Lightspeed Gateway Protocol Specification

Version 2.0.24

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Contents

1   INTRODUCTION

1.1   Overview

This document is the official specification for the communication protocol between a customer's application and the Lightspeed Gateway. The protocol is designed to be simple, efficient, and robust, while providing all the functionality to effectively trade in all of the major electronic marketplaces.

The Gateway is intended to allow software developers to build systems that electronically enter orders and cancels from their own proprietary decision making algorithms. The protocol provides basic account information, and the means to enter orders (and cancel requests) to, and receive executions from, the electronic marketplaces. It is meant to be a trading and execution system, and not a back-end accounting platform. Hence, the account information provided is the minimum needed to make effective trading decisions. For detailed account information, including transaction and balance reports, contact your account representative.

1.2   Architecture

The Gateway protocol uses the SoupTCP Protocol. All messages sent to the customer's application (referred to as outbound messages) are assumed to be sequenced and their delivery is guaranteed by a lower level protocol controlling the session. This session protocol is typically SoupTCP.

The Gateway protocol is composed of messages passed between a customer's application and a corresponding gateway into Lightspeed Gateway. Each message of the same type has a fixed length. Messages of different types generally have different lengths. All messages are composed of only non-control ASCII characters.

All messages sent from the customer's application (referred to as inbound messages) are not assumed to be guaranteed. However, the protocol is designed so that all inbound messages may be benignly resent any number of times.

Lightspeed Gateways can simultaneously support multiple versions of the Gateway protocol. Each version will be considered a unique SoupTCP session. You may specify version by filling in the session field of the SoupTCP Login Request Message with the single digit corresponding to the requested Gateway version followed by nine spaces (Please refer to the SoupTCP specification for more information on the session field.) All sessions will default to Gateway version 2.0.

2 DATA TYPES

The following are the data types used for the value field in the message formats of this protocol.

alpha	These fields contain upper and lowercase letters, i.e. A-Z and a-z. They are left justified and padded on the right with spaces.
numeric	These fields contain ASCII coded integral values. They are right justified and padded on the left with spaces.
alphanum	These fields are like alpha fields but also can include the digits 0-9 and space. They are left justified and padded on the right with spaces.
timestamp	These fields contain the ASCII coded integer representing the number of milliseconds past midnight Eastern Time. They are right justified, and padded on the left with spaces.
price	These fields are right justified and left padded with zeros. They can either include or exclude the decimal point. Price without decimal point will be interpreted as the number of hundredths of pennies. Should price be interpreted other than hundredths of pennies, a decimal point should be included. For example: '0000012345' will be interpreted as $1.2345 '0001.23456' will be interpreted as $1.23456 The formats for price, in an order accept and an order executed message, will align with what is specified for that order in the new order message.
cash	These fields are like price fields except that the whole number portion is eight digits and the decimal portion is two digits. They can also be interpreted as the number of pennies, right justified and padded on the left with zeros.
alphaprice	These fields are like price fields but can also contain the special value "MKT" or "M" which is all uppercase and left adjusted. Should price be interpreted other than hundredths of pennies, following the rule in price field. For example: 'MKT ' will force the price field to be hundredths of pennies 'MKT000.000' will force the price field to be tenths of pennies. 'M000000.00' will force the price field to be pennies.

3   OUTBOUND MESSAGES

Outbound messages are sent to the customer's application. Each outbound message begins with a timestamp and message type, as shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	alpha	Identifies the message. See the appropriate subsection for the following message types: S – System Status message V – Venue Status message H, D, P, T, K, M —Account messages A, J, C, E—Order messages
<rest of message>	9	variable		Depends on the message type

3.1   System Status Message

The System Status message informs the customer's application of the status of the operating mode of the Gateway.
The message is sent to the customer application immediately upon successful login and any time the operating mode of the system changes.
The format of a System Status message is shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	S	System Status message type.
Status Code	9	1	alpha	Status code values are as follows: N—Normal operating mode L— Liquidate Only mode

3.2   Venue Status Message

Venue status messages inform the customer's application of the status of significant events that affect trading with each supported venue.
Venue status messages are sent, one for each trading venue, as soon as new orders can be sent to that venue. These have status codes of 'O'. Once these are sent, new order messages will be accepted for that venue. The venue codes are the same as the ones on new order messages.
When no more orders can be sent to a venue due to it being closed for the session, a venue status message will be sent with the status code set to 'C'.
If an open venue (i.e. a venue status message has been sent for it with a status code of 'O') becomes unavailable during the session (for whatever reason), a venue status message will be sent for it with the status code set to 'D'. If that venue later becomes available again, another venue status message will be sent for it with the status code set to 'U'.
The format of a venue status message is shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	V	Venue Status message type
Venue Code	9	1	alpha	Venue code values are as follows: I—INET/NASDAQ OUCH A —Arca L – Arca with Pegging B—BATS Pegging R—Rash D—Super DOT X—Super DOT/DirectPlus T – BATS Z P – BATS Y H – EDGA G – EDGX O – Boston OUCH Y – NYSE/AMEX Hidden C – Credit Suisse Cross Finder Z – NYSE BBSS
Status Code	10	1	alpha	Status code values are as follows: O—Venue is open C—Venue is closed U—Venue is back up D—Venue is down W—Venue is in "Cancels Only" mode

3.3 Account Messages

Account messages inform the customer's application of start-of-day information as well as trades which occur on the account but originated elsewhere (i.e. a trade for which a new order was not sent on this session).

Normally, one start-of-day day-trading buying power message, and for each overnight position, one start-of-day position message, will be sent to the customer's application. If more than one cash or day-trading buying power message, or more than one position message for the same symbol, is sent, then the last one received is meant to replace the previous. For example, if a start-of-day cash message is received with a value of $1,000,000 at 7:30 am, then another start-of-day cash message is received with a value of $1,200,000 at 9:12 am, the later message overrides the former. That is, the customer should assume a cash value of $1,200,000. Each account message is of the form shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	alpha	Account message type values are as follows: P—Start-of-Day Position message D—Start-of-Day Day Trading Buying Power message T—Done-Away Trade message

				K—Broken Done-Away Trade message.
<rest of message>	9	variable		Depends on the account message type.

3.4   Start-of-Day Position Message

A start-of-day position message informs the customer's application of the position in a stock held overnight, as well as the previous day's adjusted closing value for that stock. One message is normally sent for each position held overnight. If more than one message is sent for the same stock, the last one overrides any previous value. Below is the form of a start-of-day position message.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	P	Start-of-Day Position message type
Long/Short Indicator	9	1	alpha	Long/short indicators are as follows: L—Long position S—Short position
Shares	10	6	numeric	Number of shares long or short
Stock Symbol	16	6	alpha	Stock's ticker symbol
Closing Price	22	10	price	Previous trading day's closing price adjusted for any dividends or splits
Account Number	32	10	numeric	Account number for the account this position belongs to. Only applies to gateways with multiple accounts.

3.5   Start-of-Day Day-Trading Buying Power Message

A start-of-day day-trading buying power message informs the customer's application of the initial day-trading buying power for the account as determined by the clearing firm. If more than one of these is sent, the last one overrides any previous value. Below is the form of a start-of-day day-trading buying power message.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	D	Start-of-Day Day-Trading Buying Power message type
Scope	9	1	alpha	S – Stock
Day-Trading Buying Power	10	10	cash	Initial day-trading buying power. See Data Types above for formatting
Account Number	20	10	numeric	Account number for the account this buying power refers to. Only applies to gateways with multiple accounts.

3.6   Done-Away Trade Message

A done-away trade message informs the customer's application of trades executed for the account that have not originated from an order entered with a new order inbound message on this session. Examples include trades done on other execution systems or other Gateway connections, but will be placed into the clearing

account corresponding to this Gateway connection. Each done-away trade is assigned a session unique done-away reference number (DRN) by the Gateway system. This is used, for example, if the done-away trade is later broken to identify the original trade. Do not confuse this reference number with the ORN and ERN used elsewhere in the Gateway. Below is the form of a done-away trade message.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	T	Done-Away Trade message type
Bought/Sold Indicator	9	1	alpha	Bought/sold indicators are as follows: B—Bought S—Sold long T—Sold short
Shares	10	6	numeric	Number of shares traded away
Stock Symbol	16	6		Stock's ticker symbol
Trade Price	22	10	price	The price at which the trade took place.
Done-Away Reference Number	32	9	numeric	The session unique reference number assigned to this done-away trade.
Account Number	41	10	numeric	Account number for the account this doneaway trade belongs to. Only applies to gateways with multiple accounts.

3.7   Broken Done-Away Trade Message

A broken done-away trade message informs the customer's application that a previously sent done-away trade has been broken and will not clear. The done-away reference number is used to identify the original done-away trade that has been broken.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	K	Broken Done-Away Trade message type.
Done-Away Reference Number	9	9	numeric	The done-away reference number as sent with the original done-away trade message.
Account Number	18	10	numeric	Account number for the account the trade that is broken belongs to. Only applies to gateways with multiple accounts.

4 ORDER MESSAGES

Order messages inform the customer's application about any change in status to an order sent with any of the new order messages. Included with each order message is the customer assigned token that was sent with the corresponding new order message. Below is the general form of every order message.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	alpha	Order message type values are as follows: A—Accepted Order message J—Rejected Order message C—Canceled Order message Q— Rejected Cancel message E—Executed Order message B—Broken Trade message
Order Token	9	16	alphanum	Order token as entered on the new order message
<rest of message>	25	variable		Depends on the order message type

4.1 Accepted Order Message

An accepted order message is sent for each order entered with a new order inbound message, but only after it has been acknowledged by the execution venue. For instance, if a new order message is sent destined for NASDAQ, an accepted order message will be sent to the customer's application after it has been acknowledged by NASDAQ, provided, of course, that the order is well formed and valid. Each accepted order is assigned a session unique order reference number (ORN) by the Gateway. Do not confuse this reference number with the ERN and DRN used elsewhere in Gateway. The form of an accepted order message is shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	A	Accepted order message type
Order Token	9	16	numeric	The user unique token for this order
Gateway Order ID	25	9		The session unique id for this order
Venue Code	34	1	alpha	Venue code values are as follows: I—INET/NASDAQ OUCH A —Arca L – Arca with Pegging B—BATS Pegging R—Rash D—Super DOT X—Super DOT/DirectPlus T – BATS Z P – BATS Y H – EDGA G – EDGX O – Boston OUCH Y – NYSE/AMEX Hidden

				C – Credit Suisse Cross Finder
				Z – NYSE BBSS
Buy/Sell Indicator	35	1	alpha	Buy/sell indicators are as follows:
				B—Buy
				S—Sell long
				T—Sell short
Shares	36	6	numeric	Total number of shares for the order
Shares Display	42	6	numeric	Shares to display
Stock Symbol	48	6		Stock's ticker symbol
Price	54	10	price	For Market Orders, this field represents the "Protection Price" field. For ALL OTHER orders, this field represents the limit price.
Discretionary offset	64	5	price	Offset from price
Time-in-Force	69	5	numeric	Number of seconds before the order times out. Three special values are as follows: 0—IOC 99998—Times out at market close of the primary exchange 99999—Good until Island's trading day ends.
Display	74	1	alpha	For NASDAQ/INET Orders. For ALL OTHER ORDERS, this field should contain 'Y'
Venue Data	75	20	alphanum	Data passed through from the venues
Secondary Shares	95	6	numeric or 'RANDOM'	For NASDAQ Reserve and Pegging Orders, this field represents the "Display Shares" field. For ALL OTHER ORDERS, this field should be zero, padded with spaces.
Peg Type	101	1	alpha	For ALL ORDERS, this field should contain an 'N' character.
Refresh Interval	102	1	alphanum	For ALL ORDERS, this field should contain a 'N' character.
MMID	103	4		This field should be space padded with no value.
Account Number	107	10	numeric	Account number for the account the order belongs to. Only applies to gateways with multiple accounts.

4.2   Rejected Order Message

A rejected order message is sent to the customer's application if a new order message cannot be accepted due to run-time problems. The reason for the rejection is given. New order messages that are not well formed due to programming bugs, such as using a previously used token, will be rejected. The token returned on a reject order message cannot be reused. The form of a reject order message is shown below.

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	J	Rejected order message type
Order Token	9	16	alphanum	Order token as entered on the new order message
Reason Code	25	1	alpha	Reason code values are as follows: A—Odd lot to venue C—Destination for order is closed or currently down E—Max order size rule F—Max position size rule G—Rule update in progress I—Price not available J—Short order with long position K—Sell order without long position L—Potential oversell M—Sell shares more than long N—Nonshortable P—Insufficient day-trading buying power R—Protection price U—Marked PnL cutoff rule V—Over selling W—Not well formed, one or more fields are not valid Y—Invalid account number Z—Max order size 3 – ARCA odd lots rule 4—Wash Sale Rule 5 – Clearly erroneous risk check 6—Max BP per stock rule O—Other error
Account Number	26	10	numeric	Account number for the account the order belongs to. Only applies to gateways with multiple accounts.

4.3   Canceled Order Message

A canceled order message informs the customer's application that an order sent with a new order message has been canceled or reduced. This message could be sent in response to a cancel request message or as a result of an order timing out or otherwise deemed no longer live. Note that the shares field is the incremental (not cumulative) number of shares canceled or reduced and that the order may still be live (i.e. not all the shares are canceled.) The form of a canceled order message is shown below.

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	C	Canceled order message type.
Order Token	9	16	alphanum	Order token as entered on the new order

				message.
Shares canceled	25	6	numeric	Incremental number of shares canceled.
Reason Code	31	1	alpha	Reason code values are as follows: U—User requested cancel T—Order was timed out or otherwise no longer valid V—Order became no longer valid for some other reason M—Order was manually canceled outside of the system O – Other reason
Account Number	32	10	numeric	Account number for the account the order belongs to. Only applies to gateways with multiple accounts.

4.4   Rejected Cancel Message

A rejected cancel message is sent to the customer's application if a cancel message cannot be accepted due to run-time problems. The reason for the rejection is given.   NOTE: You will NOT receive this message if the order is filled before the cancel can take effect. You will only receive an Executed Order Message. The form of a Rejected Cancel message is shown below.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	Q	Rejected cancel message type.
Order Token	9	16	alphanum	Order token as entered on the new order message.
Reason Code	25	1	alpha	Reason code values are as follows: L—Token is malformed N—Token unknown C—Destination for order is closed or currently down 0—System error 1—System error 9—System error O—Other reason, usually specific to a Venue
Account Number	26	10	numeric	Account number for the account the order belongs to. Only apply for gateway with multiple accounts.

4.5   Executed Order Message

An executed order message is sent to the customer's application whenever the order is partially or fully executed. Each accepted order is assigned a session unique execution reference number (ERN) by the Gateway. This is used, for example, if the execution is later broken to identify the original trade. Do not confuse this reference number with the ORN and DRN used elsewhere in Gateway. The form of an executed order message is shown below.

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	E	Executed order message type
Order Token	9	16	alphanum	Order token as entered on the new order message
Shares executed	25	6	numeric	Incremental number of shares executed
Execution Price	31	10	price	The price at which the execution occurred
Execution Reference Number	41	9	numeric	The session unique reference number assigned to this execution.
Contra / Executing Firm	50	4		Identifier of the execution's contra exchange or market-maker
Liquidity Flag	54	1	alpha	Liquidity flags are venue pass thrus – valid values can include '1' thru '9' and 'A' thru 'Z'
Venue Data	55	13	alphanum	Data passed through from the venues as follows: I—Island's nine digit Match Number followed by four spaces All others—Thirteen spaces
Order Type	68	1	alpha	Contains the same value as the Venue Code field in the corresponding New Order Message
Venue Code	69	1	alpha	The venue where the trade executed. (Order Type and Venue Code will be the same, unless Order Type = 'J')
Account Number	70	10	numeric	Account number for the account the execution belongs to. Only applies to gateways with multiple accounts.

4.6   Broken Trade Message

A broken trade message is sent to the customer's application when a previous execution is broken. The trade is no longer good and will not clear.

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above
Message Type	8	1	B	Broken Trade message type
Order Token	9	16	alphanum	Order token as entered on the new order message
Execution Number	25	9	numeric	The execution reference number as sent with the original executed order message
Reason Code	34	1	alpha	Reason code values are as follows: E—The trade was deemed clearly erroneous C—The two parties mutually consented to the break O—Some other reason
Account Number	35	10	numeric	Account number for the account the execution belongs to. Only applies to gateways with multiple accounts.

5   INBOUND MESSAGES

Inbound messages are sent from the customer's application to Gateway. These messages are used to send new orders and cancel requests to the market place. They are not guaranteed to be delivered in the case of a dropped TCP/IP connection; however, they may be benignly resent so long as all data in the resent message is identical to the original.

5.1   New Order Messages

New order messages are sent by the customer's application to send an order to any of the supported exchanges or execution systems. The following list includes the currently supported venues.
- INET (NASDAQ) OUCH
- Arca
- Arca with Pegging
- Rash (NASDAQ)
- SuperDOT
- Super DOT/DirectPlus
- NYSE/AMEX Hidden
- BATS Z
- BATS Y
- BATS with Pegging
- EDGA
- EDGX
- Boston OUCH (NASDAQ BX)
- Credit Suisse Cross Finder
- NYSE BBSS

All new order messages include a sixteen-character token, which is assigned by the customer's application but must be unique for each new order sent throughout the entire session. This token is echoed back to the customer's application on all outbound order messages. It is also used to identify an order when sending a cancel request message. The token may be composed of any combination of one or more alphabetic and numeric characters, but not exceeding sixteen. Note that the token is case sensitive.

Each new order message is of the form shown below.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	alpha	Venue code values are as follows: A—Arca B—Bats with Pegging C – Credit Suisse Cross Finder D—SuperDot G – EDGX H – EDGA I—INET/NASDAQ OUCH L – Arca with Pegging O – Boston OUCH/NASDAQ BX

				P – BATS Y
				R—Rash
				T – BATS Z
				X—SuperDot with DirectPlus
				Y – NYSE/AMEX Hidden
				Z – NYSE BBSS
<rest of message>	18	variable		Depends on the venue code

5.2 The INET/NASDAQ OUCH New Order Message

Orders sent to INET/NASDAQ can take advantage of all that Nasdaq has to offer. Below is the message format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier.
Venue Code	17	1	I	INET/NASDAQ venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display
Stock Symbol	31	6		Stock's ticker symbol.
Price	37	10	price	Limit price of the order
Discretionary Offset	47	5	price	Discretionary offset from price (not in use)
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – Opening Cross[1] 99997 – Closing Cross[2] 99998—Times out at market close of the primary exchange 99999—Good until Island's trading day ends
Display Code	57	1	alpha	Display code values are as follows: Y—Anonymous: Price to Display N—Non-displayed P – Post only M – Mid-point Peg I – Imbalance only
Account Number	58	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. Imbalance orders for Opening Cross session cannot be canceled after 9:28AM. A request to cancel the order after this time will be ignored
2. Imbalance orders for Closing Cross session cannot be canceled after 3:40PM. A request to cancel the order after that time will be ignored.

3. After 9:28AM for the opening cross and 3:50PM for the closing cross only imbalance orders that would offset the imbalance will be accepted.
4. Only imbalance-only order types that offset the imbalance (eg. A buy order entered in a stock with a sell imbalance) will be accepted for the opening session after 9:28AM and for the closing cross after 3:50PM

5.3   Arca New Order Message

These messages are used to send orders to be executed and/or posted on Arca. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type.
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	A	Arca venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order 0 – Market
Discretionary Offset	47	5	price	Discretionary offset from price
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99990 – Passive liquidity order (cannot be used with Arca listed securities) 99994 – Opening Cross[1] 99997 – Closing Cross[2] 99998—Times out at market close of the primary exchange 99999—Good until the ARCA trading day ends 90000 – NOW Order
Account Number	57	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. Imbalance orders for Opening Cross session cannot be canceled after 9:28AM. A request to cancel the order after this time will be ignored
2. Imbalance orders for Closing Cross session cannot be canceled after 3:40PM. A request to cancel the order after that time will be ignored.

5.4   Arca with Pegging New Order Message

These messages are used to send orders to be executed and/or posted on Arca. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	L	Arca with pegging venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order (0 to disable)
Discretionary Offset	47	5	price	Discretionary offset from price
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 90000 – NOW Order 99990 – Passive liquidity order (cannot be used with Arca listed securities) 99994 – Opening Cross[1] 99997 – Closing Cross[2] 99998—Times out at market close of the primary exchange, 99999—Good until the Arca trading day ends
Peg Code	57	1	alpha	Blank – no pegging M – Mid-point passive liquidity (must be combined with TIF 99990) P – Market Peg R – Primary Peg
Peg Difference	58	5	price	This value should be non-zero for 'P' Market Pegged orders.
Account Number	63	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. Imbalance orders for Opening Cross session cannot be canceled after 9:28AM. A request to cancel the order after this time will be ignored
2. Imbalance orders for Closing Cross session cannot be canceled after 3:40PM. A request to cancel the order after that time will be ignored.

5.5 NASDAQ Rash New Order Message

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	R	RASH venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows:

				B—Buy
				S—Sell Long,
				T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display(0 to disable)
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	alphaprice	Price
Discretionary Offset	47	5	price	Discretionary offset from price(0 to disable)
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – Opening Cross[1] 99997 – Closing Cross[2] 99998—Times out at market close of the primary exchange 99999—Good until Island's trading day ends
Smart Algorithm	57	4	alpha	Value passed directly through to trading system – http://www.nasdaqtrader.com/content/ProductsServices/Trading/Workstation/rash_strategy.pdf
Display Code	61	1	alpha	Display code values are as follows: Y—Anonymous: Price to Comply N—Non-displayed orders. I – Imbalance Only
Outbound	62	1	alpha	Y – Outbound flags is set N – Outbound flag is not set
Account Number	63	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. Imbalance orders for Opening Cross session cannot be canceled after 9:28AM. A request to cancel the order after this time will be ignored
2. Imbalance orders for Closing Cross session cannot be canceled after 3:40PM. A request to cancel the order after that time will be ignored.
3. After 9:28AM for the opening cross and 3:50PM for the closing cross only imbalance orders that would offset the imbalance will be accepted.
4. Only imbalance-only order types that offset the imbalance (eg. A buy order entered in a stock with a sell imbalance) will be accepted for the opening session after 9:28AM and for the closing cross after 3:50PM.
5. Rash on open and on close orders in addition to having the correct TIF setting will also be required to have the smart algo set to 'INET' and Outbound set to 'N'.

5.6 Super DOT New Order Message

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	D	Super DOT venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long

Name	Offset	Length	Value	Notes
				T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Stock Symbol	25	6		Stock's ticker symbol
Price	31	10	alphaprice	Price
Time-in-Force	41	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – On Open 99996 – Closing Offset 99997 – On Close 99998 or 99999—Times out at market close of the primary exchange
Account Number	46	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. 3:45PM cutoff time for MOC/LOC Order Entry
2. Market on close orders will need to be sent with a price of '0'.
3. As part of NYSE rules surrounding closing offset, orders with TIF value 99996 must be limit orders but can be entered on either side of the market.

5.7 Super DOT with DirectPlus New Order Message

Orders sent to Super DOT can be either market orders or limit orders. In the message format shown below, note the special "alphaprice" data type that can contain a normally formatted price or the string "MKT   " in all upper case, space padded on the right. There are two new flags at the end of the message here to allow the gateway to provide access to DirectPlus orders. This message supercedes the normal SuperDOT new order message.

When trying to send to DirectPlus, there are two limitations that the gateway enforces. First, DirectPlus orders can only be 1099 shares or less. Second, DirectPlus only allows one order per symbol per side per 30 second interval, unless the order gets cancelled. If the gateway finds an order to not be DirectPlus eligible, it can either convert the order to a SuperDOT order or it can immediately reject the order. The choice is left to the black box on a per order basis with the "Super DOT conversion allowed" flag.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	X	Super DOT venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Stock Symbol	25	6		Stock's ticker symbol
Price	31	10	alphaprice	Price
Time-in-Force	41	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – On Open

				99996 – Closing Offset 99997 – On Close 99998 or 99999—Times out at market close of the primary exchange
Use DirectPlus	46	1	alpha	Denotes how the order should be routed to DOT: Y — DirectPlus N — Super DOT
Super DOT Conversion Allowed	47	1	alpha	If the order has Use DirectPlus as a 'Y', but the order is not DirectPlus eligible, then: Y — Converts to SuperDOT N — Rejects the order If DirectPlus is 'N' or if the order is DirectPlus eligible, this flag is ignored.
Account Number	48	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. 3:45PM cutoff time for MOC/LOC Order Entry
2. Market on close orders will need to be sent with a price of '0'.
3. As part of NYSE rules surrounding closing offset, orders with TIF value 99996 must be limit orders but can be entered on either side of the market.

5.8   NYSE/AMEX Hidden New Order Message

Like SuperDOT with Direct Plus, but allows a hidden order. To send a valid hidden order, both Display Code must be set to 'N' and Display Shares must be set to 0. Otherwise, Display Shares > 0 will override Display Code to 'Y'.

Orders sent to Super DOT or AMEX can be either market orders or limit orders. In the message format shown below, note the special "alphaprice" data type that can contain a normally formatted price or the string "MKT " in all upper case, space padded on the right. There are two new flags at the end of the message here to allow the gateway to provide access to DirectPlus orders. This message supercedes the normal SuperDOT new order message.

When trying to send to DirectPlus, there are two limitations that the gateway enforces. First, DirectPlus orders can only be 1099 shares or less. Second, DirectPlus only allows one order per symbol per side per 30 second interval, unless the order gets cancelled. If the gateway finds an order to not be DirectPlus eligible, it can either convert the order to a SuperDOT order or it can immediately reject the order. The choice is left to the black box on a per order basis with the "Super DOT conversion allowed" flag.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	Y	Super DOT venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Stock Symbol	25	6		Stock's ticker symbol
Price	31	10	alphaprice	Price

Time-in-Force	41	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – On Open 99996 – Closing Offset 99997 – On Close 99998 or 99999—Times out at market close of the primary exchange
Use DirectPlus	46	1	alpha	Denotes how the order should be routed to DOT: Y — DirectPlus N — Super DOT
Super DOT Conversion Allowed	47	1	alpha	If the order has Use DirectPlus as a 'Y', but the order is not DirectPlus eligible, then: Y — Converts to SuperDOT N — Rejects the order If DirectPlus is 'N' or if the order is DirectPlus eligible, this flag is ignored.
Display Code	48	1	alpha	Display code values are as follows: Y— Display Shares N—Hidden order Note: for Hidden orders, Display Shares must also be '0', otherwise, Display Shares overrides this fields value.
Display Shares	49	6	numeric	Shares to display (0 if Display Code = 'N' for Hidden Order)
Account Number	55	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. 3:45PM cutoff time for MOC/LOC Order Entry
2. Market on close orders will need to be sent with a price of '0'.
3. As part of NYSE rules surrounding closing offset, orders with TIF value 99996 must be limit orders but can be entered on either side of the market.

5.9   BATS 'Z' New Order Message

These messages are used to send orders to be executed and/or posted on BATS Z Exchange. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	T	BATS venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display (0 to disable)
Stock Symbol	31	6		Stock's ticker symbol

Price	37	10	price	Limit price of the order (0 to disable)
Discretionary Offset	47	5	price	Discretionary offset from price
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0 – IOC 99998—Times out at market close of the primary exchange 99999—Good until BATS's trading day ends (5PM)
Display Code	57	1	alpha	Display code values are as follows: Y—Normally displayed orders, N—Non-displayed orders.
Routing Strategy	58	1	alpha	A – routable to Arca B – BATS 'Z' only C – routable to NSX Blade only D – routable to EDGA G – routable to EDGX J – BATS 'Y' only K – routable to Boston Stock Ex L – routable to LavaFlow M – routable to Chicago Stock Ex N – routable to NASDAQ P – Post Only (reject rather than remove – no IOC) T – routable to TRAC U – routable to AMEX V – routable to DATA W – routable to CBSX X – routable to Philly Stock Ex Y – routable to NYSE Z - routable to NSX first then sweep BATS R- routable to ALL
Account Number	59	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.10   BATS 'Y' New Order Message

These messages are used to send orders to be executed and/or posted on BATS 'Y' Exchange. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	P	BATS Y venue code

Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy, S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display (0 to disable)
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order (0 to disable)
Discretionary Offset	47	5	price	Discretionary offset from price
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0 – IOC 99998—Times out at market close of the primary exchange, 99999—Good until BATS's trading day ends (5PM)
Peg Code	57	1	alpha	Peg code: Blank—not pegged R—Primary Peg P – Market Peg I – Mid-price Peg L – Mid-price Peg (Midpoint Peg that will not match when NBBO locked)
Peg Difference	58	5	price	Peg difference offset
Display Code	63	1	alpha	Display code values are as follows: Y – Normally displayed orders N – Non-displayed orders
Routing Strategy	64	1	alpha	A – routable to Arca B – BATS 'Y' only C – routable to NSX Blade only D – routable to EDGA G – routable to EDGX K – routable to Boston Stock Ex L – routable to LavaFlow M – routable to Chicago Stock Ex N – routable to NASDAQ P – Post Only (reject rather than remove – no IOC) Q – Post Only (remove shares that improve upon limit price and up to MaxRemeovePct of remaining Order QTY at limit price) T – routable to TRAC U – routable to AMEX V – routable to DATA W – routable to CBSX X – routable to Philly Stock Ex Y – routable to NYSE Z – BATS 'Z ' only R – routable to ALL

| Account Number | 65 | 10 | numeric | The account number. Only applies to gateways with multiple accounts. |

5.11 BATS with Pegging New Order Message

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	B	BATS with Pegging venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display (0 to disable)
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order (0 to disable)
Discretionary Offset	47	5	price	Discretionary offset from price
Time-in-Force	52	5	numeric	Number of seconds before the order times out. Special values are as follows: 0 – IOC 99998—Times out at market close of the primary exchange, 99999—Good until BATS's trading day ends (5PM)
Peg code	57	1	alpha	Peg code: Blank – not pegged R – Primary Peg P –Market Peg I – Mid-price Peg L –Mid-price Peg (Midpoint Peg that will not match when NBBO locked)
Peg Difference	58	5	price	Peg difference offset
Display Code	63	1	alpha	Display code values are as follows: Y—Normally displayed orders N—Non-displayed orders
Routing Strategy	64	1	alpha	A – routable to Arca B – BATS 'Z' only C – routable to NSX Blade only D – routable to EDGA G – routable to EDGX J – BATS 'Y' only K – routable to Boston Stock Ex L – routable to LavaFlow M – routable to Chicago Stock Ex

Name	Offset	Length	Value	Notes
				N – routable to NASDAQ
				P – Post Only (reject rather than remove – no IOC)
				T – routable to TRAC
				U – routable to AMEX
				V – routable to DATA
				W – routable to CBSX
				X – routable to Philly Stock Ex
				Y – routable to NYSE
				Z - routable to NSX first then sweep BATS
				R- routable to ALL
Account Number	65	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.12   EDGA New Order Message

These messages are used to send orders to be executed and/or posted on EDGA exchange. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	H	EDGA venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display(0 to disable)
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order
Time-in-Force	47	5	numeric	0 – IOC 99999 – DAY Order
Peg code	52	1	alpha	Peg code: Blank – not pegged R – Primary Peg P –Market Peg I – Mid-price Peg
Peg Difference	53	5	price	Peg difference offset
Display Code	58	1	alpha	Display code values are as follows: Y—Normally displayed orders N—Non-displayed orders
Account Number	59	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.13   EDGX New Order Message

These messages are used to send orders to be executed and/or posted on EDGX exchange. Below is the format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	G	EDGX venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display (0 to disable)
Stock Symbol	31	6		Stock's ticker symbol
Price	37	10	price	Limit price of the order
Time-in-Force	47	5	numeric	0 – IOC 99999 – DAY Order
Peg code	52	1	alpha	Peg code: Blank – not pegged R – Primary Peg P –Market Peg I – Mid-price Peg
Peg Difference	53	5	price	Peg difference offset
Display Code	58	1	alpha	Display code values are as follows: Y—Normally displayed orders N—Non-displayed orders
Routing Strategy	59	4	alpha	EDGX – EDGX only ROUT – external to all ROUX – eligible to be routed to displayed liquidity but not IOI destinations ROUZ – will be routed to IOI destinations but not to displayed liquidity RDOT – if listed order is marketable, eligible to be routed to DOT ROUD – Book + CLC ROUE – Book + CLC + Street ROPA – Book + IOC Arca ROBA – Book + IOC BATS ROBX – Book + IOC BX ROBY – Book + IOC BYX ROUC – Book + CLC + BYX + EDGX MPM + Nasdaq BX + DOT + PSX + Posts to EDGX INET – Book + Nasdaq (CLC – Comprehensive Liquidity Check)
Account Number	63	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.14   The Boston OUCH (NASDAQ BX) New Order Message

These messages are used to send orders to be executed and/or posted on Boston Exchange. Below is the message format for sending these orders.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	O	The Boston Exchange venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Stock Symbol	25	6		Stock's ticker symbol
Price	31	10	price	Limit price of the order
Time-in-Force	41	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99998—Times out at market close of the primary exchange 99999—Good until Island's trading day ends.
Display Code	46	1	alpha	Display code values are as follows: Y—Anonymous: Price to Display N—Non-displayed orders P – Post Only
Account Number	47	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.16   Credit Suisse Cross Finder New Order Message

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	C	Credit Suisse Cross Finder venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Display Shares	25	6	numeric	Shares to display
Stock Symbol	31	16		Stock's ticker symbol
Price	47	10	price	Price

Time-in-Force	57	5	numeric	0 – IOC 99999 – Good until End of trading day
Destination	62	5	alpha	CROS+ – Cross Finder Plus CROS – Cross Finder CHX – Chicago Stock Exchange BSX – Boston Stock Exchange NSX – National Stock Exchange CBOE – Chicago Board Options Exchange
RPI	67	1	alpha	Destination the order is to be sent to (only applicable to CROS and CROS+, all other destination should be left blank): A – Aggressive N – Neutral P – Passive
Account Number	68	10	numeric	The account number. Only applies to gateways with multiple accounts.

5.17   NYSE BBSS New Order Message

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	O	New Order message type
Order Token	1	16	alphanum	Session unique customer assigned order identifier
Venue Code	17	1	Z	NYSE BBSS venue code
Buy/Sell Indicator	18	1	alpha	Buy/sell indicators are as follows: B—Buy S—Sell Long T—Sell Short
Shares	19	6	numeric	Total number of shares for the order
Stock Symbol	25	6		Stock's ticker symbol
Price	31	10	alphaprice	Price
Time-in-Force	41	5	numeric	Number of seconds before the order times out. Special values are as follows: 0—IOC 99994 – On Open 99997 – On Close 99998 or 99999—Times out at market close of the primary exchange
Use DirectPlus	46	1	alpha	Denotes how the order should be routed to DOT: Y — DirectPlus N — Super DOT
Super DOT Conversion Allowed	47	1	alpha	If the order has Use DirectPlus as a 'Y', but the order is not DirectPlus eligible, then: Y — Converts to SuperDOT N — Rejects the order If DirectPlus is 'N' or if the order is DirectPlus eligible, this flag is ignored.

Display Code	48	1	alpha	Display code values are as follows: Y— Display Shares N—Hidden order Note: for Hidden orders, Display Shares must also be '0', otherwise, Display Shares overrides this fields value.
Display Shares	49	6	numeric	Shares to display (0 if Display Code = 'N' for Hidden Order)
BBSS Agency	55	4		Agency Code
Account Number	59	10	numeric	The account number. Only applies to gateways with multiple accounts.

1. 3:45PM cutoff time for MOC/LOC Order Entry
2. Market on close orders will need to be sent with a price of '0'.

6 CANCEL MESSAGES

Cancel messages are used to cancel orders previously entered with a new order message. The token of the original new order message is used to identify which order to cancel. Cancel messages are of the form shown below.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	X	Cancel message type
Order Token	1	16	alphanum	Order token as entered on the new order message
<rest of message>	17	variable		Depends type of cancel message

6.1 Cancel Request Message

Cancel request messages are sent by the customer's application to cancel a live order. The format of a cancel request message is shown below.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	X	Cancel message type
Order Token	1	16	alphanum	Order token as entered on the new order message
Shares	17	6	numeric	Any value implies canceling the entire order
Account Number	23	10	numeric	The account number. Only applies to gateways with multiple accounts.

6.2 SuperDOT/INET Cancel Replace Message

Cancel Replace messages are sent by the customer's application to alter either the shares or limit price of a live order. Note that the shares field is interpreted as the new intended size of the order. The format of a cancel replace message is shown below.

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	R	Cancel Replace message type
Order Token	1	16	alphanum	Order token for the new order
Reference Order Token	17	16	alphanum	Order token of the order to be replaced
Shares	33	6	numeric	The number of shares for the replaced order
Limit Price	39	10	price	The limit price for the replaced order
Account Number	49	10	numeric	The account number. Only applies to gateways with multiple accounts.

6.3   INET Cancel Replace Message with TIF and Display Code

Customer Application to Server

Name	Offset	Length	Value	Notes
Message Type	0	1	U	INET Cancel Replace message type
Order Token	1	16	alphanum	Order token for the new order
Reference Order Token	17	16	alphanum	Order token of the order to be replaced
Shares	33	6	numeric	The number of shares for the replaced order
Limit Price	39	10	price	The limit price for the replaced order
Time-in-Force	49	5	numeric	Number of seconds before the order times out. Five special values are as follows: 0—IOC 99994 – Opening Cross 99997 – Closing Cross 99998—Times out at market close of the primary exchange 99999—Good until Island's trading day ends
Display Code	54	1	alpha	Display code values are as follows: Y—Anonymous: Price to Display N—Non-displayed P – Post only M – Mid-point Peg I – Imbalance only
Account Number	55	10	numeric	The account number. Only applies to gateways with multiple accounts.

7 QUERY MESSAGE

7.1 Query Request Packet

The query Request message allows the client to query the server for current state

Server to Customer Application

Name	Offset	Length	Value	Notes
Packet Type	0	1	I	Query Request Packet
Query Type	1	1	alpha	P – Open Position(s)
Query ID	2	10	alphanum	Identifier for this query
Stock Symbol	12	6	alpha	Stock's ticker symbol or '*' for all
Account Number	18	10	numeric	Account number this query refers to or '0' for all
Terminating Linefeed	28	1	Linefeed Character	ASCII 10 decimal, 0x0A hex

7.2 Query Response Message

A query response message is sent in response to an earlier query by the client.

Server to Customer Application

Name	Offset	Length	Value	Notes
Timestamp	0	8	timestamp	See Data Types above.
Message Type	8	1	I	Query Response
Query Type	9	1	alphanum	P – Open Positions
Query ID	10	10	alpha	Query ID supplied by requestor
More	20	6	numeric	Number of responses still to follow
Long/Short Indicator	26	1	alpha	Long/Short Indicators are as follows: L – Long Position S – Short Position
Shares	27	6	numeric	Number of Shares
Stock Symbol	33	6		Stock's ticker symbol
Account Number	39	10	numeric	Account number this position belongs to

Appendix A - SoupTCP Version 2.00

1. Overview

SoupTCP is a lightweight point-to-point protocol, built on top of TCP/IP sockets that allow delivery of a set of sequenced messages from a server to a client in real-time. SoupTCP guarantees that the client receives each message generated by the server in sequence, even across underlying TCP/IP socket connection failures. SoupTCP clients can send messages to the server. These messages are not sequenced and may be lost in the case of a TCP/IP socket failure. SoupTCP is ideal for systems where a server needs to deliver a logical stream of sequenced messages to a client in real-time but does not require the same level of guarantees for client generated messages either because the data stream is unidirectional or because the server application generates higher-level sequenced acknowledgments for any important client-generated messages. SoupTCP is designed to be used in conjunction with higher lever protocols that specify the contents of the messages that SoupTCP messages deliver. The SoupTCP protocol layer is opaque to the higher-level messages, except that the messages carried by SoupTCP may not include the ASCII linefeed character and must be at least 1 byte long. SoupTCP also includes a simple scheme that allows the server to authenticate the client on login.

1.1 SoupTCP Logical Packets

The SoupTCP client and server communicate by exchanging a series of logical packets. Each SoupTCP logical packet has: **A.** a single byte header which indicates the packet type **B.** a variable length payload **C.** a terminating linefeed character (ASCII 10 decimal, 0x0A hex).

Packet Type	Variable-length payload	Terminating line feed character

SoupTCP Logical Packet Structure

Notes: The SoupTCP logical packets do not necessarily map directly to physical packets on the underlying network socket; they may be broken apart or aggregated by the TCP/IP stack. The SoupTCP protocol does not define a maximum payload length. The payload may not contain the line feed character.

1.2 Protocol Flow

A SoupTCP connection begins with the client opening a TCP/IP socket to the server and sending a Login Request Packet. If the login request is valid, the server responds with a Login Accepted Packet and begins sending Sequenced Data Packets. The connection continues until the TCP/IP socket is broken. Each Sequenced Data Packet carries a single higher-level protocol message. Sequenced Data Packets do not contain an explicit sequence number; instead both client and server compute the sequence number locally by counting messages as they go. The sequence number of the first sequenced message in each session is always 1. Typically, when initially logging into a server the client will set the Requested Sequence Number field to 1 and leave the Requested Session field blank in the Login Request Packet. The client will then inspect the Login Accepted Packet to determine the currently active session. Starting at 1, the client begins incrementing its local sequence number each time a Sequenced Data Packet is received. If the TCP/IP connection is ever broken, the client can then re-log into the server indicating the current session and its next expected sequence number. By doing this, the client is guaranteed to always receive every sequenced

message in order, despite TCP/IP connection failures. SoupTCP also permits the client to send messages to the server using Subsequence Data Packets at any time after the Login Accepted Packet is received. These messages may be lost during TCP/IP socket connection failures.

1.3 Heartbeats

SoupTCP uses logical heartbeat packets to quickly detect link failures. The server must send a Server Heartbeat packet anytime more than 1 second has past since the server last sent any data. This ensures that the client will receive data on a regular basis. If the client does not receive anything (neither data nor heartbeats) for an extended period of time, it can assume that the link is down and attempt to reconnect using a new TCP/IP socket. Similarly, once logged in, the client must send a Client Heartbeat packet anytime more than 1 second has past since the client last sent anything. If the server doesn't receive anything from the client for an extended period of time (typically 10 seconds), it can close the existing socket and listen for a new connection.

1.4 End of Session Marker

The server indicates that the current session has terminated by sending a Sequenced Data Packet containing a zero length message in the payload. This indicates that there will be no more messages contained in this session.   The client will have to reconnect and re-login with a new Session ID to begin receiving messages for the next available session.

1.5 Data Types

Character data fields are standard ASCII bytes. Numeric fields use ASCII digits and are padded on the left with spaces.

2. SoupTCP Packet Types

2.1 Debug Packet

A debug packet can be sent by either side of a SoupTCP connection at anytime. Debug packets are intended to provide human readable text that may aid in debugging problems. Debug Packets should be ignored by both client and server application software.
Debug Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	+	Debug Packet
Terminating Linefeed	Text Len+1	1	Linefeed Character	ASCII 10 decimal 0x0A hex

2.2 Logical Packets Sent by a SoupTCP Server

2.2.1 Login Accepted Packet
The SoupTCP server sends a Login Accepted Packet in response to receiving a valid Login Request from the client. This packet will always be the first non-debug packet sent by the server after a successful login request.

Login Accepted Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	A	Login Accepted Packet
Session	1	10	alphanum	The session ID of the session that is now logged into. Left padded with spaces
Sequence Number	11	10	numeric	The sequence number of the next Sequenced Message to be sent. Left padded with spaces
Terminating Linefeed	21	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.2.2 Login Rejected Packet
The SoupTCP server sends this packet in response to an invalid Login Request Packet from the client. The server closes the socket connection after sending the Login Reject Packet. The Login Rejected Packet will be the only non-debug packet sent by the server in the case of an unsuccessful login attempt.

Login Reject Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	J	Login Rejected Packet
Rejection Reason Code	1	1	alpha	See Login Reject Codes below.
Terminating Linefeed	2	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

Login Reject Codes

Code	Explanation
A	Not Authorized. There was an invalid username and password combination in the Login Request Message.
S	Session not available. The request session in the Login Request Packet was either invalid or not available

2.2.3 Sequenced Data Packet

The Sequenced Data Packets act as an envelope to carry the actual sequenced data messages that are transferred from the server to the client. Each Sequenced Data Packet carries one message from the higher-lever protocol. The sequence number of each message is implied; the initial sequence number of the first Sequenced Data Packet for a given TCP/IP connection is specified in the Login Accepted Packet and the sequence number increments by 1 for each Sequenced Data Packet transmitted. Since SoupTCP logical packets are carried via TCP/IP sockets, the only way logical packets can be lost is in the event of a TCP/IP socket connection failure. In this case, the client can reconnect to the server and request the next expect sequence number and pick up where it left off.

Sequence Data Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	S	Sequenced Data Packed
Message	1	Variable	alphanum	Defined by a higher-level protocol, but must not contain any embedded linefeeds. A Message with zero length is a special End of Session marker that indicated that there are no more messages available in this session.
Terminating Linefeed	Payload Len+1	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.2.4 Server Heartbeat Packet

The server should send a Server Heartbeat Packet anytime more than 1 second passes where no data has been sent to the client. The client can then assume that the link is lost if it does not receive anything for an extended period of time.

Server Heartbeat Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	H	Server Heartbeat Packet
Terminating Linefeed	1	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.3 Logical Packets Sent by the SoupTCP Client

2.3.1a Login Request Packet – Full replay

The SoupTCP client must send a Login Request Packet immediately upon establishing a new TCP/IP socket connection to the server. Client and server must have mutually agreed upon the username and password fields. They provide simple authentication to prevent a client from inadvertently connecting to the wrong server. Both Username and Password are case-insensitive and should be padded on the right with spaces. The server can terminate an incoming TCP/IP socket if it does not receive a Login Request Packet within a reasonable period of time (typically 30 seconds).

Login Request Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	L	Login Request Packet
Username	1	6	alphanum	Username
Password	7	10	alphanum	Password
Requested Session	17	10	alphanum	Specifies the session the client would like to log into, or all blanks to log into the currently active session.
Requested Sequence Number	27	10	numeric	Specifies the next sequence number the client wants to receive upon connection, or 0 to start receiving the most recently generated message.
Terminating Linefeed	37	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.3.1b Login Request Packet – Executions only

The SoupTCP client must send a Login Request Packet immediately upon establishing a new TCP/IP socket connection to the server. Client and server must have mutually agreed upon the username and password fields. They provide simple authentication to prevent a client from inadvertently connecting to the wrong server. Both Username and Password are case-insensitive and should be padded on the right with spaces. The server can terminate an incoming TCP/IP socket if it does not receive a Login Request Packet within a reasonable period of time (typically 30 seconds).

Login Request Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	l	Login Request Packet
Username	1	6	alphanum	Username
Password	7	10	alphanum	Password
Requested Session	17	10	alphanum	Specifies the session the client would like to log into, or all blanks to log into the currently active session.
Requested Sequence Number	27	10	numeric	Specifies the next sequence number the client wants to receive upon connection, or 0 to start receiving the most recently generated message.
Terminating Linefeed	37	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.3.2 Subsequence Data Packets

The Unsequenced Data Packets act as an envelope to carry the actual data messages that are transferred from the client to the server. These messages are not sequenced and may be lost in the event of a socket failure. The higher-level protocol must be able to handle these lost messages in the case of a TCP/IP socket connection failure.

Unsequenced Data Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	U	Unsequenced Data Packed
Message	1	Variable	alphanum	Defined by a higher-level protocol, but must not contain any embedded linefeeds.
Terminating Linefeed	Payload Len+1	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.3.3 Client Heartbeat Packets

The client should send a Client Heartbeat Packet anytime more than 1 second passes where no data has been sent to the server. The server can then assume that the link is lost if it does not receive anything for an extended period of time.

Client Heartbeat Packets

Name	Offset	Len	Value	Notes
Packet Type	0	1	R	Client Heartbeat Packet
Terminating Linefeed	1	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

2.3.4 Logout Request Packet

The client may send a Logout Request Packet to request the connection be terminated. Upon receiving a Logout Request Packet, the server will immediately terminate the connection and close the associated TCP/IP socket.

Logout Request Packet

Name	Offset	Len	Value	Notes
Packet Type	0	1	O	Logout Request Packet
Terminating Linefeed	1	1	Linefeed Character	ASCII 10 decimal, 0x0A hex.

Revision History

Version	Date	Changes Made
1.00	March 2002	Initial document
1.01	March 22, 2002	Added Rejected Cancel message Modified "Outbound Messages" section to include the Rejected Cancel message
1.01.1	April 1, 2002	Added the justification sentence for the timestamp field.
1.01.2	April 23, 2002	Added the MMID field for Market Orders and SelectNet Message in the Executed Order Message.
1.01.3	April 25, 2002	Added 'W' to venue status types, for "Cancels Only" mode
1.01.4	April 25, 2002	Added 'O' as possible reason for Rejected Cancel
1.01.5	April 29, 2002	Changed the Message Type field for a Start of Day Cash Message from a 'C' to an 'H'
1.01.6	May 2, 2002	Removed minimum size field from Island New Order Message Added Time In Force field to SuperDOT New Order Message
1.01.7	May 3, 2002	Added the following fields to Execution Message: Contra / Executing Firm Liquidity Flag This data was previously contained in the Venue Data field. The Venue Data field was shortened from 20 to 15 spaces. Venue Data field will no longer contain contra or liquidity information.
1.01.8	June 3, 2002	Added system-error reject codes to Rejected Order Message, and Rejected Cancel Message.
1.01.9	June 21, 2002	Fixed bug in Venue Status Codes, changed a 'W' to an 'X'.
1.2	June 24, 2002	Rewrote Accepted Order Message to contain all information about the order, instead of just confirming an order reference id.
1.2.1	July 24, 2002	Removed 'M' as a possible venue for Venue Status messages. Minor grammar corrections.
1.3	August 14, 2002	Altered the Executed Order Message. Added the Order Type and Venue Code fields, and reduced the size of the Venue Data field.
1.3.1	July 8, 2003	Added two new venues – 'Z' supermontage with TIF and 'X' super DOT with DirectPlus.
1.3.2	September 11, 2003	Added reject code for order rejected message.
1.3.3	September 18, 2003	Added new "venue" – 'L' for Bullet Order. Made all changes that took effect with HUBB changing to the Schonfeld systems.
1.3.4	December 9, 2003	Removed all Bullet Orders (Venue 'L')
1.4.0	December 10, 2003	Supports multiple accounts. Added an optional Account Number field for gateway with multiple accounts.
1.5.0	March 31, 2004	Add new order type for REDEZ
1.5.1	May 18, 2004	Add 'O' as Cancel Reason code.
2.0.0	June 29, 2004	New fields added to order accept, Isld, Inca, Arca, Brut, Btrd and Soes w/ tif, removed soes message. Move mmid field from Selectnet to tif soes

		order.
2.0.1	August 17, 2004	Added Futures order.
2.0.2	September 7, 2004	Added field 'Scope' in the BuyingPower message.
2.0.3	December 14, 2004	Changed format for price field
2.0.4	May 6, 2005	Removed Redez order type, replaced with RASH
2.0.5	August 18, 2005	Add NITE as venue and new order message
2.0.6	December 27, 2005	Add OPG and MOC order capability for SuperDOT new order types
2.0.7	March 15, 2006	- Added System Status message to indicate when Liquidate Only mode has gone into effect - Update Rash message for Display and Outbound fields - Update reject codes for Exceed Throttle and Rash Algo Block
2.0.8	May 15, 2006	Add Amex new order message
2.0.9	February 16, 2007	Add BATS and EDGX order messages
2.0.10	February 22, 2007	Cleanup out of date information and remove no longer supported order types. Add Soup Tcp appendix A
2.0.11	April 10, 2007	Updates for BATS/EDGA/EDGX
2.0.11	April 26, 2007	Pass Rash algo through to trading system
2.0.12	August 28, 2007	Add price to comply/display attributes to display field in Inet and Rash new order messages
2.0.12	August 28, 2007	Add Arca w/Pegging new order message
2.0.12	August 28, 2007	Add SuperDot Cancel/Replace message
2.0.13	December 17, 2007	Add Sigma X new order message Correct Peg Codes – only P/R supported
2.0.14	July 2, 2008	Add support for Opening Cross order to INET
2.0.15	March 16, 2009	Add support for Boston (as part of Nasdaq)
2.0.16	April 8, 2009	Fixed errors in NYSE and NITE new order message layout. Added Table Of Contents.
2.0.17	April 9, 2009	Change Boston OUCH venue code from 'S' to 'O'
2.0.18	June 12, 2009	New TIF for OUCH – Closing Cross. New TIF for RASH – Opening Cross and Closing Cross.
2.0.19	June 22, 2009	Modified BATS TIF - added extended market hours option
2.0.20	July 31, 2009	Modified BATS Routing Strategy - added "Dark Scan" ExecInst.
2.0.21	February 17, 2011	Added MOC/LOC support NYSE Closing Offset Mid-Point Pegging – BATS, Arca, EDGX, Ouch

		Arca Passive Liquidity Fixed errors in grammar/order types.
2.0.22	June 6, 2011	Added NYSE MOC/LOC support through Jefferies new order message Added BATS Y new order message Added AMEX support for NYSE Hidden order message Added INET cancel replace support to SuperDOT cancel replace message. Added INET Cancel Replace message for TIF and Display Code. Updated Venue Codes, Reason codes Updated TIF support for BATS Z
2.0.23	February 1, 2012	Added Credit Suisse Cross Finder order message Added NYSE BBSS order message 'l' login request – only passes back execution as opposed to full replay with 'L'
2.0.23a	February 17, 2012	Added Table of Contents Added Query Request and Query Response Packets