet header. The table below describes the structure of the header, fields and format.

Please note that the packet header will never be compressed.

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 depends on the Service ID. Listed in Paragraph 1.3 Feeds of this document
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 is reset to 1 at the beginning of each trading day.
SendTime	8	4	Binary	Timestamp in milliseconds 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 Paragraph 1.2 Multicast streams of this document.
DeliveryFlag	14	1	Binary Bit Map	Indicates delivery method for the packet payload. 16 Real-time message (Zlib compressed). 18 Retransmission message (Zlib compressed)
NumberMsgEntries	15	1	Binary	The number of compressed messages that are contained within the packet.

2.2 Body ZliB Compressed Format

The global Zlib compressed body contains individual body messages. The structure of each message contained in the Body ZliB, depends on the packet type.

Following the value of the packet type stands in the packet header:

- 995,
505, 513, 516, 523, 530, 531, 534, 535, 537, 539, 540, 541,
550, 551, 553,
Refer to the structure of the individual body described in the
[UTP-MD -Equities Feed Specifications- Market Information Appendix](#) document.
- 998,
220, 221, 240, 241, 242, 243, 244, 245,
Refer to the structure of the individual body described in the
[UTP-MD -Equities Feed Specifications- Trade Appendix](#) document.
- 994,
140, 141,
Refer to the structure of the individual body described in the
[UTP-MD -Equities Feed Specifications– Quotes & BBO10 Appendix](#) document.
- 230, 231,
Refer to the structure of the individual body described in the
[UTP-MD -Equities Feed Specifications- OrderBook Appendix](#) document.
- 996,
542, 543, 544,
Refer to the structure of the individual body described in the
[UTP-MD -Equities Feed Specifications- Indices Appendix](#) document.

Chapter 3 – Cash CF 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'). Control messages are not compressed. Data messages are product specific although they will adhere to the specification referred to 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 Cash CF message.

The design is intended to minimize the development burden for subscribers. Meaning that, all subscribers may implement line-level protocol processing once, and then only need to 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 24 - Heartbeat Response Message 33 - SwitchOFF 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 is reset to 1 at the beginning of each trading day.
SendTime	8	4	Binary	Timestamp in milliseconds 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 for the packet payload. 16 - Real-time message (ZLiB compressed) 18 - Retransmission message (ZLiB compressed)
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 the start of the day, in response to failures, etc. Please 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 serially with each subsequent packet. There are two scenarios where the packet sequence number is reset (besides the start of the 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. Please 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 30 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.

Please 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 <i>Heartbeat response</i>				
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).

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

PacketLength = 44
 PacketType = 20
 PacketSeqNum = optional
 SendTime = optional
 ServiceID = ServiceID 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 <i>Retransmission Request</i>				
BeginSeqNum	16	4	Binary	Begin Sequence Number of the requested range of messages to be retransmitted. NB: 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. NB: 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 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 <i>Retransmission Response</i>				
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. 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 not available. 6 - Rejected - Incorrect formatted request packets.
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.

3.8 SwitchOFF Message

This message is sent by the broadcasting system. It informs the customers that the NYSE Euronext Equities Order Stream will be disabled for the remaining time of that day's trading session. That will be the last message sent in this stream.

NB: this message has no body and the fields in the packet header should be filled by the broadcasting system as follows:

PacketLength = 16
 PacketType = 33
 PacketSeqNum =
 SendTime =
 ServiceID = 201 (Production) or 11 (EUA), ID of the ORDERS broadcast stream.
 DeliveryFlag = 16
 NumberMsgEntries = 1 (standalone message)