



PDQ ATS

Liquidity Provider Interface

Specification v1.46

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NEW YORK
51 E 42ND ST, SUITE 700
NEW YORK, NY 10017
T – 212.343.9410
F – 212.343.9403

CHICAGO
2624 Patriot Blvd.
GLENVIEW, IL 60026
T – 224.521.2700
F – 224.521.2720

1. Liquidity Provider to PDQ Communication

Liquidity Providers may select from two alternatives for trading at PDQ. They may receive IOIs of liquidity seeking orders which contain Symbol, Size, Side and Price, or they may receive IOIs that contain only the Symbol. Upon receipt of either IOI type Liquidity Providers have 20 milliseconds (ms) to respond with an order and any executable contra side orders will match at PDQ with the liquidity seeking order on a “first-to-respond first-to-match” basis.

Liquidity Providers (LPs) choosing to receive the full IOI containing Symbol, Size, Side, and Price will co-locate their automated trading strategies on their own computers inside the PDQ facility and behind the PDQ firewall. The LP sends information to their computers at PDQ using one or more TCP/IP channels. To prevent signaling out of PDQ only certain pre-defined messages, whose content may not vary, are permitted to be sent back thru these channels. A TCP/IP message filtering firewall is used to enforce this policy. The LP needs to specify to PDQ in advance the content of these messages. By maintaining anonymity throughout the execution process and preventing the possibility of order information leakage, the likelihood of Liquidity Seekers (LSs) sending additional order flow to PDQ will be increased. Outside of the trading day, additional ports will automatically be opened for the LP to access his computer. An additional and separate FIX connection is provided to the LP location outside of PDQ for receiving fills for trades done at PDQ. The LP’s server at PDQ responding to IOI’s also receives fills for the IOI’s it has responded to. These fill messages are described in the Execution Report – Fill and Partial Fill section below.

Liquidity Providers choosing to respond to symbol-only IOIs do so with either a single limit order or multiple limit orders on one or both sides (buy and sell). LPs receiving symbol-only IOIs have the option to co-locate, but are not required to do so. Symbol-only LPs can connect to PDQ via a cross-connect, dedicated leased line, VPN or a financial extranet.

LP orders are all IOC by nature of the PDQ platform except for responses to FOK orders which have up to 20ms to match. When responding to FOK orders if the order is not matched within 20ms it is cancelled.

With the exception of IOI information content and connectivity the LP specification is the same for both IOI types.

2. FIX IOI Based Request for Trade Interface

This section describes the implementation of the subset of FIX 4.4 Protocol that is used by PDQ for Order, IOI, and Fill management.

This document assumes that the reader understands the FIX 4.4 protocol [2] 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 LP's FIX client, constructed according to the FIX 4.4 specifications, will be compatible with the PDQ FIX on the ambiguous details of the FIX specification.

2.1 FIX Session Protocol

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

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

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

Any other messages sent to the PDQ FIX Host will be ignored.

PDQ will send the following messages to Liquidity Providers Applications:

- Indication of Interest
- Execution Report
- Order Cancel Reject

Sequencing and Reconnecting

PDQ resets inbound and outbound numbers to 1 before the start of the trading day. Liquidity Provider clients should logout from their FIX session at the end of the trading day.

Logon

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

Logout

It is the LP's responsibility to log out of their FIX session at the end of each trading day before midnight EST. PDQ may also initiate logout. The party initiating the 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 LP receives a logout with a sequence gap, as per the FIX 4.4 protocol specification, LP should issue a Resend Request and then its own logout.

Heartbeat and Test Request

PDQ will use the heartbeat interval specified by the client in the Logon message to determine if the client is alive and the networks connecting LP to PDQ are functional. A value of 0 will disable this check, and the PDQ Host 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 Host will send a Test Request to determine if the firm is still active. After $2 * \text{HeartBtInt} + 4$ seconds of inactivity, the PDQ Host will send a logout and immediately drop the connection. PDQ expects that LP will use a similar method to determine if the PDQ Order Book Host is active.

Resend Request

If LP receives a Resend Request with a sequence gap, it is critical that LP 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 LP receive messages 1-10, and then 15, one method would be to request 11-14 and then process 15. Another method is to discard 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 LP avoids using the Reject message. As per the FIX specification, any message LP rejects will not be resent. A LP should keep a record of which messages the PDQ FIX Host rejects, and never resend them. PDQ will send a reject (MsgType=3) in

the event that LP 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 FIX Application Protocol

This section describes FIX Application messages used by LP and PDQ Reference Book. Only the following FIX Messages may be sent to and received from PDQ:

FIX Message	PDQ Semantic
<i>Messages sent to PDQ by LP</i>	
New Order Single (MsgType="D")	Reference Order Contra Side Order (CSO – IOI response)
Order Cancel Request (MsgType="F")	Reference Order Cancel Request, request to remove LP's interest in a particular symbol
<i>Messages sent by PDQ to LP</i>	
Indications of Interest (MsgType=6)	Indications of Interest is used to notify LP about the buying or selling interest
Execution Report (MsgType='8')	Reference Order Acknowledgement, Reference Order Rejected, Reference Order Canceled, Fill
Order Cancel Reject (MsgType="9")	Reference Order Cancel Request Reject

2.2.1 Reference Order – Subscriber to PDQ

PDQ utilizes FIX New Order – Single message (MsgType="D") to allow LP to enter a Reference Order into the system. A LP needs to send a Reference Order to PDQ for each symbol it wishes to receive IOI's for. In addition to requirements for the standard FIX 4.4 message header, only the following fields are used by the application layer for a Reference Order message. All other fields specified in the message are ignored.

Tag	Field	Description	Required	Values
52	SendingTime	This value must be within 60 seconds of the current time, or PDQ FIX Host will reject the order.	Y	Time in UTC format. YYYYMMDD-HH:MM:SS
11	CIOrdID	This field contains the ID assigned to the reference order by LP. It is critical that this ID is unique for all orders sent in a given day. Otherwise PDQ host sends an Execution Report with ExecType, OrdStatus = Rejected, and OrdRejReason = Duplicate Order (6).	Y	LP Defined text field <=20 characters
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid stock symbol
54	Side	Only Buy, Sell. This field is not currently in use.	Y	1=Buy 2=Sell
38	OrderQty	Indicates order quantity. This field is not currently in use.	Y	Numeric
40	OrdType	Indicates order type of order.	Y	R=Reference Order
60	TransactTime	Transaction Time	Y	Time in UTC format. YYYYMMDD-HH:MM:SS

2.2.2 Reference Order Cancel Request – Subscriber to PDQ

In order to cancel Reference Order and remove the LP's interest in a particular symbol, LP sends Reference Order Cancel Request (MsgType="F"). Only the following fields are used by the application layer for a Reference Order Cancel Request message in addition to the requirements for the standard FIX 4.4 message header. Any other fields specified in the message are ignored.

Tag	Field	Description	Required	Values
60	TransactTime	Transaction Time	Y	Time in UTC format. YYYYMMDD- HH:MM:SS
41	OrigClOrdID	This field contains the ClOrdID of the reference order to be canceled.	Y	LP Defined text field <=20 characters
11	ClOrdID	This field contains the ID assigned to the Cancel Request by LP.	Y	LP Defined text field <=20 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 This field is not in use.	Y	1=Buy 2=Sell
38	OrderQty	This value must match the order's original volume. This field is not in use.	Y	Numeric

2.2.3 New Order – Single – Subscriber to PDQ

PDQ utilizes FIX New Order – Single message (MsgType="D") to respond to an IOI message. In addition to requirements for the standard FIX 4.4 message header, only the following fields are used by the application layer for a New Order - Single message. All other fields specified in the message are ignored.

Tag	Field	Description	Required	Values
52	SendingTime	This value must be within 60 seconds of the current time, or PDQ FIX Host will reject the order.	Y	Time in UTC format. YYYYMMDD- HH:MM:SS
11	ClOrdID	This field contains the ID assigned to the new order by LP. It is critical that this ID is unique for all orders sent in a given day. Otherwise PDQ host sends an Execution Report with ExecType, OrdStatus = Rejected, and	Y	LP Defined text field <=20 characters

		OrdRejReason = Duplicate Order (6).		
23	IOIID	Indication of Interest ID this order is responding to	Y	
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	Valid stock symbol
65	SymbolSfx	Valid Symbol Suffix. Do not send if no symbol suffix in IOI	N	
44	Price	Limit Price. (order rejected if priced finer than the minimum trading increment for the stock)	Y	
54	Side	Side of order	Y	1=Buy 2=Sell 5=Sell Short 6=Sell Short Exempt
38	OrderQty	Number of shares.	Y	Numeric
40	OrdType	Only Limit orders are allowed from LP	Y	2=Limit
60	TransactTime	Transaction Time	Y	Time in UTC format. YYYYMMDD- HH:MM:SS

2.2.4.1 Indication of Interest – IOI - PDQ to Subscriber (full IOI)

PDQ sends Indication of Interest (Message Type = 6) to a Liquidity Provider when a Liquidity Seeking order is received. Liquidity Providers should respond with a New Order Single (Message Type = “D”) when responding.

Tag	Field	Values	Required	Description
35	MessageType	6	Y	Contained in standard header
23	IOIID		Y	Alphanumeric Identifier of IOI message. Unique within a trading day
28	IOITransType	N	Y	Identifies IOI message transaction type – Always N=New at PDQ
21	HandInst	1	Y	Private automatically executed order

25	IOIQltyInd	H	Y	All PDQ IOI's are High quality IOI's representing live orders ready to be executed
44	Price		N	Price per share for IOI. Field is not present in market orders.
38	OrderQty		Y	Number of shares
54	Side	1=Buy 2=Sell	Y	Side of order
55	Symbol		Y	Ticker Symbol
65	SymbolSfx		N	Valid symbol Suffix (preferred etc.)
40	OrdType	1=Market 2=Limit	Y	Order type
59	TimeInForce	3=IOC	Y	All IOI's at PDQ are IOC
110	MinQty		Y	Minimum quantity of an order to be executed. Orders below this quantity or not divisible by it are rejected (round lot rule)
167	SecurityType	CS=Common Stock	Y	Indicates type of security.
9621	AccessFee		Y	Per share rebate or fee for this order. Negative for a rebate.

2.2.4.2 Indication of Interest – IOI - PDQ to Subscriber (symbol-only IOI)

PDQ sends Indication of Interest (Message Type = 6) to a Liquidity Provider when a Liquidity Seeking order is received. Liquidity Providers should respond with a New Order Single (Message Type = “D”) when responding.

Tag	Field	Values	Required	Description
35	MessageType	6	Y	Contained in standard header
23	IOIID		Y	Alphanumeric Identifier of IOI message. Unique within a trading day
28	IOITransType	N	Y	Identifies IOI message transaction type – Always N=New at PDQ
21	HandInst	1	Y	Private automatically executed order
25	IOIQltyInd	H	Y	All PDQ IOIs are High quality IOIs representing live orders ready to be executed
55	Symbol		Y	Ticker Symbol
65	SymbolSfx		N	Valid symbol Suffix (preferred etc.)

59	TimeInForce	3=IOC	Y	All IOIs at PDQ are IOC
167	SecurityType	CS=Common Stock	Y	Indicates type of security.

2.2.5 Execution Report – Cancel Acknowledgement - PDQ to Subscriber

PDQ Reference Order Book acknowledges Reference 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 4.4 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	ClOrdID Client Order ID this report is for	Y	User specified up to 20 characters
41	OrigClOrdID	This field contains the ClOrdID of the canceled order	Y	LP Defined text field <=20 characters
37	OrderId	OrderId of canceled reference 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	Describes type of execution report	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 on ack or fill	Y	Time in UTC format. YYYYMMDD- HH:MM:SS

2.2.6 Order Cancel Reject - PDQ to Subscriber

If PDQ Reference Order Book should reject a new Reference Order Cancel Request, it sends Order Cancel Reject (MsgType="F") to LP. Only the following fields will be sent in addition to the requirements for the standard FIX 4.4 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	ClOrdID that identifies Order Cancel Request	Y	User specified up to 20 characters

41	OrigClOrdID	This field contains the ClOrdID of the canceled order	Y	LP Defined text field <=20 characters
434	CxlRejResponseTo	Identifies the type of request that a Cancel Reject is in response to.	Y	1 - Order Cancel Request
102	CxlRejReason	Code to identify reason for cancel rejection	Y	1 = Unknown order
58	Text	Description of the rejection reason	N	

2.2.7 Execution Report -- Reference Order Acknowledgement - PDQ to Subscriber

PDQ indicates acceptance of a new Reference order by sending 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 4.4 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	ClOrdID Client Order ID of the order being acknowledged.	Y	User specified up to 20 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	Describes type of execution report	Y	0=New
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	
60	TransactTime	Indicates time of transaction on ack or fill	Y	Time in UTC format. YYYYMMDD- HH:MM:SS

2.2.8 Execution Report --Reference Order Reject - PDQ to Subscriber

If PDQ Reference Order Book should reject a new Reference 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 4.4 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	ClOrdID Client Order ID of the order being Rejected	Y	User specified up to 20 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	Describes type of execution report	Y	8=Rejected
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	
60	TransactTime	Indicates time of transaction on ack or fill	Y	Time in UTC format. YYYYMMDD-HH:MM:SS
103	OrdRejReason	Code to identify reason for order rejection.	Y	
58	Text	Description of the reject reason	N	

2.2.9 Execution Report – Fill and Partial Fill - PDQ to Subscriber

When order submitted on by an LP is filled or partially filled, PDQ sends an Execution Report (MsgType="8"). Only the following fields will be sent in addition to requirements for the standard FIX 4.4 message header.

Tag	Field Name	Description	Required	Values
11	ClOrdID	ClOrdID Client Order ID of the order being filled	Y	User specified up to 20 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	1=Partial 2=Filled
150	ExecType	Describes type of execution report	Y	F=Trade
55	Symbol	This field must contain a valid security symbol in upper case lettering.	Y	
60	TransactTime	Indicates time of transaction on ack or fill	Y	Time in UTC format. YYYYMMDD-HH:MM:SS
44	Price	Indicates price on order, submitted by LP to PDQ	Y	Numeric
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	Total Rebate or Fee for this trade. This is the per share AccessFee * Fill quantity	Y	Negative for a rebate

2.3 Cancel order request and cancel/replace order request.

PDQ system doesn't support a cancel order request and a cancel/replace order request. These requests will be rejected.

2.4 Automatic Reference Order Cancellation on Disconnect

By default, the PDQ FIX Host will automatically cancel all Reference Orders when LP application disconnects from PDQ FIX Host.

2.5 Procedure sequence diagram

