NYSE TECHNOLOGIES.

Document title

NYSE PROGRAM TRADING EXECUTION REPORTS (PROTRAC) CLIENT SPECIFICATION

Version	Date
2.3a	10 Aug 2012

PREFACE

DOCUMENT HISTORY

The following table provides a description of all changes to this document.

VERSION NO.	DATE	CHANGE DESCRIPTION
1.0	05/01/2006	Released version.
1.1	05/04/2006	Correction of number of streams in page 11.
1.2	05/23/2006	Correction to retransmission request port numbers
2.0	11/14/2006	Feed Format and Spec change
2.1	02/02/2007	Updated MsgSize for 180,181,182
2.2	02/15/2008	Updated summary values for msg type 182 Updated Source IP addresses
2.3	11/04/2008	Updated Retransmission Request IP addresses
2.3a	04/20/2010	Reformatted to new template IP addresses removed and link to IP Addresses page added
	08/10/2012	Rebranded with new NYSE Technologies template

REFERENCE MATERIAL

The following lists the associated documents, which either should be read in conjunction with this document or which provide other relevant information for the user:

■   SFTI US Technical Specification

■   SFTI US Customer Guide

■   NYSE Symbology

CONTACT INFORMATION

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FURTHER INFORMATION

■   For additional product information please visit, http://www.nyxdata.com

■   For updated capacity figures, visit our capacity pages at: http://www.nyxdata.com/capacity

■   For details of IP addresses, visit our IP address pages at: http://www.nyxdata.com/ipaddresses

■   For a full glossary, visit: http://www.nyxdata.com/glossary/

CONTENTS

1.   INTRODUCTION

NYSE Program Trading Execution Reports (ProTrac) is a real-time data feed that provides investors with the ability to identify program trading at the NYSE by monitoring the program share volume for each stock as it is executed. Immediately upon execution, the Symbol, Volume, and Time of each program traded execution will be disseminated as a real-time message via the NYSE ProTrac data feed as illustrated below:

SYMBOL	SHARES EXECUTED	TIME (MILLISECONDS)
XYZ	50,000	10:51:01.210

2.   NYSE PROTRAC FEED CONFIGURATION

The following chapter provides connectivity information for the NYSE ProTrac data feed.

2.1   MULTICAST GROUPS

Each data stream will deliver a set of last sale information for a certain range of symbols. The table below describes the categorization of the data feed.

Table 1 Multicast Groups

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

2.2   JOINING MULTICAST GROUPS

Recipient's applications/hosts will be responsible for issuing multicast subscriptions to one or more of the multicast groups assigned to the NYSE ProTrac 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.

2.3   RETRANSMISSION REQUEST THRESHOLDS

The table below summarizes the retransmission request thresholds for the NYSE ProTrac feed. The numbers below represent the thresholds per channel.

Table 2 Retransmission Request Thresholds

CAPABILITY	DESCRIPTION	THRESHOLD	ACTION
Prevention of invalid subscribers	Incoming requests from subscribers that are not in the enabled subscriber's 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 the Service Desk 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 Generic	If the number of a subscriber's generic	500	Subsequent

CAPABILITY	DESCRIPTION	THRESHOLD	ACTION
Requests	requests reaches the threshold number of requests per day, the subscriber will be blocked and its retransmission request will no longer be honored during that particular day.		retransmissions requests from that subscriber will be blocked.

2.4   NYSE PROTRAC TESTING

Replay tests are generally run at night **(Tuesday and Thursday from 8:00pm to 9:00pm)** and over different multicast groups than the production environment so that subscribers do not need to worry about incorrect data over the production lines.

The data replayed over this network is from a previous trading session - all messages or a range of messages for a given service in their original sequence.

3.   NYSE PROTRAC OPERATIONAL INFORMATION

3.1   PUBLICATION PERIOD

The following section specifies the frequency and publication period for each message type disseminated by the NYSE ProTrac product.

Table 3 Publication Period

MESSAGE TYPE	PUBLICATION PERIOD
Execution Report	An execution report is generated based on events. Every execution message will be transmitted based on that event. The transmission time for the execution report message is between 9:30am (EST) until 7:30pm (EST) for most securities. Please check the NYSE website for any changes to trading hours.
Execution Report Cancellation	An execution report cancellation is generated based on events. Every cancellation message will be transmitted based on that event. The transmission time for the execution report cancel message is between 9:30am (EST) until 7:30pm (EST) for most securities. Please check the NYSE website for any changes to trading hours.
Execution Summary message	An Execution Reports Summary message is generated at 4:15 each Trading day. Two messages are sent out: 1 for the Total Buy Side volume and 1 for the Total Sell Side Volume.

3.2   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 or request retransmission of the missing/corrupted data packet.

For the NYSE ProTrac product, each data stream will have its unique set of sequence numbers. In other words, the message sequence for NYSE ProTrac A to J channel (ProTrac_AJ) is independent from the message sequence of NYSE ProTrac K to Z channel (ProTrac_KZ) and so on. The following is an example of sequencing for each channel.

ProTrac_AJ : SeqNum=1, SeqNum=2, SeqNum=3, ..., SeqNum=n.
ProTrac_KZ: SeqNum=1, SeqNum=2, SeqNum=3, ..., SeqNum=y.

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 ProTrac_AJ, then the gap filling has to be done through the appropriate ProTrac_AJ retransmission channel. The same is valid for the other channels.

3.3   DUAL SITE

NYSE ProTrac data will be published using two (2) sets of unique IP Multicast Group IDs - each originating from a separate distribution site. Thus, when appropriate, each NYSE ProTrac channel 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.

4.   NYSE PROTRAC MESSAGE SPECIFICATIONS

4.1   DATA DELIVERY FORMAT

The NYSE ProTrac service uses the push-based publishing model. This means that data will be published based on its availability. Once an execution report is available, it will be published to NYSE ProTrac Subscribers.

4.2   GENERAL PROCESSING NOTES

The following processing notes apply to the messages sent through the feed.

All fields will be sent for every packet.

- Only field values will appear in the published messages (e.g., no names, 'tags', sizes will appear in the message). The field names that appear in the descriptions below are for reference purposes only.

- All the fields are contiguous, with reserved fields for alignment issues.

- All field sizes are fixed and constant.

- The source time referenced will be using Eastern Standard Time (EST).

- Binary fields are provided in Big-Endian format.

- ASCII string fields are left aligned and null padded.

4.3   SEQUENCE NUMBERS

All messages conform to the line level sequencing. Each channel A to J, K to Z has its own sequence number. Subscribers can use sequence numbers to determine the following:

- Missing (gapped) messages

- Unordered messages

- Duplicate messages.

Clients should note that the message sequence number might restart from one following a failure recovery. A reset sequence number message will be sent to clients via the Multicast Groups to inform of such event.

4.4   SYMBOLS

The stock symbols represented in this feed includes the root and optional suffix. 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\0\0\0\0\0\0\0\0". Between the root and the suffix there will be one space. After the suffix, null values follow to fill the 16 characters allocated for the stock symbol field.

Note: "\0" represents a null value

4.5   PRICES

Prices in this feed are represented by two fields, separating the denominator and the numerator. All prices in the feed share a common denominator, which is represented in the PriceScaleCode.

The PriceScaleCode field value represents the common denominator for the following formula:

$$Price = \frac{Numerator}{10^{PriceScaleCode}}$$

For example, a price of 27.56 is represented by a Numerator of 2756 and a PriceScaleCode equals to 2.

4.6   NYSE PROTRAC DATA MESSAGES

The following table contains a list of the message types contains in the NYSE ProTrac feed.

Table 4 NYSE ProTrac Data Messages

MESSAGE TYPE	DESCRIPTION
Execution Report	An Execution Report Message contains an execution report for a given NYSE-Listed Security.
Execution Report Cancellation	An Execution Report Cancellation message contains an execution report cancellation (also referred to as 'Bust') for a given NYSE-listed security
Summary Message	An Execution Reports Summary message contains the total share volume for a given NYSE-Listed Security. Two messages are sent out: 1 for the Index-Arb volume and 1 for the Non-Index Arb Volume.

4.7   MESSAGE HEADER FORMAT

All messages are preceded by a standard header format. The following table describes the header fields of a NYSE ProTrac message.

Table 5 Message Header Format

FIELD	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
MsgSize	0	2	Binary Integer	This field indicates the size of the message body in bytes. The value in this field does not account for the MsgSize field size. Sequence Number Reset – '18 Bytes' Heartbeat Message – '14 Bytes' Heartbeat Response Message – '34 Bytes' Message Unavailable – '22 Bytes' Retransmission Request Message – '42 Bytes' Retransmission Response Message – '46 Bytes' Refresh Request Message – '50 bytes' **Execution Report Message - '44 Bytes'** **Execution Report Cancellation Message - '44 Bytes'** **Execution Report Summary Message - '36 Bytes'**
MsgType	2	2	Binary Integer	This field identifies the type of message '1' – Sequence Number Reset

FIELD	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				'2' – Heartbeat Message
				'5' – Message Unavailable
				'10' – Retransmission Response message
				'20' – Retransmission Request Message
				'22' – Refresh Request Message
				'24' – Heartbeat Response Message
				'180' – Execution Report Message
				'181' – Execution Report Cancellation Message
				'182' – Execution Report Summary Message
MsgSeqNum	4	4	Binary Integer	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).
SendTime	8	4	Binary Integer	This field specifies the time message was created by PDP. The number represents the number of milliseconds since midnight of the same day.
ProductID	12	1	Binary Integer	**'111'** is the product value used in the PDP header to identify the NYSE ProTrac feed
RetransFlag	13	1	Binary Integer	A flag that indicates whether this is an original, retransmitted, or 'replayed' message. Valid values include: '1' – Original message '2' – Retransmitted message '3' – Message Replay '4' – Retransmission of a 'replayed' message '5' – Refresh Retransmission
NumBodyEntries	14	1	Binary Integer	The number of times the message body repeats in the message. For example, if the body consists of a field (named Volume) and the "NumBodyEntries" field is 2, the number of bytes in the message body will be 8
FILLER	15	1	ASCII String	This is a filler, reserved for future use

4.8   EXECUTION REPORT MESSAGE FORMAT

The table below describes the body fields of a NYSE ProTrac message **(MsgType '180')** for additional messages such as sequence number reset, retransmission etc, see Common PDP Message Structure.

Table 6 Execution Report Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
ExecTime	16	4	ASCII String	This field specifies the execution time. The number in this field represents the number of milliseconds since midnight of the same day.
Symbol	20	16	ASCII String	See Symbols
Volume	36	4	Binary Integer	Volume specifies the quantity of shares in this report.
LinkID	40	4	Binary Integer	The LinkID identifies a unique transaction in the matching and allows you to correlate execution reports to the last sale.
ExecutionType	44	2	Binary Integer	This field indicates the type of execution report provided in this message. Valid Value(s) are: '3' – Program Trading Execution

4.9   EXECUTION REPORT CANCELLATION MESSAGE FORMAT

The table below describes the body fields of a NYSE Execution Report Cancellation message **(MsgType '181')** for additional messages such as sequence number reset, retransmission etc, see Common PDP Message Structure.

Table 7 Execution Report Cancellation Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
ExecTime	16	4	ASCII String	This field specifies the execution time. The number in this field represents the number of milliseconds since midnight of the same day.
Symbol	20	16	ASCII String	See Symbols
Volume	36	4	Binary Integer	Volume specifies the quantity of shares in this report.
LinkID	40	4	Binary Integer	The LinkID identifies a unique transaction in the matching and allows you to correlate execution reports to the last sale.
ExecutionType	44	2	Binary Integer	This field indicates the type of execution report provided in this message. Valid Value(s) are:

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				'3' – Program Trading Execution

4.10   SUMMARY MESSAGE FORMAT

The table below describes the body fields of a NYSE ProTrac Summary message **(MsgType '182')** for additional messages such as sequence number reset, retransmission etc, see Common PDP Message Structure.

Table 8 Summary Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Symbol	16	16	ASCII String	Any valid NYSE Symbol. See Symbols
TotalVolume	32	4	Binary Integer	Total volume in shares
ExecutionType	36	2	Binary Integer	This field indicates the type of execution summary provided in this message. Valid Value(s) are: '4' – Index Arb Execution Summary '5' – Algorithmic Execution Summary '6' – Non-Algorithmic Execution Summary

5. MESSAGE EXAMPLES

The following section provides examples of the data content for the NYSE ProTrac product and discusses the following scenarios:

1. Execution Report message for stock ABC

2. Execution Report message for stock DEF Preferred A

3. Execution Report Cancel Message for stock ABC

4. ProTrac Summary Message for stock ABC

5.1 SCENARIO 1

The following scenario displays what a message would look like for an execution report for Stock ABC:

Table 9 Execution Report for Stock ABC

FIELD NAME	VALUE
MsgSize	44
MsgType	180
MsgSeqNum	2
SendTime	41000250
ProductId	111
RetransFlag	1
NumBodyEntries	1
Filler	N/A
ExecTime	41000200
Symbol	ABC\0\0\0\0\0\0\0\0\0\0\0\0
LinkID	1234
Volume	200
ExecutionType	0

5.2 SCENARIO 2

The following scenario displays what a message would look like for an Execution Report message for Stock DEF: Preferred A

Table 10 Execution Report Message for Stock DEF Preferred A

FIELD NAME	VALUE
MsgSize	44
MsgType	180
MsgSeqNum	3

FIELD NAME	VALUE
SendTime	41000245
ProductId	111
RetransFlag	1
NumBodyEntries	1
Filler	N/A
ExecTime	41000215
Symbol	DEF PRA\0\0\0\0\0\0\0\0
LinkID	1235
Volume	400
ExecutionType	0

5.3   SCENARIO 3

The following scenario displays what a message would look like for an Execution Report Cancel message for Stock DEF Preferred A:

Table 11 Execution Report Cancel Message for Stock ABC

FIELD NAME	VALUE
MsgSize	44
MsgType	181
MsgSeqNum	4
SendTime	41100257
ProductId	111
RetransFlag	1
NumBodyEntries	1
Filler	N/A
ExecTime	41100212
Symbol	DEF PRA\0\0\0\0\0\0\0\0
LinkID	1235
Volume	400
ExecutionType	0

5.4   SCENARIO 4

The following scenario displays what a message would look like for a ProTrac Summary Message for the Total Buy Volume:

Table 12 ProTrac Summary Message

FIELD NAME	VALUE
MsgSize	36
MsgType	182
MsgSeqNum	567
SendTime	58500050
ProductId	113
RetransFlag	1
NumBodyEntries	1
Filler	N/A
Symbol	DEF PRA\0\0\0\0\0\0\0\0
Volume	3000000
ExecutionType	4

APPENDIX A: COMMON PDP MESSAGE STRUCTURE

In broad terms, there are two types of messages transmitted as part of this protocol:

- **Control**   Control messages do not contain data per se; rather, they allow conversing parties to exchange session-specific information (e.g. 'reset sequence number').

- **Data**   Data messages are product specific and although they will adhere to the general specification, they are defined specifically in a later section.

A.1   GENERAL PROCESSING NOTES

The following processing notes apply to the Control and Data messages:

- All fields will be sent for every packet.

- Only field values will appear in the published messages (e.g. no names, 'tags', sizes will appear in the message). The field names that appear in the descriptions below are for reference purposes only.

- All the fields are contiguous, i.e. there is no explicit (or implicit) 'padding' between fields regardless of the juxtaposed data types, sizes, and alignment issues.

- All field sizes are fixed and constant.

- The source time referenced will be using Eastern Standard Time (EST).

- Binary fields are provided in Big-Endian format.

- All binary fields will be unsigned (unless otherwise specified)

- ASCII string fields are left align, null padded.

A.2   COMMON MESSAGE HEADER FORMAT

All PDP messages will contain a Common Message Header with the exception of the Order Book Refresh Message. 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 13 Common Message Header Format

FIELD	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
MsgSize	0	2	Binary Integer	This field indicates the size of the message body in bytes. The value in this field does not account for the MsgSize field size. Sequence Number Reset – '18 Bytes' Heartbeat Message – '14 Bytes' Heartbeat Response Message – '34 Bytes'

FIELD	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				Message Unavailable – '22 Bytes'
				Retransmission Request Message – '42 Bytes'
				Retransmission Response Message – '46 Bytes'
				Refresh Request Message – '50 bytes'
				Execution Report Message - '44 Bytes'
				Execution Report Cancellation Message - '44 Bytes'
				Execution Report Summary Message - '36 Bytes'
MsgType	2	2	Binary Integer	This field identifies the type of message
				'1' – Sequence Number Reset
				'2' – Heartbeat Message
				'5' – Message Unavailable
				'10' – Retransmission Response message
				'20' – Retransmission Request Message
				'22' – Refresh Request Message
				'24' – Heartbeat Response Message
				'180' – Execution Report Message
				'181' – Execution Report Cancellation Message
				'182' – Execution Report Summary Message
MsgSeqNum	4	4	Binary Integer	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).
SendTime	8	4	Binary Integer	This field specifies the time message was created by PDP. The number represents the number of milliseconds since midnight of the same day.
ProductID	12	1	Binary Integer	**'111'** is the product value used in the PDP header to identify the NYSE ProTrac feed
RetransFlag	13	1	Binary Integer	A flag that indicates whether this is an original, retransmitted, or 'replayed' message. Valid values include:
				'1' – Original message

FIELD	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				'2' – Retransmitted message
				'3' – Message Replay
				'4' – Retransmission of a 'replayed' message
				'5' – Refresh Retransmission
NumBodyEntries	14	1	Binary Integer	The number of times the message body repeats in the message. For example, if the body consists of a field (named Volume) and the "NumBodyEntries" field is 2, the number of bytes in the message body will be 8
FILLER	15	1	ASCII String	This is a filler, reserved for future use

A.3   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.

Table 14 Sequence Number Reset Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the Sequence Number Reset Message					
MsgSize	0	2	Binary Integer	18	See Common Message Header Format
MsgType	2	2	Binary Integer	'1'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'1'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
Defined below are the 'body' fields of the Sequence Number Reset Message					
NextSeqNumber	16	4	Binary		This field contains the sequence

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
			Integer		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.

A.3.1   Sequence Number 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 NYSE ProTrac 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). Please refer to Processing of Sequence Number Reset Messages for a suggest way of processing.

A.4   HEARTBEAT MESSAGES

Subscribers that choose to establish and remain connected to the TCP/IP Retrans/Refresh server will receive Heartbeat messages to let them know that the connection is still alive.

Table 15 Heartbeat Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the Heartbeat Message					
MsgSize	0	2	Binary Integer	14	See Common Message Header Format
MsgType	2	2	Binary Integer	'2'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'0'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use

A.4.1   Heartbeat Message 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.

Subscribers must respond to these heartbeat requests with a heartbeat message.

Please refer to Processing of Heartbeat Messages for a suggest way of processing.

A.5   HEARTBEAT RESPONSE MESSAGE

This message will be sent by subscribers that choose to establish and remain connected to the TCP/IP retransmission/refresh server intraday. This message lets the NYSE know that the connection is still alive. Subscribers must respond to these heartbeat requests with a heartbeat response message.

Table 16 Heartbeat Response Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the Generic Retransmission Request Message					
MsgSize	0	2	Binary Integer	'34'	See Common Message Header Format
MsgType	2	2	Binary Integer	'24'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'1'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
Defined below are the 'body' fields of the Generic Retransmission Request Message					
SourceID	16	20	ASCII String		This field represents the name of the source requesting retransmission. This field is null padded, left aligned

A.6   RETRANSMISSION REQUEST MESSAGE

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

Table 17 Retransmission Request Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the Generic Retransmission Request Message					
MsgSize	0	2	Binary Integer	'42'	See Common Message Header Format
MsgType	2	2	Binary Integer	'20'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'1'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
Defined below are the 'body' fields of the Generic Retransmission Request Message					
BeginSeqNum	16	4	Binary Integer		The beginning sequence number of the requested range of messages to be retransmitted.
EndSeqNum	20	4	Binary Integer		The end sequence number of the requested range of messages to be retransmitted.
SourceID	24	20	ASCII String		This field represents the name of the source requesting retransmission. This field is null padded, left aligned

A.7   RETRANSMISSION RESPONSE MESSAGE

This message will be sent immediately via TCP/IP in response to the subscribers request for retransmission messages. This message does not contain any information just the acceptance or rejection of the request message.

Table 18 Retransmission Response Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the NYSE Retransmission Response Message					
MsgSize	0	2	Binary Integer	'42'	See Common Message Header Format
MsgType	2	2	Binary Integer	'10'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'1'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
Defined below are the 'body' fields of the NYSE Retransmission Response Message					
SourceSeqNum	16	4	Binary Integer		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 String		This field represents the name of the source requesting retransmission. This field is null padded, left aligned
Status	40	1	ASCII String		This is a flag that indicates whether the retransmissions request was accepted or rejected. Valid values:

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
					'A' – Accepted
					'R' – Rejected
Reject Reason	41	1	Binary Integer		This is a flag that indicates the reason why the request was rejected. Valid values: '0' – Message was accepted '1' – Rejected due to permissions '2' – Rejected due to invalid sequence range '3' – Rejected due to maximum sequence range (>1000) '4' – Rejected due to maximum request in a day '5' – Rejected due to maximum number of refresh requests in a day
Filler	42	2	ASCII String		This is a filler, reserved for future use.

A.8   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 messages sent by NYSE ProTrac, with the exception that the 'RetransFlag' in the header is set to the value of '2', '4' or '5' depending on whether the retransmission is for a non-replay or a replay retransmission message, respectively.

Table 19 Retransmission Message Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the Retransmitted Message					
MsgSize	0	2	Binary Integer	'54'	See Common Message Header Format
MsgType	2	2	Binary Integer		It will be the MsgType of the original message sent by the PDP_PROTRAC.
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary		See Common Message Header

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
			Integer		Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'2','4' or '5'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	Same as original message	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
All the 'body' fields of the Retransmitted Message are the same as the original message					

A.8.1   Retransmission Message 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.

Note that when a message for a particular symbol is retransmitted, a new message for the same symbol may be sent through the regular channel. This scenario is very likely to occur with busy symbols and may cause confusion as to which message contains the latest information on that symbol.

In order to resolve the conflict, the following qualification method should be applied:

- Check the MsgSeqNum field. A retransmitted message retains the same sequence number as the original message. Even refreshes are retransmitted with the original sequence numbers for the message they belonged to.

- The most current sequence number (SEQNUM) contains the latest information.

- If the SEQNUMS are the same: messages are the same, any of the two messages contains the same information.

Please refer to Processing of Line Level Retransmission Messages for a suggest way of processing.

A.9   MESSAGE UNAVAILABLE

This message will be sent to inform the subscribers of unavailability of a range of messages for which they may have requested retransmission via the Retransmission Multicast channels.

Table 20 Message Unavailable Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
Defined below are the 'header' fields of the NYSE Packet Unavailable Message					
MsgSize	0	2	Binary Integer	'22'	See Common Message Header Format

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	VALUE	DESCRIPTION
MsgType	2	2	Binary Integer	'5'	See Common Message Header Format
MsgSeqNum	4	4	Binary Integer		See Common Message Header Format
SendTime	8	4	Binary Integer		See Common Message Header Format
ProductID	12	1	Binary Integer	'111'	See Common Message Header Format
RetransFlag	13	1	Binary Integer	'1'	See Common Message Header Format
NumBodyEntries	14	1	Binary Integer	'1'	See Common Message Header Format
FILLER	15	1	ASCII String		This is a filler, reserved for future use
Defined below are the 'body' fields of the NYSE Packet Unavailable Message					
BeginSeqNum	16	4	Binary Integer		The beginning sequence number of the requested range of messages to be retransmitted.
EndSeqNum	20	4	Binary Integer		The end sequence number of the requested range of messages to be retransmitted.

APPENDIX B: MESSAGE PROCESSING

This appendix provides workflow diagrams to simplify how the NYSE ProTrac messages should be processed.

B.1   PROCESSING OF MESSAGES

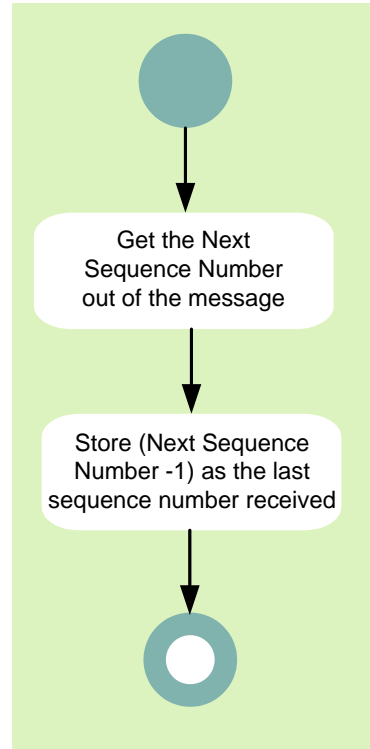The following is the recommended way of processing messages.

Figure 1 Message Processing
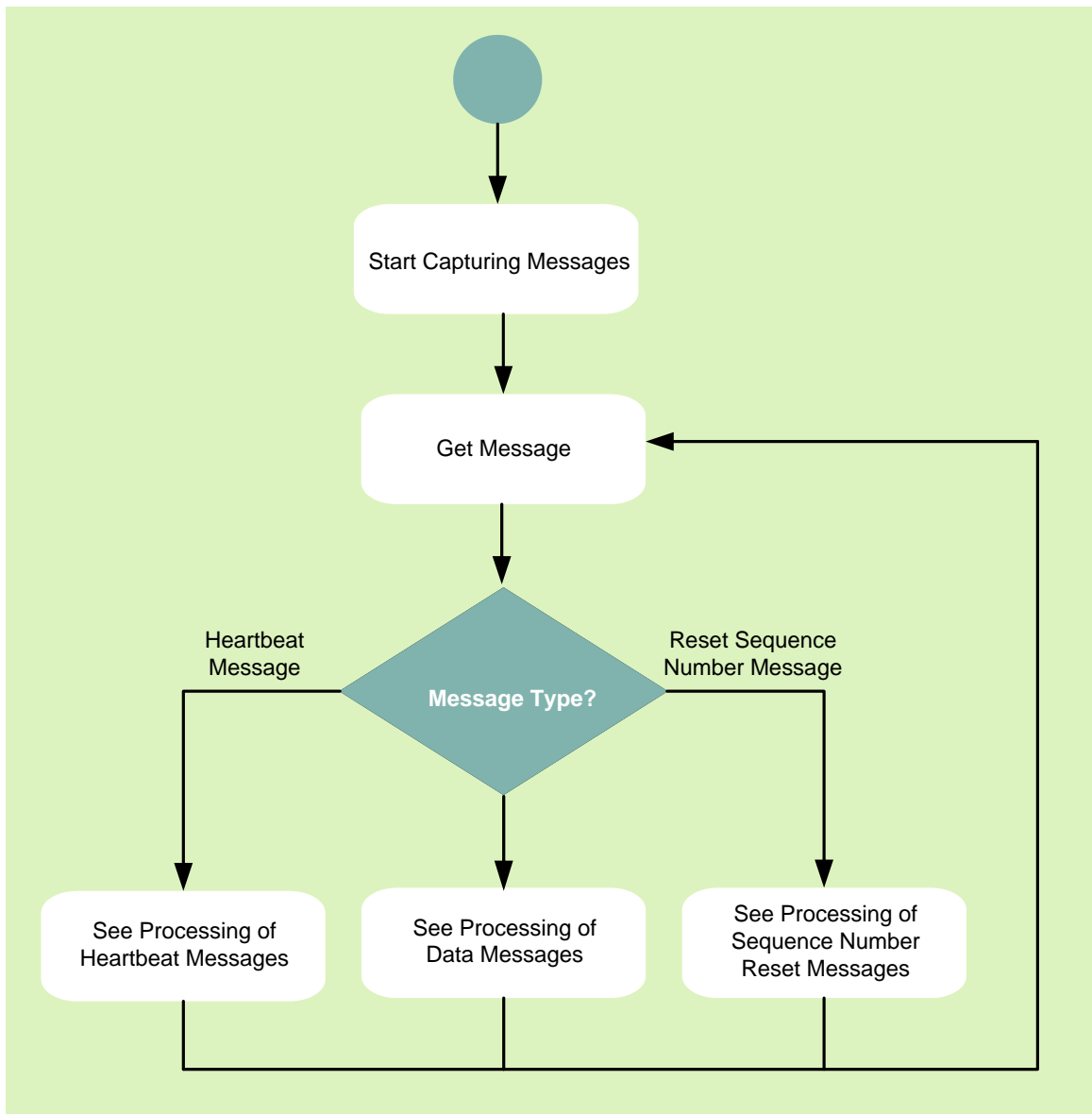
B.2   PROCESSING OF SEQUENCE NUMBER RESET MESSAGES

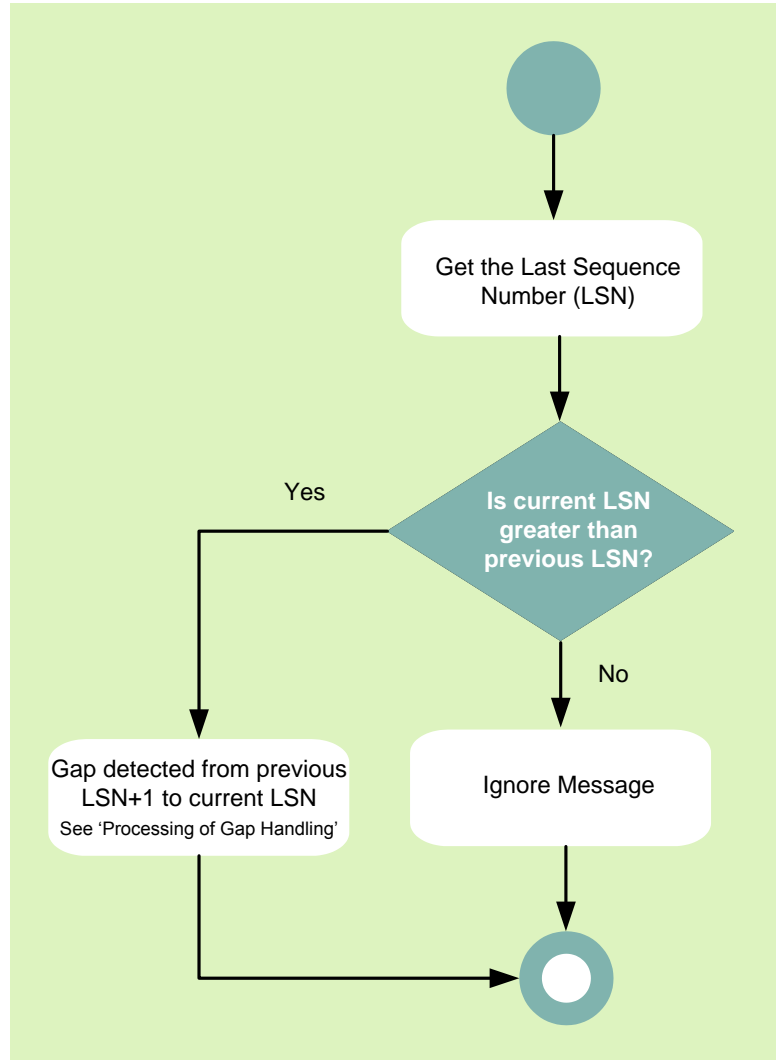The following is the recommended way of processing Sequence Number Reset messages.

Figure 2 Sequence Number Reset Message Processing

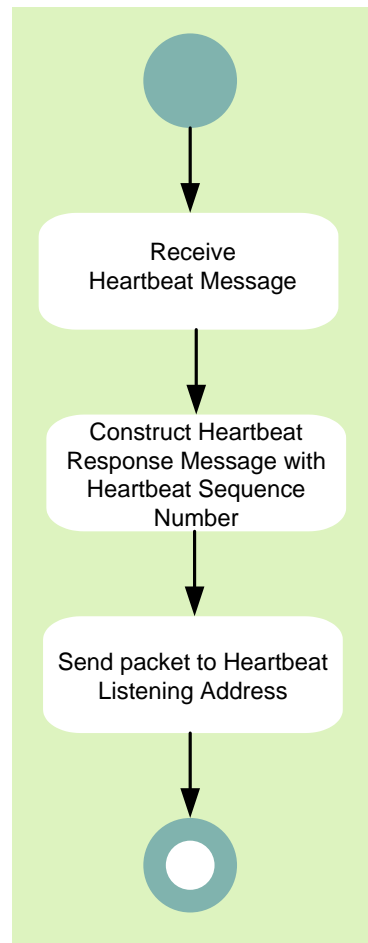**B.3   PROCESSING OF HEARTBEAT MESSAGES**

The following is the recommended way of processing Heartbeat messages.

Figure 3 Heartbeat Message Processing

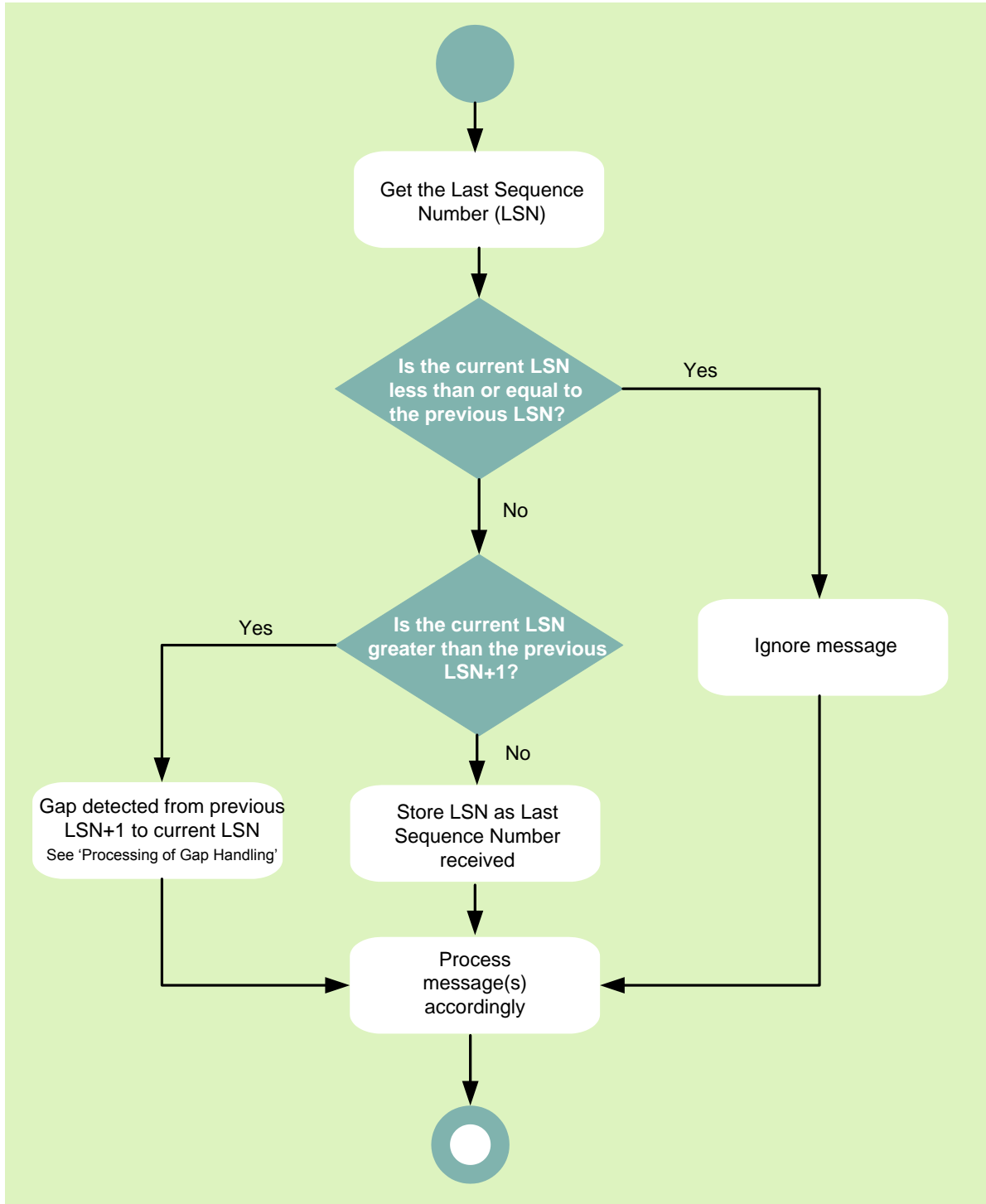## B.4   PROCESSING OF HEARTBEAT RESPONSE MESSAGES

The following is the recommended way of processing Heartbeat Response messages.

B.5   PROCESSING OF DATA MESSAGES

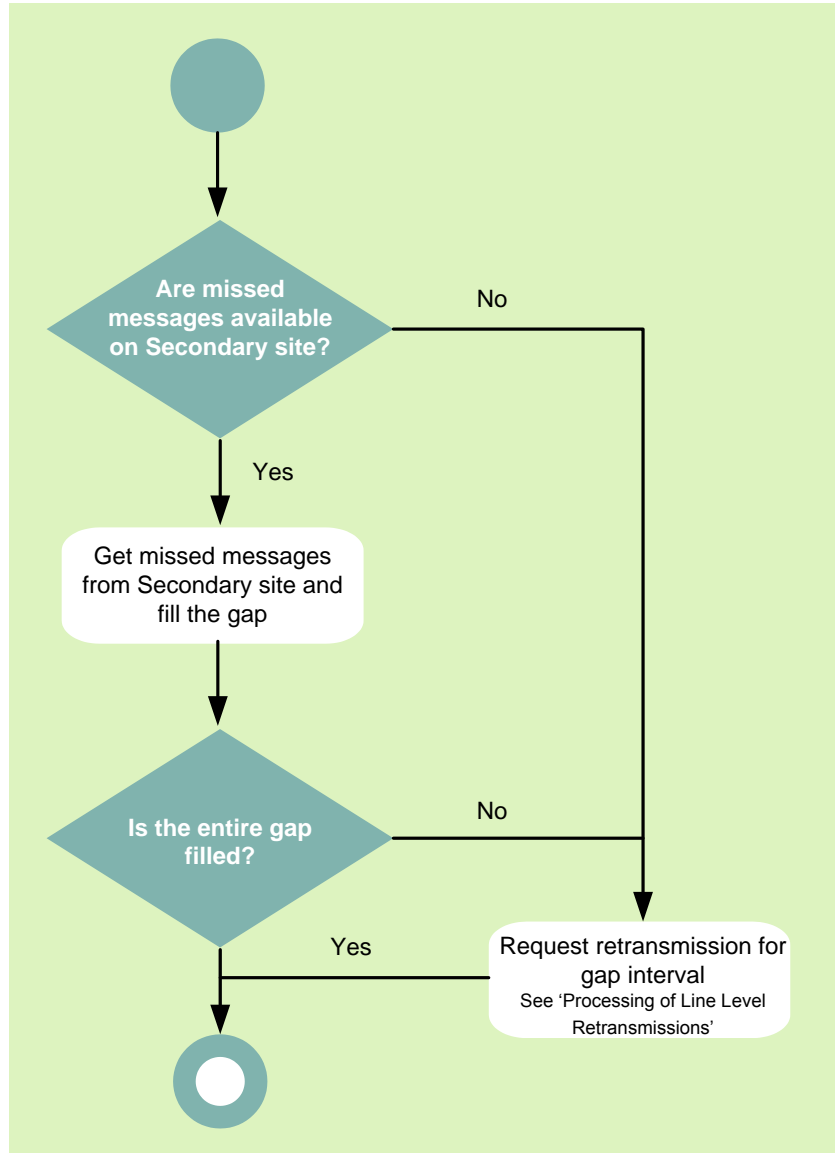The following is the recommended way of processing Data messages.

Figure 4 Data Message Processing

B.6   PROCESSING OF GAP HANDLING

The following is the recommended way of handling message gaps.

Figure 5 Message Gap Handling

B.7   PROCESSING OF LINE LEVEL RETRANSMISSIONS

The following is the recommended way of line level retransmissions.

Figure 6 Line Level Retransmission Processing