Lightspeed Gateway::Books

Note: Messages on test servers may not reflect this specification. Production messages will be adapted to follow this specification.

ECN's all use the same message formats, with differentiation occurring via the Participant ID field.

Participant ID is that ECN from which the client is receiving messages. If your implementation chooses to use the same procedure for multiple ECN messages, you may choose to switch your routine handling off the Participant ID field.

ECN	Participant ID
INET ATS	INET
Archipelago	ARCA
Bloomberg	BTRD
BATS ECN	BATS
Direct Edge ECN	EDGX

Message Semantics:

ECN messages will follow the following semantics:

- Client applications subscribe to data for a particular symbol using the SS (symbol subscribe) message.
- Client applications unsubscribe to data for a particular symbol using the SQ (symbol quit) message.
- Additions to a book will only occur via EA (ecn addition) messages.
- Changes to existing orders on the book occur via ER (ecn revision) messages. Orders are not removed from the book by this message, even if Shares is zero.
- Orders revised by ER may or may not have their time priority on the book reset. If the priority is reset, the order must be moved to the bottom of its price level.
- EX (ecn cancellation) always removes entire orders from the book.
- Order executions occur via EE (ecn execution) messages. Partial executions are possible via the EE message, thus the Client Application must keep track of the shares on the book and remove the order when shares reaches zero. Upon removal in this case, a corresponding EX message is not transmitted.

- EC (ecn cleared) triggers a removal of all orders from the book. This message is used to reset the book and indicates intent to eventually transmit a replacement snapshot.   A corresponding ES (ecn end snapshot) message will be transmitted after this snapshot.
- Hidden order executions are indicated by ET (ecn trade) messages.
- Client applications may request an extended information snapshot using the XS (extended snapshot) message.

Message Timestamps:

In addition, EA (ecn addition), EE (ecn execution), ER (ecn revision), ET (ecn trade notify), and EX (ecn cancellation) messages carry a timestamp. For EA messages, the timestamp indicates the time priority placement of the order. For all other messages, the timestamp is the time the particular event occurred.

Each ECN uses a different resolution for its timestamps. However, all timestamps will be converted to milliseconds for the Customer Application. The following table summarizes the time resolution each ECN provides.

ECN	Participant ID	Timestamp Resolution
Island	INET	1 millisecond
Archipelago	ARCA	1 millisecond
Bloomberg	BTRD	1 second
BATS	BATS	1 millisecond
Direct Edge	EDGX	1 millisecond

Messages transmitted by Customer Application to Server:
[SS] Symbol Subscription

Subscribe to receive information on a given security.

Customer Application to Server

Field	Description		Value
1	Message ID	Message type indicator	Text "SS"
2	Stock Symbol	Security's ticker symbol	Text
3	Participant ID	Participant ID of the ECN	Text

[SQ] Symbol Quit

Quit receiving ECN book messages. A successful quit results in no more EA (ecn addition), EX (ecn cancellation), ER (ecn revision), EE (ecn execution) or EC (ecn cleared) messages being sent to the Customer Application. There is no acknowledgement on sending an SQ (symbol quit) message.

Customer Application to Server

Field	Description		Value
1	Message ID	Message type indicator	Text "SQ"
2	Stock Symbol	Security's ticker symbol	Text
3	Participant ID	Participant ID of the ECN	Text

[XS] Extended Snapshot

Request a snapshot containing extended information. As a special exception, requesting a snapshot for symbol "*" will request a snapshot containing extended information for all open orders for the given participant.

Unlike the standard SS (symbol subscription) message, the extended snapshot message does not provide ongoing updates in real-time. It may only be used to obtain a snapshot.

Client applications may request an extended snapshot. This snapshot contains information about the native messages being processed from the data provider. It can be used to initialize the ECN book to synchronize a separate sequenced data session containing raw data in the provider's native format. The data contained within the extended snapshot contains the order identifier used by the venue as well as the as-of sequence number of the last applied message.

As a special exception, clients may request an extended snapshot containing all open orders by requesting the special symbol "*".

Note that the identifiers used for the extended snapshot are those of the native data provider. They do not necessarily correlate with the identifiers used within messages unrelated to the extended snapshot.

Field	Description		Value
1	Message ID	Message type indicator	Text "XS"
2	Stock Symbol	Security's ticker symbol or "*"	Text
3	Participant ID	Participant ID of the ECN	Text

Messages transmitted by Server to Customer Application:

[EA] ECN Addition

Addition of a specified quote in a given symbol to an ECN's book.

Field 8 (Timestamp) indicates the time priority of the order. This is either the time the order entered the book, or the time the order's priority was reset due to an ER (ecn revision) message. In either case, it indicates the time at which the order entered force at its current priority.

Field 9 (MMID) is an optional field that is only present if the vendor flagged the order as attributable.

Server to Customer Application

Field	Name	Description	Value
1	Message ID	Message type indicator	Text "EA"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Order ID	Order ID of the quote	Text
6	Shares	Shares added to the book	Number
7	Price	Price at which quoted	Price
8	Timestamp	Time priority	Timestamp
9	MMID	Market Maker ID (Optional)	Text

[EC] ECN Book Cleared

The book has been cleared on the ECN side, all past orders for this security are now closed. This message is commonly sent when the server is cycled, a line to an ECN goes down, or when market data is sluggish. The security remains subscribed and a snapshot will be issued when data becomes reliable again.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "EC"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text

[EE] ECN Execution

Report of a Full or Partial Fill of a specific order from an ECN's book.

If the remaining shares after execution is zero, the order is removed from the book and a corresponding EX (ecn cancellation) message will not be transmitted.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "EE"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Order ID	Order ID of the quote	Text
6	Shares Executed	Shares filled out of Order ID	Number
7	Timestamp	Execution time	Timestamp

[EI] ECN Imbalance

Indicates imbalance in a pending order matching session.

The first 5 fields are defined for all EI messages. The format of the remaining fields is indicated by field 5 (Appendage Type). Applications must discard any message that contains an unrecognized value for this field.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "EI"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Timestamp	Update time	Timestamp
5	Appendage Type	Appendage format indicator	Text

Currently one Appendage Type is defined:

Value	Description
A	ARCA Imbalance

Note: Appendage field numbers are relative to the beginning of the ECN Imbalance message.

ECN Imbalance Appendage Type [A]

This appendage is used to indicate imbalance during a matching auction on the Archipelago exchange. The fields for Appendage Type "A" are as follows:

Server to Customer Application

Field	Description		Value
6	Match Price	Indicative match price	Price
7	Match Size	Indicative match size	Number
8	Total Imbalance	Imbalance of all eligible orders	Text

9	Market Imbalance	Imbalance of market orders	Timestamp
10	Auction Type	Type of the auction. Known values: Opening O Market M Halt H Closing C	Text
11	Auction Time	Projected auction time, or zero if unknown.	Short Timestamp

[ER] ECN Revision

Changes any or all characteristics of an order currently on an ECN's book.

If the revision changes price or increases the number of shares bid or offered, the order loses its priority and falls to the bottom of the price level. This behavior is explicitly indicated by the Priority Reset Flag to reduce ambiguity.

If the remaining shares after revision is zero, the order is not removed from the book.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "ER"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Order ID	Order ID of the quote	Text
6	Shares	Updated absolute number of shares	Number
7	Price	Updated price at which quoted	Price
8	Priority Reset	Indicates if order lost priority due to revision.	Text
9	Timestamp	Revision time	Timestamp

[ES] ECN End Snapshot

Indicates end of EA (ecn addition) messages for orders currently on the Server book. All following messages for the given stock will be real-time. The Server always transmits exactly one ES (ecn end snapshot) for each SS (symbol subscribe) message transmitted by the Customer Application even if the book is empty or the symbol does not exist.

Server to Customer Application

Field	Name	Description	Value
1	Message ID	Message type indicator	Text "ES"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text

[ET] ECN Trade Notify

Report of an execution that occurred on an order not visible in an ECN's book.
For some trade notifications, the side of the trade may not be known. For these messages, 'X' will be transmitted for Field 4 (Buy/Sell). See Appendix B, BuySell Indicator table.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "ET"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Price	Price of the matched order	Price
6	Shares Executed	Shares executed	Number
7	Timestamp	Execution time	Timestamp

[EX] ECN Cancellation

Removal of a specific order from an ECN's book.

Field 6 (Shares) will always be equal to the number of outstanding shares present in the order. This message always cancels the entire order.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "EX"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Order ID	Order ID of the quote	Text
6	Shares	Shares being cancelled	Number
7	Timestamp	Cancellation time	Timestamp

[XA] ECN Extended Snapshot Order

Send to add an open order to the extended snapshot. This message includes the native venue identifier for the order. See the Trillium ECN Multicast Data Specification for information regarding this identifier.

Field 8 (Timestamp) indicates the time priority of the order. This is either the time the order entered the book, or the time the order's priority was reset due to an ER (ecn revision) message. In either case, it indicates the time at which the order entered force at its current priority.

Server to Customer Application

Field	Name	Description	Value
1	Message ID	Message type indicator	Text "XA"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Buy/Sell	Side of the book	Text
5	Venue ID	Venue-provided ID for the order	Text
6	Shares	Shares added to the book	Number

7	Price	Price at which quoted	Price
8	Timestamp	Time priority	Timestamp

[XI] ECN Extended Snapshot Imbalance

Sent to indicate imbalance in a pending order matching session during an extended snapshot. This message carries no extended information and is identical to the EI (ECN Imbalance) message except for message type.

The first 5 fields are defined for all XI messages. The format of the remaining fields is indicated by field 5 (Appendage Type). Applications must discard any message that contains an unrecognized value for this field.

Server to Customer Application

Field	Description		Value
1	Message ID	Message type indicator	Text "XI"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	Timestamp	Update time	Timestamp
5	Appendage Type	Appendage format indicator	Text

The ECN Extended Snapshot Imbalance Appendages are identical to the ECN Imbalance Appendages described above for the EI (ECN Imbalance) message.

[XS] ECN End Extended Snapshot

Indicates end of XA (ecn extended snapshot order) and XI (ecn extended snapshot imbalance) for the requested extended snapshot. The Server always transmits exactly one XS (ecn end extended snapshot) for each XS (extended snapshot) message transmitted by the Customer Application even if the book is empty or the symbol does not exist.

The As-Of Sequence field indicates the sequence number of the last message that was applied to the book to produce the extended snapshot. That is, all messages from the beginning of the day through to the As-Of Sequence inclusive have been applied to the ECN book to produce the extended snapshot.

Server to Customer Application

Field	Name	Description	Value
1	Message ID	Message type indicator	Text "XS"
2	Participant ID	Participant ID of the ECN	Text
3	Stock Symbol	Security's ticker symbol	Text
4	As-Of Sequence	Venue sequence number of the last message applied.	Number

Appendix A - Data Types

Type	Description
Number	An unsigned integer. In some cases, the number may be prefixed by a letter used to distinguish fields visually.
Text	Alphanumeric (space converted to underscore)
Price	An unsigned number, integer or decimal, no length or format requirements other than a decimal point should be proceeded by a number. In some cases, the price may be prefixed by a letter used to help distinguish the field when visually debugging the market data stream. Examples (all are valid prices): 4 15 3001.25 05.402 105.0 A4 P11.3
Unix Timestamp	An unsigned integer representing a standard "Unix style" timestamp. This quantity is the number of seconds passed since 00:00:00 on January 1, 1970.
Timestamp	An unsigned integer representing the number of milliseconds past Midnight standard local time. This is Eastern Standard Time (UTC –0500) or Eastern Daylight Time (UTC –0400), according to local daylight savings time rules.
Short Timestamp	An unsigned integer representing the number of seconds past Midnight standard local time. This is Eastern Standard Time (UTC –0500) or Eastern Daylight Time (UTC –0400), according to local daylight savings time rules.
Imbalance	An unsigned integer with optional prefix. This field is prefixed by an 'S' to indicate sell-side imbalance or a 'B' to indicate buy-side imbalance. If there is no imbalance, this field has no prefix and value 0.

Appendix B - Field Definitions

BuySell Indicator

Value	Description
B	Buy
S	Sell
X	Do not know (this indicator only occurs in ET [ecn trade] messages)

Participant ID Reference

Participant ID	Source	Description
BOST	Nasdaq UTP	Boston Stock Exchange
CINN	Nasdaq UTP	Cincinnati Stock Exchange
ADFN	Nasdaq UTP	NASD Alternative Display Facility
MWSE	Nasdaq UTP	Chicago Stock Exchange
ARCX	Nasdaq UTP	Archipelago / Pacific Exchange
NASD	Nasdaq UTP	Nasdaq
PHIL	Nasdaq UTP	Philadelphia Stock Exchange
NYSE	NYSE	New York Stock Exchange
AMEX	AMEX	American Stock Exchange
BATS	BATS	BATS ECN
EDGX	EDGX	Direct Edge ECN
????	Unknown	Reserved for unknown participants

Priority Reset Indicator

Value	Description
T	Order lost its priority.
F	Order kept its priority.
X	It is not known whether the order lost or kept its priority.

Appendix C - Sample Communications

Example conversation with the **INET** server:

```
VI alpha bits v1.05
SS QLGC INET
<- EA INET QLGC B 1100 692 46.110 10806000
<- EA INET QLGC B 1393 100 45.820 10808000
<- EA INET QLGC B 1865 100 15.000 10810000
<- EA INET QLGC B 1897 100 37.250 10810000
<- EA INET QLGC B 2604 50 40.000 10813000
```

36 more messages…

```
<- EA INET QLGC S 973893 500 47.850 37176000
<- EA INET QLGC S 1073542 2000 47.710 37561000
<- EA INET QLGC S 1074022 400 47.740 37593000
<- EA INET QLGC S 1076510 100 47.850 37593000
<- EA INET QLGC S 1076576 200 47.740 37577000
<- EA INET QLGC S 1078340 1000 47.700 37577000
<- EA INET QLGC S 1082001 300 47.690 37593000
<- ES INET QLGC
<- EX INET QLGC B 1081928 100 37598000
<- EX INET QLGC B 1082085 400 37599000
<- EX INET QLGC S 1074022 400 37599000
<- EA INET QLGC B 1082987 1100 47.630 37599000
```

36 more messages…

```
<- EA INET QLGC B 1084363 200 47.650 37609000
<- EX INET QLGC B 1084363 200 37609000
<- EA INET QLGC B 1084407 200 47.650 37609000
<- EX INET QLGC B 1062790 300 37609000
<- ET INET QLGC X 47.650 200 37609000
<- ER INET QLGC B 1084331 200 47.650 F 37609000
<- EA INET QLGC S 1084483 200 47.850 37609000
<- EX INET QLGC B 1084331 200 37610000
<- EX INET QLGC B 1084407 200 37610000
SQ QLGC INET
```

Revision History

1.00	4/2/2003	Initial version of this document
1.01	4/14/2003	- Fixed errors in ECN messages - Indicated that TU is sent with IU & ID - Added indicator tables in Appendix A
1.02	4/16/2003	- Added VI message, - Indicated ECN message volatility - Pointers to Appendix A - Updated Appendix C
1.03	5/5/2003	- Removed ER message. - Updated semantics - Updated Appendix C
1.04	6/11/2003	Added ES message.
1.05	6/23/2003	- Added ER message. - Added ET message. - Added timestamp information. - Updated semantics. - Added timestamp data type to Appendix A. - Added priority reset flag to Appendix A. - Updated Appendix A buy/sell flags. - Updated Appendix C.
	6/27/2003	Clarified EC message semantics
1.06	8/26/2003	- Renamed NQDS Messages to Price Server Messages. - Added CT message. - Added CC, CI, CJ, and CO messages. - Added TH and TR messages. - Added ED message. - Added TI message. - Updated TU message. - Updated IS, ID, IU, MS, MD, and MU messages to reflect halt semantics. - Added Quote Condition and Sale Condition informative values to Appendix A. - Added Market Center values to Appendix A. - Removed obsolete SOES Tiers information from Appendix A.

		- Updated Appendix C.
1.07	11/20/2003	- Updated IU message. IS messages will now be transmitted to an IU or ID subscription if a trade break or other update causes the IS fields to change.
	2/18/2004	- Inside prices accompanied by associated market center; IS, TU will carry the price and shares of the consolidated last print. - Updated ECN participants to reflect Island's change to INET and to remove Instinet. - Added TU and TQ customer application to server messages. - Updated appendix C. - Document renamed to Trillium Market Data Specification. - Removed obsolete advisories.
1.08	3/17/2004	Added Market Centers "N" and "T" to Appendix A. Removed consolidated last price and size from TU message.
	4/29/2004	Added notices regarding quote/sale condition processing to MS, MU, and TU message descriptions.
1.09	4/19/2004	- Added imbalance message (EI) to ECN Messages. - Added imbalance appendage type A (ARCA) to imbalance message description. - Document renamed to Lightspeed Gateway Books
1.10	10/06/2006	Added optional MMID field to the end of EA (ECN Addition) message.
1.11	2/13/2007	- Removed BRUT as an available ECN - Fix 'SQ (symbol quit)' - Created Appendix A to contain just Data Types table - Removed unnecessary Appendices
1.12	3/22/2007	- Added BATS and EDGX ECN/Participant ID's
1.13	1/06/2009	- Changed name to Lightspeed Books.