



NYSE Retail Execution Reports® “ReTrac”

Product and Interface Specification

A Member of NYSE InfoTools

VERSION 1.2

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1. Terms

Table 2, below, defines a number of terms that appear throughout this document.

TERM	DEFINITION/DESCRIPTION
BIG ENDIAN	Refers to which bytes are most significant in multi-byte data types. In big-endian architectures, the leftmost bytes are most significant. This byte order also corresponds to Network Byte Order.
GROUP ID	IP Multicast address for PDP data delivery.
HOST SYMBOL FORMAT	A format set internally by NYSE order processing systems. Its representation of suffix is different from NMS systems.
MART	Message Archive and Retransmission – The PDP component that archives and retransmits PDP message packets.
MONOTONICAL	Incrementally increase in value by one.
PDP	NYSE Proprietary Data Product.
PORT NUMBER	Socket port assigned to a feed.
PUBLISHER	Generic name for any system/application generating PDP message products.
RETRAC	Proprietary Data Products Retail Execution Reports.
RECIPIENT	Synonymous with <i>Subscriber</i> .
SEQUENCE NUMBER	A unique, sequential message ID that both ‘tags’ each message and allows recipients to identify message ‘gaps’ and request retransmission (if appropriate).
SUBSCRIBER	Any customer/client system that will subscribe to, and receive data products from, the PDP data engine (i.e. the PDP_LRP).
MTU	Maximum Transfer Unit – The largest size of IP datagram that may be transferred on a given network. Most network implementations have a default setting of 1500 bytes.
SFTI	Secure Financial Transaction Infrastructure – HTTP://SFTI.SIAC.COM
NYSE	New York Stock Exchange
SIAC	Securities Industry Automation Corporation
ASCII	American Standard Code for Information Interchange

TABLE 2. DEFINITION OF TERMS

2. Document Scope

2.1 Identification

This document specifies the methods and procedures by which authorized NYSE Retail Execution Reports recipients may subscribe to, and receive NYSE Retail Execution Reports data from SIAC.

2.2 Document Overview

This interface specification defines the general session and transport protocol requirements for recipients of NYSE Retail Execution Reports data.

For more information regarding the network infrastructure provided by SFTI, please see reference [1], below.

2.3 Referenced Documents

The following documents are referenced herein:

[1] <http://sfti.siac.com>

2.4 Web Site

For more information regarding the NYSE Retail Execution Reports feed and this document's location please reference the following Internet web site:

<http://www.nysedata.com/infotools>

3. PDP System Overview

3.1 Introduction

The document defines the interface specifications that will identify the procedures by which authorized recipients can interpret PDP data received via the Secure Financial Transaction Infrastructure (SFTI).

Authorized recipients may subscribe to one or more PDP products via any given connection to the SFTI network.

3.2 General Guidelines

The following guidelines will govern the creation and transmission of all NYSE PDP products.

3.2.1 IP ASSIGNMENTS

Note that the following terms are analogous:

- Multicast Group
- Multicast Group ID
- Multicast Host Group
- Multicast Host Group ID

The Multicast groups IDs are represented by a multicast IP address and port number. The multicast IP address is a portion of the IP address range known as Class D IP addresses. Using standard IP address notation, this range covers addresses from 224.0.0.0 through 239.255.255.255.

All PDP services will be assigned a set of unique Multicast Group IDs as described in Table 3. Note that not all services will require (or be provided with) the full suite of address types.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

ADDRESS TYPE	DESCRIPTION
Primary Site Multicast Group ID	Multicast Group ID(s) assigned to the product delivered from the primary SIAC site.
Secondary Site Multicast Group ID	Alternate Multicast Group ID(s) assigned to the product delivered from a secondary SIAC site.
Primary Retransmission Multicast Group ID	Multicast Group ID(s) to which retransmitted packets for a specific product are delivered from the primary SIAC site.
Secondary Retransmission Multicast Group ID	Alternate Multicast Group ID(s) to which retransmitted packets for a specific product are delivered from the secondary SIAC site.
Primary Retransmission Requests Unicast Group ID	UDP address to which subscribers can make requests for re-transmissions.
Secondary Retransmission Requests Unicast Group ID	Alternate UDP address to which subscribers can make requests for retransmissions.

Table 3. General IP Assignments

All above Addresses are also available for testing during ‘after hours’ replay of data.

Note that the use of the terms ‘primary’ and ‘secondary’ in Table 3 is meant only to reflect dual-site data delivery. Data originating from either site is equally reliable.

Due to capacity measures, the ReTrac message feed will be split into two (2) data streams. Each data stream will deliver a set of ReTrac data for a certain range of symbols. The table below describes the categorization of the data feed.

FEED TYPE	DESCRIPTION
ReTrac AJ	Multicast Groups assigned to deliver ReTrac data of symbols starting with letters A through J.
ReTrac KZ	Multicast Groups assigned to deliver ReTrac data of symbols starting with letters K through Z.

Table 4. Symbols Ranges for ReTrac data feed.

3.2.2 GAP DETECTION

The PDP Distribution System will assign all data packets a unique, sequential message ID. This will allow recipients to identify ‘gaps’ in the message sequence and, if appropriate, reconcile them ‘locally’ with an alternate feed (Section 3.2.3) or request retransmission of the missing/corrupted data packet (Section 3.2.4).

For the ReTrac product, each data stream described in Table 4 will have its unique set of sequence numbers. In other words, the message sequence for ReTrac AJ channel is independent from the message sequence of ReTrac KZ channel. The following is an example of sequencing for each channel.

ReTrac AJ: SeqNum=1, SeqNum=2, SeqNum=3, ..., SeqNum=n.

ReTrac KZ: SeqNum=1, SeqNum=2, SeqNum=3, ..., SeqNum=m.

If there is a gap in the sequence of any channel, it has to be recovered independently. Therefore, if there is a sequence number gap on channel ReTrac KZ, then the gap filling has to be done through the appropriate ReTrac KZ retransmission channel (see section 3.2.4 for more information). The same is valid for channel ReTrac AJ.

3.2.3 DUAL SITE

Depending on business requirements, individual data products may be published using two (2) sets of unique IP Multicast Group IDs—each originating from a separate SIAC distribution site. Thus, when appropriate, ReTrac will transmit a given message packet over two (2) Multicast Groups, one originating from each site and each containing an identical sequence number. This will allow customers to receive two redundant feeds. Additionally, any message on either feed can be retransmitted upon request (some products may have restrictions, refer to section 3.2.4).

3.2.4 RETRANSMISSION

Some data products may support—upon authorized subscriber request—retransmission of ‘missing’¹ data packets. In such cases, subscribers may issue a ‘retransmission request’. In response, the service will retransmit the packet as appropriate.² Please refer to Section 5. for details on how retransmissions are handled.

3.2.4.1 Retransmission Thresholds

Table 5, below, summarizes the Retransmission limitations:

¹ The actual cause of the ‘message gap’ (e.g., transmission errors, hardware failures, subscriber software error, etc.) is irrelevant. However, NYSE does reserve the right to suspend the retransmission service selectively whenever its use affects ‘normal’ transmissions.

² Details will be provided separately.

CAPABILITY	DESCRIPTION	THRESHOLD³	ACTION
Prevention of invalid subscribers	Incoming requests from subscribers that are not in the enabled subscribers source ID list will not be honored. PDP subscribers will need a source ID, which is a string that uniquely identifies the subscriber of the retransmission requests. Please contact SIAC Customer Service to get a unique source ID.	N/A	Request will not be processed.
Limitation of Requests for a large number of packets	Only retransmission requests for 1000 messages or less will be honored.	1000	Request will not be processed.
Limitation of Refresh Requests	Unlike other PDP products, ReTrac does not provide symbol refreshes (retransmission of the current state of a given symbol) due to the nature of the data.	N/A	N/A
Limitation of Refresh Requests for All Symbols	Unlike other PDP products, ReTrac does not provide symbol refreshes (retransmission of the current state of a given symbol) due to the nature of the data.	N/A	N/A
Limitation of Generic Requests	If the number of subscriber's generic requests reaches the threshold number of requests per day, this subscriber will be blocked and its retransmission requests, of any kind, will no longer be accepted during that particular day.	500	All subsequent subscribers' retransmissions request will be blocked.

Table 5. Retransmission Thresholds

NOTE: PDP subscribers should contact SIAC's support if they want to update their source id or are having problems with retransmission requests.

3.2.5 MESSAGE PLAYBACK

The PDP products may offer a message 'replay' service. That is, at a specified time a PDP component will replay—from a previous session—all messages, or a range of messages, for a given service in their original sequence. ReTrac does support this feature. Please contact SIAC's Testing for schedule information.

³ The provided threshold is subject to change based on system's performance.

4. Session Protocol

4.1 Session Initiation and Termination

Recipient's applications/hosts will be responsible for issuing Multicast *subscriptions* to one or more of the Multicast Groups assigned to a particular product. In response to each authorized subscription request, SFTI network will complete the tasks associated with delivering the Multicast packets from the NYSE data source to the recipient's network.

The process of subscribing to a Multicast Group ID is also known as 'joining' a Multicast Group. Upon session termination, the subscriber's host system should issue an 'unjoin' message. This will terminate delivery of data to that host's local network. If an application/host terminates without issuing an 'unjoin' message, the network will eventually issue a 'timeout' for the Multicast Group subscription that will automatically terminate delivery of the Multicast packets to the host's local network.

4.2 RETRANSMITTED MESSAGES

Retransmitted packets will be identified by the value of 'RETRANSFLAG' field in the message header. Please refer to the Retransmission Messages section below for any additional information.

5. Common PDP Message Structure

5.1 General Notes

In broad terms, there are two types of messages transmitted as part of this protocol: *control* and *data*. Control messages do not contain data *per se*; rather, 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 general specification, they are defined specifically in a later section.

5.2 Format Specifics

All messages are delivered in a wire format as described later in this document.

In addition, the following is true about the delivery format:

- All fields in a message will be contiguous
- No fields are explicitly aligned
- All binary fields will be represented using ‘Big Endian’ format
- All binary fields will be unsigned (unless otherwise specified)
- Any physical packet will contain at most one message
- ASCII strings are non-null terminated character arrays (unless otherwise specified)

5.3 Common PDP Message Header

All PDP messages will contain a Common PDP Message Header. This model is akin to that of an envelope/letter paradigm. The message header comprises *envelope* information; the message body comprises the *letter*. All correspondence will use the same envelope format regardless of content.

The intent of this design is to minimize development burden on behalf of Subscribers. That is, all Subscribers may implement line-level protocol processing once, and then need only develop parsing algorithms for messages of choice.

Table 6, defines the Common PDP Message Header Format which all PDP products conform to. Note that the fields must appear in the order indicated by their relative position in the table.

FIELD NAME	DESCRIPTION	FORMAT	SIZE (BYTES)
PRODUCTID	Product code/identifier. Uniquely defined for each PDP product. Value of ‘112’ for NYSE Retail Execution Reports.	BINARY INTEGER	1

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

FIELD NAME	DESCRIPTION	FORMAT	SIZE (BYTES)
VERSIONID	Version ID – Used to identify message formats/revisions for a given product.	BINARY INTEGER	1
SEQNUM	This field contains the message sequence number assigned by PDP for each product. It is used for gap detection. Also known as Line Sequence Number (LSN).	BINARY INTEGER	4
MSGTYPE	Message Type Identifier. It's used to identify the type of message so it can be interpreted by the recipient.	BINARY INTEGER	1
RETRANSFLAG	<p>A flag that indicates whether this is an original, retransmitted, or 'replayed' message. Valid values include:</p> <ul style="list-style-type: none"> • '1' – Original message • '2' – Retransmitted message • '3' – Message Replay • '4' – Retransmission of a 'replayed' message • '5' – Refresh Retransmission⁴ 	BINARY INTEGER	1
TIMESTAMP	<p>This field records/indicates message creation time by PDP. It does not indicate the time of data generation.</p> <p>All retransmissions of this message will retain its original timestamp.</p> <p>The format of this field is as follows:</p> <p align="center">YYYYMMDDhhmmssxxx</p> <p>Where:</p> <p>YYYY – Millennium-compliant year</p> <p>MM – Month (01-12)</p> <p>DD – Day of Month (1-31)</p> <p>hh – Hour of day (00-23)</p> <p>mm – Minute (00-59)</p> <p>ss – Second (00-59)</p> <p>xxx – Milliseconds (000-999)</p>	ASCII STRING	17

⁴ Refreshes give current state.

FIELD NAME	DESCRIPTION	FORMAT	SIZE (BYTES)
MSGBODYSIZE	The message body size in bytes.	BINARY INTEGER	2

Table 6. Required PDP Message Header Fields

5.4 Publisher Control Messages

These are control messages that originate from PDP Products. The following control messages are supported as part of this protocol.

5.4.1 SEQUENCE NUMBER RESET

This message is sent to ‘reset’ the Sequence Number at start of day, in response to failures, etc. Note that this message will contain a valid sequence number.

5.4.1.1 Message Format

Table 7, below, defines the format of the Sequence Number Reset.

FIELD NAME	SIZE	FORMAT	VALUE	DESCRIPTION
Set forth below are the ‘header’ fields of the Sequence Number Reset Message				
PRODUCTID	1	BINARY IN-TEG-ER	‘112’	Refer to Table 6.
VERSIONID	1	BINARY IN-TEG-ER	‘1’	Refer to Table 6.
SEQNUM	4	BINARY IN-TEG-ER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEG-ER	‘1’	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEG-ER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEG-ER	‘4’	Refer to Table 6.
Defined below are the ‘body’ fields of the Sequence Number Reset Message				
NEXTSEQNUMBER	4	BINARY IN-TEG-ER		This field contains the sequence number value that the recipient should expect in the immediately succeeding data packet. Note that this message will contain its own valid sequence number in the header portion of the message.

Table 7. Sequence Number Reset Message Format

5.4.1.2 Processing Notes

Sequence numbers normally begin at one (1) and increase monotonically with each subsequent message. There are two scenarios where the sequence number is reset (besides the start of day). First, if the value should exceed the maximum value that the SEQNUM field may contain, it will be reset to one (1). Second, if PDP has a failure and it recovers, it sends a sequence number reset message. The SEQNUM field of that message will be set to one (1) and the NEXTSEQNUMBER field will be set to two (2). Refer to Figure 2 in Appendix B for a suggested way of processing.

5.4.2 HEARTBEAT

In the case when data is not being sent, Subscribers will receive heartbeat messages to let them know that the system is still alive.

5.4.2.1 Message Format

Below, defines the format of the Heartbeat message.

FIELD NAME	SIZE	FORMAT	VALUE	DESCRIPTION
Set forth below are the 'header' fields of the Heartbeat Message				
PRODUCTID	1	BINARY IN-TEGER	'112'	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	'1'	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER	'2'	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEGER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER	'0'	Refer to Table 6.

Table 8. Heartbeat Message Format

5.4.2.2 Processing Notes

- Heartbeat messages will be sent with the **same** sequence number as the most recent message that was sent.
- Heartbeat messages will only contain the PDP Message Header with an empty body.

Refer to Figure 3 in Appendix B for a suggested way of processing.

5.5 Retransmission Messages

The sections below describe the different retransmission related messages.

5.5.1 GENERIC RETRANSMISSION REQUEST MESSAGE

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

5.5.1.1 Message Format

This message will contain the fields/values specified in Table 9, below.

FIELD NAME	SIZE	FORMAT	VALUE	DESCRIPTION
Set forth below are the 'header' fields of the Generic Retransmission Request Message				
PRODUCTID	1	BINARY IN-TEG-ER	'112'	Refer to Table 6.
VERSIONID	1	BINARY IN-TEG-ER	'1'	Refer to Table 6.
SEQNUM	4	BINARY IN-TEG-ER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEG-ER	'20'	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEG-ER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEG-ER	'28'	Refer to Table 6.
Defined below are the 'body' fields of the Generic Retransmission Request Message				
SOURCEID	20	ASCII STRING		This field represents the name of the source requesting retransmission.
BEGINSEQNUM	4	BINARY IN-TEG-ER		The beginning sequence number of the requested range of messages to be retransmitted.
ENDSEQNUM	4	BINARY IN-TEG-ER		The end sequence number of the requested range of messages to be retransmitted.

Table 9. Generic Retransmission Request Message Format

5.5.2 RETRANSMITTED 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 messages sent by ReTrac, with the exception that the 'RetransFlag' in the header is set to the value of '2' or '4' depending on whether the retransmission is for a non-replay or a replay retransmission message, respectively.

5.5.2.1 Message Format

Table 10, below, defines the format of the Retransmitted message.

FIELD NAME	SIZE	FORMAT	VALUE	DESCRIPTION
Set forth below are the 'header' fields of the Retransmitted Message				
PRODUCTID	1	BINARY IN-TEGER	'112'	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	'1'	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER		It will be the MsgType of the original message sent by the ReTrac.
RETRANSFLAG	1	BINARY IN-TEGER	'2' or '4'	Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER		Refer to Table 6.
All the 'body' fields of the Retransmitted Message are the same as the original message				

Table 10. Retransmitted Message Format

5.5.2.2 Processing Notes

- All Subscribers will receive retransmission messages through the retransmission channel.
- Due to the multicast nature, subscribers will receive 'all' retransmission messages, including messages that were not requested by them.

Refer to Figure 6 in Appendix B for a suggested way of processing.

5.5.3 MESSAGE UNAVAILABLE

This message will be sent to inform the subscribers of unavailability of a range of messages that they requested retransmission.

5.5.3.1 Message Format

Table 11; below, defines the Message Unavailable message.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

FIELD NAME	SIZE	FORMAT	VALUE	DESCRIPTION
Set forth below are the 'header' fields of the NYSE Packet Unavailable Message				
PRODUCTID	1	BINARY IN-TEGER	'112'	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	'1'	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER	'5'	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEGER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER	'8'	Refer to Table 6.
Defined below are the 'body' fields of the NYSE Packet Unavailable Message				
BEGINSEQNUM	4	BINARY IN-TEGER		The beginning sequence number of the requested range of messages to be retransmitted.
ENDSEQNUM	4	BINARY IN-TEGER		The end sequence number of the requested range of messages to be retransmitted.

Table 11. Message Unavailable Message Format

6.3 Data Messages

An Execution Report Message contains information regarding a cleared trade, specifically: the NYSE-Listed Security, the quantity of shares for the execution report, the report type (report or cancellation – as a message type), and the trade’s execution time.

6.4 Sequence Numbers

All messages conform to the line level sequencing described in Table 6. Each channel, as defined in Table 12, above, has its own sequence number. Subscribers can use sequence numbers to determine the following:

- Missing (gapped) messages
- Disordered messages
- Duplicate messages

6.5 Symbols

The stock symbols represented in this feed use Host Symbol Format, which uses a 16-bit ASCII character (blank padded) to represent a symbol.

For example, if a symbol’s root is “ABC” and its suffix is “PRA”, the symbol’s root/suffix will be represented as: “ABC^PRA^^^^^^^^^^”, where ‘^’ represents a blank space. If the symbol is “ABC” without a suffix, it will be represented as: “ABC^^^^^^^^^^^^^^^^”. Note that there is no static position for the suffix.

6.6 NYSE Retail Execution Reports Data Messages

As discussed previously in this document, the NYSE Retail Execution Reports data is primarily distributed using Execution Report Messages and Execution Report Cancellation Messages. This section describes the following:

- Message Format
- General Processing Notes

6.6.1 REPORT MESSAGE

6.6.1.1 Format

The message body contains NYSE Retail Execution Reports data published in a proprietary, binary format. Table 14, below, defines its format and content.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

FIELD NAME	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Set forth below are the 'header' fields of the NYSE Retail Execution Reports Execution Report Message.⁶				
PRODUCTID	1	BINARY IN-TEGER	'112'	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	'1'	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER	'190'	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEGER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER	33	Refer to Table 6.
Defined below are 'body' fields of the NYSE Retail Execution Reports Report Message.				
EXCECTIME	9	ASCII STRING	00000000 - 235959999	Execution Time specifies the time the trade was executed. Its format is defined as HHMMSSsss, where: HH – Hour (00-23) MM – Minute (00-59) SS – Second (00-59) sss – Millisecond (000-999)
SYMBOL	16	ASCII STRING	Any valid NYSE symbol	Symbol. Refer to Section 6.5 for processing details.
VOLUME	4	BINARY IN-TEGER		Volume specifies the quantity of shares in this report.
RESERVED FIELD	4			Field reserved for future use.

Table 14. Execution Report Message Format.

⁶ Refer to Table 6 for a complete definition of the PDP Common Message Header.

6.6.1.2 General Processing Notes

The following processing notes apply to the Execution Report Message. Please refer to section 6.6.2 for additional information. Refer to Appendix B, for a suggested way on how to process Execution Report Messages.

- Only field values will appear in the published messages (e.g. no names, ‘tags’, sizes will appear in the message). The field tags that appear in Table 14, are for reference purposes only.
- In the same vein as the prior bullet, all fields are contiguous. That is, there is no explicit (or implicit) ‘padding’ between fields regardless of the juxtaposed data types, sizes, and alignment issues.
- If, for a given entry, the Value Field in Table 14, above, is blank, it means that the value for that field is not ‘fixed’, but rather are computed and thus will vary with each message.
- All field sizes are fixed and constant.
- The publication time referenced in Table 14, above, will be using Eastern Standard Time (EST).
- Binary fields are provided in *Big Endian* format.
- ASCII string fields are not null terminated.

6.6.2 EXECUTION REPORT CANCELLATION MESSAGE

6.6.2.1 Format

The message body contains NYSE Retail Execution Reports data published in a proprietary, binary format. Table 15, below, defines its format and content.

FIELD NAME	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Set forth below are the ‘header’ fields of the NYSE Retail Execution Reports Execution Report Cancellation Message.⁷				
PRODUCTID	1	BINARY IN-TEGER	‘112’	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	‘1’	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER	‘191’	Refer to Table 6.

⁷ Refer to Table 6 for a complete definition of the PDP Common Message Header.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

FIELD NAME	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
RETRANSFLAG	1	BINARY IN-TEGER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER	33	Refer to Table 6.
Defined below are 'body' fields of the NYSE Retail Execution Reports Report Message.				
EXCECTIME	9	ASCII STRING	00000000 - 235959999	Execution Time specifies the time the correction was executed. Its format is defined as HHMMSSsss, where: HH – Hour (00-23) MM – Minute (00-59) SS – Second (00-59) sss – Millisecond (000-999)
SYMBOL	16	ASCII STRING	Any valid NYSE symbol	Symbol. Refer to Section 6.5 for processing details.
VOLUME	4	BINARY IN-TEGER		Volume specifies the quantity of shares in this report.
RESERVED FIELD	4			Field reserved for future use.

Table 15. Report Correction Message Format.

6.6.2.2 General Processing Notes

The following processing notes apply to the Execution Report Cancellation Message. Please refer to section 6.6.2 for additional information. Refer to Appendix B for a suggested way on how to process Report Messages.

- All Execution Report Cancellation Messages should be processed to reduce the security's share volume. A cancellation, also known as 'bust', means that a given report's validity has been revoked.
- Only field values will appear in the published messages (e.g. no names, 'tags', sizes will appear in the message). The field tags that appear in Table 14, are for reference purposes only.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

- In the same vein as the prior bullet, all fields are contiguous. That is, there is no explicit (or implicit) ‘padding’ between fields regardless of the juxtaposed data types, sizes, and alignment issues.
- If, for a given entry, the Value Field in Table 14, above, is blank, it means that the value for that field is not ‘fixed’, but rather are computed and thus will vary with each message.
- All field sizes are fixed and constant.
- The publication time referenced in Table 14, above, will be using Eastern Standard Time (EST).
- Binary fields are provided in *Big Endian* format.
- ASCII string fields are not null terminated.

6.6.3 EXECUTION REPORTS SUMMARY MESSAGE

6.6.3.1 Format

The message body contains NYSE Retail Execution Reports data published in a proprietary, binary format Table 16, below, defines its format and content.

FIELD NAME	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Set forth below are the ‘header’ fields of the NYSE Retail Execution Reports Execution Reports Summary Message.⁸				
PRODUCTID	1	BINARY IN-TEGER	‘112’	Refer to Table 6.
VERSIONID	1	BINARY IN-TEGER	‘1’	Refer to Table 6.
SEQNUM	4	BINARY IN-TEGER		Refer to Table 6.
MSGTYPE	1	BINARY IN-TEGER	‘192’	Refer to Table 6.
RETRANSFLAG	1	BINARY IN-TEGER		Refer to Table 6.
TIMESTAMP	17	ASCII STRING		Refer to Table 6.
MSGBODYSIZE	2	BINARY IN-TEGER	29	Refer to Table 6.

⁸ Refer to Table 6 for a complete definition of the PDP Common Message Header.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

FIELD NAME	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are 'body' fields of the NYSE Retail Execution Reports Report Message.				
EXCECTIME	9	ASCII STRING	000000000 - 235959999	Execution Time specifies the time of the last computed report. Its format is defined as HHMMSSsss, where: HH – Hour (00-23) MM – Minute (00-59) SS – Second (00-59) sss – Millisecond (000-999)
SYMBOL	16	ASCII STRING	Any valid NYSE symbol	Symbol. Refer to Section 6.5 for processing details.
VOLUME	4	BINARY IN- TEGER		Volume specifies the quantity of shares in this report.

Table 16. Report Summary Message Format.

6.6.3.2 General Processing Notes

The following processing notes apply to the Report Message. Please refer to section 6.6.2 for additional information. Refer to Appendix B for a suggested way on how to process Execution Report Messages.

- All Report Summary Messages should be processed as snapshots of a given security's position at the end of the auction. The share volume specified in the message corresponds to the sum of all Execution Reports for trades executed in the NYSE until that time of the day.
- The Report Summary Messages carry the total share volume for a given NYSE-Listed security for the current trading day.
- Only field values will appear in the published messages (e.g. no names, 'tags', sizes will appear in the message). The field tags that appear in Table 14 are for reference purposes only.
- In the same vein as the prior bullet, all fields are contiguous. That is, there is no explicit (or implicit) 'padding' between fields regardless of the juxtaposed data types, sizes, and alignment issues.
- If, for a given entry, the Value Field in Table 14, above, is blank, it means that the value for that field is not 'fixed', but rather are computed and thus will vary with each message.
- All field sizes are fixed and constant.
- The publication time referenced in Table 14, above, will be using Eastern Standard Time (EST).

- Binary fields are provided in *Big Endian* format.
- ASCII string fields are not null terminated.

6.7 Retransmission Support

The NYSE Retail Execution Reports service provides a mechanism to retransmit messages, based on line level sequence numbers. This section explains how to interact with this mechanism and its limitations.

6.7.1 RETRANSMISSION THRESHOLDS

Table 17, below, summarizes the Retransmissions Limitations for NYSE Retail Execution Reports.

CAPABILITY	DESCRIPTION	THRESHOLD	ACTION
Prevention of invalid subscribers	See Table 5.	N/A	See Table 5.
Limitation of Requests for a large number of packets	See Table 5.	1000 per request	See Table 5.
Limitation of Generic Requests	See Table 5.	500 per day	See Table 5.

Table 17. NYSE Retail Execution Reports Retransmission Limitations

6.7.2 RETRANSMISSION MESSAGES

NYSE Retail Execution Reports supports generic retransmission requests, as defined in 5.5 Retransmission Messages.

7. IP Group Assignments

7.1 Production Settings

7.1.1 PRODUCTION IP/MULTICAST GROUP ASSIGNMENTS

Table 18, below, defines the IP/Multicast Group and Port assignments for all messages in this service.

ADDRESS TYPE	GROUP IP	PORT NO.	DESCRIPTION
Primary ReTrac Feed – Symbol range A through J.	233.75.215.34	8034	Primary data feed originating from SIAC.
Secondary ReTrac Feed – Symbol range A through J.	233.75.215.162	8162	Secondary data feed originating from SIAC.
Primary Retransmission Service – Symbol range A through J.	233.75.215.35	8035	Primary retransmission data feed originating from SIAC.
Secondary Retransmission Service – Symbol range A through J.	233.75.215.163	8163	Secondary retransmission data feed originating from SIAC.
Primary ReTrac Feed – Symbol range K through Z.	233.75.215.34	9034	Primary data feed originating from SIAC.
Secondary ReTrac Feed – Symbol range K through Z.	233.75.215.162	9162	Secondary data feed originating from SIAC.
Primary Retransmission Service – Symbol range K through Z.	233.75.215.35	9035	Primary retransmission data feed originating from SIAC.
Secondary Retransmission Service – Symbol range K through Z.	233.75.215.163	9163	Secondary retransmission data feed originating from SIAC.

Table 18. NYSE Retail Execution Reports Production IP Group Assignments

7.1.2 PRODUCTION RETRANSMISSION REQUEST IP ASSIGNMENTS

Table 19, below, defines the UDP IP Address and Port assignments for the retransmission request service.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

ADDRESS TYPE	IP	PORT NO.	DESCRIPTION
Primary Retransmission Request Address Feed – Symbol range A through J.	198.140.58.88	10200	Primary retransmission request address.
Secondary Retransmission Request Address Feed – Symbol range A through J.	198.140.59.88	10200	Secondary retransmission request address.
Primary Retransmission Request Address Feed – Symbol range K through Z.	198.140.58.88	11200	Primary retransmission request address.
Secondary Retransmission Request Address Feed – Symbol range K through Z.	198.140.59.88	11200	Secondary retransmission request address.

Table 19. NYSE Retail Execution Reports Production Retransmission Request IP/Port

7.2 Replay/Test Settings

This section contains the IP/Multicast Group Assignments and Retransmission Request Assignments for the test configuration. These tests are generally run at night and out of band from the production environment so that Subscribers need not worry about incorrect data on the production lines.

7.2.1 REPLAY/TEST IP/MULTICAST GROUP ASSIGNMENTS

Table 20, below, defines the IP/Multicast Group and Port assignments for all messages in this service.

ADDRESS TYPE	GROUP IP	PORT NO.	DESCRIPTION
Primary ReTrac Feed – Symbol range A through J.	233.75.215.2	8002	Primary data feed originating from SIAC.
Secondary ReTrac Feed – Symbol range A through J.	233.75.215.130	8130	Secondary data feed originating from SIAC.
Primary Retransmission Service – Symbol range A through J.	233.75.215.3	8003	Primary retransmission data feed originating from SIAC.
Secondary Retransmission Service – Symbol range A through J.	233.75.215.131	8131	Secondary retransmission data feed originating from SIAC.
Primary ReTrac Feed – Symbol range K through Z.	233.75.215.2	9002	Primary data feed originating from SIAC.

NYSE RETAIL EXECUTION REPORTS: PRODUCT AND INTERFACE SPECIFICATION

ADDRESS TYPE	GROUP IP	PORT No.	DESCRIPTION
Secondary ReTrac Feed – Symbol range K through Z.	233.75.215.130	9130	Secondary data feed originating from SIAC.
Primary Retransmission Service – Symbol range K through Z.	233.75.215.3	9003	Primary retransmission data feed originating from SIAC.
Secondary Retransmission Service – Symbol range K through Z.	233.75.215.131	9131	Secondary retransmission data feed originating from SIAC.

Table 20. NYSE Retail Execution Reports Test IP Group Assignments

7.2.2 REPLAY/TEST RETRANSMISSION REQUEST IP ASSIGNMENTS

Table 21, below, defines the UDP IP Address and Port assignments for the retransmission request service.

ADDRESS TYPE	IP	PORT No.	DESCRIPTION
Primary Retransmission Request Address Feed – Symbol range A through J.	198.140.58.88	10300	Primary retransmission request address.
Secondary Retransmission Request Address Feed – Symbol range A through J.	198.140.59.88	10300	Secondary retransmission request address.
Primary Retransmission Request Address Feed – Symbol range K through Z.	198.140.58.88	11300	Primary retransmission request address.
Secondary Retransmission Request Address Feed – Symbol range K through Z.	198.140.59.88	11300	Secondary retransmission request address.

Table 21. NYSE Retail Execution Reports Test Retransmission Request IP/Port

APPENDIX A

This section provides examples of the content of the data that will be received by subscribers during trading hours.

7.3 Processing of Messages during Trading Hours

The Table 22. Processing of Messages during Trading Hours, below, exemplifies the processing of messages for two securities throughout the trading hours.

MSG SEQ #	MESSAGE TYPE	NUMBER OF SHARES	SECURITY⁹	COMPUTED SECURITY VOLUME (IN SHARES)
1	HEARTBEAT – 2			
1	HEARTBEAT - 2			
1	REPORT – 190	10,000	FOO	10,000
2	REPORT – 190	15,000	FOO	25,000
3	REPORT – 190	5,000	FOO	30,000
4	REPORT – 190	20,000	OOF	20,000
5	REPORT – 190	6,000	FOO	36,000
6	REPORT – 190	4,000	OOF	24,000
7	REPORT CANCELLATION – 191	15,000	FOO	21,000
8	REPORT – 190	3,000	OOF	27,000
9	REPORT CANCELLATION – 191	4,000	OOF	23,000
10	REPORT – 190	7,500	FOO	28,500

Table 22. Processing of Messages during Trading Hours

⁹ Security symbols are fictitious.

7.4 Processing of Summary Report Messages

Table 23. Processing of Execution Reports Summary Messages, below, exemplifies the processing of end of auction “6.6.3 Execution Reports Summary Message”.

MSG SEQ #	MESSAGE TYPE	NUMBER OF SHARES	SECURITY	SECURITY VOLUME (IN SHARES)
10,000	REPORT SUMMARY – 192	345,00	FOO	345,000
10,001	REPORT SUMMARY – 192	450,000	OOF	450,000

Table 23. Processing of Execution Reports Summary Messages

APPENDIX B

7.5 Processing of Messages

The following is the recommended way of processing messages:

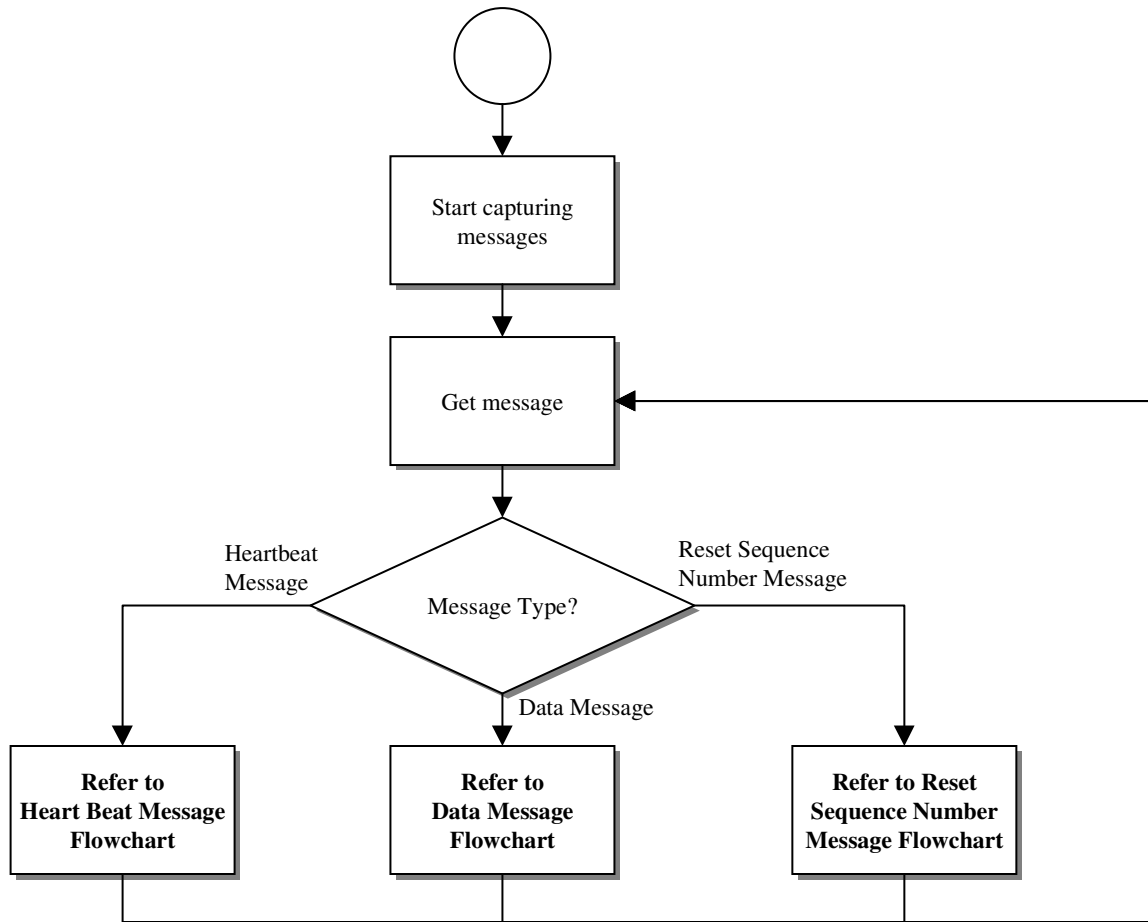


Figure 1. Processing of Messages

7.6 Processing of Sequence Number Reset Message

The following is the recommended way of processing Sequence Number Reset Messages:

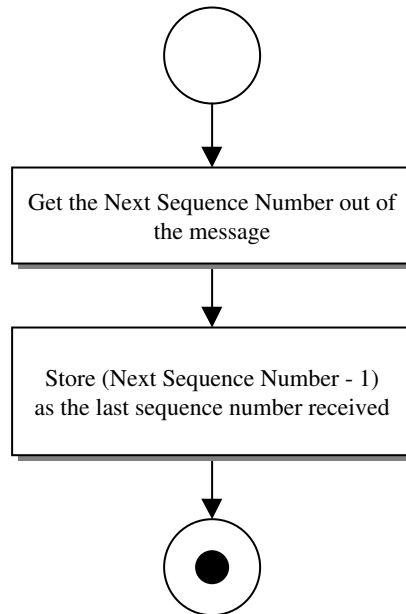


Figure 2. Processing of Sequence Number Reset Message

7.7 Processing of Heartbeat Messages

The following is the recommended way of processing Heartbeat Messages:

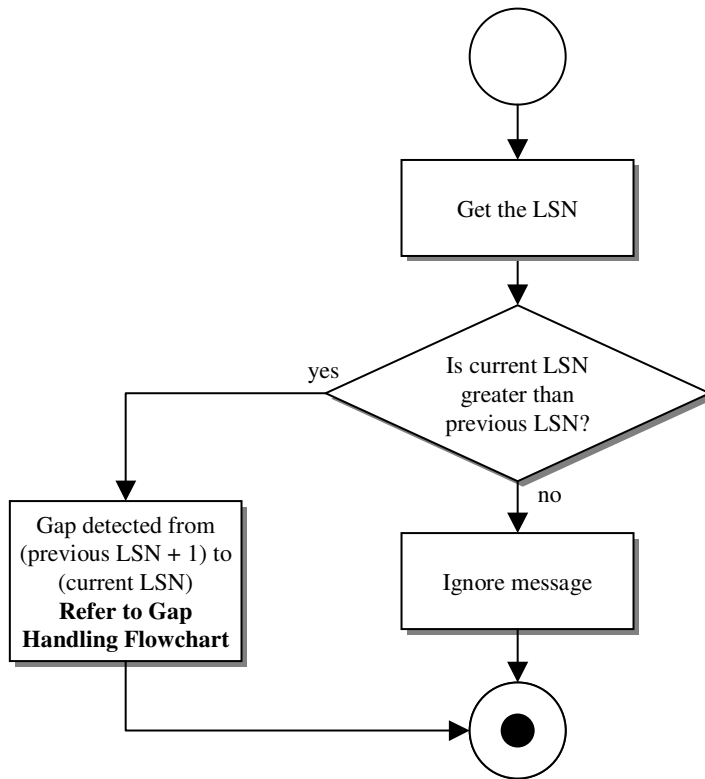


Figure 3. Processing of Heartbeat Messages

7.8 Processing of Data Messages

The following is the recommended way of processing data messages:

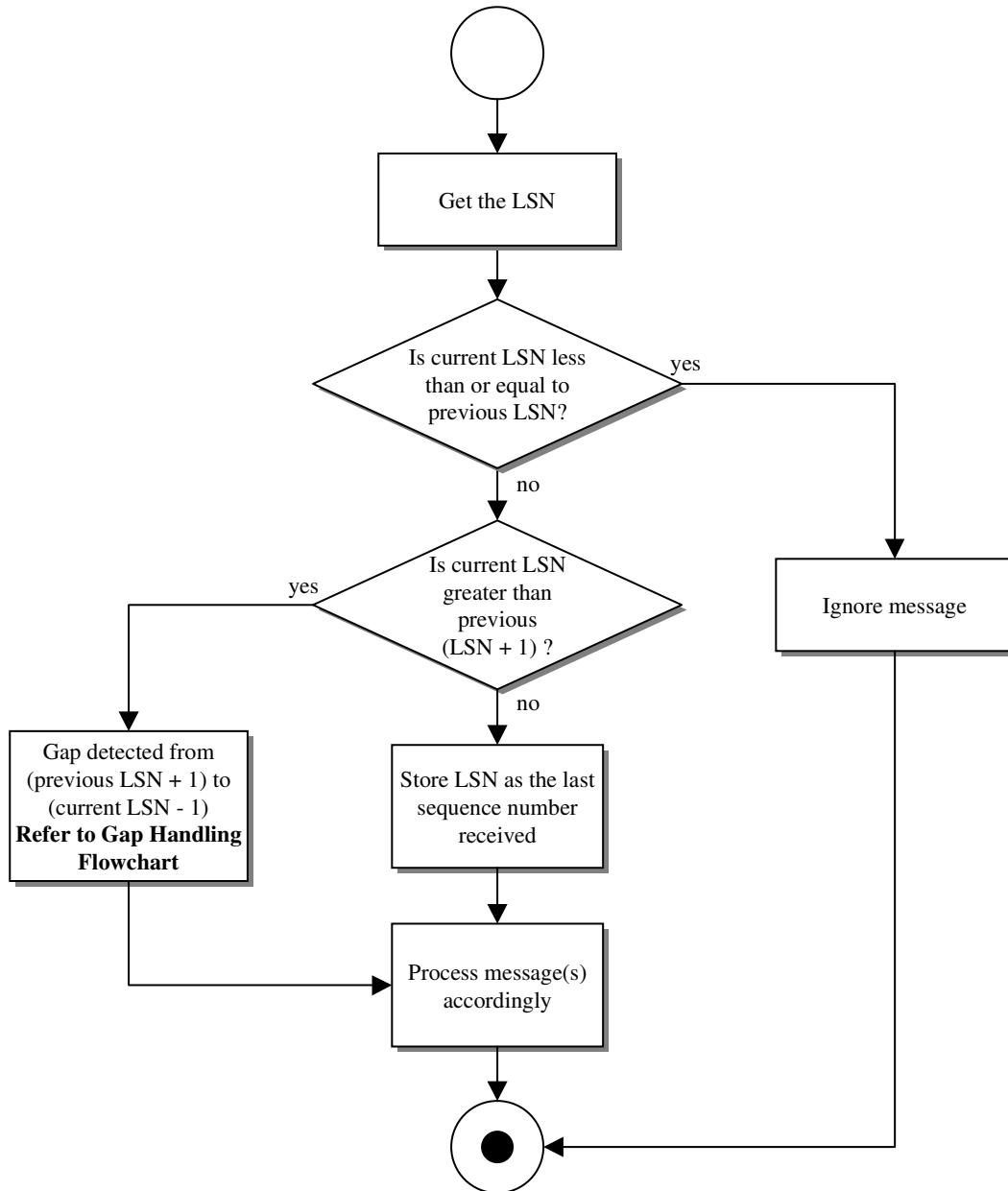


Figure 4. Processing of Data Messages

7.9 Processing of Gap Handling

The following is the recommended way of handling gaps:

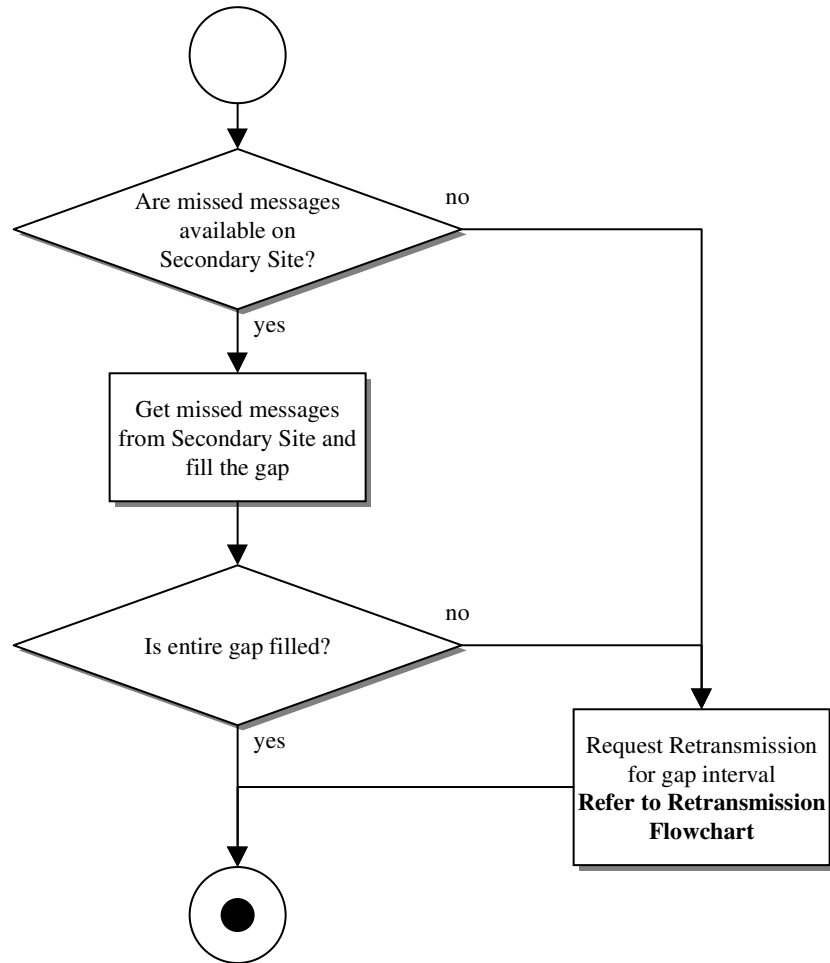


Figure 5. Processing of Gap Handling

7.10 Processing of Line Level Retransmissions

The following is the recommended way of processing line level retransmissions:

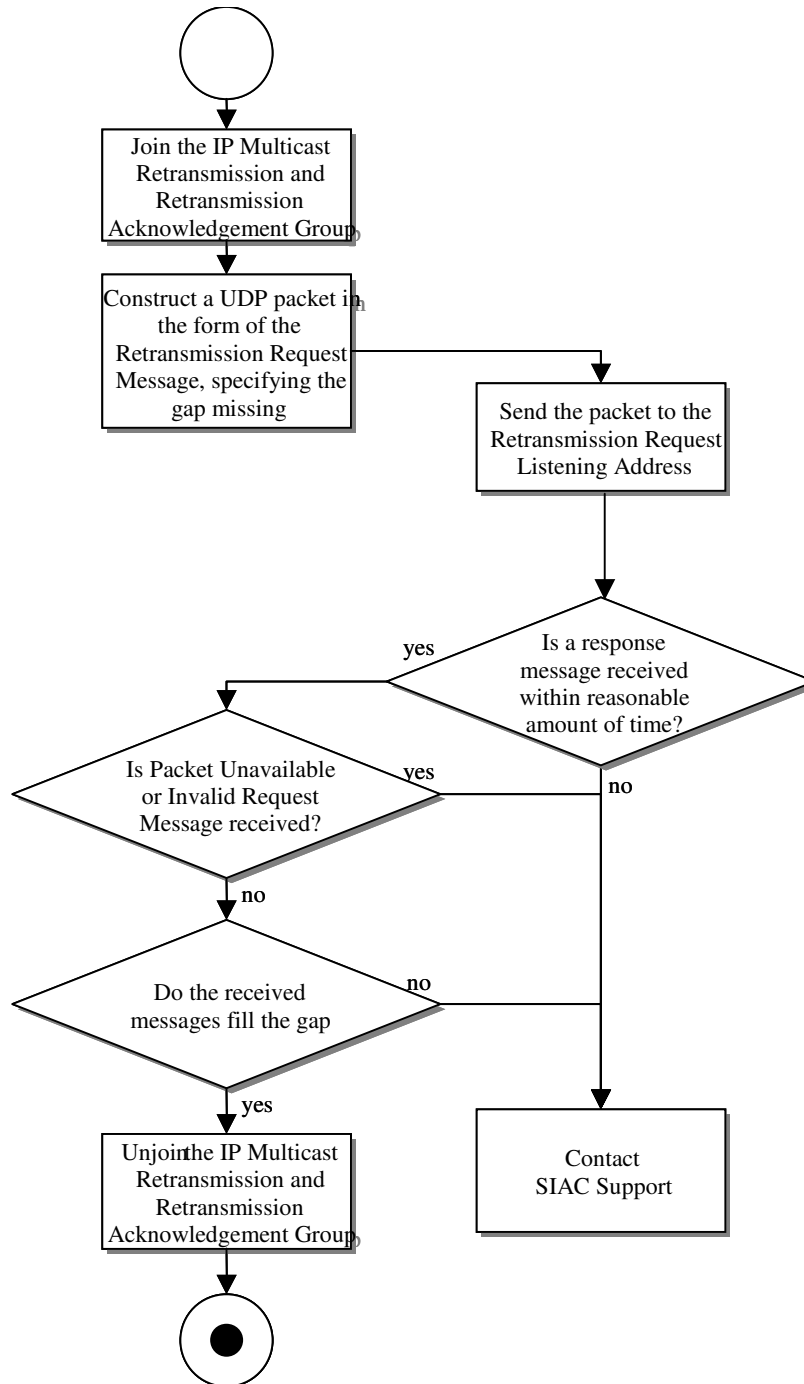


Figure 6. Processing of Line Level Retransmissions

APPENDIX C

This section provides information to assist Subscribers with frequently asked questions concerning the NYSE Retail Execution Reports service.

7.11 Frequently Asked Questions

Q: What is the average message size?

A: Average message size is approximately 77 bytes.

Q: What is the process to define my Source ID for retransmission purposes?

A: Contact SIAC Support and provide the desired Source ID (under the constraints of the format defined in Table 9. Generic Retransmission Request Message Format). SIAC Support will evaluate and approve or disapprove the Source ID. In case of disapproval, a new Source ID has to be defined. In case of approval, SIAC Support will make the necessary updates on the product provider side to add the Source ID and applicable rules.

Q: What is the average message rate (messages per second) seen in a normal day for NYSE Retail Execution Reports?

A: Refer to the NYSE Retail Execution Reports Impact Guide.

Q: What is the average number of messages seen in a normal day?

A: Refer to the NYSE Retail Execution Reports Impact Guide.

Q: Will retransmitted data ever come down the normal data feed?

A: No, retransmitted data will always be sent out on the designated retransmission IP/Multicast address/port.

Q: Are the Primary and Secondary feeds identical?

A: The feeds are not identical because they are distributed from 2 (two) different source addresses. However, the data content (like the sequence numbers and message content) are the same and can be used to fill gaps.

Q: We continue to see gaps in the feed even though our network is isolated and our server is underutilized. What could it be?

A: Although collisions are very rare, it is possible to have message gaps due to them. However, it is more likely that your multicast receiver is gapping during a message burst. This may be due to a UDP buffer overflow. SIAC recommends that Subscribers increase the standard UDP buffer setting to capture this burst.

Q: We sent several retransmissions request during the day that were fulfilled, but suddenly they stopped being responded. What could it be?

A: Please contact SIAC Support to reactivate your Retransmission ID, as your application may have reached the retransmission thresholds as specified in Section 6.7.1.