PDQ ATS, Inc.
Liquidity Seekers Guide

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1. Introduction

PDQ ATS offers subscribers a way to receive better prices and deeper liquidity for their orders. Subscribers' orders are paused for 20 ms at PDQ and then either matched and sent to a TRF, sent on to another market center, returned to the subscriber, or held and managed at PDQ (See section on Managed Orders) During these 20 ms computerized algorithms are given an opportunity to respond to these orders. These algorithms are running on the secure servers managed by PDQ to insure the confidentiality of the order. In this document we refer to liquidity seeking customers that initiate an order to us thru FIX as Liquidity Seekers and the parties behind the computerized algorithms as Liquidity Providers (LP's). The algorithms the LP's run at PDQ are referred to as Liquidity Provider Procedures (LPP's).

2. PDQ ATS

Subscribers send their orders to PDQ via FIX 4.2 protocol. A Liquidity Seeker sends order management commands (new order, order cancel request, order replace request) through our Order Router's FIX session and receives back order state updates (new order, cancel and replace requests, acknowledgements and rejects, trade reports).

PDQ will maintain connections with several market places. If an order is not filled at PDQ it is routed on to another market center. The subscriber selects their default destination in the connectivity agreement. Subscribers may direct individual orders to one of these market centers by utilizing FIX tag 100 in their NewOrder message.

2.1 PDQ FIX Interface

2.1.1 Introduction

This section describes the subset of the FIX 4.2 Protocol that is used by PDQ.

This document assumes that the reader understands FIX protocol available at http://www.fixprotocol.org/. This document is not intended as a guide to constructing a FIX client. Rather, it is a checklist to ensure that a Liquidity Seeker FIX client, constructed according to the FIX 4.2 specifications, will be compatible with the PDQ FIX implementation on the ambiguous details of the FIX specification.

2.2.2 FIX Session Protocol

The FIX Session Protocol is responsible for providing reliable, ordered transport of FIX Application messages.

All messages sent by a Liquidity Seeker must have a SenderCompID that is agreed upon in advance with PDQ. All messages sent from the PDQ Router to Liquidity Seeker will have a SenderCompID set to "PDQ," and the TargetCompID agreed upon in advance with the Liquidity Seeker.

FIX Messages in use

Only the following FIX Session messages may be sent to PDQ FIX Host:

- Sequence Reset
- Logon
- Logout
- Heartbeat
- Test Request
- Resend Request
- Reject

Only the following FIX Application messages may be sent to PDQ FIX Host:

- Order Single
- Order Cancel Request
- Order Cancel Replace

Any other messages sent to the PDQ Order Router will be ignored.

PDQ will reply to Liquidity Seeker Applications with:

- Execution Report
- Order Cancel Reject

Sequencing and Reconnecting

PDQ resets inbound and outbound sequence numbers to 1 each evening while closed.

Logon

The logon message must be the first message a Liquidity Seeker sends after establishing a TCP connection on the port agreed upon with PDQ. Liquidity Seeker must wait until a Logon message has been sent before sending other messages and beginning gap fill operations.

Logout

It is the Liquidity Seekers responsibility to log out at the end of each trading day. Prior to logout the Liquidity Seeker must verify, that there are no live orders, otherwise the Liquidity Seeker may miss trade reports. PDQ may also initiate logout.

The party initiating logout must be the party that breaks the TCP connection. This requirement allows for both sides to issue a Resend Request, should the logout or its reply arrive with a sequence gap. If Liquidity Seeker receives a logout with a sequence gap, as per the FIX 4.2 protocol specification, the Liquidity Seeker should issue a Resend Request and then its own logout.

Heartbeat and Test Request

The PDQ Order Router will use the heartbeat interval specified by the client in the Logon message to determine if the client is alive and the networks connecting Liquidity Seeker to PDQ are functional. A value of 0 will disable this check, and the PDQ Order Router will neither send test requests nor break the connection if the client becomes idle. We recommend a heartbeat interval of 30 seconds. A value too small will waste bandwidth, and a value too large will defeat the purpose of the heartbeat. After HeartBtInt + 2 seconds of inactivity, the PDQ Order Router will send a Test Request to determine if the firm is still active. After 2 * HeartBtInt + 4 seconds of inactivity, the PDQ Order Router will send a logout and immediately drop the connection. PDQ expects that Liquidity Seeker will use a similar method to determine if the PDQ Order Router is active.

Resend Request

If a Liquidity Seeker receives a Resend Request with a sequence gap, it is critical that Liquidity Seeker resends the appropriate messages first before sending its own Resend Request.

The FIX protocol specification defines two methods to recover from gaps in messages. For example, should Liquidity Seeker receive messages 1-10, then 15, one method would be to request 11-14 and then process 15. Another method is to cause discarding message 15, and request messages 11-999999. PDQ will resend all messages with sequence numbers greater than or equal to 11. Note that this example refers to the general case; the FIX protocol specification outlines more specific recovery behavior for certain out of sequence administrative messages.

Reject
We recommend a Liquidity Seeker avoids using the Reject message. As per the FIX specification, any message a Liquidity Seeker rejects will not be resent. A Liquidity Seeker should keep a record of which messages the PDQ FIX engine rejects, and never resend them. PDQ will send a reject (MsgType=3) in the event that Liquidity Seeker has sent a properly formatted message, but a data field (stock symbol for example) is not populated with a proper value.

Sequence Reset
It is required that a Sequence Reset – Gap Fill occurs in sequence. For instance, if resending 10-15, and 11-14 are Administrative messages other than Reject, the client should resend 10, then 11 should be a Sequence Reset – Gap Fill, with a NewSeqNum of 15, and then resend 15. As per the specification, all the messages sent in reply to a Resend Request must be flagged PossDupe. PDQ assumes that the Sequence Reset – Gap Fill itself must be flagged PossDupe as well.

2.2.3 FIX Application Protocol

This section describes FIX Application messages used by a Liquidity Seeker and the PDQ Router.

Only the following FIX Messages may be sent to and received from PDQ:

FIX Message	PDQ Semantic
Messages sent to PDQ by Liquidity Seeker	
New Order Single (MsgType="D")	New Order
Order Cancel Request (MsgType="F")	Request to cancel the order
Order Cancel/Replace Request (MsgType="G")	request to replace an order with a new one
Messages sent by PDQ to LP	
Execution Report (MsgType='8')	Order Acknowledgement, Order Rejected, Order Canceled, Order Replaced, Fill
Order Cancel Reject (MsgType="9")	Order Cancel and Order Cancel/Replace Request Reject

2.2.3.1 New Order

New order is submitted to PDQ system via FIX 4.2 New Order – Single message (MsgType="D"). In addition to requirements for the standard FIX 4.2 message header, only the following fields are used by the application layer for a New Order message. All other fields specified in the message are ignored. Specific tags for each destination are shown is separate sections.

Tag	Field	Description	Required	Values
52	SendingTime	This value must be within 60 seconds of the current time, or PDQ FIX Router will reject the order.	Y	Time in UTC format. YYYYMMDD-hh:mm:ss
11	ClOrdID	This field contains the ID assigned to the order by Liquidity Seeker. It is critical that this ID is unique for all orders sent in a given day. Otherwise PDQ router sends an Execution Report with ExecType, OrdStatus = Rejected, and OrdRejReason = Duplicate Order (6).	Y	Liquidity Seeker Defined text field <=30 characters
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid Stock Symbol
54	Side	Order side indication	Y	1=Buy 2=Sell 5=Sell Short Client affirms ability to borrow (Default)
114	LocateReqd	Optional, only processed for Sell Short	N	N=client affirms ability to borrow Y=client does not affirm ability to borrow (will be rejected)
38	OrderQty	Indicates order quantity.	Y	Numeric
44	Price	Indicates price on order, submitted by PDQ on Liquidity Seeker behalf	Y	Numeric
40	OrdType	Indicates order type of order. Only Market and Limit Orders should be sent to PDQ.	Y	1=Market 2=Limit P=Pegged (only allowed with Managed orders)
18	ExecInst	Indicates type of Pegged order at PDQ Required for pegged	N	R = Primary Peg (Peg buy to nbbo bid, sell to nbbo

		managed orders at PDQ. i.e. if 59=A & 40=P 18 must be present and = R, P or M		offer) P = Market Peg. (Peg Buy to nbbo Offer, Sell to nbbo bid) M=Midpoint Peg
110	MinQty	Minimum Quantity – Only used for Pegged Managed Orders	N	Min Execution size.
60	TransactTime	Transaction Time	Y	Time specified in UTC time. YYYYMMDD-hh-mm-ss
167	SecurityType	Indicates type of Security. Only Common Stocks are supported at this time.	Y	CS-Common Stock
1	Account	Liquidity Seekers account at its clearing firm	N	16 Characters or less.
47	Rule80A	Order capacity.	Y	A=Agency P=Principal R=Riskless
59	TimeInForce	Specifies for how long order remains in effect	Y	0 = Day 1 = GTC 3 = IOC All 5=GTX (Bats Only) 8 = Fill or Kill at PDQ 9 = IOC Plus A = PDQ Managed Algorithm B = IOC at PDQ Please see notes below.
100	ExDestination	Specifies order destination – Forwarded to exchange	N	= 'PDQ' default – if not present See 2.3 Order Routing Destinations below

115	OnBehalfOfCompId	Identifies end-client in service bureau connections to PDQ.	N	Valid NSCC MPID
Bats Specific tags				
18	ExecInst	Bats Execution Instructions	N	Only values: f, v,w, and z will be passed on to BATS. Orders with other values will be rejected.
111	MaxFloor	Portion of OrderQty to Display. The balance is reserve	N	Number >= 0
9479	DisplayIndicator	See BATS Specification	N	Valid BATS values
9303	RoutingInst	See BATS Specification		Valid BATS values
Direct Edge Specific tags				
111	MaxFloor	See Direct Edge Specification	N	>=0
9140	DisplayInstruction	See Direct Edge Specification	N	Y=Display N=Hidden
9206	ExtHrsEligible	SeeDirect Edge Specification	N	Next Edge appropriate value
9400	RoutStrategy	See Direct Edge Specification	N	Next Edge appropriate value
Arca Specific tags				
18	ExecInstructions	See Arca Specification	N	1,5,6 only.
111	MaxFloor	Used for Reserve Orders see Arca Specification	N	Valid Arca values

388	DiscretionInst	See Arca Specification	N	Valid Arca values
389	DiscretionOffset	See Arca Specification	N	-9999.99-9999.99
386	NoTrading Sessions	The number of instances of TradingSessionID values following.	N	1-3 – Must come before 336 Tags
336	TradingSessionId	Indicates Trading session order is designated for	N	P1=Pre Open P2=Core P3=PostMarket
8020	Display Range	Used for Random Reserve Orders to indicate the display range	N	0-999,999
8021	Passive Discretion	Set to indicate that a discretionary order should not route away from NYSE Arca	N	0

Order routing behavior for allowed TimeInForce field values:

Day
An order with TimeInForce set to "Day"(0) will be filled by LPP's, PDQ's Dark Partners, and then routed to an endpoint Exchange if still not completely filled.

Fill or Kill at PDQ
An order with TimeInForce set to "PDQ Fill or Kill"(8) will be filled in its entirety by LPP's at PDQ or else canceled and returned to the subscriber

IOC All
An order with TimeInForce set to "IOC All"(3) will be filled or partially filled by LPP's at PDQ, its Dark Partners, and the destination Exchange.

IOC Plus
An order with TimeInForce set to "IOC Plus"(9) will be filled or partially filled by LPP's at PDQ and it's Dark Partners.

IOC at PDQ
An order with TimeInForce set to "B" – IOC at PDQ will be filled or partially filled by LPP's at PDQ.

PDQ Managed Algorithm
An order with TimeInForce set to "PDQ Managed Algorithm"(A) is filled or partially filled by LPP's at PDQ. If the order is not completely filled, it is held in a Managed

Algorithm Server. The Managed Algorithm Server attempts to fill the order by responding to Request for Trades generated by subsequent liquidity seeking orders.

2.2.3.2 Order Cancel Request

In order to cancel an order, a Liquidity Seeker sends Order Cancel Request (MsgType="F"). Only the following fields are used by the application layer for an Order Cancel Request message in addition to the requirements for the standard FIX 4.2 message header. Any other fields specified in the message are ignored.

Tag	Field	Description	Required	Values
60	TransactTime	Transaction Time	Y	Time specified in UTC time. YYYYMMDD-hh-mm-ss
41	OrigClOrdID	This field contains the ClOrdID of the order to be canceled.	Y	Liquidity Seeker Defined text field <=30 characters
11	ClOrdID	This field contains the ID assigned to the Cancel Request by the Liquidity Seeker.	Y	Liquidity Seeker Defined text field <=30 characters
55	Symbol	This field must contain a valid symbol in upper case lettering.	Y	Valid stock symbol
54	Side	This value must match the order's side.	Y	1=Buy 2=Sell 5=Sell Short
115	OnBehalfOfCompId	Identifies end-client on messages to PDQ. Must be allowed NSCC MPID.	N	

2.2.3.3 Order Cancel/Replace Request

In order to replace an order, a Liquidity Seeker sends an Order Cancel/Replace Request (MsgType="G"). Only the following fields are used by the application layer for an Order Cancel Request message in addition to the requirements for the standard FIX 4.2 message header. Any other fields specified in the message are ignored.

Tag	Field	Description	Required	Values

60	TransactTime	Transaction Time	Y	Time specified in UTC time. YYYYMMDD-hh-mm-ss
41	OrigClOrdID	This field contains the ClOrdID of the order to be replaced.	Y	Liquidity Seeker Defined text field <=30 characters
11	ClOrdID	This field contains the ID assigned to the Cancel/Replace Request by Liquidity Seeker.	Y	Liquidity Seeker Defined text field <=30 characters
55	Symbol	This field must contain a valid symbol in upper case lettering.	Y	Valid stock symbol
54	Side	This value must match the order's side.	Y	1=Buy 2=Sell 5=Sell Short
38	OrderQty	This field can contain a new Order quantity.	N	Numeric
44	Price	This field can contain a new order price.	N	Numeric
167	SecurityType	Indicates type of Security. Only Common Stocks are supported at this moment.	Y	CS-Common Stock
1	Account	Liquidity Seeker's clearing account.	Y	Clearing firm supplied.
47	Rule80A	Order capacity.	Y	Contact PDQ for detail information.
59	TimeInForce	Specifies for how long order remains in effect.	Y	0 = Day 8=PDQ Fill or Kill 9=PDQ Immediate or Cancel Please see notes in New Order Section.
115	OnBehalfOfCompId	Identifies end-client on messages to PDQ. Must be allowed NSCC MPID.	N	

2.2.3.3 Execution Report – Order Acknowledgement

PDQ indicates acceptance of a new order by sending an Execution Report (MsgType="8") with tag<150> ExecType and tag <39> OrdStatus set to "0". Only the following fields will be sent in addition to the requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the order being acknowledged.	Y	Liquidity Seeker specified up to 30 characters
37	OrderId	OrderId assigned by PDQ.	Y	Numerical
17	ExecId	Execution Id assigned by PDQ.	Y	Numerical
39	OrdStatus	Indicates status of order.	Y	0=New
150	ExecType	Indicates type of a message.	Y	0=New
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid stock symbol
60	TransactTime	Indicates time of transaction.	Y	Time specified in UTC time. YYYYMMDD-hh-mm-ss
128	DeliverToCompID	Returns OnBehalfOf tag value on order	N	Valid NSCC MPID

2.2.3.4 Execution Report – Order Reject

If PDQ Router should reject a new Order it sends Execution Report (MsgType="8") with tag <150> ExecType and tag <39> OrdStatus set to "8". Only the following fields will be sent in addition to the requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the order being rejected	Y	Liquidity Seeker specified up to 30 characters
37	OrderId	OrderId assigned by PDQ	Y	Numerical
17	ExecId	Execution Id assigned by PDQ	Y	Numerical

39	OrdStatus	Indicates status of order.	Y	8= Rejected
150	ExecType	Indicates type of a message.	Y	8=Rejected
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid stock symbol
60	TransactTime	Indicates time of transaction.	Y	Time specified in UTC time. Yyyymmdd-HH-MM-SS
103	OrdRejReason	Code to identify reason for order rejection.	Y	2 = Exchange closed 6 = Duplicate Order
128	DeliverToCompID	Returns OnBehalfOf tag value on order	N	Valid NSCC MPID
58	Text	Description of the reason for the reject.	N	

2.2.3.5 Execution Report – Fill and Partial Fill

When order submitted by Liquidity Seeker is filled, PDQ Router sends Execution Report (MsgType=”8”) with tag <150> ExecType and tag <39> OrdStatus set to “2”. Only the following fields will be sent in addition to requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the order being filled.	Y	Liquidity Seeker specified up to 30 characters
37	OrderId	OrderId assigned by PDQ.	Y	Numerical
17	ExecId	Execution Id assigned by PDQ.	Y	Numerical
39	OrdStatus	Indicates status of order.	Y	2=Filled
150	ExecType	Indicates type of a message.	Y	8=Rejected
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid stock symbol
60	TransactTime	Indicates time of transaction	Y	Time specified in UTC time. YYYYMMDD-hh-mm-ss
44	Price	Indicates price on order, submitted by PDQ on	Y	Numeric

		Liquidity Seeker behalf		
30	LastMkt	Contra Side/Displayed Market Destination Present for trades.	N	PDQX, BATS, or other displayed market
31	LastPx	Indicates price of fill	Y	Numeric
32	LastShares	Indicates quantity of fill	Y	Numeric
14	CumQty	Indicates total quantity of fills on open order	Y	Numeric
6	AvgPx	Indicates Average Price of fills on order	Y	Numeric
151	LeavesQty	Indicates open shares remaining on order	Y	Numeric
9621	AccessFee	Access Fee for this Fill	Y	Up to five decimal places. Negative for a rebate.
128	DeliverToCompID	Returns OnBehalfOf tag value on order	N	Valid NSCC MPID

2.2.3.6 Execution Report – Cancel Acknowledgement

PDQ Router acknowledges Order Cancel Request by sending Execution Report (MsgType="8") with tag <150> ExecType and tag <39> OrdStatus set to "4". Only the following fields will be sent in addition to the requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the cancel request being acknowledged	Y	Liquidity Seeker specified up to 30 characters
41	OrigClOrdID	This field contains the ClOrdID of the canceled order	Y	Liquidity Seeker Defined text field <=30 characters
37	OrderId	OrderId of canceled order assigned by PDQ	Y	Numerical
17	ExecId	Execution Id assigned by PDQ	Y	Numerical

39	OrdStatus	Indicates status of order.	Y	4=Cancelled
150	ExecType	Indicates type of a message.	Y	4=Cancelled
55	Symbol	This field must contain a valid symbol in upper case lettering.	Y	Valid stock symbol
60	TransactTime	Indicates time of transaction	Y	Time specified in UTC time. YYYYYMMDD-hh-mm-ss
128	DeliverToCompID	Returns OnBehalfOf tag value on order	N	Valid NSCC MPID

2.2.3.7 Execution Report – Cancel Replace Acknowledgement

PDQ Router acknowledges Order Cancel/Replace Request by sending Execution Report (MsgType="8") with tag <150> ExecType and tag <39> OrdStatus set to "5". Only the following fields will be sent in addition to the requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the cancel request being acknowledged	Y	Liquidity Seeker specified up to 30 characters
41	OrigClOrdID	This field contains the ClOrdID of the canceled order	Y	Liquidity Seeker Defined text field <=30 characters
37	OrderId	OrderId of canceled order assigned by PDQ	Y	Numerical
17	ExecId	Execution Id assigned by PDQ	Y	Numerical
39	OrdStatus	Indicates status of order.	Y	5=Replaced
150	ExecType	Indicates type of a message.	Y	5=Replaced
55	Symbol	This field must contain a valid symbol in upper case lettering.	Y	Valid stock symbol
44	Price	Indicates a new order price.	Y	Numeric
54	Side	Order side indication	Y	1=Buy 2=Sell 5=Sell Short
38	OrderQty	Indicates new order quantity.	Y	Numeric

40	OrdType	Indicates order type of order.	Y	1=Market 2=Limit
60	TransactTime	Indicates time of transaction.	Y	Time specified in UTC time. YYYYYMMDD-hh-mm-ss
128	DeliverToCompID	Returns OnBehalfOf tag value on order	Y	Valid NSCC MPID

2.2.3.8 Order Cancel/Order Cancel Replace Reject

If PDQ Order Router should reject a new Order Cancel Request or Order Cancel/Replace, it sends Order Cancel Reject (MsgType="F") to Liquidity Seeker. Only the following fields will be sent in addition to the requirements for the standard FIX 4.2 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	This field contains ClOrdID of the cancel request being rejected	Y	User specified up to 30 characters
41	OrigClOrdID	This field contains the ClOrdID of the order that had to be canceled or replaced	Y	Liquidity Seeker Defined text field <=30 characters
434	CxlRejResponseTo	Identifies the type of request that a Cancel Reject is in response to.	Y	1 - Order Cancel Request 2-Order Cancel/Replace Request
102	CxlRejReason	Code to identify reason for cancel rejection	Y	0=To Late to Cancel 1 = Unknown order 3 = Order already in Pending Cancel or Pending Replace status 6=Duplicate ClOrdId
	Text	Description of the rejection reason	N	

2.2.4 Automatic Order Cancellation on Disconnect

At the Liquidity Seeker request, the PDQ FIX Host can be configured to automatically cancel all outstanding Orders when a Liquidity Seeker application disconnects from the PDQ Order Router.

This feature is intended to help a Liquidity Seeker in emergency situations. Liquidity Seeker should not rely upon automatic cancellation feature as a normal business practice.

2.3 Order Routing Destinations

Tag <100> is optional. If set to "PDQ" or absent, PDQ will forward Liquidity Seeking orders not matched at PDQ thru our dark partners and then on to the default market center pre-arranged with the subscriber.

Destinations accessible thru PDQ:

Tag 100 value	Destination
ARCA	ARCA
BATS	BATS
EDGA	Direct Edge EDGA
EDGX	Direct Edge EDGX
Other values for custom routing agreed upon between PDQ and subscriber	*Destination agreed upon*